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NCI TOBACCO CONTROL
MONOGRAPH SERIES

21

# The Economics of Tobacco and Tobacco Control

IN COLLABORATION WITH
WORLD HEALTH ORGANIZATION

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### Recently Published Monographs

*Phenotypes and Endophenotypes: Foundations for Genetic Studies of Nicotine Use and Dependence.* Tobacco Control Monograph No. 20. NIH Publication No. 09-6366, August 2009.

*The Role of the Media in Promoting and Reducing Tobacco Use.* Tobacco Control Monograph No. 19. NIH Publication No. 07-6242, August 2008.

*Greater than the Sum: Systems Thinking in Tobacco Control.* Tobacco Control Monograph No. 18. NIH Publication No. 06-6085, May 2007.

*Evaluating ASSIST: A Blueprint for Understanding State-level Tobacco Control.* Tobacco Control Monograph No. 17. NIH Publication No. 06-6058, October 2006.

## Contents

## Section 3—Price Determinants of Demand



## Section 4—Non-Price Determinants of Demand

## Section 5—Policy and Other Influences on the Supply of Tobacco Products

## Section 7—Global Implications of Tobacco Control

# Figures and Tables

## Figures

## Tables

## Preface: National Cancer Institute

For more than 25 years, the National Cancer Institute's Tobacco Control Monograph series has provided timely, authoritative summaries on a wide variety of issues in tobacco use and health. These topics have included: the role of the clinician in addressing tobacco use, the health effects of exposure to secondhand smoke, the health hazards of cigars, the risks associated with smoking "low-tar" cigarettes, the impact of tobacco control policies, and the role of the media in both promoting and reducing tobacco use. These monographs have served as formal reviews of the evidence for scientists and the general public, and their findings are often used and cited by policymakers in the United States and abroad.

This monograph, the 21st volume in the series, represents a partnership between the National Cancer Institute and the World Health Organization (WHO). We are grateful for the work of numerous distinguished researchers who served as editors, chapter authors, and reviewers. It is especially fitting to publish this monograph in 2016, marking the fifth anniversary of the NCI Center for Global Health. The Center was created to reduce the global cancer burden by creating sustainable international partnerships, supporting research and scientific training, and disseminating information on best practices for cancer prevention and control.[1] By disseminating the latest science and best practices on the economics of tobacco and tobacco control, this monograph makes an important contribution to the Center's goals.

Research to address the tobacco epidemic is important because tobacco use accounts for about six million deaths worldwide every year, including one in every five cancer deaths. As explained by Dr. Harold Varmus, former NCI Director, and Dr. Harpal Kumar, CEO of Cancer Research UK, "with respect to modifiable risk factors for cancer, there is a consensus that tobacco use remains, by far, the most important at a global level."[2,p.3] Indeed, the International Agency for Cancer Research (IARC)[3] has identified 15 cancer types or subtypes for which tobacco is a known risk factor, and lung cancer—largely caused by tobacco use—is the leading cause of cancer death in men worldwide. At the global level, an estimated 41% of men and 9% of women (age ≥15 years) smoke cigarettes, including *nearly half of all men* (48%) who reside in low- and middle-income countries (LMICs). Indeed, of the 800 million adult men who currently smoke cigarettes, more than 80% live in LMICs, foreshadowing grave consequences for health in these countries. Use of smokeless tobacco also conveys a major cancer burden. More than 300 million men and women in at least 70 countries currently use smokeless tobacco, putting themselves at increased risk for oral, esophageal, and pancreatic cancer.[4]

This monograph addresses a topic of increasing urgency for global cancer control efforts: the economics of tobacco and tobacco control. NCI has supported and conducted a wide range of research related to tobacco use and health for over half a century; research on economic aspects of tobacco control has been an important part of our research agenda and will continue to be important for making further progress. More than 20 years ago, NCI commissioned an expert panel to review the evidence on the impact of cigarette excise taxes on smoking among children and adults. The resulting report[5] was part of an emerging body of research that demonstrated a robust relationship between price, including tobacco tax increases, and cigarette consumption. Additionally, when the American Stop Smoking Intervention Study for Cancer Prevention (ASSIST)[6] was launched in 1991 through a public/private partnership between NCI and the American Cancer Society, higher tobacco taxes were one of the four policy changes the partnership focused on (along with eliminating exposure to secondhand smoke, limiting tobacco advertising and promotions, and reducing youth access to tobacco products). During the ASSIST project, 12 of the 17 ASSIST states raised tobacco taxes, and the capacity the project helped

build in tobacco control and research dissemination facilitated a number of states to pass further tobacco tax increases.[6]

As this volume makes clear, economic methods and concepts play an important role across a wide variety of domains in tobacco control research, from understanding the structure of the tobacco product market, to evaluating the effectiveness and cost-effectiveness of tobacco control policies, to estimating the costs of tobacco-related disease and mortality. And economic arguments are often used—and misused—by the tobacco industry and its allies to pose objections to effective tobacco control policy interventions.

A key aim of this volume has been to highlight the tremendous public health burden posed by tobacco use worldwide and the potential for evidence-based interventions to reduce tobacco-related morbidity and mortality. The monograph builds on previous literature, especially the World Bank's seminal report *Curbing the Epidemic* (1999)[7] and the companion book *Tobacco Control in Developing Countries,* [8] and provides the most comprehensive examination to date of global tobacco control efforts from an economic perspective since the 2003 adoption of the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC).[9]

This volume includes data from many low- and middle-income countries (LMICs), where the tobacco control landscape has been undergoing rapid change. Including data on LMICs is an especially important contribution because only limited data for these countries were available when *Curbing the Epidemic* and *Tobacco Control in Developing Countries* were published.

The evidence described in this monograph provides support for many important conclusions, some of which we highlight here. The health and economic burden of tobacco use is already enormous and is increasingly borne by LMICs. At the same time, the market power of tobacco companies has increased, posing new challenges for public health. Although a range of evidence-based policy and program interventions have been shown to be effective for controlling tobacco use and the resulting health and economic costs, these strategies are not yet fully used by countries around the world, including the United States. Tobacco control interventions are highly cost-effective, and much evidence demonstrates that they do not harm economies. Tobacco control efforts can reduce the disproportionate burden that tobacco use imposes on the poor, thereby reducing the often wide disparities in health outcomes between rich and poor. Perhaps most important, this monograph provides reason for hope: *progress is being made in controlling the global tobacco control epidemic*. Indeed, in most world regions and country income groups, the prevalence of tobacco use is remaining constant or falling.

This volume also identifies areas where ongoing research and surveillance are needed, including the complex relationship between tobacco use and poverty, effective strategies to control illicit trade in tobacco, and economically viable alternatives to tobacco growing and manufacturing. But research alone cannot solve this problem. To ensure that evidence is effectively translated into practice, more and diverse stakeholders are needed. For example, given the evidence described in this monograph on the impact of tobacco use on economic development in LMICs, international development organizations have a stake in successful tobacco control. Since 2014, NCI has partnered with the United States Agency for International Development to support tobacco control research projects in the context of development goals through the Partnerships for Enhanced Engagement in Research program.[10]

This is an especially important time to invest in research to support global tobacco control research. It is a time of rapid change characterized by implementation of innovative tobacco control interventions in response to the WHO FCTC, widespread use of new technologies and mass media channels, introduction of new tobacco products, and diverse political and economic developments. In addition, the tobacco industry has responded to successes in tobacco control by taking aggressive new actions designed to weaken or eliminate effective tobacco control efforts—for example, by mounting legal challenges that take advantage of trade and investment agreements.

The World Health Assembly has called on governments to reduce the prevalence of tobacco use by 30% by 2025,[11] which would prevent more than 200 million deaths from tobacco during the remainder of the century. Cancer research funders such as the NCI can make an important contribution to this goal by continuing to support research and research capacity building for tobacco control. We can also put forth the message that—despite the need for continued research—effective tools exist to curtail the global tobacco epidemic. As this monograph appropriately concludes, "Government fears that tobacco control will have an adverse economic impact are not justified by the evidence. The science is clear; the time for action is now."

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## Preface: World Health Organization

Globally, approximately six million people a year die from diseases caused by tobacco use, including 600,000 from exposure to secondhand smoke. This is six million too many. Every single death from tobacco is a preventable tragedy.

*The Economics of Tobacco and Tobacco Control*, a collaboration between the World Health Organization and the National Cancer Institute (United States), is an outcome of teamwork among international authors and reviewers from across academia, international organisations, and government. It represents the culmination of many years of research on the economics of tobacco and tobacco control, and is a truly remarkable contribution to what is an important and ever-evolving area of public health. We welcome the publication of such a timely and relevant piece of work in the area of the economics of tobacco and tobacco control.

### Origins of the monograph

The academic background of this work stems from the seminal 1999 World Bank publication *Curbing the Epidemic: Governments and the Economics of Tobacco Control*. It is testament to the weight of this original publication that its fundamental conclusions have stood the test of time. *Curbing the Epidemic* showed that many of the commonly used economic arguments against tobacco control are not supported by evidence, particularly in relation to tobacco taxation. *Curbing the Epidemic* also demonstrated the huge economic losses from tobacco use. *The Economics of Tobacco and Tobacco Control* represents the most comprehensive publication in this area in recent years, and a particular strength is the inclusion of robust data from low- and middle-income countries.

### Advances in tobacco economics and tobacco control

*The Economics of Tobacco and Tobacco Control* highlights progress in a number of areas. Most importantly, the WHO Framework Convention on Tobacco Control (WHO FCTC) has since entered into force in 2005. The only public health treaty under the auspices of WHO, and with 180 Parties to the Convention at the time that this monograph goes to print, the WHO FCTC stands today as one of the United Nations' most widely and rapidly embraced international treaties. It binds parties to commitments to introduce and implement tobacco control policies in key demand and supply reduction areas.

An increasing number of partnerships, from both the public and the private sectors, are supporting tobacco control. In collaboration with Bloomberg Philanthropies, in 2007 WHO launched the MPOWER package of policy measures: the most cost effective and efficient demand reduction articles of the WHO FCTC, designed and packaged to facilitate country-level implementation. WHO estimates that 2.8 billion people worldwide are covered by at least one of these life-saving measures at the highest level of achievement.

At the turn of the millennium, advances in policy such as the introduction of plain packaging seemed little more than a chimera even for the most ardent tobacco control advocates. Today, countries around the world are introducing ever larger graphic health warnings, and countries including Australia and the United Kingdom have introduced plain packaging of tobacco products, with several more countries having announced intention to introduce the legislation.

From New York to Beijing, and from Russia to Madagascar, cities, provinces and countries are adopting smoke-free legislation that prohibits smoking in public places and thereby protects populations from exposure to dangerous secondhand smoke, which currently causes approximately 600,000 deaths per year. In 2008, Beijing hosted the world's first entirely smoke-free summer Olympic Games, and smoke-free sporting events are becoming increasingly common worldwide. Together with measures to increase awareness of the dangers of tobacco such as mass media campaigns, and policies including prohibiting advertising, promotion and sponsorship of tobacco products, and introducing large graphic health warnings on tobacco packets; banning smoking in public places plays an important role in de-normalising tobacco use.

Progress is being made in combating illicit trade, which threatens revenues from tobacco taxation and increases the affordability and accessibility of tobacco. The Protocol to Eliminate Illicit Trade in Tobacco Products, the first Protocol of the WHO FCTC, was adopted on 12 November 2012 at the 5th session of the Conference of the Parties in Seoul, Republic of Korea, and is open for ratification, acceptance, approval or access by the Parties to the WHO FCTC. At the end of 2016, an additional 17 Parties are needed in order for the Protocol to enter into force. The Protocol, which aims to eliminate all forms of illicit trade in tobacco products, will help ensure that the public health impact of higher tobacco taxes is more effective, when implemented comprehensively alongside other tobacco control measures.

The 2015 Addis Ababa Action Agenda, the outcome document of the 3rd International Conference on Financing for Development, recognizes the importance of tobacco taxation as a public health measure in reducing demand for tobacco and saving lives, as well as a mechanism to increase domestic resource mobilisation for development. The Addis Ababa Action Agenda will drive the financing landscape for the Sustainable Development Goals, under the 2030 Agenda for Sustainable Development.

### Challenges to tobacco economics and tobacco control

While progress has been made in global tobacco control, it remains uneven, with a vast majority of developing economies continuing to see increases in tobacco use. *The Economics of Tobacco and Tobacco Control* describes new challenges. The market power of global tobacco companies is increasing and new and emerging tobacco products are posing regulatory challenges.

The tobacco industry continues to work to promote its deadly product, and tobacco industry interference in advancing public health policies is a grim reminder of reality in many countries. The industry continues to devote substantial resources and efforts to employing a range of tactics intended to interfere with the implementation of provisions of the WHO FCTC. In particular, they continue to promote misleading economic arguments against tobacco control, such as the long-peddled argument that increasing taxation on tobacco products will lead to increased illicit trade and lost revenues. More broadly, litigation or the threat of litigation from the tobacco industry against governments can act as a very significant economic deterrent to the introduction of strong tobacco control measures.

The economics of tobacco and tobacco control is a broad and far-reaching discipline that has implications far beyond the realm of public health. Covering topics as broad as the relationship between tobacco use and poverty, licit and illicit trade flows, taxation of tobacco products, and the economic burden of tobacco-inflicted disease, the economics of tobacco control sits at the core of development.

## The road ahead for tobacco economics and tobacco control

The World Health Organization, alongside the Secretariat of the WHO FCTC, works to support Parties to the Convention and Member States of the World Health Assembly in implementing strong and evidence-based tobacco control measures worldwide. The WHO Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020, endorsed by the World Health Assembly, calls for countries to reduce relative prevalence of tobacco use by 30% by 2025. Under Sustainable Development Goal 3, adopted by the United Nations in September 2015, governments are called upon to implement the WHO Framework Convention on Tobacco Control, and to reduce the prevalence of noncommunicable diseases, of which tobacco is a key risk factor, by 2030. Achievement of these internationally agreed goals and targets will not be possible without the mainstreaming of consideration of economic issues into tobacco control, into action to tackle noncommunicable diseases, and more broadly into all areas of health and development.

The fight against tobacco-related disease is far from over.

Now more than ever, we need to work together across nations to implement comprehensive measures for tobacco control. The fate of millions of lives is dependent upon governments worldwide acting decisively to end this global epidemic. We hope that this monograph will provide vital materials and supporting evidence for countries and policy makers who are concerned with tobacco control.

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## Abbreviations

| Abbreviation/Acronym | Definition |
|---|---|
| AFR | African Region |
| AMR | Region of the Americas |
| ATC | American Tobacco Company |
| BAT | British American Tobacco |
| CDC | U.S. Centers for Disease Control and Prevention |
| CNTC | China National Tobacco Corporation |
| DALY | Disability-adjusted-life-year |
| DHHS | U.S. Department of Health and Human Services |
| EMR | Eastern Mediterranean Region |
| ENDS | Electronic nicotine delivery systems |
| EU | European Union |
| EUR | European Region |
| FAO | Food and Agricultural Organization of the United Nations |
| FDA | U.S. Food and Drug Administration |
| FDI | Foreign direct investment |
| GATS | Global Adult Tobacco Survey |
| GYTS | Global Youth Tobacco Survey |
| HICs | High-income countries |
| IARC | International Agency for Research on Cancer |
| ITC | International Tobacco Control Policy Evaluation Project |
| ITG | Imperial Tobacco Group |
| JTI | Japan Tobacco International |
| L&M | Liggett & Myers Tobacco Company |
| LMICs | Low- and middle-income countries |
| MPOWER | M: Monitor tobacco use and prevention policies; P: Protect people from tobacco smoke; O: Offer help to quit tobacco use; W: Warn about the dangers of tobacco; E: Enforce bans on tobacco advertising, promotion and sponsorship; R: Raise taxes on tobacco |
| NCI | U.S. National Cancer Institute |
| PLC | P. Lorillard Company |
| PMI | Philip Morris International |
| PPP | Purchasing Power Parity |
| RJR | R. J. Reynolds Tobacco Company |
| SHS | Secondhand smoke |
| SEAR | South-East Asia Region |
| VAT | Value-added tax |

| Abbreviation/Acronym | Definition |
|---|---|
| WHO | World Health Organization |
| WHO FCTC | World Health Organization Framework Convention on Tobacco Control |

## Glossary

| Term | Definition |
|---|---|
| *Ad valorem* excise tax | A tax levied on selected products based on value, such as retail selling price, the manufacturer's (or ex-factory) price, or the cost insurance freight (CIF) price |
| Affordability | Price relative to per capita income |
| Bootlegging | The purchase of tax-paid tobacco products in a lower tax or price jurisdiction for resale in a higher tax or price jurisdiction |
| Crop substitution | The creation of a strategy portfolio that allows the reduction of dependence on a single crop and reduces instability in the process of reproduction caused by faults in production activities; also referred to as tobacco farming diversification |
| Disability-adjusted life-years (DALY) | A measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability. Calculated as the sum of the years of life lost (YLL) due to premature mortality in the population and the years lost due to disability (YLD) caused by a specific health condition or its consequences |
| Earmarked tax | A tax for which some or all of the revenues generated are allocated to specific expenditure programs; also referred to as dedicated taxes or hypothecated taxes |
| Excise tax | A tax or duty imposed on the sale or production of selected products, such as tobacco products |
| Farm gate price | The price, in local currency, at which the farmer sells tobacco leaf |
| Foreign direct investment (FDI) | An investment whereby an entity residing in one economy ("direct investor") obtains a lasting interest in an entity residing in an economy other than that of the investor ("direct investment enterprise") |
| High-income countries | Countries with a gross national income per capita of US$ 12,736 or more in 2014, as calculated using the World Bank Atlas method |
| High-income OECD countries | Countries that are classified as high income by the World Bank and are members of the Organisation for Economic Co-operation and Development |
| Illicit trade | Any practice or conduct prohibited by law and which relates to production, shipment, receipt, possession, distribution, sale, or purchase, including any practice or conduct intended to facilitate such activity |
| Import duty (or import tax) | A tax imposed on selected imported products, such as tobacco products |
| Income elasticity of demand | The percentage change in consumption resulting from a 1% increase in real (inflation-adjusted) income |
| Low-income countries | Sometimes referred to as developing economies; countries with gross national per capita income of US$ 1,045 or less in 2014, as calculated using the World Bank Atlas method |
| Middle-income countries | Sometimes referred to as developing economies. Lower middle-income countries have gross national income (GNI) of US$ 1,046–$4,125 per capita (2014); upper middle-income countries have per capita GNI of US$ 4,126–$12,735 (2014); as calculated using the World Bank Atlas method |
| Mixed system | A tax that includes both a specific tax component and an *ad valorem* tax component; also referred to as mixed tax or hybrid tax |
| Opportunity cost | A cost measured by reference to the opportunities forgone at the time an asset or resource is used, as distinct from the costs incurred at some time in the past to acquire the asset, or the payments that could be realized by an alternative use of a resource |
| Price elasticity of demand | The percentage change in consumption resulting from a 1% increase in real (inflation-adjusted) price |
| Privatization | The transfer of a business, industry, or service from public to private ownership and control; in the case of the tobacco industry, public ownership often constitutes a monopoly |

| Term | Definition |
|---|---|
| Purchasing power parity (PPP) | An expression of the relationship between the amount of a country's currency that would be required to buy a particular good or service in that country's domestic market to the amount of U.S. dollars that would be required to buy the same good or service in the U.S. market |
| Smuggling | A customs offense consisting of the clandestine movement of goods across a customs frontier in order to evade customs control |
| Specific excise tax | A tax levied on selected products based on quantity, such as number of cigarettes or weight of tobacco |
| Tax avoidance | The use of legal methods to circumvent tobacco taxes, including tax-free purchases and the purchase of tobacco products in other jurisdictions in amounts allowable under customs regulations |
| Tax burden | The sum of all taxes—including general sales taxes, such as a value-added tax—expressed as a percentage of the retail price; also referred to as tax incidence |
| Tax evasion | The use of illegal methods to circumvent tobacco taxes, including the purchase of smuggled and illegally manufactured tobacco products |
| Tiered tax | A tax applied at different rates to different variants of a given product, based on various factors such as price, product characteristics, or production characteristics |
| Trade down | To move from high- to low-priced brands in response to a relative price increase |
| Trade liberalization | The move towards freer trade through the reduction of tariff and other barriers |
| Uniform tax | A tax applied at the same rate to all variants of a given product, such as all cigarette brands and brand variants |
| Value-added tax (VAT) | A tax imposed on a wide variety of products (domestic and imported), based on the value added at each stage of production or distribution |
| Value chain | The full range of activities required to bring a product, such as tobacco, from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), to delivery to final consumers and use |

## Section 1
## Introduction

# Chapter 1
# Overview and Conclusions

# Chapter 1
# Overview and Conclusions

This monograph, a joint effort of the U.S. National Cancer Institute and World Health Organization, examines economic issues in tobacco and tobacco control, including the supply and demand of tobacco products. This first chapter frames the issues addressed in the monograph and describes its organization around key topic areas. Each monograph chapter focuses on the global evidence on these issues, particularly the evidence from low- and middle-income countries (LMICs). The closing sections of this chapter present chapter conclusions and major overall conclusions generated by the work presented here. Experts in economics, tobacco control, public policy, public health, and other related fields from every region in the world, including high-income countries and LMICs, were assembled to provide the research and analyses presented within these pages. It is hoped that this monograph will help inform the implementation of global tobacco control efforts in the 21st century.

## Chapter Contents

## Introduction

Tobacco use remains one of the world's leading causes of preventable premature death. Today it is also a global public health issue which is increasingly seen in economic and geopolitical terms as well as in social, cultural, and biomedical contexts. These factors have played key roles in the current policy interventions for tobacco control worldwide, most notably the World Health Organization (WHO) Framework Convention for Tobacco Control (WHO FCTC).[1]

This monograph is the 21st volume in the series of monographs on tobacco control produced by the National Cancer Institute (NCI) of the National Institutes of Health, an agency of the U.S. Department of Health and Human Services. This monograph examines the economics of global tobacco control and features the contributions of many leading researchers in the field. It examines the current research and evidence base surrounding the economics of tobacco control—including tobacco use, tobacco growing, manufacturing and trade, tobacco product taxes and prices, and tobacco control policies and other interventions to reduce tobacco use and its consequences—and the economic implications of global tobacco control efforts.

This report follows in the steps of a growing literature base on global economic issues in tobacco control. As early as 1992, the U.S. Surgeon General's report *Smoking and Health in the Americas*[2] included a chapter reviewing international data on the economic costs of smoking, the economics of growing and manufacturing, and the impact of tobacco taxes. This was followed by the 1999 World Bank publication *Curbing the Epidemic: Governments and the Economics of Tobacco Control*[3] and the companion volume, *Tobacco Control in Developing Countries*,[4] which contained the background papers produced for the World Bank report.

Why is a global economics monograph of tobacco and tobacco control needed today? There are several reasons, including:

- Extensive new evidence from low- and middle-income countries (LMICs), much of it derived from research supported by international agencies
- New questions raised by emerging political, supply-side, and health concerns
- New infrastructure issues ranging from privatization to trade liberalization
- New global economic concerns about tobacco use and tobacco control.

As the study of the production, distribution, and consumption of goods and services, economics has become integral to understanding and addressing tobacco use. The history of tobacco control has its origins in direct interventions for tobacco use, such as public education and efforts to promote smoking cessation. In the 21st century, however, it is increasingly recognized that the economic and consumer behavioral factors common to all goods are intimately involved in the process of making further reductions in global tobacco use.

Knowledge from specific subdisciplines of economics has led to new ways of controlling the use of addictive consumer goods such as tobacco. As examples: public finance theory has increased understanding of the powerful influence of excise taxation, and the mix of specific and *ad valorem* taxation; the economics of regulation supports arguments for government intervention in tobacco markets; health economics reveals how tobacco demand and cost modeling can drive policy change; labor economics helps address the employment impact of effective tobacco control policies; and

consumer behavioral theories such as the rational choice model of addiction help us understand how pricing and other correlates such as warning labels and product attributes influence consumption. At a global level, international trade principles provide insight into the mechanics of licit and illicit trade in cigarettes.

Specific chapters of this monograph examine these and other areas in detail, aided by global data sources compiled by various stakeholders, such as WHO, the World Bank, the United Nations Food and Agriculture Organization, the Centers for Disease Control and Prevention (an agency of the U.S. Department of Health and Human Services), private organizations, and others.

## WHO FCTC: A Framework for Action

A milestone in the implementation of evidence-based tobacco control interventions has been the entry into force of the legally binding WHO FCTC,[1] which provides a set of actions to reduce demand for, and supply of, tobacco products. The WHO FCTC, which was negotiated between 1999 and 2003[1] and entered into force as international law in February 2005,[5] is an extraordinary public health tool. It is a trend-setting instrument in global, regional, and national tobacco control which has changed the paradigm of health promotion policies. As of November 2015, 179 countries and the European Union were Parties to the WHO FCTC.

The WHO FCTC represents the culmination of years of collaborative, multidisciplinary engagement by governments, elements of civil society, and international organizations to address the tobacco epidemic using international law. It offers a comprehensive set of affordable, evidence-based tobacco control measures that involve many sectors of society and operate in both the demand-reduction and supply-restriction areas. An international instrument for tobacco control policy interventions, the WHO FCTC reflects the gravity of the worldwide tobacco epidemic, the relative weakness of domestic regulatory agencies in most WHO Member States, and the economically driven spread of tobacco marketing strategies at the country level.[6,7] It also reflects the collaboration needed among countries to counteract the globalization of tobacco industry promotional practices with cross-border effects. The transnational nature of the tobacco trade, including trade liberalization and foreign direct investment, tobacco marketing, and the flow of contraband, also points to the need for international regulatory strategies.

Ultimately, the WHO FCTC aims to strengthen tobacco control efforts at the country level by, among other things, facilitating ongoing information-sharing and technical assistance and by creating an international framework through which nations can address the supranational dimensions of tobacco control. A key goal of this monograph is to present the research base for countries implementing the WHO FCTC—to fill the information gap on policy-relevant issues, provide comprehensive global and country-level evidence on the economics of tobacco control, and disseminate information that helps countries build their own tobacco control infrastructure relative to the WHO FCTC.

## Preparation of This Monograph

The NCI, in conjunction with WHO, invited three experts representing the domains of economics, public health, and tobacco control to serve as the editors of this monograph. This ambitious effort included contributions from more than 60 authors selected for their individual and collective expertise. These authors are based or work in all major world regions, with an emphasis on LMICs, which have traditionally been underrepresented in tobacco control economics research.

This monograph was subjected to a rigorous review process, which began with a review of the monograph outline. As each chapter was drafted, the chapter was reviewed by many peer reviewers with expertise on the individual topic. When the entire volume was complete, the full draft was submitted to expert reviewers who evaluated the monograph as a whole, related one chapter to another, and ensured that the volume-level conclusions were supported by the monograph's content. Both NCI and WHO conducted a final review before the monograph was published. Comments from more than 70 expert reviewers formed the basis of the revisions that the authors and editors made to the monograph. These efforts have culminated in a monograph comprising 17 chapters that explore the many dimensions of the economics of tobacco and tobacco control, which are summarized and illustrated by numerous examples, tables, and figures.

Where appropriate, the data for this monograph have been analyzed and reported by geographical area. Countries are organized into WHO Regions: the African, Americas, South-East Asia, Eastern Mediterranean, European, and Western Pacific Regions. The data are also presented using the World Bank's analytical classification of countries based on gross national income per capita: high-income, upper middle-income, lower middle-income, and low-income countries.[8] These classifications are updated each year, thus the country income groups across the monograph are based on the year that best reflects the data referenced. Appendix 1A lists countries by WHO Region and by 2014 country income level.

## Major Accomplishments

This volume accomplishes several "firsts."

- It examines the economics of tobacco control through the lens of the rapidly emerging body of research that explores the impact of tobacco control in LMICs as well as the continually growing research evidence from high-income countries (HICs). Although much of the new evidence from LMICs corroborates the findings from work in HICs, much has been learned about the unique challenges of implementing tobacco control in LMICs and many other areas where such efforts have a potentially greater impact on economic and public health outcomes.
- This monograph is one of the first publications to examine global tobacco control efforts since the 2003 adoption and 2005 entry into force of the WHO FCTC, including the observed or projected impact of specific articles of this global public health treaty and the subsequent implementation assistance provided by the WHO MPOWER package.[9]
- This report presents a growing base of data on tobacco control interventions and their impact—data that were derived from public and private sources and from local and global tobacco surveillance systems. Since the publication of *Curbing the Epidemic: Governments and the Economics of Tobacco Control*, a considerable amount of new knowledge has been generated using these data regarding the effectiveness of specific interventions and their relative impact on the economies of countries at varying income levels.
- Above all, this monograph confirms that effective, evidence-based tobacco control interventions—such as increased taxes; complete bans on tobacco marketing; comprehensive, smoke-free policies; dissemination of information on the health consequences of tobacco use; and many other types of interventions—make sense from an economic as well as a public health standpoint.

## Major Conclusions

Nine broad conclusions that emerge from this volume are as follows:

1. **The global health and economic burden of tobacco use is enormous and is increasingly borne by low- and middle-income countries.** Already, around 80% of smokers live in LMICs. While smoking prevalence is falling at the global level, the total number of smokers worldwide is not decreasing, largely due to population growth. There is a strong possibility that the global target of a 30% relative reduction in tobacco use by 2025 agreed to by WHO Member States will not be met. The number of tobacco-related deaths is projected to increase from about 6 million deaths annually to about 8 million annually by 2030, with more than 80% of these occurring in LMICs.
2. **Failures in the markets for tobacco products provide an economic rationale for governments to intervene in these markets.** These market failures include (1) the public's imperfect and asymmetric information about the health and economic consequences of consuming tobacco products, particularly in LMICs, which is further complicated by the time-inconsistency of individual preferences for tobacco and the uptake of tobacco use during youth and adolescence; and (2) the externalities of tobacco use for nonusers. These externalities include the fact that nonsmokers, both children and adults, experience adverse health consequences when exposed to secondhand smoke (SHS) and that the cost of treating diseases caused by tobacco use and SHS exposure is borne, in part, by the public. The external costs of tobacco use are greater in countries where public funds are used to pay for a greater share of health care costs, given public spending to treat the diseases caused by tobacco use.
3. **Effective policy and programmatic interventions are available to reduce the demand for tobacco products and the death, disease, and economic costs that result from their use, but these interventions are underutilized.** The WHO FCTC and its implementation guidelines provide an evidence-based framework for governmental action to reduce tobacco use. Technical resources included in the MPOWER package in line with the WHO FCTC can support the implementation of tobacco control demand-reduction provisions on the ground. In addition, numerous other documents—including U.S. Surgeon General's reports, NCI monographs, and reports of the Institute of Medicine (U.S.), the WHO Tobacco Free Initiative, and the WHO International Agency for Research on Cancer—summarize the science and provide guidance on effective policy and program interventions. However, the vast majority of the world's population is still not adequately covered by the most effective of these interventions, including sufficiently high levels of tobacco taxation, comprehensive smoke-free policies, complete bans on tobacco marketing, information interventions, and cessation support.
4. **Policies and programs that work to reduce the demand for tobacco products are highly cost-effective.** Significant tobacco tax and price increases, comprehensive bans on tobacco industry marketing activities, and prominent pictorial health warning labels are generally the least costly tobacco control interventions, followed by the implementation and enforcement of smoke-free policies and the provision of population-wide tobacco cessation programs. Significant tobacco tax and price increases are the most cost-effective of these interventions. Despite the considerable revenues generated by tobacco taxes, few governments are investing more than a fraction of these revenues in tobacco control or in other health programs. WHO estimated that in 2013–2014, global tobacco excise taxes generated nearly 269 billion U.S. dollars (US$) in government revenues, but governments spent a combined total of less than US$ 1 billion on tobacco control.[10]

5. **Control of illicit trade in tobacco products, now the subject of its own international treaty, is the key supply-side policy to reduce tobacco use and its health and economic consequences.** There is broad agreement that control of illicit trade will benefit tobacco control and public health and result in broader benefits for governments. Other supply-side policies, such as support for economically viable alternatives to tobacco production and restrictions on youth access to tobacco products, can be effective, especially as part of a comprehensive strategy to reduce tobacco use.
6. **The market power of tobacco companies has increased in recent years, creating new challenges for tobacco control efforts.** The global tobacco market has become increasingly concentrated over the past 25 years and is being driven by the same forces that have contributed to globalization in other industries, including reductions in barriers to trade and foreign direct investment, privatization of state-owned tobacco enterprises, and a wave of mergers and acquisitions. Policies aimed at limiting the market power of tobacco companies are largely untested but hold promise for reducing tobacco use.
7. **Tobacco control does not harm economies.** The number of jobs that depend on tobacco has been falling in most countries, largely thanks to technological innovations, the shift from state-owned to private ownership of tobacco manufacturing, and globalization, which have facilitated efficiencies in tobacco growing and manufacturing. For the vast majority of countries, implementation of tobacco control measures will have only a modest impact on tobacco-related employment, and will not lead to net job losses. For the few countries particularly dependent on tobacco growing and tobacco leaf exports, job losses due to global tobacco control efforts are likely to be gradual, predictable, and far enough in the future to have little effect on the current generation of tobacco farmers, and programs could be implemented that help tobacco farmers make the transition to alternative livelihoods. Evidence from high-income countries and LMICs shows that smoke-free policies do not adversely affect the hospitality sector.
8. **Tobacco control reduces the disproportionate burden that tobacco use imposes on the poor.** Tobacco use is concentrated among the poor and other vulnerable groups, and tobacco use accounts for a significant share of the health disparities between the rich and poor. These disparities are exacerbated by a lack of access to health care and the diversion of household spending from other basic needs, such as food and shelter, to tobacco use. Moreover, tobacco use contributes to poverty, as illnesses caused by tobacco lead to increased health care spending and reduced income. Research indicates that tobacco control interventions lead to reductions in tobacco use among all population groups. Additionally, significant increases in tax and price lead to greater reductions in tobacco use among the poor than among the rich, and thus contribute to reducing health disparities. Tobacco taxes also provide the opportunity to dedicate tax revenues specifically to health programs that benefit the poor, thus increasing their ability to reduce health disparities between population subgroups.
9. **Progress is now being made in controlling the global tobacco epidemic, but concerted efforts will be required to ensure that progress is maintained or accelerated.** In most world regions and country income groups, the prevalence of tobacco use is stagnant or falling. In HICs, progress in tobacco control has been ongoing over several decades; in LMICs, progress has generally been more recent and has sometimes been more rapid. Factors contributing to recent progress include the galvanizing effort of the WHO FCTC, research documenting the health and economic burden of tobacco use and evidence-based tobacco control interventions, the contributions of private funders and civil societies in promoting tobacco control policies, and broad recognition of the tobacco industry's role in promoting tobacco use around the world.

Despite this progress, many threats remain, including increasing tobacco use in some world regions and the potential for tobacco use to increase in regions that are still at an early stage of the tobacco epidemic. Maintaining and increasing progress will require continued research and surveillance of the epidemic and implementation of the evidence-based strategies set forth in the WHO FCTC, as well as vigilant monitoring of the tobacco industry's tactics and strategies to undermine or subvert tobacco control efforts.

## Chapter Summaries and Conclusions

### Section 1—Introduction

#### *Chapter 1. Overview and Conclusions*

Chapter 1 introduces this monograph, describes its framework, and explains how it was prepared and organized. It also presents the volume's major conclusions and the individual chapter conclusions.

### Section 2—Situation Analysis/Mapping

#### *Chapter 2. Patterns of Tobacco Use, Exposure, and Health Consequences*

Chapter 2 examines the global distribution and health consequences of cigarette and smokeless tobacco use and SHS. This chapter draws on many data sources including the *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2015*, the *WHO Global Report: Mortality Attributable to Tobacco*, the National Cancer Institute – Centers for Disease Control and Prevention report *Smokeless Tobacco and Public Health: A Global Perspective*, as well as data from the Global Youth Tobacco Survey and the Global Adult Tobacco Survey.

Conclusions:

1. There are about 1.1 billion smokers in the world, and about 4 in 5 smokers live in LMICs. Nearly two-thirds of the world's smokers live in 13 countries.
2. Substantial progress has been made in reducing tobacco smoking in most regions, especially in HICs. Overall smoking prevalence is decreasing at the global level, but the total number of smokers worldwide is still not declining, largely due to population growth. Unless stronger action is taken, it is unlikely the world will reach the WHO Member States' 30% global reduction target by 2025.
3. Globally, more than 80% of the world's smokers are men. Differences in prevalence between male and female smokers are particularly high in the South-East Asia and Western Pacific Regions and in LMICs.
4. Globalization and population migration are contributing to a changing tobacco landscape, and non-traditional products are beginning to emerge within regions and populations where their use had not previously been a concern.
5. An estimated 25 million youth currently smoke cigarettes. Although cigarette smoking rates are higher among boys than girls, the difference in smoking rates between boys and girls is narrower than that between men and women. Smoking rates among girls approach or even surpass rates among women in all world regions.

6. Worldwide, an estimated 13 million youth and 346 million adults use smokeless tobacco products. The large majority of smokeless tobacco users live in the WHO South-East Asia Region. Smokeless tobacco use may be undercounted globally due to scarcity of data.
7. Secondhand smoke exposure remains a major problem. In most countries, an estimated 15%–50% of the population is exposed to secondhand smoke; in some countries secondhand smoke exposure affects as much as 70% of the population.
8. Annually, around 6 million people die from diseases caused by tobacco use, including about 600,000 from secondhand smoke exposure. The burden of disease from tobacco is increasingly concentrated in LMICs.

### *Chapter 3. The Economic Costs of Tobacco Use, With a Focus on Low- and Middle-Income Countries*

Chapter 3 provides a framework for estimating the direct and indirect costs of tobacco use, including the cost of illness, disability, premature death, and forgone consumption and investment. It also reviews studies that estimate these costs for many HICs and some LMICs, as well as global estimates.

Conclusions:

1. The economic costs of tobacco use are substantial and include significant health care costs for treating the diseases caused by tobacco use and the lost productivity that results from tobacco-attributable morbidity and mortality.
2. In high-income countries, lifetime health care costs are greater for smokers than for nonsmokers, even after accounting for the shorter lives of smokers.
3. Evidence on the economic costs of tobacco use in low- and middle-income countries is limited but growing; the comprehensiveness of these studies varies greatly within and across countries, as do the existing cost estimates.
4. Past and current trends in tobacco use, together with improvements in health care systems and access to health care, suggest that the economic costs of tobacco use in low- and middle-income countries are likely to increase considerably in coming years.
5. The public's share of tobacco-attributable economic costs varies significantly among countries, reflecting differences in the role of government in providing health care.

## Section 3—Price Determinants of Demand

### *Chapter 4. The Impact of Tax and Price on the Demand for Tobacco Products*

Chapter 4 explains the rationale for levying excise taxes on tobacco products, describes models of consumer demand, and reviews studies of the relationship between tobacco taxes, prices, affordability, and consumer demand for tobacco products in both HICs and LMICs.

Conclusions:

1. A substantial body of research, which has accumulated over many decades and from many countries, shows that significantly increasing the excise tax and price of tobacco products is the single most consistently effective tool for reducing tobacco use.

2. Significant increases in tobacco taxes and prices reduce tobacco use by leading some current users to quit, preventing potential users from initiating use, and reducing consumption among current users.
3. Tobacco use by young people is generally more responsive to changes in taxes and prices of tobacco products than tobacco use by older people.
4. Demand for tobacco products is at least as responsive and often more responsive to price in low- and middle-income countries as it is in high-income countries.

### *Chapter 5. Design and Administration of Taxes on Tobacco Products*

Chapter 5 examines topics relating to tobacco tax policy and administration, including the implications of tax increases for tobacco tax revenue. It explains the types of tobacco product taxes and their differential effects on price, product substitution, product differentiation, and tax avoidance. This chapter also discusses key components of effective tobacco product tax administration.

Conclusions:

1. Governments have a variety of reasons for taxing tobacco products, including generating revenue and improving public health by reducing tobacco use. Although price and tax measures are among the core demand reduction measures of the WHO FCTC, they are among the least implemented.
2. Almost all governments tax tobacco products, applying a variety of different taxes and using different tax structures. The different taxes and tax structures vary in their impact on public health. Relying on import duties to generate revenue is not an effective tax policy and does not substantially affect public health. More reliance on high, uniform, and specific excise taxes on tobacco products will have the greatest public health impact.
3. Because of the low share of tax in the retail prices of cigarettes and the relative inelasticity of demand for tobacco products, increases in tobacco taxes will ensure higher revenues.
4. A number of countries dedicate part of their tobacco tax revenues for health promotion and/or tobacco control. Dedicating part of tobacco tax revenues for comprehensive tobacco control or health promotion programs (i.e., earmarking) increases the public health impact of higher tobacco taxes.
5. An effective tax system is one that is well-designed and -administered. A well-designed system sets appropriate tax rates to achieve public health and revenue objectives; a well-administered system ensures high tax compliance and minimizes tax avoidance and evasion.

## Section 4—Non-Price Determinants of Demand

### *Chapter 6. The Impact of Smoke-Free Policies*

Chapter 6 describes the economic rationale for comprehensive smoke-free policies as well as studies that assess enforcement, compliance, and the degree of public support for these policies. The chapter examines studies of the impact of comprehensive smoke-free policies on secondhand smoke exposure, smoking behavior, and health outcomes. This chapter also discusses studies of the economic consequences of smoke-free policies, including costs or savings to various stakeholders, particularly business establishments.

Conclusions:

1. Comprehensive smoke-free policies reduce exposure to secondhand smoke; compliance with these policies is generally high, and public support for them is strong.
2. Comprehensive smoke-free policies in workplaces reduce active smoking behaviors including cigarette consumption and smoking prevalence.
3. Overall, rigorous empirical studies (largely from high-income countries) using objective economic indicators find that smoke-free policies do not have negative economic consequences for businesses, including restaurants and bars, with a small positive effect being observed in some cases. Findings from the limited existing research conducted in low- and middle-income countries are generally consistent with those from high-income countries.
4. Around the world, the tobacco industry is the greatest obstacle to enacting comprehensive smoke-free policies, often by arguing, despite strong evidence to the contrary, that smoke-free policies harm businesses.
5. Other economic benefits of smoke-free policies for businesses include increased worker productivity, health care savings, reduced cleaning and maintenance costs, and reduced insurance costs.

### *Chapter 7. The Impact of Tobacco Industry Marketing Communications on Tobacco Use*

Chapter 7 describes the many forms of tobacco marketing communications and reviews the global implementation of policy interventions directed toward these activities. The chapter also covers econometric studies of the impact of tobacco advertising and advertising bans, providing new evidence on the impact of advertising bans globally and in LMICs. It also discusses cross-sectional and longitudinal studies of consumer response to tobacco advertising and the impact of other tobacco marketing initiatives such as sponsorship, price promotions, and marketing via emerging communication platforms such as the Internet and social media.

Conclusions:

1. Tobacco companies engage in a wide variety of marketing activities, ranging from traditional advertising, promotion, and sponsorship to emerging marketing techniques in the digital arena. These marketing activities have the potential to affect key populations, such as young people and women, particularly in low- and middle-income countries, who may be particularly susceptible to these efforts.
2. The weight of the evidence from multiple types of studies done by researchers from a variety of disciplines and using data from many countries indicates that a causal relationship exists between tobacco company marketing activities and tobacco use, including the uptake and continuation of tobacco use among young people.
3. In high-income countries, comprehensive policies to ban the marketing activities of tobacco companies are effective in reducing tobacco use, but partial marketing bans have little or no effect.
4. Comprehensive policies to ban the marketing activities of tobacco companies leads to larger reductions in tobacco use in low- and middle-income countries than in high-income countries.

### *Chapter 8. The Impact of Information on the Demand for Tobacco Products*

Chapter 8 reviews evidence on awareness of the health risks of tobacco use in HICs and LMICs, and on the role of tobacco industry practices in influencing this awareness. The chapter also discusses studies of the impact of information dissemination efforts—including anti-tobacco mass media campaigns, school-based education programs, pictorial warning labels, and packaging interventions—by public health authorities.

Conclusions:

1. Imperfect understanding of the impact of cigarette smoking and other tobacco use on health, particularly in low- and middle-income countries, provides an economic rationale for interventions to disseminate information about the addictive and harmful nature of tobacco products.
2. Tobacco industry disinformation practices have directly contributed to the information failures associated with consumers' imperfect knowledge of the risks of disease and addiction.
3. Well-designed and -implemented anti-tobacco mass media campaigns are effective in improving understanding about the health consequences of tobacco use, building support for tobacco control policies, strengthening social norms against tobacco use, and reducing tobacco consumption among youth and adults.
4. School-based tobacco education programs, when implemented as part of comprehensive tobacco control programs, can improve knowledge, contribute to denormalizing tobacco use, and help prevent tobacco use. Emerging evidence suggests that school-based programs can be as or more effective in reducing tobacco use among young people in low- and middle-income countries, where knowledge of the hazards of tobacco use is lower compared with high-income countries.
5. Large pictorial health warning labels on tobacco packages are effective in increasing smokers' knowledge, stimulating their interest in quitting, and reducing smoking prevalence. These warnings may be an especially effective tool to inform children and youth and low literacy populations about the health consequences of smoking.
6. Plain (standardized) packaging (i.e., devoid of logos, stylized fonts, colors, designs or images, or any additional descriptive language) reduces the appeal of tobacco products, enhances the salience of health warnings, minimizes consumers' misunderstanding of the harms of tobacco, and has contributed to a decline in tobacco use in Australia, the first country to implement plain packaging.
7. The stock of information about the harms of tobacco use is subject to potential erosion over time (wear-out) and needs to be replenished and maintained.

### *Chapter 9. Smoking Cessation*

Chapter 9 examines studies of the health and economic benefits of cessation as well as individual- and population-level interventions to provide cessation support. It examines economic factors influencing demand for cessation services, such as the cost of cessation services and the price of tobacco products, and the literature on how tobacco control policies affect cessation. This chapter also describes some of the challenges and opportunities in enhancing implementation of cessation services.

Conclusions:

1. Rates of tobacco cessation among current tobacco users will need to increase in order to significantly reduce the health consequences of tobacco use worldwide, in both the short and mid term.
2. Tobacco control policies, such as increased taxation, anti-smoking media campaigns, and comprehensive smoke-free policies, increase the demand for tobacco dependence treatment and the rates of subsequent cessation.
3. Research from high-income countries demonstrates that a number of effective and cost-effective tobacco dependence treatments can increase the likelihood of successful cessation. Relatively little evidence is available on the effectiveness and cost-effectiveness of tobacco dependence treatments in low- and middle-income countries and on the transferability of effective interventions from high-income countries to low- and middle-income countries.
4. Demand for cessation support exists in low- and middle-income countries, but in most of these countries, cessation services and products are often of limited availability or accessibility, or are unaffordable for most of the population.

## Section 5—Policy and Other Influences on the Supply of Tobacco Products

### *Chapter 10. Tobacco Growing and Tobacco Product Manufacturing*

Chapter 10 describes tobacco growing around the world, including the increased role of LMICs in tobacco farming, case studies of efforts to provide alternative livelihoods for tobacco farmers, and cigarette production by country income group. This chapter also discusses changes in cigarette design and manufacturing over time, and studies of efforts to regulate tobacco products such as bans on certain tobacco products, mandated reductions in constituents, and efforts to reduce addictiveness or appeal and to limit brand proliferation.

Conclusions:

1. In 2013, ten countries accounted for most of the world's tobacco leaf production (80%); China alone produced more than 40% of the world's tobacco leaf. Tobacco is increasingly grown in low- and middle-income countries, and many of these countries export a large proportion of the world's tobacco leaf.
2. In the past, governments have sought to control price and quantity in the tobacco leaf market through quotas and pricing restrictions and to provide technical assistance to tobacco growers, along with other agricultural producers. Although most high-income countries have reduced or eliminated subsidies for tobacco growing, many low- and middle-income countries still provide support for the tobacco-growing sector.
3. The vast majority of workers in the tobacco production chain are tobacco farmers doing highly labor-intensive work on small family farms, which are increasingly located in low- and middle-income countries. In contrast, cigarette manufacturing—the higher value phase of the chain—is highly mechanized and dominated by a few large multinational corporations largely based in high-income countries.
4. Tobacco growing is relatively profitable, but farming of other crops has the potential to be as or more profitable than tobacco growing. Alternatives to tobacco growing tend to be highly specific to a country or region. Policies that encourage crop diversification or substitution are useful as

part of a comprehensive tobacco control strategy, but alone they will have little impact on tobacco use.

5. Changes in product design—often made in response to consumer concerns about the adverse health consequences of tobacco as well as to reduce costs to the manufacturer—have likely contributed to increased tobacco use.
6. Product regulation is a rapidly developing component of a comprehensive tobacco control strategy. Regulation of tobacco products is a highly technical area, which poses many challenges for regulators, including the diversity of products, the ability of the tobacco industry to respond quickly to changing market conditions, and the need for sufficient capacity for testing and enforcing regulatory measures; addressing these issues is likely to be particularly challenging for low- and middle-income countries.

### *Chapter 11. Policies Limiting Youth Access to Tobacco Products*

Chapter 11 examines policy interventions designed to limit youth access to tobacco products, including the economic rationale for these policies. It reviews studies of sources of tobacco products for youth; country adoption of youth access laws including implementation, enforcement, and compliance; and the impact of youth access policies on smoking behaviors in both HICs and LMICs.

Conclusions:

1. Information failures in the market for tobacco products are particularly pronounced during the ages at which most tobacco use begins, providing an economic rationale for interventions to limit youth access to tobacco products.
2. Youth access policies, when consistently enforced, can reduce commercial access to tobacco products among underage youth. Sufficient resources are needed to implement and enforce these policies well enough to effectively limit youth access to commercial sources of tobacco.
3. Evidence from high-income countries indicates that strongly enforced youth access policies that successfully disrupt the commercial supply of tobacco products to underage youth can reduce youth tobacco use, although the magnitude of this effect is relatively small.
4. Emerging research suggests that youth access policies can also be effective in reducing youth tobacco use in low- and middle-income countries, although the amount of reduction is unclear.

### *Chapter 12. Tobacco Manufacturing Privatization and Foreign Direct Investment and Their Impact on Public Health*

Chapter 12 examines foreign direct investment within the tobacco sector and factors that have driven the privatization of state-owned tobacco companies. The chapter reviews studies of the impact of foreign direct investment and of privatization on the tobacco industry, tobacco use, and global tobacco control efforts. The evolution and consolidation of the tobacco industry and trends in international investment law are also discussed.

Conclusions:

1. Over the past few decades, the privatization of domestic tobacco companies and direct investment by multinational tobacco companies, particularly in low- and middle-income countries, have contributed to the globalization of the tobacco industry.

2. The impact of privatization on public health is varied and is influenced by the strength of domestic regulation. Some countries have implemented strong tobacco control measures after privatization, leading to reductions in tobacco use. However, in the majority of countries, privatization leads to significantly greater efficiency and production, massive marketing campaigns, and increased cigarette consumption—particularly among women and young people.
3. China's state tobacco monopoly is a market leader, with over 40% of global cigarette market share, almost all of which is consumed domestically. The China National Tobacco Corporation appears poised to expand beyond domestic sales by using foreign direct investments, partnerships with multinational tobacco companies, development of an international supply chain to support its premium brands, and by other means.
4. Increasingly, the tobacco industry is using trade and investment treaties to challenge innovative tobacco control policies. The tobacco industry also uses the threat of litigation, with its attendant costs, and lobbying campaigns to deter governments from advancing tobacco control policies, especially in low- and middle-income countries.

### *Chapter 13. Licit Trade in Tobacco Products*

Chapter 13 provides an overview of trends in trade in tobacco leaf and manufactured tobacco products by WHO Region and country income group. It reviews studies on the effects of trade liberalization on tobacco use and provides new estimates to update and extend existing research on this topic. It also briefly discusses the impact of trade agreements on tobacco control.

Conclusions:

1. Trade in tobacco leaf accounts for a very small proportion (<1%) of global agricultural imports and exports, and very few countries rely heavily on earnings from trade in tobacco leaf.
2. Although many countries participate in either the export or import of manufactured cigarettes, these products account for only a very small share of overall global trade in goods and services.
3. International, regional, and bilateral trade agreements have reduced tariff and non-tariff barriers to trade, increased trade in tobacco leaf and tobacco products, and contributed to the globalization of the tobacco industry.
4. Increased liberalization of trade has contributed to increased tobacco use in low- and middle-income countries. During the period when trade in tobacco products was liberalized, most low- and middle-income countries had weak or no tobacco control measures in place.
5. Recent World Trade Organization decisions involving challenges to domestic tobacco control policies suggest that governments can address public health concerns associated with increased liberalization of trade in tobacco leaf and tobacco products by adopting and implementing effective tobacco control policies and programs that apply evenly to domestic and foreign tobacco growers and manufacturers.

### *Chapter 14. Tobacco Tax Avoidance and Tax Evasion*

Chapter 14 examines tax avoidance and tax evasion—activities aimed at circumventing taxes on tobacco products through legal and illegal means, respectively—and reviews studies of the determinants and extent of these activities. This chapter also discusses measures to counteract tax evasion, in particular the Protocol to Eliminate Illicit Trade in Tobacco Products adopted by the WHO FCTC.

Conclusions:

1. Tax avoidance and tax evasion, especially large-scale smuggling of tobacco products, undermine the effectiveness of tobacco control policies and reduce the health and economic benefits that result from these policies.
2. While tobacco product tax and price differentials create incentives for tax evasion, other factors, such as high levels of corruption, lack of commitment to addressing illicit trade, and ineffective customs and tax administration, play an equal or greater role.
3. Illicit trade has sometimes included the involvement of tobacco companies themselves.
4. Experience from many countries demonstrates that illicit trade can be successfully addressed, even while raising tobacco taxes and prices, resulting in increased tax revenues and reduced tobacco use.
5. Implementing and enforcing strong measures to control illicit tobacco trade would enhance the effectiveness of significantly increased tobacco taxes and prices and strong tobacco control policies in reducing tobacco use and its health and economic consequences.

## Section 6—Economic and Other Implications of Tobacco Control

### *Chapter 15. Employment Impact of Tobacco Control*

Chapter 15 examines employment issues related to tobacco, providing an overview of tobacco-related employment (focusing on jobs directly dependent on tobacco) and trends in employment in both tobacco growing and manufacturing. The chapter also discusses studies of the effect of tobacco control policies on employment in the tobacco sector and other sectors.

Conclusions:

1. The number of jobs that depend on tobacco—tobacco growing, manufacturing, and distribution—is low and has been falling in most countries.
2. Adoption of new production technologies and improved production techniques, together with the shift from state to private ownership in many countries, has reduced employment in both the tobacco-farming and -manufacturing sectors.
3. In nearly all countries, national tobacco control policies will have either no effect or a net positive effect on overall employment because any tobacco-related job losses will be offset by job gains in other sectors.
4. In the few countries that depend heavily on tobacco leaf exports, global tobacco control policies could lead to job losses, but these losses are expected to be small, gradual, and unlikely to affect the current generation of tobacco farmers in these countries.

### *Chapter 16. The Impact of Tobacco Use and Tobacco Control Measures on Poverty and Development*

Chapter 16 focuses on the interaction between tobacco use and poverty, especially in LMICs. It examines studies of tobacco use by poverty status and country income level and the impact of tobacco use on individual finances and economic development more broadly. The chapter also reviews studies on the ability of tobacco control policies to reduce disparities in tobacco use and tobacco-related disease.

Conclusions:

1. Tobacco use and its consequences have become increasingly concentrated in low- and middle-income countries and, within most countries, among lower socioeconomic status populations.
2. Tobacco use in poor households exacerbates poverty by increasing health care costs, reducing incomes, and decreasing productivity, as well as diverting limited family resources from basic needs.
3. By reducing tobacco use among the poor, tobacco control policies can help break the cyclical relationship between tobacco use and poverty.
4. Tobacco control efforts that are integrated with other public health and development policies can improve the overall health of the poor and can help achieve the Sustainable Development Goals.
5. Lower income populations often respond more to tobacco tax and price increases than higher income populations. As a result, significant tobacco tax and price increases can help reduce the health disparities resulting from tobacco use.

## Section 7—Global Implications of Tobacco Control

### *Chapter 17. Ending the Epidemic*

Chapter 17 provides an in-depth review of the major conclusions of this monograph and highlights research and surveillance priorities needed for a greater understanding of the economics of tobacco and tobacco control in both HICs and LMICs.

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## Appendix 1A. Country Groupings

| World Health Organization Grouping of Countries | |
|---|---|
| African Region | Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe |
| Region of the Americas | Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela (Bolivarian Republic of) |
| South-East Asia Region | Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste |
| European Region | Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom of Great Britain and Northern Ireland, Uzbekistan |
| Eastern Mediterranean Region | Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen |
| Western Pacific Region | Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu, Viet Nam |

| World Bank Income Grouping of Countries (2014) | |
|---|---|
| High-Income | Andorra, Antigua and Barbuda, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Republic of Korea, Russian Federation, Saint Kitts and Nevis, San Marino, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay |
| Upper Middle-Income | Albania, Algeria, Angola, Argentina, Azerbaijan, Belarus, Belize, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Cook Islands, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Fiji, Gabon, Grenada, Hungary, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Maldives, Marshall Islands, Mauritius, Mexico, Montenegro, Namibia, Nauru, Niue, Palau, Panama, Peru, Romania, Saint Lucia, Saint Vincent and the Grenadines, Serbia, Seychelles, South Africa, Suriname, Thailand, The former Yugoslav Republic of Macedonia, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Venezuela (Bolivarian Republic of). |

| World Bank Income Grouping of Countries (2014) | |
|---|---|
| Lower Middle-Income | Armenia, Bhutan, Bolivia (Plurinational State of), Cameroon, Cabo Verde, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Mauritania, Micronesia (Federated States of), Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Republic of Moldova, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, South Sudan, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Timor-Leste, Ukraine, Uzbekistan, Vanuatu, Viet Nam, Yemen, Zambia. |
| Low-Income | Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Tajikistan, Togo, Uganda, United Republic of Tanzania, Zimbabwe. |

*Cook Islands, Nauru, and Niue were not allocated to an income group by the World Bank. To avoid excluding these three countries from analyses, we used the World Bank allocation criteria and the GDP sourced from the CIA Factbook to allocate them to the appropriate income group.

## Section 2
## Situation Analysis/Mapping

# Chapter 2
# Patterns of Tobacco Use, Exposure, and Health Consequences

# Chapter 2
# Patterns of Tobacco Use, Exposure, and Health Consequences

Tobacco products, both smoked and smokeless products, are used in a wide variety of forms around the world, and the patterns of use and resulting health and economic burden vary across the globe. Effective tobacco control policies and programs are aimed at reducing the demand for tobacco products and the death, disease, and economic cost of their use. This chapter examines tobacco consumption and prevalence, as well as the impact of tobacco use and secondhand smoke exposure on health and mortality. Specific topics include:

- Current patterns of tobacco use across world regions and in selected countries for smoked and smokeless products
- Exposure to secondhand smoke, the effects of this exposure on health, and the associated disease burden
- Health disparities related to tobacco use
- The impact of tobacco use on noncommunicable diseases, communicable diseases, and mortality.

This chapter describes the extent of tobacco use among youths and adults globally by drawing on national or subnational data available for various countries. The chapter also examines the health consequences of tobacco use, including data that is used in planning and evaluating tobacco control policy and program interventions in many countries.

## Chapter Contents



## Figures and Tables

## Introduction

Tobacco is the only legal product that kills a large proportion of its consumers when used as intended by its manufacturers. The World Health Organization (WHO) has estimated that around 6 million people die each year from tobacco use[1] including 600,000 who die from exposure to secondhand smoke (SHS).[2] Unless strong tobacco control measures are put in place, the number of tobacco-related direct and indirect deaths is projected to increase to 8 million by 2030, with more than 80% of these deaths expected to occur in low- and middle-income countries (LMICs).[3]

The patterns of tobacco use and health effects of the tobacco epidemic vary throughout the world. It is very important to understand current patterns and trends in tobacco use worldwide (both smoking and smokeless as well as exposure to SHS) in order to address the many complex issues associated with the economics of tobacco control. The purpose of this chapter is to provide a brief overview of the global information available on the use of tobacco products worldwide and in selected countries, as well as the impact of tobacco use on disease and mortality.

The information on tobacco smoking among adults presented in this chapter is drawn from the *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2015*.[1] Data on tobacco smoking among adults in the United States are derived from the National Adult Tobacco Survey (NATS).[4] Data for smoking and smokeless use among youth ages 13–15 years come from the Global Youth Tobacco Survey (GYTS),[5] the Health Behaviour in School-Aged Children Survey (HBSC)[6] (mostly in European countries), and the National Youth Tobacco Survey (NYTS)[7] (in the United States). Information on smokeless tobacco (ST) is drawn from WHO records as well as the report *Smokeless Tobacco and Public Health: A Global Perspective*[8] produced by the National Cancer Institute (NCI) of the National Institutes of Health and by the Centers for Disease Control and Prevention (CDC), both agencies of the U.S. Department of Health and Human Services. Information on health outcomes from tobacco use is derived from the *WHO Global Report: Mortality Attributable to Tobacco*,[9] which provides information on mortality consequences by country and across regions. Data from these sources have been used extensively by many countries in planning and evaluating their tobacco control policy and program interventions. (For more information on how the data were used in calculations, please see the Statistical Annex at the end of this monograph.)

Consistent with the rest of the monograph, the data for this chapter have been analyzed by geographical area. Countries were organized by WHO Region—the African, Americas, South-East Asia, Eastern Mediterranean, European, and Western Pacific Regions. One adjustment was made to this organization: all countries classified as high income by the Organisation for Economic Co-operation and Development (OECD) were grouped into one category regardless of their WHO Region. These high-income countries are: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom of Great Britain and Northern Ireland, and the United States. Thus, the tables and figures in this chapter present information for these countries separately from their WHO Region.

## Diversity of Tobacco Products Worldwide

A wide variety of tobacco products, differing in design, ingredients, and modes of consumption, are used around the world. The use and impact of these diverse tobacco products are complex. Tobacco products have traditionally been broadly classified into two categories—those that are smoked and those

that are chewed or sniffed, that is, ST products. Many tobacco products contain added flavors and other ingredients in addition to tobacco, and no tobacco product has been shown to be free of harm.[10]

Smoked products include manufactured and roll-your-own cigarettes, cigars, bidis, kreteks, waterpipe, and many others. ST products can be premade (sold ready to use) or custom-made (assembled by the user or a vendor according to user preferences), and may include a variety of non-tobacco ingredients such as ashes, alkaline agents, areca nut, spices, catechu, or other plant materials.[8] A third class of products has recently emerged, often called electronic nicotine delivery systems (ENDS) (e.g., electronic cigarettes, e-cigarettes, e-hookah, vape pens, tank systems). ENDS are battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user. These products are very diverse, encompassing hundreds of products and brands.[11]

Manufactured cigarettes are the most commonly used form of tobacco, accounting for 92.3% of tobacco product sales worldwide[12]; as a consequence, cigarettes cause most global tobacco-related harm.[10] Among some populations, however, ST products predominate (e.g., in the South-East Asia Region).[8]

### Box 2.1: Characteristics of Types of Products

- Manufactured cigarettes consist of shredded or reconstituted tobacco along with a variety of additives. They are wrapped in paper, often have a filter, and are mass-produced by machines. Manufactured cigarettes, the predominant form of tobacco used worldwide, accounts for 92.3% of total tobacco sales in the world.[12]
- Kreteks, or clove cigarettes, contain minced, dried clove buds in addition to tobacco and are produced and commonly used in Indonesia.
- Bidis are small hand-rolled cigarettes wrapped in a tendu leaf; they are commonly used in India as an inexpensive alternative to conventional cigarettes.
- Cigars, which can be hand or machine rolled, consist of a roll of tobacco wrapped in tobacco leaf or tobacco-containing paper. Little cigars (or cigarillos) are approximately the size of a cigarette and may contain added flavorings.
- Waterpipe (also known as hookah or shisha) smoking involves inhaling tobacco smoke though a water basin. A waterpipe typically includes a head (in which a brick of flavored tobacco, along with coal, is burned), a large body housing the water bowl, and a hose for inhalation. Waterpipe use is most common in the Middle East but has recently gained popularity in many other regions.
- Moist snuff, or dip, is typically made of damp and finely ground or shredded tobacco. A lump of this product is placed between the lip and the gum and held there. Snus is a traditionally Swedish smokeless form of moist, fine tobacco that is typically pasteurized.
- Gutka contains betel quid (betel leaf, areca nut, and slaked lime), tobacco, and a variety of flavorings. Gutka is commercially available in foil packets/sachets and tins and is widely used in the Indian subcontinent and throughout the Asian and Pacific regions.
- Electronic nicotine delivery systems (ENDS) are battery-powered devices designed to heat a liquid (typically of propylene glycol, glycerin, nicotine, flavors, and sometimes other chemicals) into an aerosol for inhalation by the user.

## Smoked Tobacco Products

### Prevalence of Tobacco Smoking Among Adults

The information presented in this section is derived from data generated for the *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2015*.[1] This report produced fitted estimates for current and daily tobacco smoking, as well as current and daily cigarette smoking for the years 2000, 2005, 2010, 2013 and then, based on the trends for these years, projected to 2025. Projections are only shown for the years 2015, 2020, and 2025. Data for 2013 have been used to understand the currently prevailing status of tobacco use levels.

As shown in Table 2.1, the results for 2013 indicate that 21.2% of the world's population age 15 years and over (both sexes combined) were current smokers, which represents a decrease in prevalence from an average of 26.5% in 2000, and 22.1% in 2010. Following the High-Level Meeting of the United Nations General Assembly on the Prevention and Control of Noncommunicable Diseases in 2012, WHO Member States unanimously agreed in 2013 to a 30% relative reduction target in global prevalence of tobacco use (both smoking and smokeless) by 2025, using 2010 as baseline.[1] Applying this target reduction to the 2010 baseline of 22.1% results in an expected absolute target of 15.5% in 2025. If countries continue to apply tobacco control measures with the same intensity as they did during the period 1990–2010, the WHO projection exercise indicates that, collectively, countries will only achieve a level of 18.9% in 2025, 3.4% above the reduction target.

**Table 2.1 Estimated and Projected Prevalence Rates (%) for Tobacco Smoking, by WHO Region, Country Income Group, and Sex, 2000–2025**

| | | Estimated prevalence | | | | Projected prevalence | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sex** | **WHO Region** | **2000** | **2005** | **2010** | **2013** | **2015*** | **2020*** | **2025*** | ***2025 target†*** | ***Target gap‡*** |
| **Male** | **Global** | **42.7** | **39.4** | **36.9** | **35.8** | **35.2** | **34.0** | **33.2** | ***25.8*** | ***7.4*** |
| | African | 20.7 | 21.6 | 23.2 | 24.7 | 26.0 | 30.1 | 34.7 | *16.2* | *18.5* |
| | Americas | 32.9 | 28.4 | 24.7 | 22.8 | 21.6 | 18.9 | 16.7 | *17.3* | *-0.6* |
| | Eastern Mediterranean | 32.0 | 33.0 | 35.1 | 36.8 | 38.1 | 41.6 | 45.2 | *24.6* | *20.6* |
| | European | 59.2 | 54.7 | 50.7 | 48.5 | 47.2 | 43.9 | 40.7 | *35.5* | *5.2* |
| | South-East Asia | 40.6 | 36.3 | 33.1 | 31.7 | 30.8 | 29.0 | 27.5 | *23.2* | *4.3* |
| | Western Pacific | 55.9 | 52.9 | 50.4 | 49.4 | 48.7 | 47.1 | 45.0 | *35.3* | *9.7* |
| | High-income OECD | 39.0 | 34.6 | 30.8 | 28.6 | 27.5 | 24.4 | 21.8 | *21.6* | *0.2* |
| **Female** | **Global** | **10.4** | **8.7** | **7.3** | **6.6** | **6.2** | **5.4** | **4.7** | ***5.1*** | ***-0.4*** |
| | African | 3.6 | 3.0 | 2.5 | 2.3 | 2.1 | 1.8 | 1.6 | *1.8* | *-0.2* |
| | Americas | 16.8 | 13.9 | 11.5 | 10.4 | 9.6 | 8.1 | 6.8 | *8.1* | *-1.3* |
| | Eastern Mediterranean | 5.2 | 3.8 | 3.0 | 2.8 | 2.7 | 2.5 | 2.4 | *2.1* | *0.3* |
| | European | 18.2 | 17.2 | 16.1 | 15.6 | 15.2 | 14.3 | 13.5 | *11.3* | *2.2* |
| | South-East Asia | 6.0 | 4.1 | 2.9 | 2.4 | 2.1 | 1.6 | 1.2 | *2.0* | *-0.8* |
| | Western Pacific | 3.7 | 3.1 | 2.6 | 2.4 | 2.3 | 2.1 | 1.8 | *1.8* | *-0.0* |
| | High-income OECD | 23.7 | 21.1 | 18.8 | 17.7 | 16.8 | 15.1 | 13.5 | *13.2* | *0.3* |

## Table 2.1 (continued)

| Sex | WHO Region | Estimated prevalence 2000 | 2005 | 2010 | 2013 | Projected prevalence 2015* | 2020* | 2025* | *2025 target†* | *Target gap‡* |
|---|---|---|---|---|---|---|---|---|---|---|
| **Both sexes** | **Global** | **26.5** | **24.0** | **22.1** | **21.2** | **20.7** | **19.7** | **18.9** | ***15.5*** | ***3.4*** |
| | African | 12.1 | 12.2 | 12.8 | 13.4 | 14.0 | 15.9 | 18.1 | *9.0* | *9.1* |
| | Americas | 24.6 | 20.9 | 17.9 | 16.4 | 15.4 | 13.3 | 11.6 | *12.5* | *-0.9* |
| | Eastern Mediterranean | 18.9 | 18.8 | 19.6 | 20.4 | 21.0 | 22.7 | 24.5 | *13.7* | *10.8* |
| | European | 37.4 | 34.8 | 32.3 | 31.0 | 30.2 | 28.1 | 26.2 | *22.6* | *3.6* |
| | South-East Asia | 23.6 | 20.5 | 18.2 | 17.2 | 16.7 | 15.5 | 14.5 | *12.7* | *1.8* |
| | Western Pacific | 30.3 | 28.5 | 27.0 | 26.4 | 26.0 | 25.1 | 23.9 | *18.9* | *5.0* |
| | High-income OECD | 31.1 | 27.7 | 24.6 | 23.0 | 22.0 | 19.6 | 17.6 | *17.2* | *0.4* |

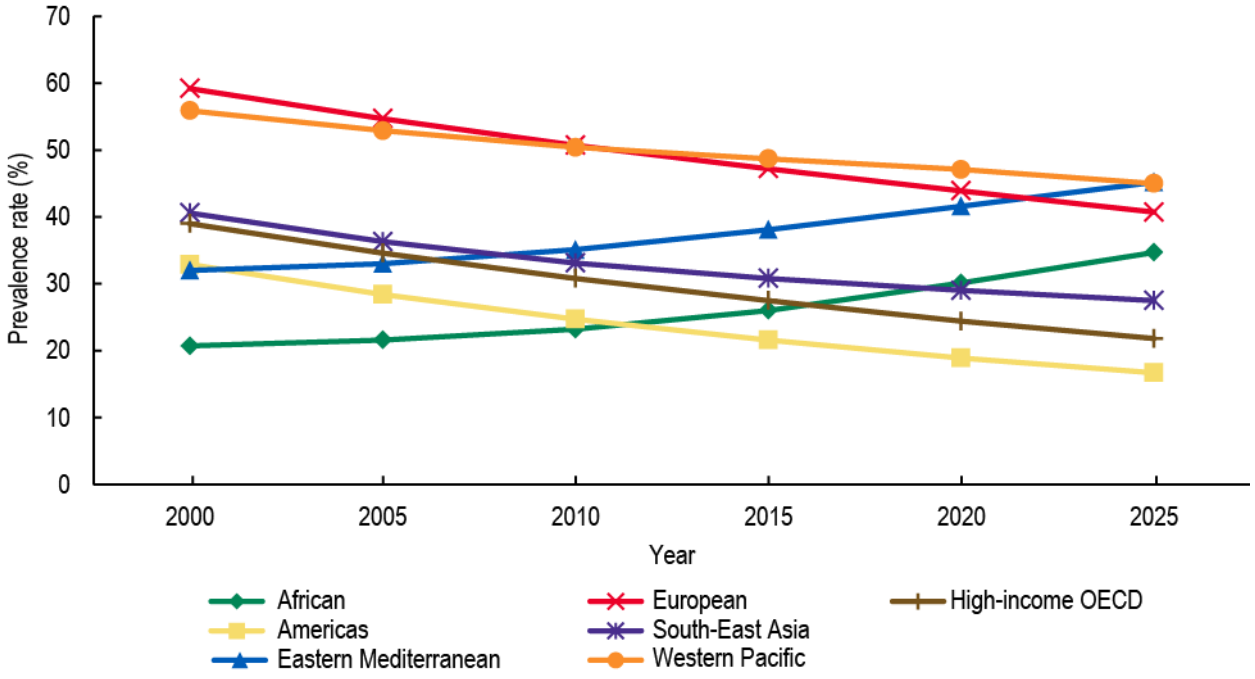
| Sex | World Bank country income group | Estimated prevalence 2000 | 2005 | 2010 | 2013 | Projected prevalence 2015* | 2020* | 2025* | *2025 target†* | *Target gap‡* |
|---|---|---|---|---|---|---|---|---|---|---|
| **Male** | **Global** | **42.7** | **39.4** | **36.9** | **35.8** | **35.2** | **34.0** | **33.2** | ***25.8*** | ***7.4*** |
| | High-income | 42.1 | 37.7 | 34.1 | 32.1 | 31.0 | 28.4 | 26.3 | *23.9* | *2.4* |
| | Upper middle-income | 49.3 | 46.1 | 43.6 | 42.4 | 41.6 | 40.0 | 38.2 | *30.5* | *7.7* |
| | Lower middle-income | 36.9 | 34.3 | 32.7 | 32.3 | 32.1 | 32.0 | 32.3 | *22.9* | *9.4* |
| | Low-income | 37.5 | 33.8 | 31.2 | 30.2 | 29.9 | 30.0 | 31.0 | *21.8* | *9.2* |
| **Female** | **Global** | **10.4** | **8.7** | **7.3** | **6.6** | **6.2** | **5.4** | **4.7** | ***5.1*** | ***-0.4*** |
| | High-income | 22.7 | 20.6 | 18.5 | 17.5 | 16.8 | 15.3 | 13.9 | *13.0* | *1.0* |
| | Upper middle-income | 7.8 | 6.5 | 5.5 | 5.1 | 4.8 | 4.2 | 3.7 | *3.9* | *-0.2* |
| | Lower middle-income | 5.6 | 4.2 | 3.2 | 2.8 | 2.5 | 2.0 | 1.7 | *2.2* | *-0.5* |
| | Low-income | 6.2 | 4.5 | 3.4 | 2.9 | 2.7 | 2.2 | 1.9 | *2.4* | *-0.5* |
| **Both sexes** | **Global** | **26.5** | **24.0** | **22.1** | **21.2** | **20.7** | **19.7** | **18.9** | ***15.5*** | ***3.4*** |
| | High-income | 32.1 | 28.9 | 26.1 | 24.6 | 23.7 | 21.7 | 20.0 | *18.3* | *1.7* |
| | Upper middle-income | 28.7 | 26.4 | 24.6 | 23.8 | 23.3 | 22.2 | 21.1 | *17.2* | *3.9* |
| | Lower middle-income | 21.5 | 19.4 | 18.1 | 17.7 | 17.5 | 17.2 | 17.2 | *12.7* | *4.5* |
| | Low-income | 21.7 | 19.0 | 17.1 | 16.4 | 16.1 | 15.9 | 16.2 | *12.0* | *4.2* |

*Projections are shown for the years 2015, 2020, and 2025.
†The 2025 target was calculated as a 30% relative reduction using the 2010 estimated prevalence rate as the baseline.
‡The target gap was calculated as the absolute difference between the 2025 projected prevalence rate and the 2025 target.
*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. Country income group classification based on World Bank Analytical Classifications for 2013. High-income OECD countries are excluded from their respective regions.
*Source:* Based on data from World Health Organization 2015.[1] For more information, see the Statistical Annex.

In addition to the data for both sexes combined, the WHO prevalence trends analysis was conducted separately for males and females age 15 years and over. Using the same 30% relative reduction target, the 2010 global tobacco smoking levels of 36.9% for males and 7.3% for females translate into 2025 target levels of 25.8% for males and 5.1% for females. The projections to 2025 by sex indicate that globally males will only achieve a level of 33.2% in 2025, or 7.4% above the target. With a projected level of 4.7%, females are expected to reach the 2025 target of 5.1% (Table 2.1).[1]

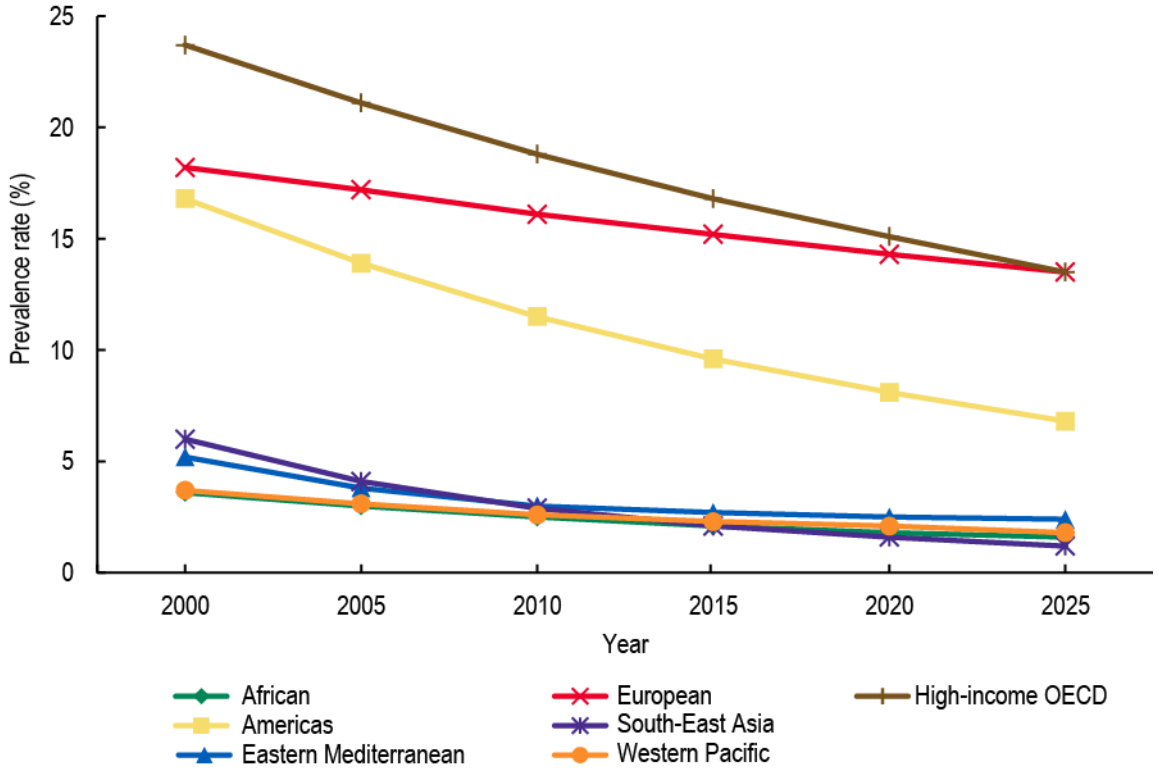
Trends for each region and the high-income OECD countries (Figures 2.1 and 2.2) indicate that prevalence rates for males and females in all regions are trending downwards, except for male prevalence rates in the African and Eastern Mediterranean Regions, which are projected to increase between 2000 and 2025. The countries within the Region of the Americas (excluding Canada and the United States, which are grouped in the OECD category) are the only group of countries that are projected to reach the 2025 tobacco reduction target of 30% for both males and females. No other group is projected to reach the target for males, but the high-income OECD group will be very close to the 2025 target level. Unless strong action is taken in the African and Eastern Mediterranean Regions to address the tobacco epidemic, the failure to reach the target for males will be particularly marked, at 18.5% and 20.6% above those regions' respective 2025 targets for males.[1]

**Figure 2.1 Estimated and Projected Prevalence Rates for Tobacco Smoking, by WHO Region, Males, 2000–2025**




*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Projections are shown for the years 2015, 2020, and 2025.
*Source:* Based on data from World Health Organization 2015.[1] For more information, see the Statistical Annex.

## Figure 2.2 Estimated and Projected Prevalence Rates for Tobacco Smoking, by WHO Region, Females, 2000–2025




*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Projections are shown for the years 2015, 2020, and 2025.
*Source:* Based on data from World Health Organization 2015.[1] For more information, see the Statistical Annex.

WHO has estimated that the number of smokers age 15 years and older in the world has changed very little over the past 15 years, remaining at slightly more than 1.11 billion since the year 2000 (Table 2.2).[1] This number is not expected to decrease in the near future, and may reach about 1.15 billion in 2025. Importantly, the global lack of decrease in the number of smokers is due mainly to population growth, as the prevalence of smoking is decreasing in most regions. In 2013, there were approximately 349 million smokers in the Western Pacific Region and 228 million smokers in the South-East Asia Region, accounting for more than 50% of the total number of smokers in the world. Between 2000 and 2013, the number of smokers in the high-income OECD countries decreased by 45 million people, from 248 to 203 million. This number is projected to decrease further to 163 million smokers by 2025 (Table 2.2).[1]

## Table 2.2 Estimated and Projected Number of Tobacco Smokers (in Millions), by WHO Region, Country Income Group, and Sex, 2000–2025

| | | Estimated | | | | Projected | | |
|---|---|---|---|---|---|---|---|---|
| **Sex** | **WHO Region** | **2000** | **2005** | **2010** | **2013** | **2015*** | **2020*** | **2025*** |
| **Male** | **Global** | **906** | **917** | **928** | **938** | **946** | **972** | **1,006** |
| | African | 38 | 46 | 56 | 65 | 73 | 97 | 129 |
| | Americas | 55 | 52 | 49 | 48 | 47 | 44 | 42 |
| | Eastern Mediterranean | 47 | 57 | 69 | 78 | 85 | 102 | 123 |
| | European | 89 | 85 | 81 | 78 | 76 | 71 | 66 |
| | South-East Asia | 215 | 213 | 211 | 213 | 214 | 217 | 220 |
| | Western Pacific | 311 | 325 | 331 | 333 | 333 | 332 | 327 |
| | High-income OECD | 151 | 140 | 129 | 123 | 119 | 108 | 99 |
| **Female** | **Global** | **222** | **202** | **184** | **175** | **168** | **154** | **142** |
| | African | 7 | 6 | 6 | 6 | 6 | 6 | 6 |
| | Americas | 29 | 27 | 24 | 23 | 22 | 20 | 18 |
| | Eastern Mediterranean | 7 | 6 | 6 | 6 | 6 | 6 | 6 |
| | European | 31 | 31 | 29 | 28 | 28 | 26 | 25 |
| | South-East Asia | 31 | 23 | 18 | 16 | 14 | 12 | 10 |
| | Western Pacific | 20 | 18 | 17 | 16 | 15 | 14 | 13 |
| | High-income OECD | 97 | 91 | 84 | 80 | 77 | 70 | 64 |
| **Both sexes** | **Global** | **1,128** | **1,119** | **1,112** | **1,113** | **1,114** | **1,126** | **1,147** |
| | African | 45 | 52 | 63 | 72 | 79 | 103 | 135 |
| | Americas | 84 | 79 | 74 | 71 | 69 | 64 | 59 |
| | Eastern Mediterranean | 54 | 63 | 75 | 84 | 90 | 108 | 129 |
| | European | 120 | 116 | 110 | 106 | 104 | 97 | 91 |
| | South-East Asia | 246 | 236 | 229 | 228 | 228 | 229 | 229 |
| | Western Pacific | 331 | 343 | 348 | 349 | 348 | 346 | 340 |
| | High-income OECD | 248 | 230 | 213 | 203 | 196 | 179 | 163 |

| | | Estimated | | | | Projected | | |
|---|---|---|---|---|---|---|---|---|
| **Sex** | **World Bank country income group** | **2000** | **2005** | **2010** | **2013** | **2015*** | **2020*** | **2025*** |
| **Male** | **Global** | **906** | **917** | **928** | **938** | **946** | **972** | **1,006** |
| | High-income | 193 | 182 | 172 | 166 | 162 | 151 | 143 |
| | Upper middle-income | 392 | 403 | 408 | 409 | 409 | 408 | 405 |
| | Lower middle-income | 252 | 261 | 274 | 286 | 295 | 321 | 351 |
| | Low-income | 69 | 70 | 73 | 77 | 80 | 92 | 107 |

## Table 2.2 (continued)

| Sex | World Bank country income group | Estimated | | | | Projected | | |
|---|---|---|---|---|---|---|---|---|
| | | 2000 | 2005 | 2010 | 2013 | 2015* | 2020* | 2025* |
| **Female** | **Global** | **222** | **202** | **184** | **175** | **168** | **154** | **142** |
| | High-income | 112 | 106 | 99 | 95 | 91 | 85 | 78 |
| | Upper middle-income | 61 | 56 | 51 | 48 | 46 | 42 | 38 |
| | Lower middle-income | 38 | 31 | 26 | 24 | 23 | 20 | 18 |
| | Low-income | 12 | 10 | 8 | 8 | 7 | 7 | 7 |
| **Both sexes** | **Global** | **1,128** | **1,119** | **1,112** | **1,113** | **1,114** | **1,126** | **1,147** |
| | High-income | 305 | 288 | 271 | 260 | 253 | 236 | 221 |
| | Upper middle-income | 453 | 459 | 459 | 457 | 455 | 450 | 443 |
| | Lower middle-income | 290 | 292 | 301 | 310 | 318 | 341 | 369 |
| | Low-income | 80 | 80 | 82 | 85 | 88 | 99 | 114 |

*Projections are shown for the years 2015, 2020, and 2025.
*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Based on data from World Health Organization 2015.[1] For more information, see the Statistical Annex.

Analyzing global data for 2013 by sex, there were just over five times as many male smokers (938 million) as female smokers (175 million) (Table 2.2). The majority of male adult smokers lived in the WHO Regions of the Western Pacific (333 million) and South-East Asia (213 million), accounting for 58% of all male smokers in the world. A very different picture emerges for females. Of the 175 million female smokers age 15 years and over in 2013, the large majority (80 million, or 46%) lived in high-income OECD countries. When using the World Bank country income groups, this proportion is even higher: 54% of female smokers globally live in high-income countries (HICs).[1] The lower prevalence of cigarette smoking among women in many LMICs and certain world regions results from many factors including low social acceptability of women's tobacco use, various sociocultural and religious factors, women's limited financial resources, and others.[13] However, in many LMICs, traditional constraints on women's tobacco use are likely to erode as women's social, legal, economic, and political status improves.[14] Evidence indicates that the influence of norms and traditions may already be weakening. For example, data from 14 countries that participated in the Global Adult Tobacco Survey (GATS)[15] show that women are increasingly initiating smoking at an age similar to that of men.[16] Thus, continued vigilance is warranted in order to avert a rise in smoking among women.

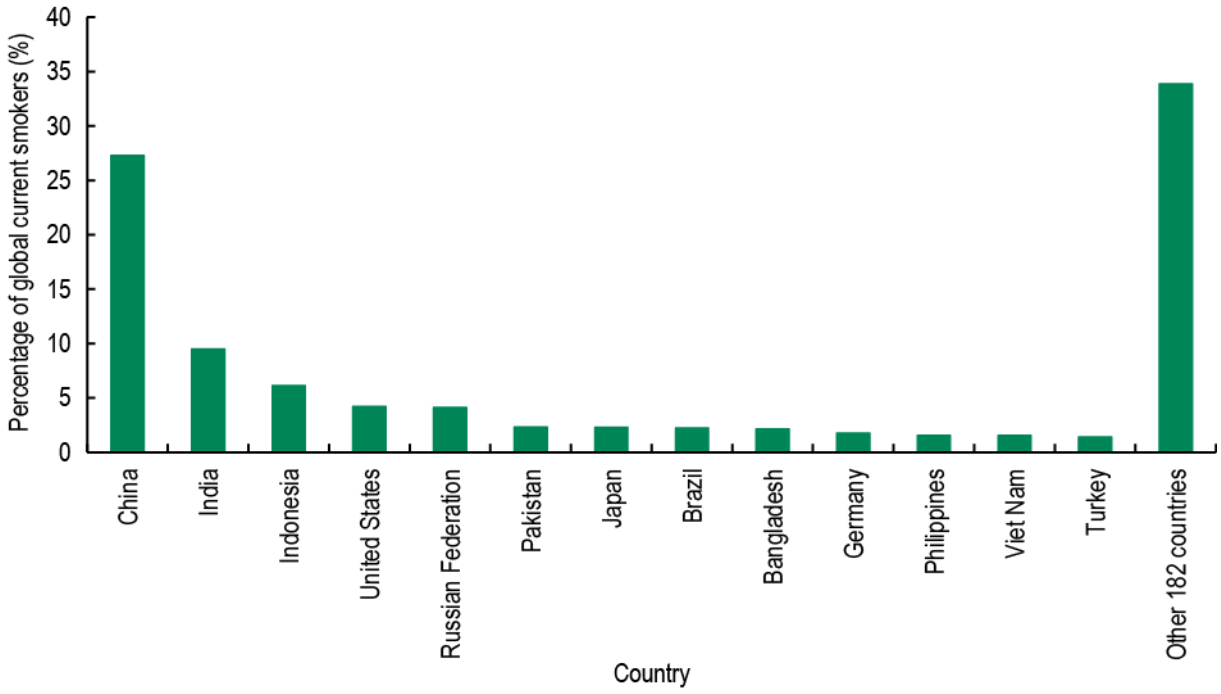
Fitted estimates to generate the underlying trends for most countries are also available in the *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2015*.[1] The data for 2013 indicate that nearly two-thirds of the world's smokers lived in just 13 countries (Bangladesh, Brazil, People's Republic of China, Germany, India, Indonesia, Japan, Pakistan, Philippines, Russian Federation, Turkey, United States, and Viet Nam) (Table 2.3 and Figure 2.3). These 13 countries accounted for a total of 736.3 million smokers (646.2 million males and 90.1 million females), with the remaining countries accounting for 376.9 million smokers.

## Table 2.3 Number of Current Tobacco Smokers Age 15 Years and Over (in Millions), by Country, 2013

| Country | Males | Females | Both sexes |
|---|---|---|---|
| **Global** | **938.5** | **174.7** | **1,113.2** |
| Bangladesh | 23.1 | 0.4 | 23.6 |
| Brazil | 15.0 | 9.5 | 24.6 |
| China | 292.1 | 11.5 | 303.5 |
| Germany | 10.6 | 8.7 | 19.3 |
| India | 96.7 | 8.5 | 105.2 |
| Indonesia | 64.7 | 3.1 | 67.8 |
| Japan* | 19.5 | 5.8 | 25.3 |
| Pakistan | 23.9 | 1.8 | 25.7 |
| Philippines | 14.4 | 2.6 | 17.0 |
| Russian Federation | 32.6 | 12.8 | 45.4 |
| Turkey | 11.5 | 3.8 | 15.3 |
| United States* | 25.7 | 21.0 | 46.7 |
| Viet Nam | 16.4 | 0.5 | 16.9 |
| Other 182 countries | 292.3 | 84.6 | 376.9 |

*Data for cigarette smokers only.
*Source:* World Health Organization 2015.[1]

## Figure 2.3 Percentage of Global Current Tobacco Smokers Age 15 Years and Over, by Country, 2013




*Note:* Data for the United States and Japan only include cigarette smokers.
*Source:* World Health Organization 2015.[1]

The majority of the male smokers of the world, 292.1 million (31.1%), live in China. Although the prevalence of smoking among women in China is relatively low, the sheer size of its population gives China the third-largest number of female smokers (11.5 million), after the United States (21.0 million) and the Russian Federation (12.8 million).[1]

### Daily and Non-daily Smoking Among Adults

Current tobacco smoking includes both daily and non-daily (i.e., occasional) smoking. Differences in smoking behavior, such as daily versus non-daily smoking, may result from different patterns of tobacco dependence as well as cultural, social, economic, and environmental influences. As depicted in Table 2.4 and Figure 2.4, WHO estimated that in 2013, world prevalence of current tobacco smoking was 21.2% (35.8% for males and 6.6% for females). The large majority of current tobacco smokers (83.0%) used tobacco daily; 83.9% of male current smokers and 77.8% of female current smokers were daily smokers.[1]

**Table 2.4 Percentage of People Age 15 Years and Over Who Currently Smoke Tobacco Daily and Non-daily, by WHO Region and Country Income Group, 2013**

| | | Prevalence of smoking | | | |
|---|---|---|---|---|---|
| Sex | WHO Region | Current | Daily | Non-daily | Proportion of daily to current |
| **Male** | **Global** | **35.8** | **30.0** | **5.8** | **83.9** |
| | African | 24.7 | 19.1 | 5.6 | 77.4 |
| | Americas | 22.8 | 15.9 | 6.8 | 70.0 |
| | Eastern Mediterranean | 36.8 | 30.9 | 6.0 | 83.8 |
| | European | 48.5 | 41.3 | 7.2 | 85.1 |
| | South-East Asia | 31.7 | 27.5 | 4.2 | 86.8 |
| | Western Pacific | 49.4 | 42.3 | 7.1 | 85.6 |
| | High-income OECD | 28.6 | 23.7 | 5.0 | 82.6 |
| **Female** | **Global** | **6.6** | **5.2** | **1.5** | **77.8** |
| | African | 2.3 | 1.6 | 0.6 | 71.4 |
| | Americas | 10.4 | 7.4 | 3.0 | 70.9 |
| | Eastern Mediterranean | 2.8 | 2.1 | 0.8 | 73.2 |
| | European | 15.6 | 12.1 | 3.5 | 77.5 |
| | South-East Asia | 2.4 | 1.9 | 0.5 | 78.0 |
| | Western Pacific | 2.4 | 2.0 | 0.4 | 82.2 |
| | High-income OECD | 17.7 | 14.1 | 3.6 | 79.8 |

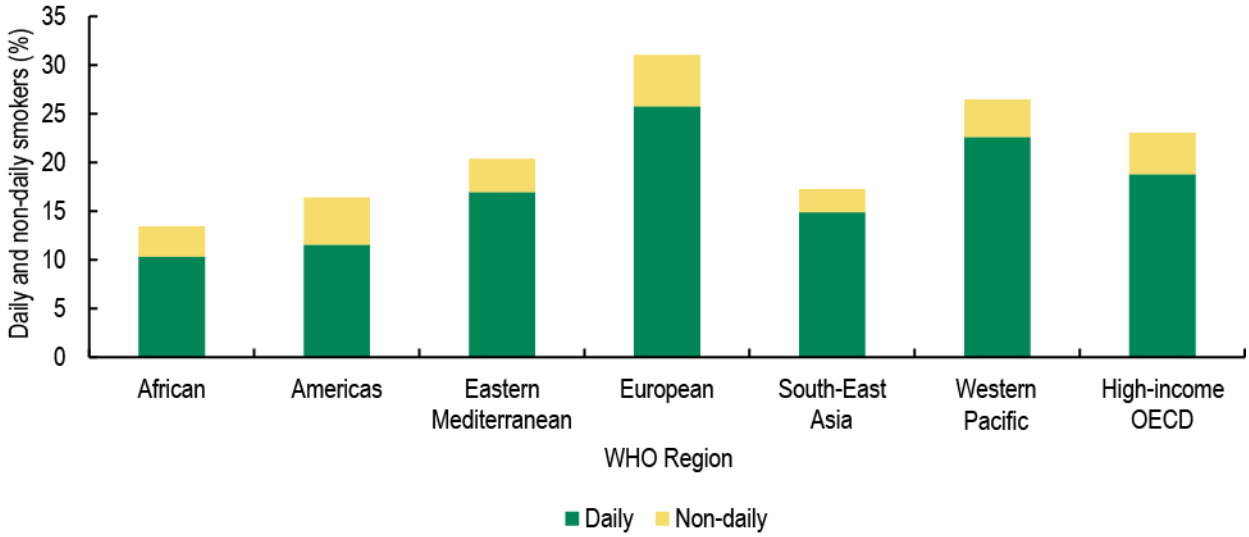
## Table 2.4 (continued)

| Sex | WHO Region | Prevalence of smoking | | | Proportion of daily to current |
|---|---|---|---|---|---|
| | | Current | Daily | Non-daily | |
| **Both sexes** | **Global** | **21.2** | **17.6** | **3.6** | **83.0** |
| | African | 13.4 | 10.3 | 3.1 | 76.8 |
| | Americas | 16.4 | 11.5 | 4.9 | 70.3 |
| | Eastern Mediterranean | 20.4 | 16.9 | 3.4 | 83.1 |
| | European | 31.0 | 25.7 | 5.3 | 83.1 |
| | South-East Asia | 17.2 | 14.9 | 2.4 | 86.2 |
| | Western Pacific | 26.4 | 22.6 | 3.9 | 85.4 |
| | High-income OECD | 23.0 | 18.8 | 4.3 | 81.5 |

| Sex | World Bank country income group | Prevalence of smoking | | | Proportion of daily to current |
|---|---|---|---|---|---|
| | | Current | Daily | Non-Daily | |
| **Male** | **Global** | **35.8** | **30.0** | **5.8** | **83.9** |
| | High-income | 32.1 | 26.8 | 5.3 | 83.5 |
| | Upper middle-income | 42.4 | 35.7 | 6.7 | 84.3 |
| | Lower middle-income | 32.3 | 27.3 | 5.0 | 84.5 |
| | Low-income | 30.2 | 24.5 | 5.7 | 81.0 |
| **Female** | **Global** | **6.6** | **5.2** | **1.5** | **77.8** |
| | High-income | 17.5 | 13.9 | 3.6 | 79.7 |
| | Upper middle-income | 5.1 | 3.9 | 1.2 | 76.5 |
| | Lower middle-income | 2.8 | 2.1 | 0.7 | 75.1 |
| | Low-income | 2.9 | 2.1 | 0.8 | 71.1 |
| **Both sexes** | **Global** | **21.2** | **17.6** | **3.6** | **83.0** |
| | High-income | 24.6 | 20.2 | 4.4 | 82.1 |
| | Upper middle-income | 23.8 | 19.9 | 3.9 | 83.4 |
| | Lower middle-income | 17.7 | 14.8 | 2.9 | 83.8 |
| | Low-income | 16.4 | 13.1 | 3.3 | 80.1 |

*Notes:* Current smoking is the sum of the prevalences of daily and non-daily smoking. WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* World Health Organization 2015.[1]

## Figure 2.4 Percentage of People Age 15 Years and Over Who Currently Smoke Tobacco Daily and Non-daily, by WHO Region, 2013

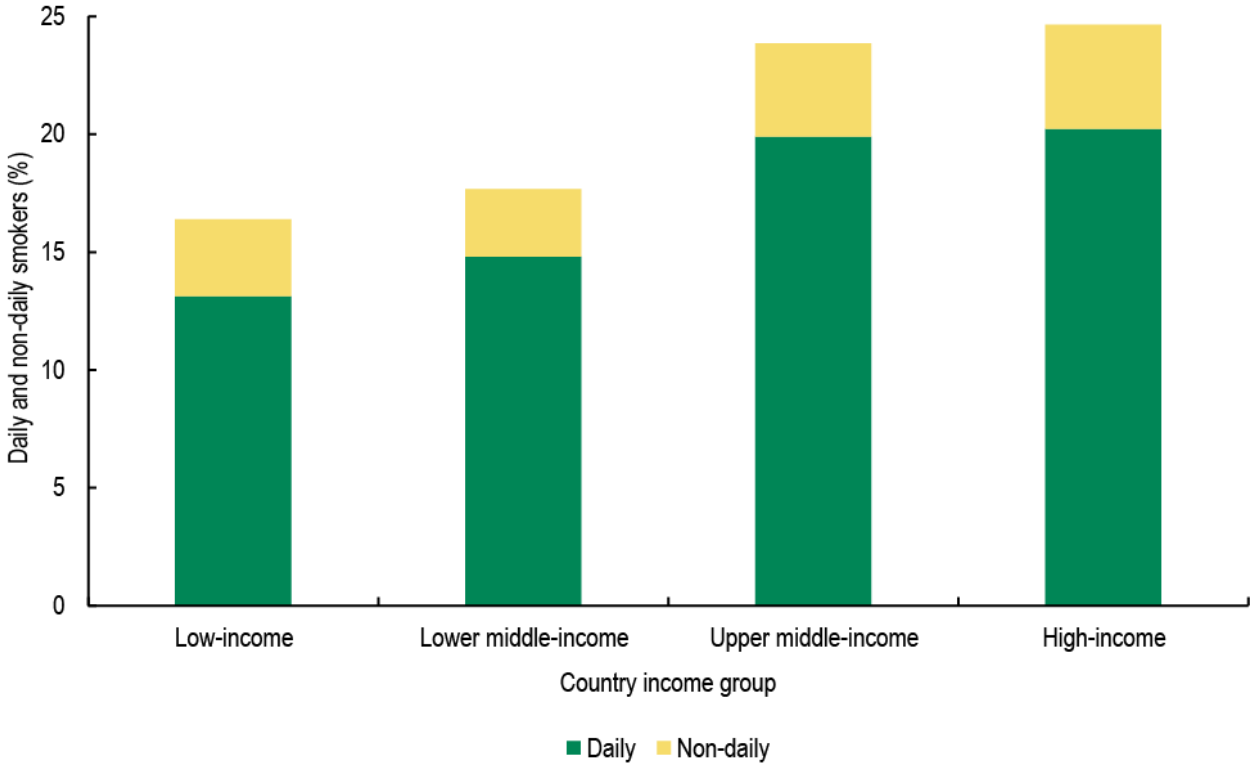



*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions.
*Source:* World Health Organization 2015.[1]

Among males, the proportion of daily to current smokers was higher in the Eastern Mediterranean, European, South-East Asia, and Western Pacific Regions, with values ranging between 84% and 87%. In contrast, 70% of male current smokers in the Region of the Americas and 77% in the African Region were daily smokers. Among females, the proportion of daily to current smokers was higher than 80% in the Western Pacific Region only, whereas the proportion for all other Regions ranged between 71% and 78%.[1]

The above pattern was essentially replicated when using World Bank country income group categories (Table 2.4 and Figure 2.5). The proportion of daily to current tobacco smoking was lowest in low-income countries for both males and females.

**Figure 2.5 Percentage of People Age 15 Years and Over Who Currently Smoke Tobacco Daily and Non-daily, by Country Income Group, 2013**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* World Health Organization 2015.[1]

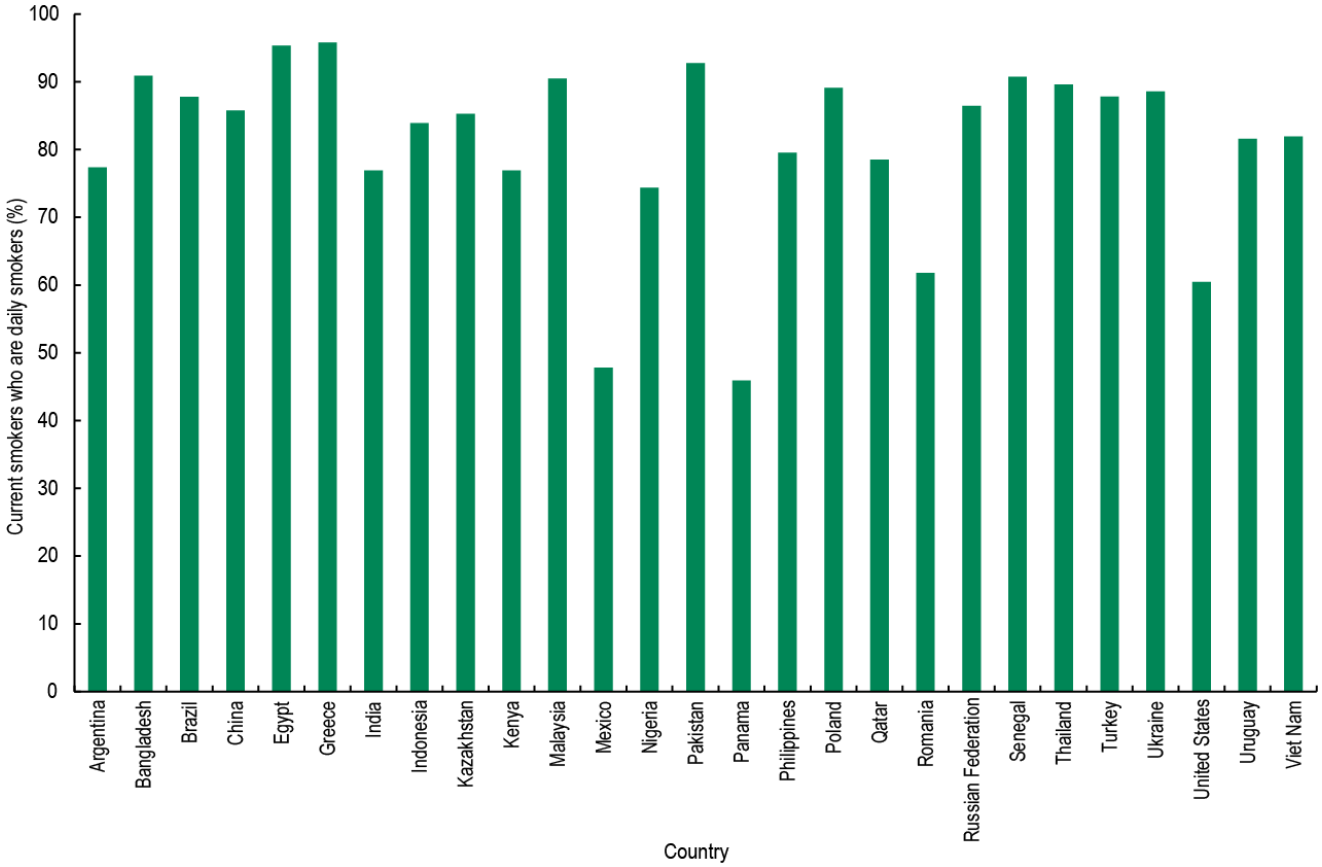
Table 2.5 and Figure 2.6 show data derived from GATS. For data on adult tobacco use in the United States, NATS was used. Analysis of data in this figure and table provides a largely consistent picture of daily versus current tobacco smoking. The proportion of daily to current smoking was about 75% or greater in 23 of the 27 countries that had undertaken the survey. Exceptions to the overall picture were the United States and Romania (both at about 61%) and two Central American countries, Mexico and Panama (below 50%). This means that for most countries included in the analysis, the majority of smokers are daily smokers.

## Table 2.5 Percentage of People Age 15 Years and Over Who Currently Smoke Tobacco Daily, in Selected Countries, by Sex, 2008–2014

| | Both sexes | | | Males | | | Females | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | Current | Daily | Daily to current | Current | Daily | Daily to current | Current | Daily | Daily to current |
| Argentina | 22.1 | 17.1 | 77.4 | 29.4 | 21.9 | 74.5 | 15.6 | 12.7 | 81.4 |
| Bangladesh | 23.0 | 20.9 | 90.9 | 44.7 | 40.7 | 91.1 | 1.5 | 1.3 | 86.7 |
| Brazil | 17.2 | 15.1 | 87.8 | 21.6 | 18.9 | 87.5 | 13.1 | 11.5 | 87.8 |
| China | 28.1 | 24.1 | 85.8 | 52.9 | 45.4 | 85.8 | 2.4 | 2.0 | 83.3 |
| Egypt | 19.4 | 18.5 | 95.4 | 37.7 | 35.8 | 95.0 | 0.5 | 0.5 | 100.0 |
| Greece | 38.2 | 36.6 | 95.8 | 51.2 | 49.7 | 97.1 | 25.7 | 23.9 | 93.0 |
| India | 14.0 | 10.7 | 76.4 | 24.3 | 18.3 | 75.3 | 2.9 | 2.4 | 82.8 |
| Indonesia | 34.8 | 29.2 | 83.9 | 67.0 | 56.7 | 84.6 | 2.7 | 1.8 | 66.7 |
| Kazakhstan | 22.4 | 19.1 | 85.3 | 42.4 | 36.9 | 87.0 | 4.5 | 3.2 | 71.1 |
| Kenya | 7.8 | 6.0 | 76.9 | 15.1 | 11.6 | 76.8 | 0.8 | 0.6 | 75.0 |
| Malaysia | 23.1 | 20.9 | 90.5 | 43.9 | 39.9 | 90.9 | 1.0 | 0.7 | 70.0 |
| Mexico | 15.9 | 7.6 | 47.8 | 24.8 | 11.8 | 47.6 | 7.8 | 3.7 | 47.4 |
| Nigeria | 3.9 | 2.9 | 74.4 | 7.3 | 5.6 | 76.7 | 0.4 | 0.3 | 75.0 |
| Pakistan | 12.4 | 11.5 | 92.7 | 22.2 | 20.6 | 92.8 | 2.1 | 2.0 | 95.2 |
| Panama | 6.1 | 2.8 | 45.9 | 9.4 | 4.4 | 46.8 | 2.8 | 1.2 | 42.9 |
| Philippines | 28.3 | 22.5 | 79.5 | 47.7 | 38.2 | 80.1 | 9.0 | 6.9 | 76.7 |
| Poland | 30.3 | 27.0 | 89.1 | 36.9 | 33.5 | 90.8 | 24.4 | 21.0 | 86.1 |
| Qatar | 12.1 | 9.5 | 78.5 | 20.2 | 16.5 | 81.7 | 3.1 | 1.7 | 54.8 |
| Romania | 26.7 | 16.5 | 61.8 | 37.4 | 17.6 | 47.1 | 16.7 | 14.1 | 84.4 |
| Russian Federation | 39.1 | 33.8 | 86.4 | 60.2 | 55.0 | 91.4 | 21.7 | 16.3 | 75.1 |
| Senegal | 5.4 | 4.9 | 90.7 | 10.7 | 9.7 | 90.7 | 0.4 | 0.3 | 75.0 |
| Thailand | 24.0 | 21.5 | 89.6 | 46.6 | 42.0 | 90.1 | 2.6 | 2.1 | 80.8 |
| Turkey | 27.1 | 23.8 | 87.8 | 41.5 | 37.3 | 89.9 | 13.1 | 10.7 | 81.7 |
| Ukraine | 28.8 | 25.5 | 88.5 | 50.0 | 45.4 | 90.8 | 11.2 | 8.9 | 79.5 |
| United States* | 22.3 | 13.7 | 61.4 | 27.0 | 15.5 | 57.4 | 18.1 | 12.1 | 66.9 |
| Uruguay | 25.0 | 20.4 | 81.6 | 30.7 | 24.8 | 80.8 | 19.8 | 16.4 | 82.8 |
| Viet Nam | 23.8 | 19.5 | 81.9 | 47.4 | 38.7 | 81.6 | 1.4 | 1.2 | 85.7 |

*Shows data for smokers age 18 years and older from the U.S. National Adult Tobacco Survey.
*Note:* Current smoking is the sum of the prevalences of daily and non-daily smoking.
*Sources:* Global Adult Tobacco Survey 2008–2014.[15] National Adult Tobacco Survey 2013–2014.[4]

**Figure 2.6 Percentage of Current Smokers Age 15 Years and Over Who are Daily Tobacco Smokers, by Country, 2008–2014**




*Notes:* Current smoking is the sum of the prevalences of daily and non-daily smoking. Data presented for the United States is for smokers age 18 and older based on the National Adult Tobacco Survey.
*Sources:* Global Adult Tobacco Survey 2008–2014.[15] National Adult Tobacco Survey 2013–2014.[4]

In addition to daily tobacco smoking, another good indicator of addictiveness and tobacco dependence is the average number of cigarettes smokers use daily (Table 2.6).

The GATS data suggest that, on average, daily smokers consume 10 or more cigarettes per day. India reported the lowest average number of cigarettes smoked per day per smoker (6.2 cigarettes per day), but the population of India is known to use ST heavily. The average number of cigarettes smoked per day by women in India (7.0) was nominally higher than average use by Indian men (6.1). Although the reported overall prevalence for women for many of the countries was low, mean cigarettes per day of those who did smoke was quite high in some countries.[15]

### Table 2.6 Mean Number of Cigarettes Smoked Per Day Per Smoker, 2008–2014

| Country | Males | Females | Both sexes |
|---|---|---|---|
| Argentina | 16.6 | 13.0 | 15.2 |
| Bangladesh* | 5.2 | 0.8 | 5.1 |
| China | 14.3 | 10.6 | 14.2 |
| Egypt | 19.3 | — | 19.4 |
| Greece | 21.3 | 16.8 | 19.8 |
| India | 6.1 | 7.0 | 6.2 |
| Indonesia | 13.0 | 8.1 | 12.8 |
| Kazakhstan | 15.2 | 11.8 | 14.9 |
| Malaysia | 14.0 | — | 13.9 |
| Mexico | 9.7 | 8.4 | 9.4 |
| Nigeria | 8.0 | — | 8.3 |
| Pakistan | 13.7 | 10.3 | 13.6 |
| Panama | 16.3 | 10.1 | 14.8 |
| Philippines | 11.3 | 7.0 | 10.6 |
| Qatar* | 17.6 | 10.9 | 17.2 |
| Romania | 17.7 | 14.1 | 16.6 |
| Russian Federation* | 18.4 | 12.6 | 16.9 |
| Thailand | 10.0 | 9.3 | 10.0 |
| Turkey | 20.3 | 15.3 | 19.2 |
| Ukraine | 18.2 | 11.8 | 16.9 |
| United States | 17.0 | 14.0 | 15.6 |
| Viet Nam | 13.6 | 10.9 | 13.5 |

*Data shown refer to average number of cigarettes smoked by current (daily or non-daily) cigarette smokers. For all other countries, the average number of cigarettes smoked by daily smokers is presented.
*Sources:* Global Adult Tobacco Survey 2008–2014.[15] National Adult Tobacco Survey 2013–2014.[4]

## Current Cigarette Smoking Among Youth

Information on use of tobacco products by youth was drawn from the Global Youth Tobacco Surveys[5] and the Health Behaviour in School-Aged Children surveys.[6] Adjustments were made to account for the fact that the GYTS captures information on youth ages 13–15 years, and the HBSC surveys youth ages 11, 13, and 15 years. In addition, the GYTS reports information on cigarette smoking and smokeless tobacco use, and the HBSC captures information on smoked tobacco (including cigarettes). For data on tobacco use by youth in the United States, the National Youth Tobacco Survey[7] was used.

Using both GYTS and HBSC data for the period 2007–2014 applied to the 2010 population (Table 2.7 and Figure 2.7), an estimated 7.0% of youth ages 13–15 years worldwide smoked cigarettes. The prevalence of cigarette smoking for boys (9.4%) was over 2 times that for girls (4.5%). Excluding youth from the high-income OECD countries, youth from the Americas (13.0%) and European (9.8%) Regions had the highest prevalence of cigarette smoking compared with youth from any other region.

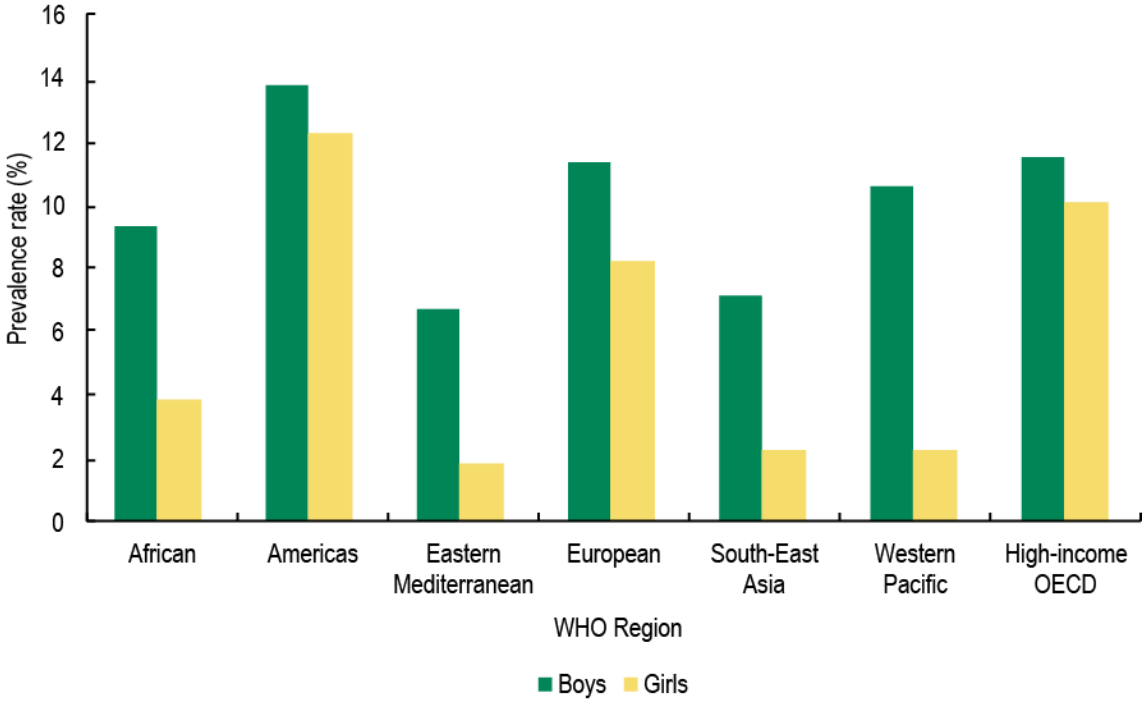
### Table 2.7 Prevalence of Cigarette Smoking Among Youth Ages 13–15 Years, by WHO Region and Country Income Group, 2007–2014

| | Estimated prevalence (%) | | | Number of smokers (in thousands) | | |
|---|---|---|---|---|---|---|
| **WHO Region** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **9.4** | **4.5** | **7.0** | **17,148** | **7,658** | **24,806** |
| African | 9.3 | 3.8 | 6.6 | 2,788 | 1,126 | 3,914 |
| Americas | 13.7 | 12.2 | 13.0 | 2,272 | 1,954 | 4,226 |
| Eastern Mediterranean | 6.7 | 1.8 | 4.3 | 1,255 | 317 | 1,572 |
| European | 11.3 | 8.2 | 9.8 | 964 | 675 | 1,639 |
| South-East Asia | 7.1 | 2.2 | 6.6 | 3,847 | 1,079 | 4,926 |
| Western Pacific | 10.5 | 2.2 | 6.6 | 3,846 | 713 | 4,559 |
| High-income OECD | 11.5 | 10.0 | 7.0 | 2,175 | 1,795 | 3,970 |

| | Estimated prevalence (%) | | | Number of smokers (in thousands) | | |
|---|---|---|---|---|---|---|
| **World Bank country income group** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **9.4** | **4.5** | **7.0** | **17,148** | **7,658** | **24,806** |
| High-income | 11.7 | 9.9 | 10.9 | 2,420 | 1,940 | 4,359 |
| Upper middle-income | 11.6 | 5.6 | 8.7 | 6,810 | 3,037 | 9,846 |
| Lower middle-income | 7.5 | 2.6 | 5.1 | 6,340 | 2,016 | 8,356 |
| Low-income | 8.0 | 3.4 | 5.7 | 1,579 | 666 | 2,245 |

*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. The number of users was calculated by applying the prevalence rates to the estimates provided for the year 2010 by the United Nations. Country income group classification based on World Bank Analytical Classifications for 2014.
*Sources:* Global Youth Tobacco Survey 2007–2014.[5] Health Behaviour in School-Aged Children 2013–2014.[6]

## Figure 2.7 Prevalence of Current Cigarette Smoking Among Youth, by WHO Region, 2007–2014



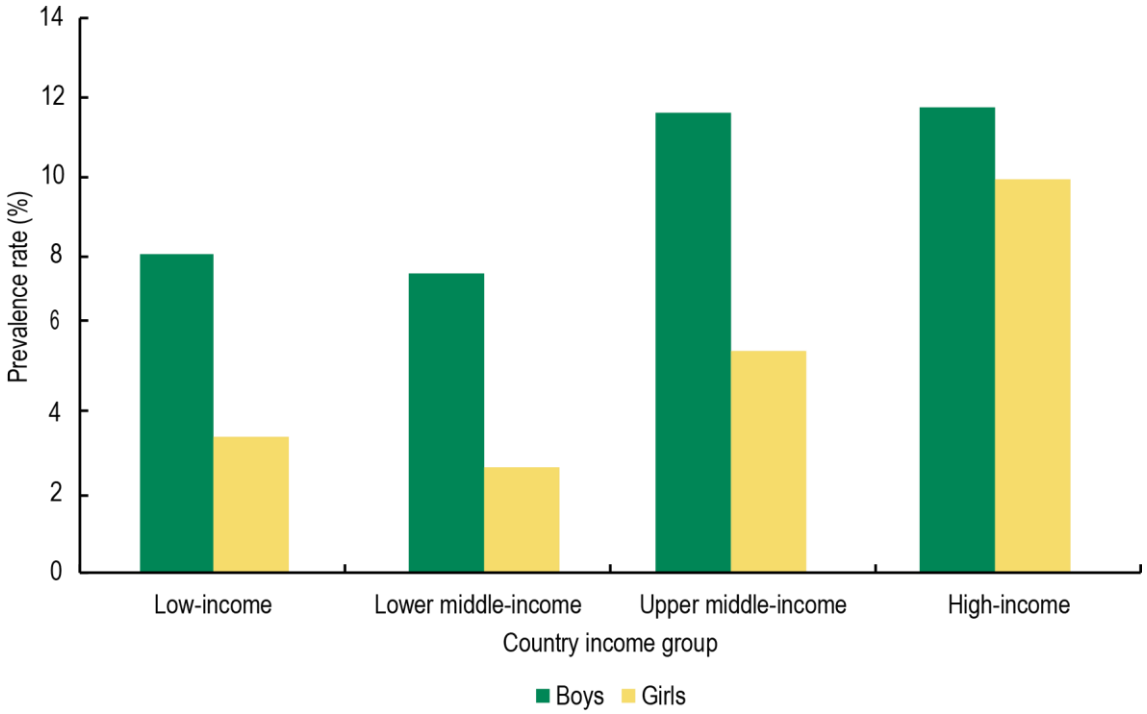

*Notes:* WHO = World Health Organization. OECD = high-income countries as defined by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. The number of users was calculated by applying the prevalence rates to the United Nations–provided population estimates for the year 2010.
*Sources:* Global Youth Tobacco Survey 2007–2014.[5] Health Behaviour in School-Aged Children 2013–2014.[6]

Youth from the Eastern Mediterranean Region had the lowest prevalence of cigarette smoking (4.3%). However, use of other smoked products—especially waterpipe use—is common in this region. An analysis of GYTS data since 2006 shows that when all smoked products are included, prevalence of tobacco smoking in youth of the Eastern Mediterranean Region increases to 8.2%, around double that of cigarette smoking alone. A similar analysis was also conducted for the South-East Asia Region, where products such as bidis or kreteks are known to be popular; this analysis found an all-tobacco smoking prevalence rate of 9.1%, which was almost double the 4.7% rate for cigarette smoking alone.[5]

As shown in Figure 2.8, the prevalence of current cigarette smoking among boys and girls in HICs was not only relatively high, the difference between prevalence among boys and girls in HICs was much smaller than in other country income groups, where boys had a much higher current smoking prevalence than girls.

The analyses undertaken for this monograph raise further concern about the relative increase in tobacco use by girls. Although the ratio of the 2013 prevalence rate for smoking by men in the Western Pacific Region (49.4%) compared to the prevalence of smoking among women in that region (2.4%; Table 2.1) was 20.6, the corresponding ratio between smoking prevalences for boys and girls in that region was only about 5.0. Similarly, for the South-East Asia Region, the ratio of smoking prevalences for men and women was 13.2, while the boys-to-girls ratio was only 4.6. And in the African Region, the men-to-women smoking ratio was 10.7 compared with a boys-to-girls ratio of 2.6. These results indicate that in the future, the burden of tobacco use in men and women will be more similar than it is today.

**Figure 2.8 Prevalence of Current Cigarette Smoking Among Youth, by Country Income Group, 2007–2014**




*Notes:* Country income group classification based on World Bank Analytical Classifications for 2014. The number of users was calculated by applying the prevalence rates to the United Nations–provided population estimates for the year 2010.
*Sources:* Global Youth Tobacco Survey 2007–2014.[5] Health Behaviour in School-Aged Children 2013–2014.[6]

## Global Cigarette Consumption

Using data from Euromonitor International,[12] WHO found that the world's smokers consumed more than 5.6 trillion cigarettes in 2013, compared with 5.2 trillion cigarettes in 2000 (Table 2.8, Figure 2.9)—an increase of 437 billion sticks, or an 8.4% increase in total cigarette consumption since 2000 (though this rising trend may be leveling off). This change is equivalent to an absolute increase of 33.6 billion sticks per year. In 2013, total annual cigarette consumption was highest in the Western Pacific Region (2.7 trillion), followed by the high-income OECD countries (1.1 trillion) and the European Region (0.7 trillion) (Table 2.8). Together, countries in these three areas accounted for 80% of global cigarette consumption.

The global increase in consumption was substantially higher during the period that preceded the entry into force of the WHO Framework Convention on Tobacco Control (WHO FCTC) on February 27, 2005. Between 2000 and 2005, the increase was 49.4 billion sticks per year, compared with an increase of only 23.8 billion per year between 2005 and 2013. In the high-income OECD countries in the years 2000–2005, average cigarette consumption declined by 37.2 billion sticks per year (from 1,669 billion sticks in 2000 to 1,483 billion sticks in 2005). In contrast, these countries experienced an average reduction of 47.0 billion sticks per year in the years 2005 through 2013. In the Region of the Americas (excluding Canada and the United States, which are high-income OECD countries) the volume of cigarettes consumed in 2000 was 242 billion sticks, which increased rapidly to 270 billion sticks in 2001, after which the volume remained relatively stable through 2005. Since 2005 the volume of cigarettes consumed in the Americas has declined steadily, reaching 210 billion sticks in

2013. In the European Region (again, excluding high-income OECD countries), annual consumption increased rapidly from 690 billion sticks in 2000 to a high of 856 billion sticks in 2008 and has consistently declined since then, reaching 706 billion sticks in 2013 (Table 2.8).[12]

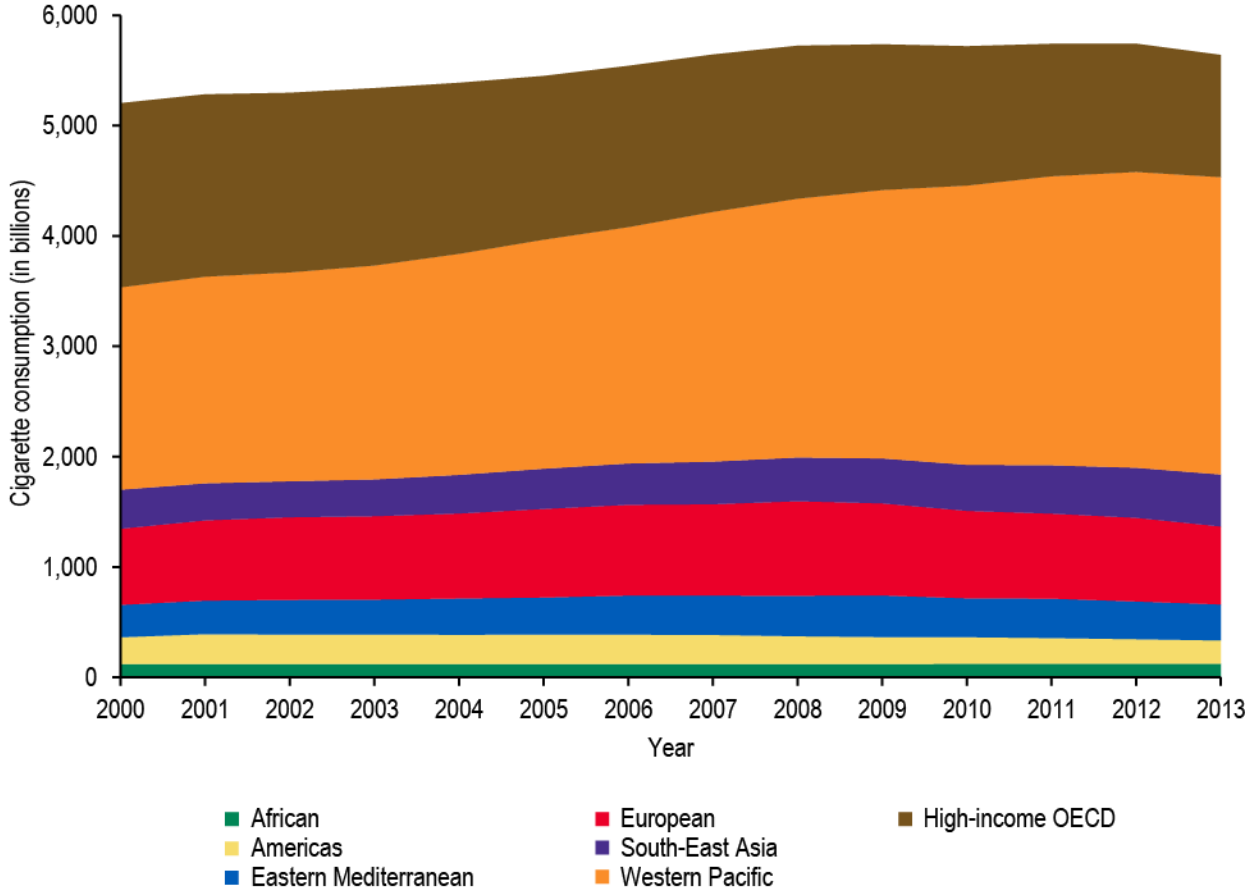
### Table 2.8 Global Consumption of Cigarette Sticks (in Billions), by WHO Region and Country Income Group, 2000–2013

| WHO Region | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Global** | **5,204** | **5,284** | **5,299** | **5,340** | **5,389** | **5,451** | **5,543** | **5,645** | **5,725** | **5,738** | **5,721** | **5,742** | **5,743** | **5,641** |
| African | 123 | 122 | 123 | 123 | 121 | 122 | 121 | 121 | 122 | 123 | 124 | 125 | 126 | 126 |
| Americas | 242 | 270 | 265 | 267 | 266 | 268 | 267 | 264 | 252 | 244 | 241 | 232 | 221 | 210 |
| Eastern Mediterranean | 293 | 304 | 315 | 316 | 329 | 335 | 354 | 356 | 367 | 377 | 352 | 357 | 342 | 326 |
| European | 690 | 727 | 749 | 756 | 770 | 803 | 822 | 828 | 856 | 834 | 792 | 770 | 758 | 706 |
| South-East Asia | 354 | 336 | 326 | 334 | 351 | 365 | 375 | 386 | 396 | 408 | 418 | 438 | 454 | 471 |
| Western Pacific | 1,834 | 1,873 | 1,893 | 1,939 | 2,003 | 2,076 | 2,142 | 2,263 | 2,346 | 2,432 | 2,531 | 2,619 | 2,681 | 2,695 |
| High-income OECD | 1,669 | 1,652 | 1,627 | 1,607 | 1,549 | 1,483 | 1,461 | 1,425 | 1,386 | 1,320 | 1,262 | 1,200 | 1,162 | 1,107 |

| World Bank country income group | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Global** | **5,204** | **5,284** | **5,299** | **5,340** | **5,389** | **5,451** | **5,543** | **5,645** | **5,725** | **5,738** | **5,721** | **5,742** | **5,743** | **5,641** |
| High-income | 2,040 | 2,034 | 2,016 | 1,997 | 1,948 | 1,906 | 1,896 | 1,854 | 1,837 | 1,766 | 1,700 | 1,633 | 1,592 | 1,514 |
| Upper middle-income | 2,381 | 2,454 | 2,472 | 2,515 | 2,588 | 2,653 | 2,727 | 2,833 | 2,918 | 2,991 | 3,041 | 3,134 | 3,178 | 3,165 |
| Lower middle-income | 670 | 688 | 699 | 716 | 741 | 777 | 802 | 836 | 841 | 847 | 843 | 837 | 830 | 820 |
| Low-income | 113 | 108 | 111 | 113 | 113 | 115 | 118 | 123 | 129 | 134 | 137 | 139 | 143 | 143 |

*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Euromonitor International 2016.[12]

**Figure 2.9 Global Consumption of Cigarette Sticks (in Billions), by WHO Region, 2000–2013**



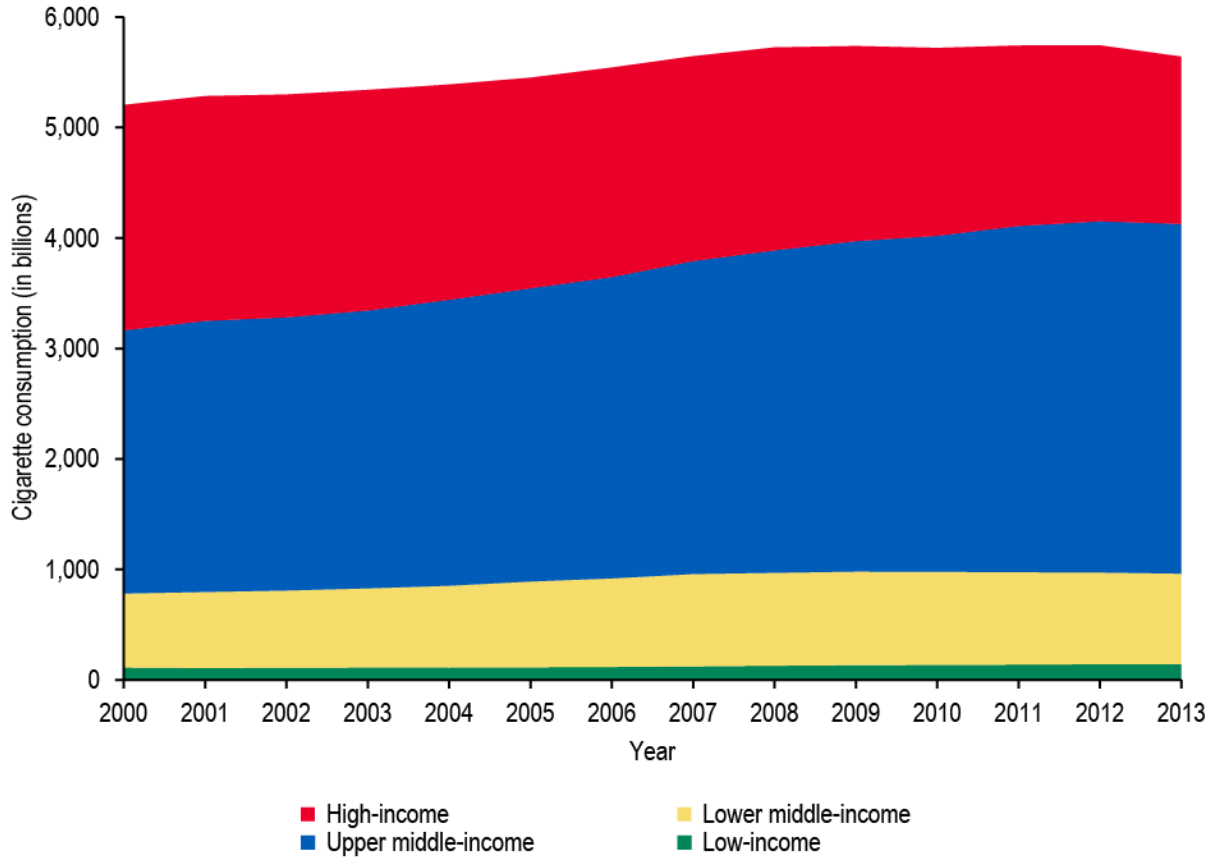

*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions.
*Source:* Euromonitor International 2016.[12]

The African Region has experienced a subtle but visible increase in the recent past. During the period 2000–2009, between 121 and 123 billion sticks were consumed each year. Since 2008, consumption has increased steadily, reaching 126 billion sticks in 2013. The Eastern Mediterranean Region has also experienced an interesting change. Between 2000 and 2009, consumption in the Eastern Mediterranean Region increased steadily from 293 billion sticks to 377 billion sticks, after which consumption declined to 326 billion sticks in 2013. However, the Eastern Mediterranean Region has been subject to substantial political turmoil and conflict in the past few years, and the resulting breakdown in law and order in several Member States appears to have resulted in substantial importation of illicit cigarettes.[17] In addition, use of waterpipes has increased substantially in this region, and large numbers of cigarette smokers may have switched to waterpipes in the recent past.

The remaining two regions, by far the most populous regions of the world, have experienced substantial increases in consumption—a 33.1% increase in South-East Asia, from 354 billion sticks consumed in 2000 to 471 billion sticks in 2013, and a 47.0% increase in the Western Pacific (excluding high-income OECD countries such as Australia, Japan, Republic of Korea, and others), from 1,834 billion sticks consumed in 2000 to 2,695 billion sticks in 2013.[12]

The trends in cigarette consumption by WHO Region are consistent with trends in consumption by World Bank country income group (Figure 2.10). Annual cigarette consumption decreased by 25.5% in HICs, from 2,040 billion sticks consumed in 2000 to 1,514 billion sticks in 2013. In contrast, consumption increased in all other country income groups. Consumption in low-income countries increased by 26.3% from 2000 to 2013; most of this increase occurred between 2005 and 2013. From 2000 through 2005, consumption remained relatively unchanged at around 113 billion sticks. In lower middle-income countries consumption increased rapidly between 2000 and 2009 from 670 billion sticks to 847 billion sticks. After 2009, consumption declined, reaching 820 billion sticks in 2013. Upper middle-income countries, which account for 56.1% of global consumption, experienced an 11.4% increase between 2000 and 2005 compared with a 19.3% increase in the period 2005–2013.[12]

**Figure 2.10 Global Consumption of Cigarette Sticks (in Billions), by Country Income Group, 2000–2013**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Euromonitor International 2016.[12]

## Global Cigarette Consumption Per Capita

As shown in Table 2.9 and Figure 2.11, annual per capita cigarette consumption among people age 15 and older around the world has declined steadily since 2000. The major driver of that reduction has been the decline in per capita consumption in high-income OECD countries, from 2,246 cigarettes per person in 2000 to 1,459 cigarettes per person in 2013. Per capita consumption also declined in the Region of the Americas (excluding Canada and the United States, which are high-income OECD countries), from 894 in 2000 to 587 in 2013. In the African Region, despite a small increase in overall

consumption in the region, per capita consumption fell from 379 cigarettes per person in 2000 to 255 per person in 2013. On the other hand, two regions experienced large increases: In the European Region, excluding high-income OECD countries, per capita consumption increased from 1,984 cigarettes per person in 2000 to 2,322 cigarettes per person in 2013; and in the Western Pacific Region, from 1,661 cigarettes per person in 2000 to 1,965 cigarettes per person in 2013.[12]

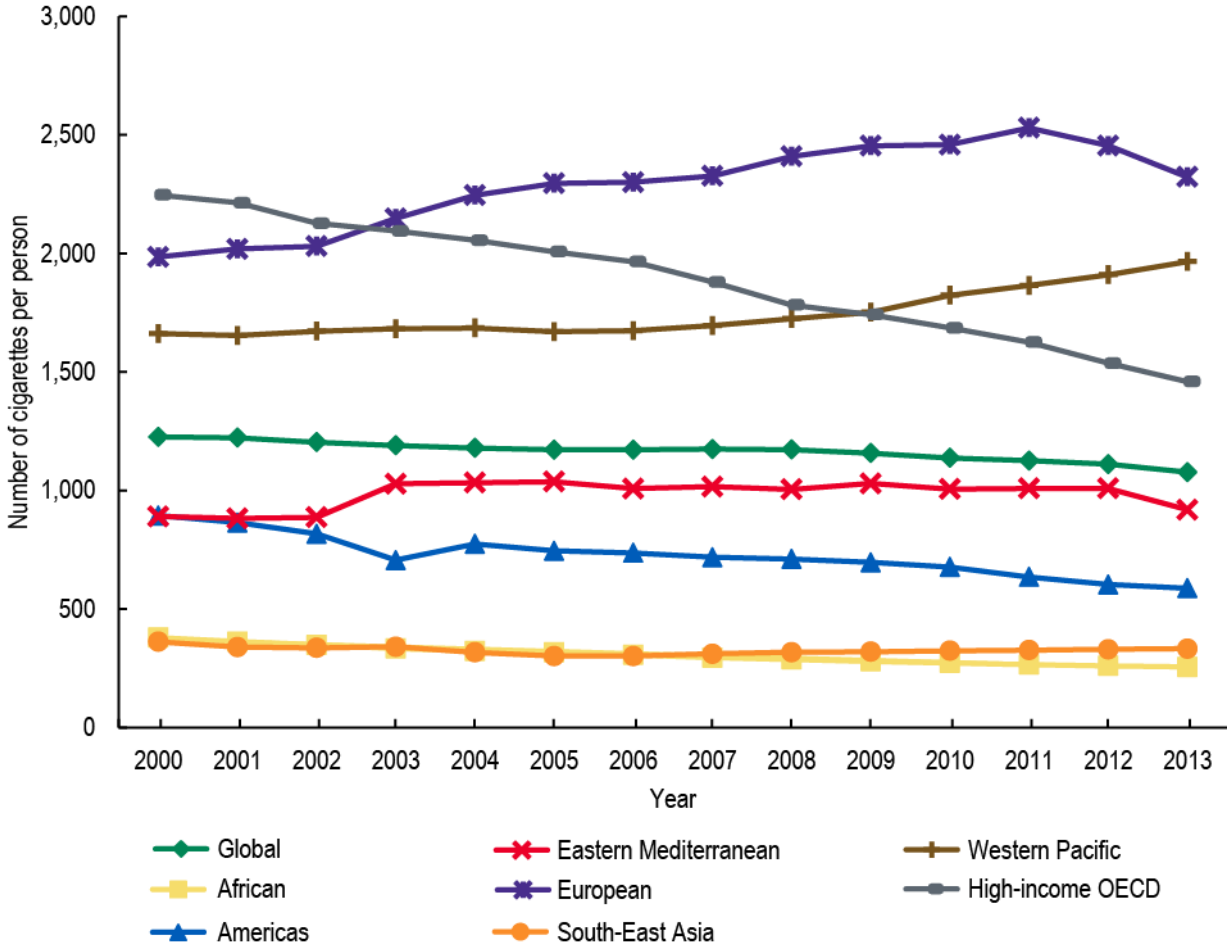
### Table 2.9 Per Capita Consumption of Cigarette Sticks Among People Age 15 Years and Older, by WHO Region and Country Income Group, 2000–2013

| WHO Region | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Global** | **1,226** | **1,222** | **1,203** | **1,190** | **1,179** | **1,171** | **1,171** | **1,174** | **1,172** | **1,157** | **1,137** | **1,125** | **1,110** | **1,077** |
| African | 379 | 362 | 348 | 333 | 323 | 317 | 306 | 294 | 287 | 279 | 272 | 265 | 260 | 255 |
| Americas | 894 | 864 | 816 | 706 | 774 | 745 | 736 | 718 | 710 | 696 | 677 | 634 | 603 | 587 |
| Eastern Mediterranean | 889 | 881 | 887 | 1,028 | 1,033 | 1,036 | 1,007 | 1,016 | 1,004 | 1,029 | 1,005 | 1,008 | 1,008 | 918 |
| European | 1,984 | 2,018 | 2,030 | 2,147 | 2,245 | 2,295 | 2,299 | 2,326 | 2,409 | 2,453 | 2,458 | 2,529 | 2,454 | 2,322 |
| South-East Asia | 361 | 339 | 336 | 340 | 316 | 301 | 301 | 311 | 317 | 320 | 324 | 326 | 329 | 332 |
| Western Pacific | 1,661 | 1,653 | 1,671 | 1,681 | 1,685 | 1,669 | 1,673 | 1,695 | 1,724 | 1,751 | 1,823 | 1,864 | 1,909 | 1,965 |
| High-income OECD | 2,246 | 2,213 | 2,127 | 2,094 | 2,055 | 2,007 | 1,965 | 1,879 | 1,782 | 1,742 | 1,686 | 1,625 | 1,537 | 1,459 |

| World Bank country income group | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Global** | **1,226** | **1,222** | **1,203** | **1,190** | **1,179** | **1,171** | **1,171** | **1,174** | **1,172** | **1,157** | **1,137** | **1,125** | **1,110** | **1,077** |
| High-income | 2,142 | 2,117 | 2,080 | 2,041 | 1,973 | 1,913 | 1,886 | 1,828 | 1,795 | 1,712 | 1,636 | 1,562 | 1,514 | 1,433 |
| Upper middle-income | 1,509 | 1,526 | 1,507 | 1,502 | 1,516 | 1,526 | 1,544 | 1,580 | 1,606 | 1,625 | 1,633 | 1,665 | 1,672 | 1,650 |
| Lower middle-income | 498 | 501 | 497 | 499 | 505 | 518 | 524 | 535 | 528 | 522 | 509 | 496 | 483 | 469 |
| Low-income | 305 | 286 | 285 | 283 | 274 | 272 | 273 | 279 | 285 | 288 | 287 | 284 | 284 | 276 |

*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Based on data from Euromonitor International 2016.[12] For more information, see the Statistical Annex.

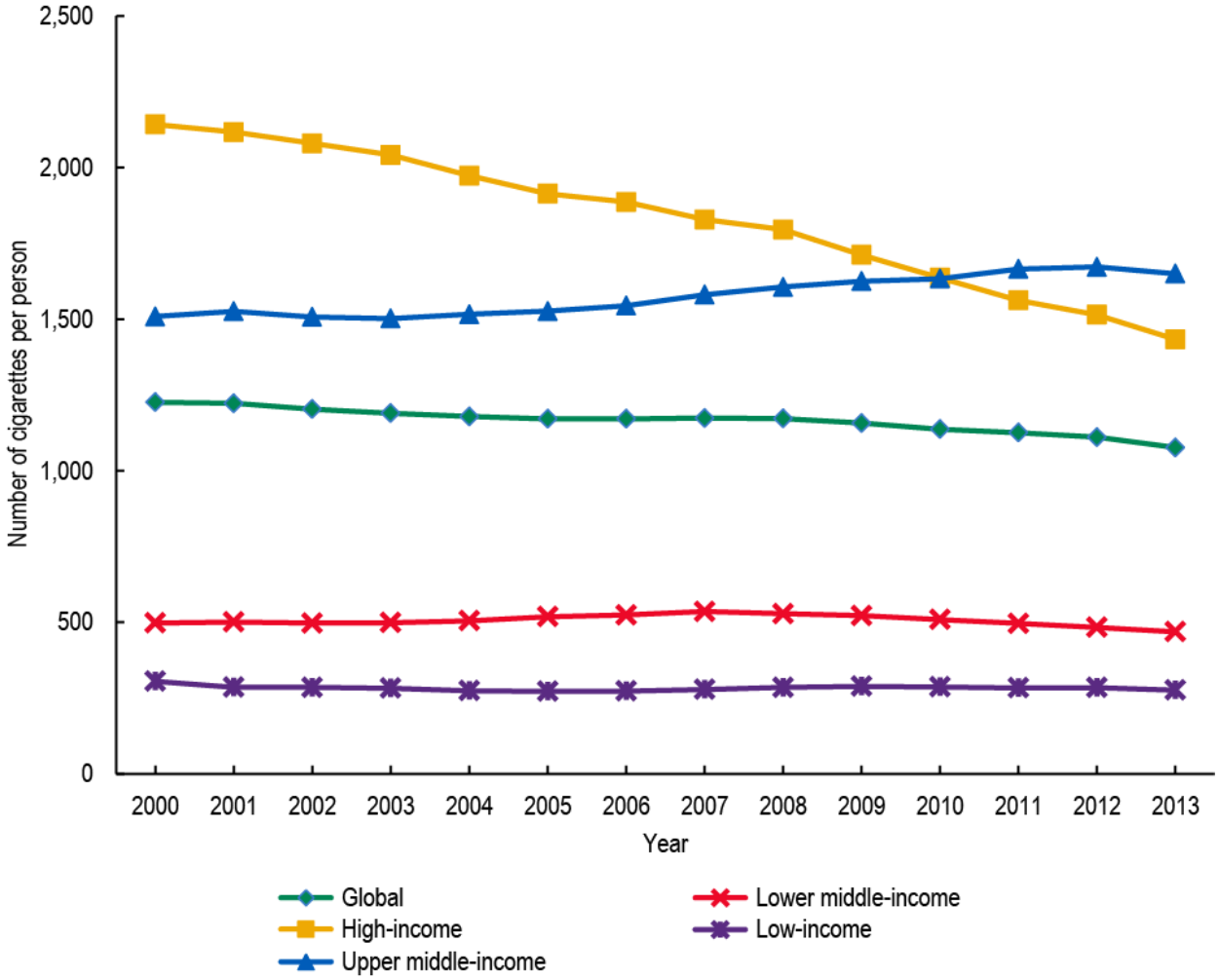
## Figure 2.11 Global Per Capita Cigarette Consumption Among People Age 15 Years and Older, by WHO Region, 2000–2013




*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions.
*Source:* Based on data from Euromonitor International 2016.[12] For more information, see the Statistical Annex.

As shown in Table 2.9 and Figure 2.12, data for World Bank country income groups show a similar picture. HICs experienced a substantial reduction, from 2,142 cigarettes per person in 2000 to 1,433 in 2013. Per capita consumption in lower middle-income countries remained essentially unchanged between the year 2000 and the years 2010–2013, despite an increase in the mid-2000s. Upper middle-income countries, however, generally experienced increases between 2000 (1,509 cigarettes per person), 2012 (1,672), and 2013 (1,650).[12]

**Figure 2.12 Per Capita Cigarette Consumption Among People Age 15 Years and Older, Globally and by Country Income Group, 2000–2013**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Based on data from Euromonitor International 2016.[12] For more information, see the Statistical Annex.

## Smokeless Tobacco Products

### Prevalence of Smokeless Tobacco Use Among Adults

WHO estimates that there are at least 346 million adult ST users worldwide. As shown in Table 2.10, the South-East Asia Region has by far the largest number of adult ST users, with 296.9 million users (86% of the total number of ST users worldwide). India has the largest number of ST users of any country (152.4 million men and 80.8 million women users),[18] followed by Bangladesh (16.5 million men and 18.7 million women users).[19] (Note that, as described in the Statistical Annex, many countries lack adequate surveillance data for ST. Additionally, the NCI–CDC report *Smokeless Tobacco and Public Health: A Global Perspective*[8] also concluded that in many regions, including some where ST use is highly prevalent, surveillance of ST use is inadequate.)

There is concern that the introduction of new ST products and their marketing to new users may lead to increased tobacco use in countries or populations where it had previously been low. In some HICs, cigarette manufacturers have introduced ST products with attractive flavorings, such as mint or fruit flavors, and new nicotine delivery methods, such as lozenges or small pouches that allow for more concealed use. For example, sales of moist snuff products (including snus) in the United States increased 65.6% between 2005 and 2011.[20]

### Table 2.10 Prevalence of Adult Current Smokeless Tobacco Use, by WHO Region and Country Income Group, 2010

| | Estimated prevalence (%) | | | Number of ST users (in millions) | | |
|---|---|---|---|---|---|---|
| **WHO Region** | **Men** | **Women** | **Both sexes** | **Men** | **Women** | **Both sexes** |
| **Global** | **8.4** | **4.6** | **6.5** | **223.3** | **122.7** | **346.0** |
| African | 2.8 | 2.1 | 2.4 | 7.6 | 5.9 | 13.4 |
| Americas | 0.6 | 0.2 | 0.4 | 1.3 | 0.5 | 1.8 |
| Eastern Mediterranean | 4.1 | 1.4 | 2.9 | 9.0 | 2.8 | 11.8 |
| European | 2.1 | 0.1 | 1.0 | 3.4 | 0.2 | 3.6 |
| South-East Asia | 27.4 | 16.5 | 22.0 | 187.3 | 109.6 | 296.9 |
| Western Pacific | 1.0 | 0.4 | 0.7 | 6.5 | 2.8 | 9.2 |
| High-income OECD | 1.9 | 0.2 | 1.2 | 8.2 | 1.0 | 9.2 |

| | Estimated prevalence (%) | | | Number of ST users (in millions) | | |
|---|---|---|---|---|---|---|
| **World Bank country income group** | **Men** | **Women** | **Both sexes** | **Men** | **Women** | **Both sexes** |
| **Global** | **8.4** | **4.6** | **6.5** | **223.3** | **122.7** | **346.0** |
| High-income | 1.7 | 0.2 | 1.1 | 8.9 | 1.2 | 10.1 |
| Upper middle-income | 1.0 | 0.5 | 0.7 | 9.4 | 4.5 | 13.8 |
| Lower middle-income | 19.0 | 10.2 | 14.6 | 171.7 | 90.7 | 262.3 |
| Low-income | 12.7 | 9.8 | 11.2 | 33.3 | 26.4 | 59.7 |

*Notes:* WHO = World Health Organization. ST = smokeless tobacco. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* Based on data from World Health Organization 2015.[1] For more information, see the Statistical Annex.

## Prevalence of Smokeless Tobacco Use Among Youth

Using data from the Global Youth Tobacco Surveys, WHO has estimated that at least 12.8 million youth ages 13–15 globally used ST in 2010, a prevalence of 3.6% (Table 2.11). This compares with a prevalence rate of 7.0% for youth cigarette smoking (24.8 million youth). The number of boys using ST was 8.6 million compared with 4.2 million girls, for a ratio of 2 boy users for every girl user. These prevalence rates and absolute numbers of users were derived by applying prevalence data for surveys carried out between 2007 and 2014 to the 2010 regional and global 13- to 15-year-old populations (as estimated by the UN Population Division).[5]

## Table 2.11 Prevalence of Smokeless Tobacco Use Among Youth Ages 13–15 Years, by WHO Region and Country Income Group, 2007–2014

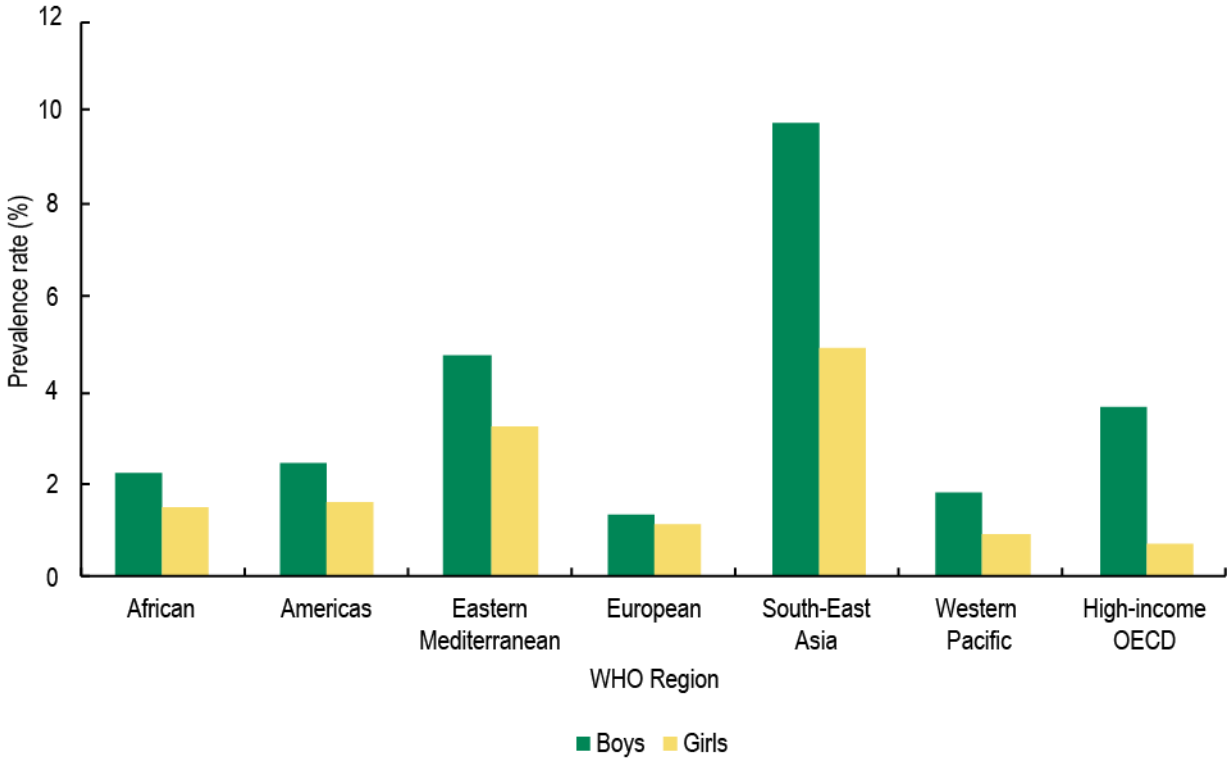
| | Estimated prevalence (%) | | | Number of ST users (in thousands) | | |
|---|---|---|---|---|---|---|
| **WHO Region** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **4.7** | **2.5** | **3.6** | **8,588** | **4,242** | **12,831** |
| African | 2.2 | 1.5 | 1.8 | 652 | 432 | 1,084 |
| Americas | 2.4 | 1.6 | 2.0 | 390 | 255 | 645 |
| Eastern Mediterranean | 4.7 | 3.2 | 3.9 | 874 | 568 | 1,442 |
| European | 1.3 | 1.1 | 1.2 | 114 | 91 | 205 |
| South-East Asia | 9.7 | 4.9 | 7.4 | 5,222 | 2,458 | 7,680 |
| Western Pacific | 1.8 | 0.9 | 1.4 | 659 | 309 | 968 |
| High-income OECD | 3.6 | 0.7 | 2.2 | 677 | 130 | 807 |

| | Estimated prevalence (%) | | | Number of ST users (in thousands) | | |
|---|---|---|---|---|---|---|
| **World Bank country income group** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **4.7** | **2.5** | **3.6** | **8,588** | **4,242** | **12,831** |
| High-income | 3.6 | 0.8 | 2.2 | 742 | 161 | 903 |
| Upper middle-income | 2.0 | 1.2 | 1.6 | 1,165 | 647 | 1,812 |
| Lower middle-income | 7.2 | 3.8 | 5.6 | 6,070 | 3,004 | 9,074 |
| Low-income | 3.1 | 2.2 | 2.6 | 612 | 430 | 1,043 |

*Notes:* WHO = World Health Organization. ST = smokeless tobacco. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. Country income group classification based on World Bank Analytical Classifications for 2010. The number of users was calculated by applying the prevalence rates to the United Nations–provided population estimates for the year 2010.
*Source:* Based on data from Global Youth Tobacco Survey 2007–2014.[5] For more information, see the Statistical Annex.

Youth in the South-East Asia Region had the highest prevalence of ST use in 2010 (7.4%), as well as the highest ST prevalence among both boys (9.7%) and girls (4.9%) (Table 2.11 and Figure 2.13). Youth ST users in the South-East Asia Region accounted for 60% of all ST users ages 13–15 years in the world.[5]

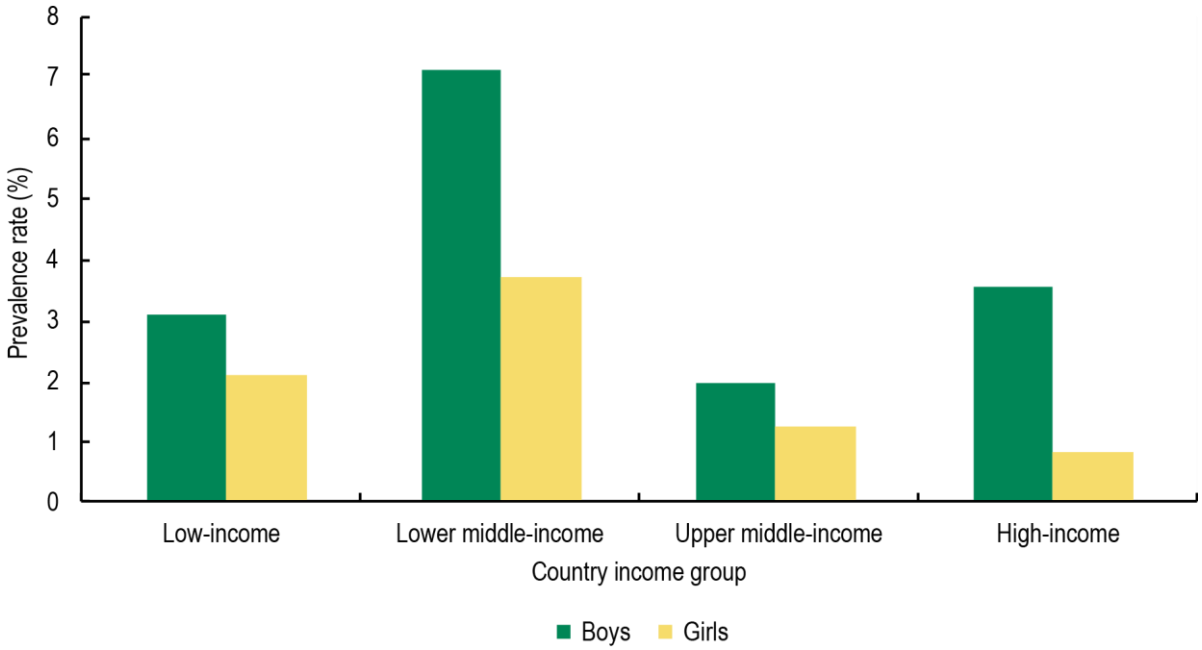
## Figure 2.13 Prevalence of Smokeless Tobacco Use Among Youth Ages 13–15 Years, by WHO Region, 2007–2014




*Notes:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. The number of users was calculated by applying the prevalence rates to the United Nations–provided population estimates for 2010.
*Source:* Based on data from Global Youth Tobacco Survey 2007–2014.[5] For more information, see the Statistical Annex.

The prevalence of ST use is greater in low-income and lower middle-income countries than in high-income and upper middle-income countries, particularly among youth (Table 2.11 and Figure 2.14). In contrast, the prevalence of cigarette smoking is greater in high-income and upper middle-income countries than in lower middle-income and low-income countries (Table 2.1 and Figure 2.1).

**Figure 2.14 Prevalence of Smokeless Tobacco Use Among Youth Ages 13–15 Years, by Country Income Group, 2007–2014**




*Notes:* Country income group classification based on World Bank Analytical Classifications for 2014. The number of users was calculated by applying the prevalence rates to the United Nations–provided population estimates for 2010.
*Source:* Based on data from Global Youth Tobacco Survey 2007–2014.[5] For more information. see the Statistical Annex.

## Other Tobacco Products

As new products and marketing strategies emerge and globalization, population migration, and tobacco control policies alter the environment, studying patterns of tobacco consumption becomes more challenging. Some tobacco control experts warn that the increased marketing of other tobacco products, such as snus or modified cigarettes, could have an adverse health impact by appealing to young people or new users, or by assisting smokers to maintain their nicotine dependence.[21–23]

In the past decade, ENDS, often marketed as an alternative to conventional cigarettes, have been increasingly promoted and used worldwide. Prevalence of having ever used ENDS was 12.6% among U.S. adults in 2014,[24] and ENDS use rose from 7% to 12% among European Union residents age 15 years and over between 2012 and 2014.[25]

ENDS pose new research and regulatory challenges, as the safety of these products and their efficacy for smoking cessation remain unclear.[26–28] Some countries have banned the sale and marketing of these products (e.g., Panama,[29,30] Singapore,[31] Thailand,[32] and Uruguay[33]). The European Union enacted a revised Tobacco Products Directive that includes regulation of ENDS products, and several U.S. states and localities have enacted smoke-free policies and/or laws restricting minors' access to these products.[28,34,35] In November 2015, the United Kingdom's Medicines and Healthcare Products Regulatory Agency licensed a British American Tobacco ENDS called 'e-Voke' for medical use as a smoking cessation device.[36]

Globalization and population migration are also contributing to a changing tobacco landscape, leading to the emergence of non-traditional products within regions and among populations where their use had previously not been a concern. Examples include use of ST and waterpipes. South Asian emigrants have brought to their new countries products that are commonly used in their countries of origin (e.g., smokeless tobacco). ST products are also marketed to the large Asian immigrant labor force in the Eastern Mediterranean Region.[8] Changing social norms and the denormalization of cigarette smoking might contribute to the increased attractiveness of smokeless products in places where smoking is declining. Traditionally used among men in the Middle East and North Africa, waterpipe smoking is increasing in many countries where it was previously unknown.[37–40] The introduction of products to new markets may influence patterns of tobacco use in those countries and, in turn, impact public health.

## Exposure to Secondhand Smoke

Secondhand smoke (sometimes referred to as passive smoking, environmental tobacco smoke, or tobacco smoke pollution) is a mixture of sidestream smoke from the burning tip of cigarettes or other smoked tobacco products, and mainstream smoke exhaled by the smoker. At least 50 carcinogenic chemicals have been identified in SHS,[41] and scientific evidence indicates that there is no safe level of exposure to SHS.[42] People in low-income countries and of lower educational attainment are less likely to be aware of the risks of SHS exposure or to take precautions to protect children and other nonsmokers in the family.[41,43]

Cross-sectional data collected in 2006 from households in 31 countries (12 countries in Asia, 9 in the Americas, 3 in the Middle East, and 7 in Europe [not including Western Europe and the United States]) showed that air nicotine concentrations were 17 times higher in households with a smoker than in those without a smoker, and 12.9 times higher in households that permitted smoking indoors than in those that prohibited it.[44] This study also showed that hair nicotine concentrations collected from women and children in 1,200 of these households increased with the number of smokers in the household.[44]

As described further in chapter 6, comprehensive smoke-free policies—those that, by law, completely prevent smoking in all enclosed indoor workplaces, public places, and transportation—are now in place in many countries. Article 8 of the WHO FCTC obligates Parties to the treaty to adopt and implement effective measures to protect people from exposure to SHS in indoor workplaces, public transport, indoor public places, and, as appropriate, other public places. However, exposure to SHS in the workplace, in public places, and in the home remains common.

Data on exposure to SHS in the 26 countries that have completed a Global Adult Tobacco Survey as well as in the United States (Table 2.12) show a very broad range of SHS exposure levels at work (from 5.6% to 69.1%) and at home (from 4.4% to 78.4%). In all 27 countries, men were more likely than women to be exposed to SHS at work. Exposure at home was often similar between men and women; in general, women's greatest exposure occurred at home rather than at work.

## Table 2.12 Adult Exposure to Secondhand Smoke at Work and at Home in Selected Countries, 2008–2014

| | At work | | | | At home | | | |
|---|---|---|---|---|---|---|---|---|
| Country | Male (%) | Female (%) | Both sexes (%) | Male–female ratio | Male (%) | Female (%) | Both sexes (%) | Male–female ratio |
| Argentina | 38.5 | 24.1 | 31.6 | 1.6 | 34.1 | 31.9 | 33.0 | 1.1 |
| Bangladesh | 67.8 | 30.4 | 63.0 | 2.2 | — | — | — | — |
| Brazil | 28.5 | 20.4 | 24.4 | 1.4 | 28.9 | 27.0 | 27.9 | 1.1 |
| China | 71.1 | 53.2 | 63.3 | 1.3 | 70.5 | 63.9 | 67.3 | 1.1 |
| Egypt | 62.4 | 54.0 | 60.7 | 1.2 | 68.1 | 73.6 | 70.8 | 0.9 |
| Greece | 58.8 | 41.8 | 52.3 | 1.4 | 68.9 | 62.5 | 65.7 | 1.1 |
| India | 32.2 | 19.4 | 29.9 | 1.7 | 52.2 | 52.5 | 52.3 | 1.0 |
| Indonesia | 58.0 | 41.4 | 51.3 | 1.4 | 81.4 | 75.4 | 78.4 | 1.1 |
| Kazakhstan | 24.7 | 12.9 | 19.0 | 1.9 | 16.7 | 11.4 | 13.8 | 1.5 |
| Kenya | 23.0 | 11.5 | 17.6 | 2.0 | 16.8 | 12.0 | 14.3 | 1.4 |
| Malaysia | 46.2 | 30.1 | 39.8 | 1.5 | 43.3 | 33.3 | 38.4 | 1.3 |
| Mexico | 23.3 | 13.9 | 19.7 | 1.7 | 17.4 | 18.2 | 17.8 | 1.0 |
| Nigeria | 21.1 | 12.0 | 17.3 | 1.8 | 7.7 | 5.6 | 6.6 | 1.4 |
| Pakistan | 72.5 | 37.3 | 69.1 | 1.9 | 50.8 | 45.7 | 48.3 | 1.1 |
| Panama | 7.4 | 3.7 | 5.6 | 2.0 | 5.3 | 3.5 | 4.4 | 1.5 |
| Philippines | 43.3 | 28.8 | 36.9 | 1.5 | 50.9 | 46.7 | 48.8 | 1.1 |
| Poland | 41.3 | 24.9 | 33.6 | 1.7 | 44.9 | 43.6 | 44.2 | 1.0 |
| Qatar | 13.7 | 7.8 | 12.0 | 1.8 | 16.7 | 17.0 | 16.8 | 1.0 |
| Romania | 36.8 | 31.2 | 34.2 | 1.2 | 37.7 | 33.2 | 35.4 | 1.1 |
| Russian Federation | 45.7 | 25.7 | 34.9 | 1.8 | 36.7 | 33.0 | 34.7 | 1.1 |
| Senegal | 33.0 | 25.1 | 30.4 | 1.3 | 24.5 | 19.0 | 21.6 | 1.3 |
| Thailand | 39.9 | 32.3 | 36.0 | 1.2 | 37.1 | 22.8 | 30.5 | 1.6 |
| Turkey | 17.8 | 9.6 | 15.6 | 1.9 | 39.2 | 37.4 | 38.3 | 1.0 |
| Ukraine | 44.0 | 22.9 | 34.0 | 1.9 | 33.6 | 28.1 | 30.6 | 1.2 |
| United States* | 27.6 | 20.1 | 24.0 | 1.4 | 4.7 | 4.1 | 4.4 | 1.1 |
| Uruguay | 21.4 | 11.8 | 16.5 | 1.8 | 32.0 | 26.7 | 29.2 | 1.2 |
| Viet Nam | 68.7 | 41.4 | 55.9 | 1.7 | 77.2 | 69.2 | 73.1 | 1.1 |

*Data presented for the United States is based on the National Adult Tobacco Survey.
*Sources:* Global Adult Tobacco Survey 2008–2014.[15] National Adult Tobacco Survey 2013–2014.[4]

According to a similar analysis using data from the Global Youth Tobacco Surveys (Tables 2.13 and 2.14), a substantial proportion of youth ages 13 to 15 years reported being exposed to SHS, both inside and outside the home. As many as 116 million youth in this age group reported SHS exposure at home, and 173 million reported exposure outside the home. The actual number of youth exposed is likely to be substantially higher, as most of these 13- to 15-year-olds would have siblings who also would have been exposed.

### Table 2.13 Percentage of Youth Ages 13–15 Years Exposed to Secondhand Smoke Inside the Home, by WHO Region and Country Income Group, 2007–2014

| | Estimated prevalence (%) | | | No. exposed to SHS (in thousands) | | |
|---|---|---|---|---|---|---|
| **WHO Region** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **33.9** | **31.3** | **32.6** | **62,068** | **53,817** | **115,885** |
| African | 28.8 | 27.3 | 28.1 | 8,606 | 8,005 | 16,611 |
| Americas | 28.3 | 27.1 | 27.7 | 4,676 | 4,331 | 9,007 |
| Eastern Mediterranean | 28.5 | 26.1 | 27.3 | 5,336 | 4,652 | 9,989 |
| European | 51.9 | 56.2 | 54.0 | 4,451 | 4,612 | 9,063 |
| South-East Asia | 31.0 | 25.4 | 28.3 | 16,728 | 12,664 | 29,392 |
| Western Pacific | 46.8 | 43.6 | 45.3 | 17,128 | 14,266 | 31,394 |
| High-income OECD | 27.1 | 29.4 | 28.2 | 62,068 | 53,817 | 115,885 |

| | Estimated prevalence (%) | | | No. exposed to SHS (in thousands) | | |
|---|---|---|---|---|---|---|
| **World Bank country income group** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **33.9** | **31.3** | **32.6** | **62,068** | **53,817** | **115,885** |
| High-income | 36.5 | 39.0 | 37.7 | 5,712 | 5,836 | 11,548 |
| Upper middle-income | 41.0 | 38.2 | 39.6 | 24,214 | 21,085 | 45,298 |
| Lower middle-income | 30.8 | 26.7 | 28.8 | 26,194 | 21,525 | 47,719 |
| Low-income | 32.1 | 27.7 | 29.9 | 5,949 | 5,372 | 11,320 |

*Notes:* WHO = World Health Organization. SHS = secondhand smoke. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. The number of youth exposed was calculated by applying the prevalence rates to the United Nations–provided population estimates for 2010. Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* Based on data from Global Youth Tobacco Survey 2004–2014.[5] For more information, see the Statistical Annex.

### Table 2.14 Percentage of Youth Ages 13–15 Years Exposed to Secondhand Smoke Outside the Home, by WHO Region and Country Income Group, 2007–2014

| | Estimated prevalence (%) | | | No. exposed to SHS (in thousands) | | |
|---|---|---|---|---|---|---|
| **WHO Region** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **50.0** | **47.7** | **48.9** | **91,650** | **82,010** | **173,660** |
| African | 52.6 | 49.6 | 51.1 | 15,691 | 14,530 | 30,221 |
| Americas | 45.8 | 40.8 | 43.3 | 7,564 | 6,514 | 14,078 |
| Eastern Mediterranean | 43.5 | 37.0 | 40.3 | 8,149 | 6,609 | 14,758 |
| European | 75.4 | 75.1 | 75.3 | 6,462 | 6,161 | 12,623 |
| South-East Asia | 40.1 | 34.4 | 37.4 | 21,649 | 17,167 | 38,815 |
| Western Pacific | 62.8 | 62.2 | 62.5 | 23,017 | 20,354 | 43,371 |
| High-income OECD | 48.0 | 59.3 | 53.5 | 9,117 | 10,676 | 19,793 |

| | Estimated prevalence (%) | | | No. exposed to SHS (in thousands) | | |
|---|---|---|---|---|---|---|
| **World Bank country income group** | **Boys** | **Girls** | **Both sexes** | **Boys** | **Girls** | **Both sexes** |
| **Global** | **50.0** | **47.7** | **48.9** | **91,650** | **82,010** | **173,660** |
| High-income | 56.8 | 63.7 | 60.1 | 9,963 | 11,374 | 21,337 |
| Upper middle-income | 51.2 | 47.6 | 49.4 | 34,277 | 30,370 | 64,647 |
| Lower middle-income | 42.9 | 38.2 | 40.6 | 37,091 | 30,922 | 68,013 |
| Low-income | 57.3 | 51.3 | 54.3 | 10,319 | 9,343 | 19,662 |

*Notes:* WHO = World Health Organization. SHS = secondhand smoke. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development. High-income OECD countries are excluded from their respective regions. The number of youth exposed was calculated by applying the prevalence rates to the United Nations–provided population estimates for 2010. Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* Based on data from Global Youth Tobacco Survey 2004–2014.[5] For more information, see the Statistical Annex.

## Tobacco-Related Health Disparities

WHO has called attention to the "vicious cycle of tobacco and poverty" and recognizes that the death, disease, loss of income, and loss of productivity due to tobacco all contribute to poverty, along with the diversion of household funds from necessary resources, such as food, shelter, and education, to tobacco purchases.[45,46] (See chapter 16 for additional information.)

National surveillance data from the United States, Australia, and other HICs have documented an increasingly disproportionate burden of tobacco use and exposure to SHS, and as a consequence, a higher level of tobacco-related ill health and death among lower socioeconomic groups within these countries. In the United States, although tobacco smoking prevalence has declined across all income categories, smoking has declined less among people living below the poverty line. Socioeconomic position has been typically defined by family/household income or poverty status, educational attainment, and occupational category (e.g., working class or blue-collar occupations versus professional or white-collar occupations).[47–53] Tobacco-related health disparities (TRHDs) have also been documented across other factors, such as gender, ethnicity, neighborhood poverty level, and geographical region.[48,49,54,55]

Similarly, the Australian Institute of Health and Welfare[56] has reported that people of the lowest socioeconomic status (SES), whether measured by income or by completed level of education, were almost three times more likely to smoke daily compared with people of the highest SES (19.9% versus 6.7%, respectively). Similar trends are seen in European countries, where overall tobacco smoking prevalence is gradually yet steadily declining while becoming more concentrated among lower SES populations than among their more prosperous counterparts.[57,58]

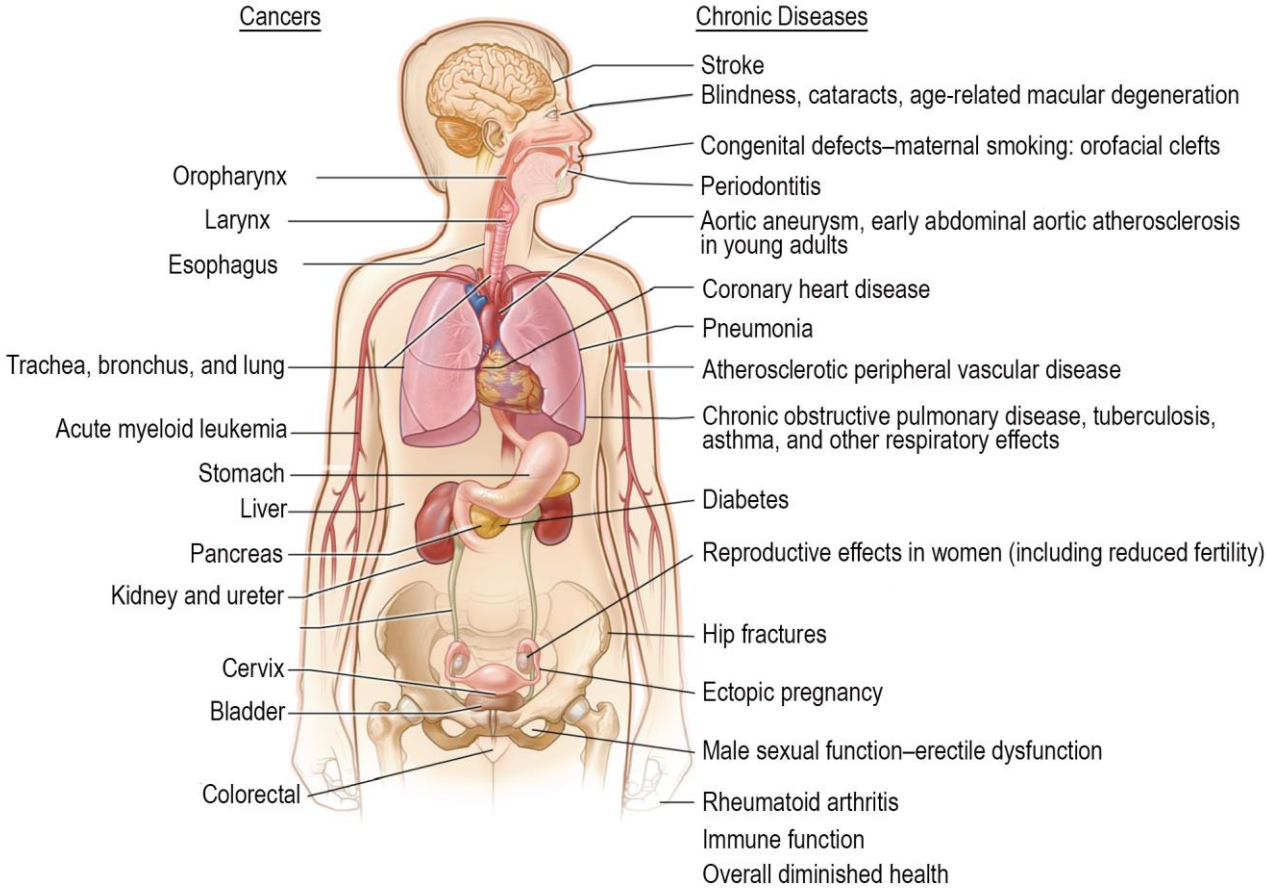
Until relatively recently, most of the evidence on TRHDs across the globe has come from studies conducted in HICs. Evidence of a disproportionate burden of tobacco use among the poor and other less-resourced populations has become increasingly available.[50,59] WHO World Health Survey data for 48 LMICs in all WHO Regions were analyzed to examine socioeconomic inequality in smoking among men and women age 18 years and older.[60] These data showed that smoking was more prevalent among poor men in most countries, and that the poorest men were more than 2.5 times more likely to smoke than the richest men in many countries. Socioeconomic inequality in women was more varied, showing higher prevalences of tobacco smoking among the rich in some countries and among the poor in other countries. In 20 countries, the poorest women had a statistically significant higher prevalence of smoking compared with the richest women. In contrast, in 9 mostly middle-income Eastern European countries, the richest women were more likely to smoke than the poorest women.

## Health Consequences of Tobacco Use

### Tobacco Use, Secondhand Smoke Exposure, and Disease

Decades of research have conclusively established that tobacco use, and in particular cigarette smoking, causes numerous serious illnesses, including cancer, cardiovascular disease and stroke, and pulmonary disease. As shown in Figure 2.15, major diseases causally linked to cigarette smoking include diseases of the circulatory system (e.g., ischemic heart and cerebrovascular diseases); cancers of the trachea, bronchus and lung, esophagus, oropharynx, larynx, stomach, liver, pancreas, kidney and ureter, cervix, bladder, colon/rectum, as well as acute myeloid leukemia; chronic respiratory diseases (e.g., asthma, chronic obstructive pulmonary disease); and metabolic diseases such as diabetes mellitus.[61] The U.S. Surgeon General has stated that "cigarette smoking has been causally linked to diseases of nearly all organs of the body, to diminished health status, and to harm to the fetus. Even 50 years after the first Surgeon General's report, research continues to newly identify diseases caused by smoking."[61,p.7] Such common diseases as diabetes mellitus, rheumatoid arthritis, and colorectal cancer were causally linked to smoking by this more recent research.

## Figure 2.15 Health Consequences Causally Linked to Smoking

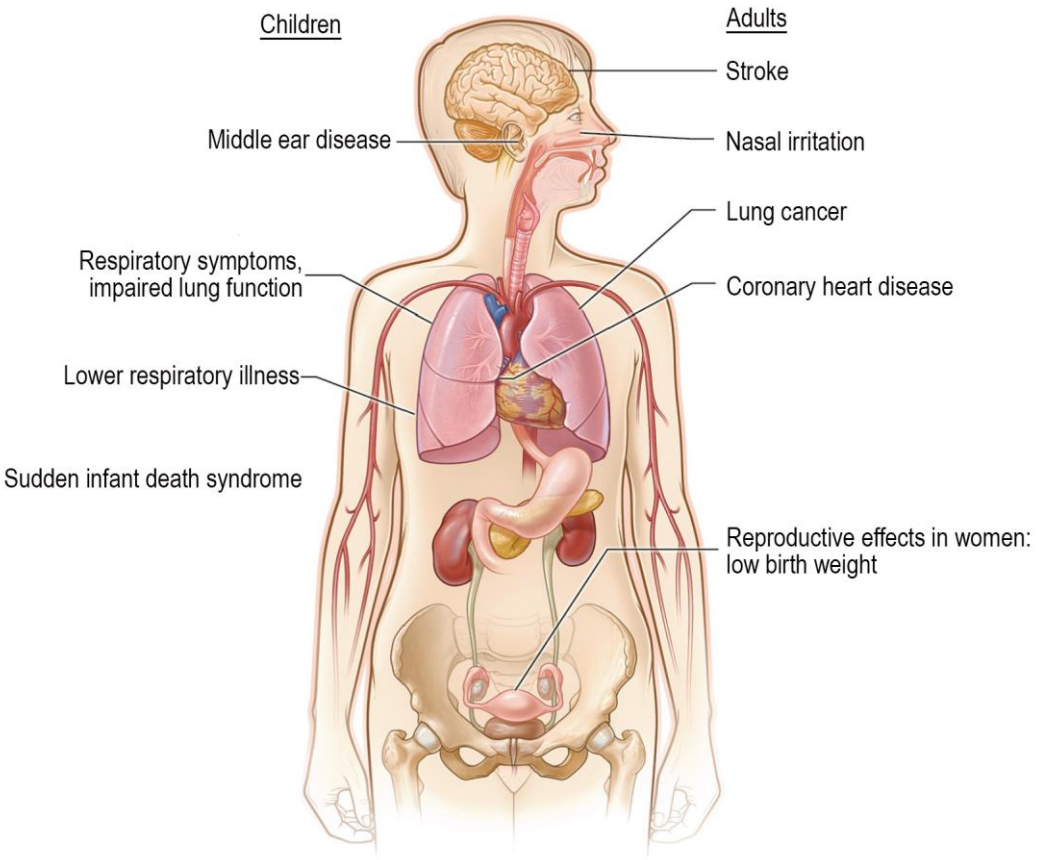



*Source:* Centers for Disease Control and Prevention 2014.[61]

The health hazards of exposure to SHS are also now well established. These include cancer, respiratory and cardiovascular diseases in adults, as well as disease and death in infants and children (Figure 2.16). The International Agency for Research on Cancer (IARC) has concluded that SHS is carcinogenic to humans (Group 1).[62]

Both tobacco use and SHS exposure during pregnancy have been conclusively linked to harm to the developing fetus. Active cigarette smoking by the mother increases the risk for ectopic pregnancy, premature rupture of membranes, abruptio placentae, placenta previa, miscarriage, stillbirth, preterm birth, low birth weight, small for gestational age, some congenital anomalies, and sudden infant death syndrome (SIDS). Women who are exposed to SHS while pregnant are also at increased risk for having babies with low birth weight.[63,64]

## Figure 2.16 Health Consequences Causally Linked to Secondhand Smoke Exposure

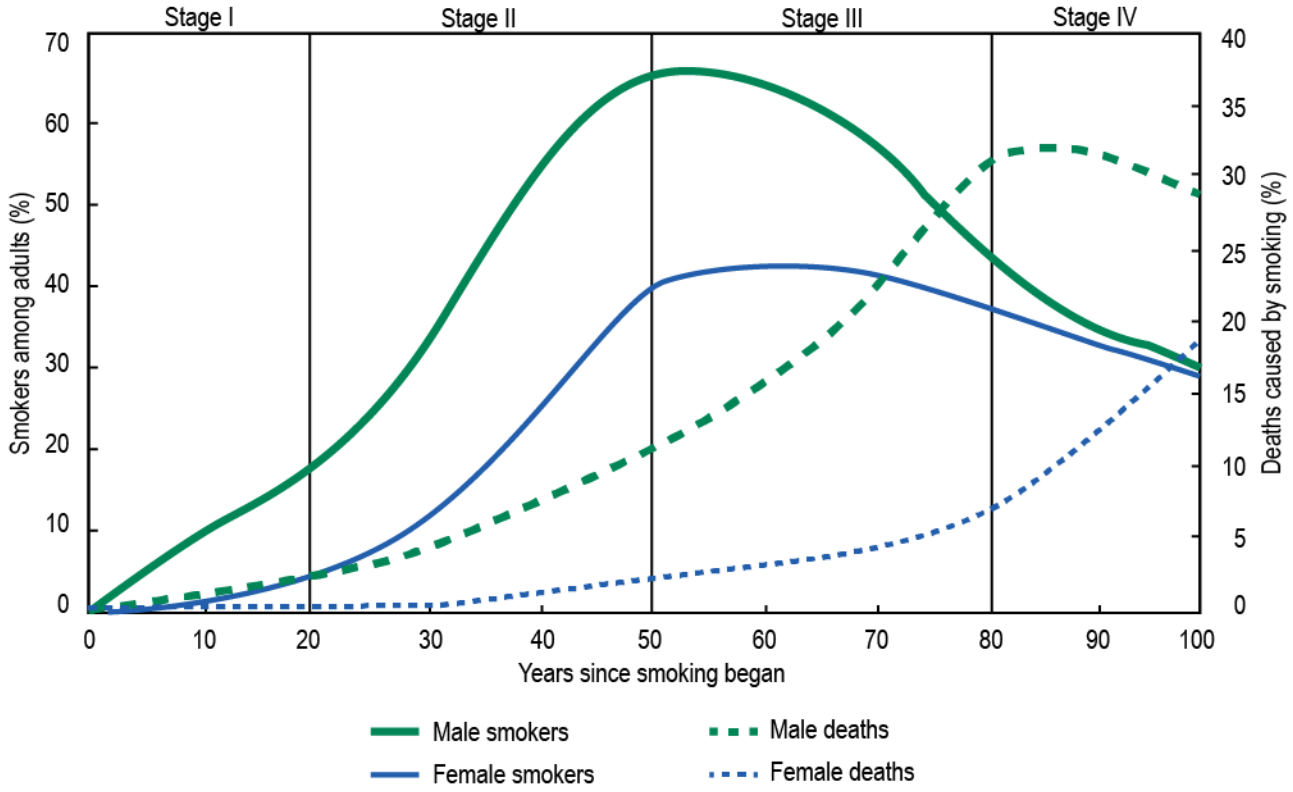



*Source:* Centers for Disease Control and Prevention 2014.[61]

### Stages of the Tobacco Epidemic and Global Implications

To understand the evolution of the tobacco epidemic in all countries, regardless of income level, and the potential impact of tobacco use on morbidity and mortality over time, Lopez and colleagues[65] proposed a descriptive model of smoking prevalence and mortality in 1994. This model was based on a careful analysis of changes in tobacco use over time and of mortality attributable to tobacco in the United States and selected HICs. When Lopez and colleagues first proposed this model, many LMICs had been exposed to tobacco use for only a short time compared with HICs. Many LMICs have now been subjected to tobacco industry marketing and distribution processes for at least 30 years—long enough for the health consequences of tobacco use to become apparent (Figure 2.17). Countries with the longest history of tobacco use and relatively strong tobacco control measures are generally thought to be in Stage IV of the model; countries with shorter histories of exposure to tobacco are expected to transition from Stage I to Stage IV. The model indicates that countries in the early stages of the epidemic could take several decades to see a decrease in tobacco-related mortality. Implementation of strong tobacco control measures can hasten progression through the stages, possibly leading to lower prevalence and improved health outcomes sooner. Indeed, strong tobacco control measures may help ensure that countries in the early stages of the epidemic never progress to the later stages at all.

### Figure 2.17 Four-Stage Model of the Cigarette Epidemic




*Source:* Lopez et al. 1994.[65]
Reproduced from "A descriptive model of the cigarette epidemic in developed countries," Lopez A, Collishaw N, Piha T, volume 3(3), p. 246, with permission from BMJ Publishing Group Ltd.

In 2012, Thun and colleagues[66] updated the model to describe the stages of the epidemic separately for men and women so as to increase the model's utility for countries (primarily low-income and low- and middle-income countries) where women's tobacco use rates remain low.

## Impact of Tobacco on Noncommunicable Diseases

According to the *WHO Global Report: Mortality Attributable to Tobacco*,[9] worldwide, 12% of all adult deaths (>30 years of age and older) are attributed to tobacco (16% among men, 7% among women). Deaths from noncommunicable diseases (NCDs) currently account for nearly 70% of all deaths globally.[67] Tobacco is widely acknowledged to be one of the major risk factors for NCD deaths; indeed, worldwide, approximately 14% of adult deaths from NCDs are attributed to tobacco use, including 10% of all adult deaths from cardiovascular diseases (14% among men; 6% among women), and 22% of all adult deaths from cancer (32% among men, 11% among women). The vast majority (71%) of adult lung cancer deaths (78% among men, 53% among women) were attributable to tobacco. In addition, 36% of all adult deaths from diseases of the respiratory system were attributable to tobacco (42% among men, 29% among women). Tobacco smoking is also an important causal factor for chronic obstructive pulmonary disease (COPD) and is responsible for more than 75% of cases worldwide.[68] In 2004 about 49% of COPD deaths among adult men and 34% of COPD deaths among adult women were attributable to tobacco.[9]

### Impact of Tobacco on Communicable Diseases

Approximately 5% of global deaths from communicable diseases are attributed to tobacco, including 7% of all deaths due to tuberculosis (TB) and 12% of deaths due to lower respiratory infections.[9] The vast majority of tobacco-related TB deaths occur in LMICs.[69] A systematic review by WHO[70] found a significant positive relationship between exposure (passive or active) to tobacco smoke and TB infection and disease, independent of various potential confounders including alcohol use and socioeconomic status. Recurrent TB and mortality resulting from TB were also associated with active smoking.[70] Recent research suggests that cigarette smoking doubles the risk of recurrent TB in those previously treated, complicating disease control efforts.[71] Data from India show that tobacco smoking increases the risk of dying from TB by two to four times, and accounts for about half of TB deaths in men.[72–74]

### Impact of Tobacco Mortality, by Region

Data reported by WHO showed that, in 2004, the number of deaths attributable to tobacco was greatest in the European Region (1.47 million deaths), followed by the Western Pacific Region (1.41 million deaths), the South-East Asia Region (1.04 million deaths), and the Americas Region (0.86 million deaths). In addition, tobacco use caused 0.15 million deaths in the African Region and 0.19 million deaths in the Eastern Mediterranean Region.[75] According to these data, nearly 70% of deaths attributable to tobacco worldwide occurred in LMICs.[75] Death rates for diseases caused by smoking were lower in low-income countries than in middle-income countries and HICs, reflecting the lower past smoking rates in low-income countries and the higher past smoking rates in middle-income countries and HICs.

Tobacco use was a leading health risk in HICs, causing 1.5 million deaths, or 17.9% of total mortality, in those countries. In middle-income countries, 2.6 million deaths, or 10.8% of deaths, were attributable to tobacco use. In low-income countries, tobacco use caused 1 million deaths, or 3.9% of deaths.[75] Because of the lengthy time lags for the development of cancers and chronic respiratory diseases associated with tobacco smoking, deaths from these illnesses in LMICs—and among women in many regions—may continue to rise, even if smoking prevalence remains the same or decreases.

### Disease Burden Attributable to Secondhand Smoke Exposure

Based on analyses of 2004 data, SHS exposure was estimated to have caused more than 600,000 deaths worldwide (accounting for 1% of global mortality), including 379,000 deaths from ischemic heart disease, 166,000 from lower respiratory infections, 35,800 from asthma, and 21,400 from lung cancer.[76] Twenty-eight percent of deaths from SHS exposure occurred in children. Of adult deaths attributable to SHS exposure, about 47% occurred in women. In addition, global data showed that 10.9 million disability-adjusted life-years (DALYs) were lost in 2004 because of SHS exposure, which accounted for about 0.7% of the total worldwide burden of diseases in DALYs. Children bear 61% of the burden in DALYs. The largest disease burdens were from lower respiratory infections in children younger than 5 years old (5.9 million), ischemic heart disease in adults (2.8 million), and asthma in adults (1.2 million) and children (0.7 million).[2] In the United States, nonsmokers' SHS exposure has been shown to increase the risk of developing coronary heart disease; to increase the risk of suffering a stroke (by 20%–30% for those exposed to SHS); to increase the risk of diabetes by 30%–40%; and to increase the risk of developing cancers, notably lung cancer, by about 25%.[61]

## Summary

Around the world, the health burden of tobacco use is enormous. At present, about 6 million people die each year from tobacco use; this figure is projected to grow to 8 million by 2030, with the vast majority (80%) of deaths anticipated to occur in low- and middle-income countries. A wide variety of tobacco products—both smoked products (cigarettes, cigars, kreteks, bidis, and waterpipe) and a diverse group of smokeless tobacco products—are in use worldwide. Manufactured cigarettes, however, account for 92.3% of tobacco sales worldwide; thus they are responsible for by far the most of tobacco-caused disease and death. Secondhand smoke, a mixture of sidestream smoke from the burning tip of cigarettes or other smoked tobacco products and mainstream smoke exhaled by the smoker, is a cause of disease and death in adults and children. Tobacco use and secondhand smoke exposure are now recognized as important causes of noncommunicable disease, communicable disease, and harm during pregnancy. Tobacco use is estimated to cause 12% of deaths among persons aged 30 and over worldwide; this represents about 14% of deaths from noncommunicable diseases (such as cancer, cardiovascular disease, and lung disease) and 5% of deaths from communicable diseases (such as tuberculosis and lower respiratory tract infections). Additionally, tobacco use contributes to and exacerbates poverty, which itself contributes to ill health.

About 21% of the world's population age 15 and over (about 1.1 billion people) are current smokers—about 35% of males and 6% of females. Tobacco is a highly addictive substance, and the vast majority of users smoke on a daily basis. With the exception of the African and Eastern Mediterranean Regions, smoking prevalence is declining in all world regions; about half of all smokers live in either the South-East Asia or the Western Pacific Region. Smoking prevalence is also declining when viewed from a country income group perspective (high-, middle-, and low-income). The fact that the number of adult tobacco users worldwide is not declining is primarily attributable to population growth. About 7% of youth ages 13–15 worldwide smoke cigarettes, including about 9% of boys and 4.5% of girls. In many countries, particularly low-income countries and lower middle-income countries, women's smoking prevalence remains low, often because of socio-cultural and economic factors discouraging tobacco use among women. As these barriers fall, continued efforts will be required to ensure that women's tobacco use does not rise.

The number of smokeless tobacco users worldwide is estimated at 346 million, most of whom (86%) live in the South-East Asia Region. Approximately 4% of youth ages 13–15 worldwide use smokeless tobacco; as with adults, most 13- to 15-year-old smokeless tobacco users live in the South-East Asia Region. An estimated 600,000 deaths worldwide in 2004 (1% of global mortality) were attributed to SHS exposure. Data from countries participating in the GATS show a wide range of SHS exposure at home and at work for both men and women. Data from the GYTS also show that a substantial proportion of youth ages 13–15 years are exposed to SHS in the home and in other locations.

Studies from a number of countries document a disproportionate burden of tobacco use and SHS exposure among disadvantaged groups, which are defined by income, race/ethnicity, geography, and other factors. In most countries, poor people are more likely to smoke than their more affluent counterparts, which contributes to a disproportionate burden of disease and death among the poor. The four-stage model of the cigarette epidemic developed by Lopez and colleagues provides a useful illustration of the stages of development of the tobacco epidemic. Implementation of strong tobacco control measures can hasten countries' progress through the stages of this model, resulting in lower prevalence of tobacco use and a lower burden of disease.

## Research Needs

Ongoing surveillance of all forms of tobacco use is critical to understanding the tobacco epidemic and its shifting global impact, including the burden of disease resulting from tobacco use. It is important that surveillance systems monitor and adapt to changes in the tobacco product landscape. Information is especially needed on patterns of use of non-cigarette tobacco products, for which data are more limited. Although the body of evidence on the health effects of cigarette smoking is extensive, the long-term health effects of other tobacco products, including use of waterpipe and smokeless tobacco, are not as well understood. Finally, more information is also needed on the prevalence and patterns of ENDS use, as well as the short- and long-term health effects of these products, including the effect of ENDS aerosol exposure on nonusers.

## Conclusions

1. There are about 1.1 billion smokers in the world, and about 4 in 5 smokers live in low- and middle-income countries. Nearly two-thirds of the world's smokers live in 13 countries.
2. Substantial progress has been made in reducing tobacco smoking in most regions, especially in high-income countries. Overall smoking prevalence is decreasing at the global level, but the total number of smokers worldwide is still not declining, largely due to population growth. Unless stronger action is taken, it is unlikely the world will reach the WHO Member States' 30% global reduction target by 2025.
3. Globally, more than 80% of the world's smokers are men. Differences in prevalence between male and female smokers are particularly high in the South-East Asia and Western Pacific Regions and in low- and middle-income countries.
4. Globalization and population migration are contributing to a changing tobacco landscape, and non-traditional products are beginning to emerge within regions and populations where their use had not previously been a concern.
5. An estimated 25 million youth currently smoke cigarettes. Although cigarette smoking rates are higher among boys than girls, the difference in smoking rates between boys and girls is narrower than that between men and women. Smoking rates among girls approach or even surpass rates among women in all world regions.
6. Worldwide, an estimated 13 million youth and 346 million adults use smokeless tobacco products. The large majority of smokeless tobacco users live in the WHO South-East Asia Region. Smokeless tobacco use may be undercounted globally due to scarcity of data.
7. Secondhand smoke exposure remains a major problem. In most countries, an estimated 15%–50% of the population is exposed to secondhand smoke; in some countries secondhand smoke exposure affects as much as 70% of the population.
8. Annually, around 6 million people die from diseases caused by tobacco use, including about 600,000 from secondhand smoke exposure. The burden of disease from tobacco is increasingly concentrated in low- and middle-income countries.

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## Section 2
## Situation Analysis/Mapping

# Chapter 3
# The Economic Costs of Tobacco Use, With a Focus on Low- and Middle-Income Countries

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# The Economic Costs of Tobacco Use, With a Focus on Low- and Middle-Income Countries

The costs of tobacco use include illness, disability, premature death, and forgone consumption and investment. This chapter examines the estimation of the costs of tobacco use by:

- Reviewing the economic framework for cost estimation of tobacco use
- Examining cost estimates for individual low- and middle-income countries (LMICs) by World Health Organization Region
- Analyzing recent cost estimates for high-income countries (HICs) in the Region of the Americas, European Region, and Western Pacific Region
- Offering recommendations for addressing current gaps in data and areas for further study.

Significant obstacles to calculating comprehensive estimates of the costs of tobacco use still exist in many countries, particularly in LMICs, where markets in many economic sectors do not function well. Estimates from HICs consistently show that considerable economic costs, for both health care and lost productivity, result from tobacco use and from exposure to secondhand smoke among nonsmokers. Where sufficient data exist, they demonstrate that tobacco-related health care costs for LMICs are comparable to those for HICs when considered as a percentage of total health care costs.

## Chapter Contents



## Tables

## Introduction

Tobacco use produces the fourth highest burden of premature morbidity and mortality, accounting for approximately 4% of the total disease burden worldwide—behind only childhood underweight, unsafe sex, and high blood pressure.[1] Tobacco use also is the second leading cause of death globally, accounting for around 6 million deaths annually.[2]

The costs of tobacco use are global, affecting low- and middle-income countries (LMICs) as well as high-income countries (HICs). Many LMICs are in the early-to-middle stages of the tobacco epidemic that has affected HICs for many decades.[3,4] Therefore, the already high burden of tobacco use in LMICs will grow significantly if trends continue. By 2030, tobacco use is forecast to produce the largest burden of premature mortality and disability in the world compared with other health risk factors.[5]

Tobacco products in many LMICs are more diverse than those in HICs and have different profiles of uptake and prevalence by age and gender[6,7]; tobacco products in LMICs may also be associated with different health effects[8,9] (see chapter 2). Use of smokeless tobacco and forms of smoked tobacco other than cigarettes (e.g., hookahs, bidis) is more frequent in many LMICs than in HICs.[8,10] Although research on the economic costs of tobacco use in LMICs has increased significantly during the past decade, fewer studies have estimated the economic costs of tobacco use in LMICs than in HICs[11]—hence, this review.

This chapter first briefly reviews the economic framework for estimating the costs of tobacco use. Next, the chapter examines cost estimates for individual countries by World Health Organization (WHO) Region. The principal outcome measures are direct costs of tobacco use, costs as a proportion of total national health care expenditures, and total cost (including direct and indirect costs) of tobacco use as a proportion of gross domestic product (GDP). This chapter then reviews estimates of the economic costs of tobacco use in LMICs across all regions, followed by costs in HICs. Finally, the chapter summarizes results and suggests areas for further research.

## Framework for Estimating the Costs of Tobacco Use

The information presented in this chapter is intended to provide a general understanding of the economic framework for estimating the costs of tobacco use. More formal discussions of methods for applying economic approaches to estimating the costs of tobacco use can be found in the existing literature.[11–20] WHO provides a "toolkit" for estimating the economic costs of tobacco use which is particularly useful for researchers in LMICs, where key data are often less available.[21]

Accurately estimating the cost of tobacco use is more difficult in LMICs than in HICs. For example, many dwellings in LMICs use solid fuels for cooking and heating, which results in indoor air pollution, and the health effects of indoor air pollution can be difficult to differentiate from those of secondhand smoke (SHS).[22] Also, the tobacco use epidemic is developing simultaneously with modern private and public health care and insurance delivery systems in LMICs.[1,23–25] Thus, the methods used to estimate costs in HICs, which have fully developed health care systems, may not be appropriate for estimating such costs in LMICs.[11] Furthermore, economic evaluations using assumptions appropriate for HICs may not accurately estimate the indirect costs of death and disability in LMICs.

## Cost Concepts

### *Basic Definition of Cost*

For any good or service, *economic cost* is defined by opportunity cost—that is, the value of resources forgone to produce or consume another unit of that good or service. For example, the opportunity cost of an hour of a doctor's time consists of the output the doctor could have produced if he or she had been doing something else. The opportunity cost of a tobacco user's time away from work due to disease caused by smoking would be the market price of the lost labor, usually the market wage, or the monetary value of the total wages and fringe benefits that he or she was receiving. Applied to consumption of tobacco, the opportunity cost of buying and consuming tobacco products is the alternative consumption that would have occurred if such products had not been purchased and consumed.

In most cases of ordinary goods and services, which are either not addictive or much less addictive and have far fewer harmful effects than tobacco, the opportunity cost is measured by market price. Thus, the hourly wage of a doctor is used to measure the opportunity cost of an hour of a doctor's time. The dollar value represents the cost of all production (which is also a person's consumption) forgone because of the use of a doctor's time in one activity rather than another. As discussed later in this chapter, the definition of cost used in tobacco control follows the cost-of-illness framework that uses this basic definition of economic cost but in a different way.

### *Marginal, Total, and Average Costs*

*Marginal cost* is defined as the cost to produce the last additional increment of a specified good or service, assuming production is efficient. *Total cost* is defined as the cost of the total production of a specified good or service. *Average cost* is defined as the total cost divided by the number of units of a good or service.

Using the example of a particular day at a hospital, if an accident requires an unexpected additional surgery, then the marginal cost of that surgery would be the value of the additional health professionals' time, medical supplies, equipment, and services required for the additional surgery. The total cost of surgery is the total sum of the costs of all surgeries for that day. The average cost is the total cost of surgeries for that day divided by the number of surgeries. Of note, marginal cost is usually not equal to average cost. For example, an additional operation in a busy hospital operating at capacity may require payment of overtime for personnel and additional costs for rush delivery of prescription drugs. Therefore, the marginal cost of the last unit produced or consumed may exceed the average cost.

Average costs, or alternatively, observed average expenditures for individual treatment episodes, often are used to estimate health care costs because marginal costs, such as those associated with surgery, are often unavailable, even in HICs.

### *Direct Costs and Indirect Costs*

In the health care field, *direct cost* is defined as the cost incurred by the consumption of health care services. Examples of direct health care costs include the costs of the physician's time, medical supplies, and the value of equipment services for a visit to the physician. In HICs with well-developed survey systems, most services provided in the formal health care field are included as direct costs, such as inpatient acute care, convalescent hospital, and ambulatory clinic services; health professional services; prescription drugs and over-the-counter medications; and medical supplies. *Indirect cost* is defined as

any additional cost (e.g., the cost of traveling to a doctor's office) incurred as a result of consuming health care services.

Use of such terminology is inconsistent, as indirect cost may be included with direct cost. Indirect cost of morbidity typically includes lost productivity (measured by compensation) due to disease-related work absence and premature disability. Indirect cost of mortality includes mainly lost productivity due to premature death.

Many of the direct and indirect costs of tobacco use show up in GDP calculations as income due to goods and services sold in the economy. However, these costs would not be incurred in the absence of tobacco-induced illnesses that reduce welfare through ill health. Thus, the overall economic balance without tobacco-induced illnesses would be more welfare-enhancing.

### *Cross-Sectional and Longitudinal Costs*

Estimates of total cost can include the cost of all current and past tobacco use or only the cost of current tobacco use. For example, the cost of current tobacco use per user (e.g., the cost of smoking per current smoker) is often of interest for policy reasons because many of the costs of former smoking may be fixed. Because consumption of tobacco shortens a smoker's expected life span, the question arises whether the cost should be adjusted for the difference in the life expectancy of smokers versus never smokers.

*Cross-sectional cost* is defined as a cost that does not adjust for different life expectancies. Cross-sectional cost also may be called prevalence-based cost or gross cost and often includes the cost of current and past smoking.[19,26] Conceptually, cross-sectional health care costs are the flows of health-related costs incurred by a living person over a given period of time, rather than the expected present value of smoking-related costs over a person's life span.

Cross-sectional estimates also exist for the indirect costs of morbidity and mortality. Cross-sectional estimates of the morbidity costs of lost productivity from smoking can be interpreted similarly to cross-sectional direct health care costs. Estimates of the indirect cost of mortality, which estimate total production lost in a given year, are sometimes reported. However, longitudinal costs usually are used for this purpose, so indirect cost estimates should be interpreted carefully when reading published estimates.

*Longitudinal cost* is defined as the discounted present value of expected annual flows of cross-sectional costs, using reasonable assumptions about life expectancy and an appropriate discount rate for expenditures in the future (usually 2–3% per year). Longitudinal cost also may be called net cost[19] or life-cycle or incidence-based cost.

The difference between cross-sectional and longitudinal costs can be misinterpreted because they have different dimensions and measure different things. Longitudinal costs are incidence based—that is, they allocate cost of incident disease in a current year, usually in a current smoker compared with a never smoker. Smokers often die at an earlier age than never smokers, and therefore have fewer years of health care costs, which affects the present value of the future stream of costs but not the flow of costs per living smoker.

For some purposes, the different expected life spans of current smokers and never smokers must be taken into account. The most straightforward way to do this is to estimate the longitudinal cost of a typical smoker. For example, the longitudinal direct health care cost of smoking for a 22-year-old male smoker would be estimated by calculating the difference between his discounted present value of future direct health costs and that of an identical 22-year-old never smoker.

### *Measures of Indirect Mortality Cost: Value of Production Versus Value of a Statistical Life and Willingness to Pay*

Estimating the indirect costs of mortality is difficult because life does not have a market price. Three approaches can be used to measure the value of years of life lost due to premature death: The *value of production* approach is based on market losses, and the *value of a statistical life* (VSL) and *willingness-to-pay* (WTP) approaches are based on the subjective value placed on avoiding premature death.

The value of production approach (also called the human capital approach) values lost years of life by estimating the market value of the flow of lost production due to premature death in a given year. This value can be estimated by using average labor compensation, which is appropriate for the majority of the population who are wage earners. This is a convenient measure that is appropriate for macroeconomic analysis and analyses for financial planning, but it has some drawbacks when used to compare losses between populations. Most workers in LMICs earn lower average money wages and fringe benefits than those in HICs. Because of arbitrary economic circumstances, the value of production approach produces lower cost estimates for the loss of a life in LMICs than in HICs. The value of production approach also undervalues the lives of people who are not working for reasons other than smoking—such as those who care for young children at home, youth in school, the elderly, and the disabled.

Some estimates that use the value of production approach only use the years of productive life lost, thus the calculations are truncated at the average age of retirement. The reasoning behind this adjustment is that years of life lost after retirement do not contribute to a country's GDP. This variation to the value of production approach is consistent with analyses that use measured economic production as the outcome measure. Using the entire remaining life expectancy is more appropriate as a measure of economic welfare given that it provides some measure of the value of life after retirement, but suffers from the drawbacks of using the value of production as a proxy measure of well-being.

Conversely, limiting the lost productivity to the working years reduces (a) the rate of return to education in a full employment situation and (b) the personal return to investments in education and other human capital. From a social point of view, in many societies a replacement worker often can be found easily if unemployment is present. Some estimates use the "friction cost" method to account for this, producing estimates that are considerably lower than those produced using the human capital approach.[27] However, in LMICs, the true costs must balance the skills a former worker acquired through on-the-job experience versus the increasing human capital of potentially inexperienced new workers. For practical purposes this issue has not been explored in most human capital studies in LMICs.

The VSL and WTP approaches attempt to avoid the limitations of the value of production approach by measuring the subjective evaluation that a person puts on his or her life.[28,29] VSL represents the economic value of preventing the risk of a single premature death. WTP measures what a person is willing to pay to avoid a specific risk, such as the health consequences of smoking addiction.

The VSL approach assumes that a person's welfare is a function of the present value of the flow of his or her expected monetary and nonmonetary benefits over time. Increases in the annual probability of death over a given time period reduce the person's perceived welfare. The VSL approach values life by estimating the value of a small change in the probability of death. Empirical methods to assess value of life can be used to analyze variations in acceptance of wage levels for increases in the objective probability of fatality without any knowledge of subjective probability at which the wage was accepted.[30] An associated empirical method for WTP would be to ask directly what monetary tradeoffs a person would accept to decrease the probability of death in a likely scenario with which he or she is familiar, tailoring the likely scenario to the particular setting involved as necessary.[31] The inferred value of life estimates is highly dependent on personal characteristics.

The WTP approach can assess the amount a person is willing to pay to be indifferent between two alternative states, instead of asking questions about probabilities.[32] As an example of the WTP approach, if the loss of expected life span is the sole concern of an addicted smoker, and the smoker is indifferent both to staying addicted and to paying 500,000 U.S. dollars (US$) to have the addiction removed, then the value of life would be US$ 500,000. WTP is conceptually equal to VSL whether people are purely selfish or altruistic toward the welfare of others, but WTP may differ when policymaking reflects paternalistic concerns that ignore individual preferences.[33] WTP also is usually measured through surveys that attempt to elicit direct revelation of preferences instead of through statistical analyses of market behavior.[34]

The VSL and WTP approaches attempt—directly or indirectly—to ask people about their own valuations; these approaches do not rely solely on the value of their market production. VSL estimates of the value of life vary widely. For example, VSL estimates in LMICs range from approximately US$ 300,000 to several million U.S. dollars, usually far higher than production-based measures for the average resident of a given country.[35]

The VSL approach to measuring the value of a life shares some of the flaws of production-based approaches. Theoretically and empirically, VSL estimates rise with increasing wealth, similar to the value of production approach. VSL estimates also vary by age and several other sociodemographic factors.[35,36]

A straightforward and theoretically sound approach incorporates aspects of VSL and WTP, capturing a person's willingness to trade years of life for consumption of some amount of goods constrained by the ability to earn income. Using this approach, Becker and colleagues[37] note that since the 1960s, at least some LMICs have placed greater importance on gains in life expectancies alongside higher incomes. A theoretically fuller account would incorporate the value others place on one's life.[38] Although these approaches are more theoretically sound than the value of production approach, they have not yet been integrated into the literature assessing the costs of tobacco use.

### *Internal Versus External Costs of Consumption*

Another important cost concept is the distinction between internal and external costs. *Internal costs of consumption* are defined as those costs that fall on or are borne by the consumer. *External costs of consumption* are those that fall on others in society. For example, internal costs are the health care costs of smoking incurred by the smoker, and external costs are the health care costs of those sickened by exposure to SHS from the smoker as well as the publicly financed health care costs of treating smokers.

In economic analyses, external costs weigh more than internal costs, because external costs are considered to be involuntary burdens. For example, if smoking is permitted in workplaces and public areas, a nonsmoker who wishes to be employed or attend public meetings will be involuntarily exposed to SHS. Some analyses include quasi-external costs for costs incurred by nonsmokers in a smoker's household. The idea is that members of the same household make decisions through a group process, and costs incurred by nonsmokers cannot be considered involuntary to the same degree as those incurred by nonfamily members.[39] The external costs of smoking are important to consider because, as discussed in chapter 2, SHS exposure has many significant adverse health consequences for both adults and children.[40,41] Similarly, the external costs of medical care for smokers will reflect the role of government in providing health care, and these external costs will be substantial in countries where all or most health care is publicly funded.

### *Perspective of Analysis*

The *perspective of analysis* is defined as the economic unit that ultimately bears a particular set of costs in an analysis. The perspective of analysis determines which costs are included in a cost analysis. For example, if the perspective of analysis is a private patient in a hospital, then such a cost analysis would examine out-of-pocket and insurance payments incurred by the patient. In this case, any costs of care subsidized by the government or paid by private insurance would not be counted as cost. However, from a social perspective, all costs would be included in a cost analysis.

## Estimation Techniques

### *Epidemiological and Regression Approaches*

Most estimates of direct health care costs are based on cross-sectional cost estimates because longitudinal datasets are few and of insufficient duration to observe differential mortality by smoking status. Most of the studies highlighted in this chapter use the epidemiological (also called attributable fraction) approach to estimate direct health care costs.

The epidemiological approach, as applied to direct health care costs, uses the concept of population-attributable risk, which, when applied to tobacco control, is often called the smoking-attributable fraction (SAF). The SAF is the proportion of the total for a given outcome (i.e., health care costs, health services utilization, deaths or other health outcome measures) that is attributable to current and past tobacco use. The SAF takes into account prevalence of tobacco use and the relative risk of incurring costs as a result of tobacco use, compared to the risk faced by never smokers. When the SAF has been determined, it can be multiplied by another health outcome measure to arrive at the part of that measure that is attributable to tobacco use. For example, the cost of treating heart attacks can be multiplied by the SAF to find the part of heart attack treatment costs that is attributable to smoking.

The SAF is expressed in Equation 1, where for a given smoking-related disease $j$, $p$ is the prevalence of ever smoking, and $R_j$ is the relative risk of health care cost for treating disease $j$ for ever smokers (including both current and former smokers) compared with never smokers. The proportion of the cost of the disease attributable to smoking equals $SAF_j$:

$$SAF_j = \frac{p\,(R_j - 1)}{((1 - p) + pR_j)} \qquad (1)$$

The total cost of smoking in a country can be found by summing the smoking-attributable costs over all diseases that are attributable to smoking. For more accurate estimates, Equation 1 also may be stratified by smoking status (current versus former), age group, and gender.

Rice and colleagues[42] produced the earliest well-documented estimates of the cost of smoking for the United States, using the relative risks of health care utilization to derive the SAFs. Later research by Tanuseputro and colleagues[43] provided modifications for multiple risk factors and imperfect linkages between exposure measures (e.g., prevalence of smoking) and resulting adverse health effects.

An alternative method is the Smoking Impact Ratio (SIR) developed by Peto, Lopez, and colleagues,[44] which captures the accumulated risks from smoking and defines these risks in terms of lung cancer mortality rates within a study population. The SIR is the ratio of (1) the study population's lung cancer mortality that exceeds lung cancer mortality among never smokers to (2) the excess lung cancer mortality for a known reference population's smokers (adjusted to account for differences in never smokers' lung cancer mortality rates between the study population and the reference population).[21] According to Ezzati and Lopez,[4] SIR can be calculated using the formula (Equation 2):

$$SIR = \frac{C_{LC} - N_{LC}}{S_{LC}^* - N_{LC}^*} \times \frac{N_{LC}^*}{N_{LC}} \qquad (2)$$

where $C_{LC}$ is the (age-/gender-specific) lung cancer mortality rate of all individuals in the study population; $N_{LC}$ is the (age-/gender-specific) lung cancer mortality rate of never smokers in the same population as $C_{LC}$; $S_{LC}$* is the lung cancer mortality rate for smokers; and $N_{LC}$* the lung cancer mortality rate for never smokers in the reference population (both are age- and gender-specific).

Conceptually, the SIR converts smokers in the study population who may have different smoking histories into equivalent smokers in the reference population, where the relative risks for different diseases have been measured. Most studies that use the SIR employ the American Cancer Society's Cancer Prevention Study II for the reference population, given that: (1) this is one of the largest smoking and mortality studies ever conducted, (2) it provides separate relative risk estimates for different causes of death, and (3) most smokers studied were lifelong cigarette smokers, which allowed the full effects of the smoking epidemic to be captured.

The SIR method has mainly been used to estimate smoking-attributable mortality rather than the direct health care costs of smoking. More detailed discussions about using SIR as a measure of exposure to accumulated smoking hazards particularly in LMICs are available in the WHO toolkit on assessing economic costs[21] and elsewhere.[4,45,46]

Regression estimates that require nationally representative survey information on health risks, health status, and health care utilization and costs are often used in cost estimation. Regression techniques have been developed to estimate relative risks and attributable fractions.[47–49] These techniques use a multi-equation framework to examine the impact of smoking on health status and health care expenditures and to control for other risk factors and the preferences of individuals for consuming health care services. A first regression analysis is used to model the probability of individual health care utilization over a reference time period as a function of smoking status and demographic, sociodemographic, and other health risk factors. A second regression analysis derives estimates of expected health care expenditures that are conditional on positive utilization, a function of smoking status, and other variables. The cost of

smoking is estimated by using the estimated regressions for two simulations. One simulation estimates the expected costs in a population with observed smoking, and a second simulation estimates the expected costs in a population with no smoking (achieved by setting all smoking indicator variables to zero). The cost of smoking is the difference between the expected costs for these two populations.

Modifications to Equation 1 may be required because relative risks are often available only for mortality, but relative risk for morbidity is a more appropriate entity to estimate the direct costs of health care. The prevalence of ever smoking may not be available in some countries, so the prevalence of current smoking may be used instead. Using the prevalence of current smoking may produce unbiased estimates of the SAF only when the prevalence of past smoking is zero. Cost data may not be sufficient to estimate an SAF for costs. Instead, a population-attributable risk can be estimated for utilization of health care services, and a separate cost estimate can be developed to apportion costs as a function of utilization. This modification may present a problem in LMICs, where the required estimates of relative risk may not exist or the relationship between tobacco use and disease may differ from estimates borrowed from HICs (e.g., for tuberculosis).[50,51] The methods used for each study should be read carefully to ensure proper interpretation of results.

Estimation of indirect morbidity and mortality costs requires estimates of the annual flow of work loss, premature disability, and mortality attributable to tobacco use. The present value of the effects of changes in annual morbidity and mortality in future years must be simulated because adequate longitudinal data are almost never available.

The epidemiological approach is popular because simple estimates can be calculated using only aggregate data and therefore can be used when detailed health survey data are not available. Warner and colleagues[19] and Max[16] have published reviews of smoking studies that use the epidemiological approach to derive the SAF.

Other types of cost estimates use large longitudinal datasets to make direct regression estimates of the difference, or ratio, of costs between current and former smokers and never smokers. Still other cost estimates use survey data that focus on household expenditures. These methods usually are not used to estimate the total economic cost of smoking to society. For summary analyses of large populations and regions, estimation methods have been developed that (a) can be used for both direct health care costs and indirect costs of tobacco use and (b) combine the relative risk approach and regression analyses that use aggregate population-level data (e.g., WHO's Burden of Disease Project).[1,52–55] When data on smoking status are not available, the indirect method of prevalence measurement, or the Peto method, can be used. In this method, a sentinel disease that is known to be a specific indicator of smoking, such as lung cancer, is used in place of smoking prevalence to measure cumulative smoking exposure.[54,56,57]

Estimating the costs of exposure to SHS is similar to estimating the costs of smoking. However, the specific health effects causally associated with SHS exposure are somewhat different from those caused by direct smoking. SHS exposure in adults causes such health effects as coronary heart disease, lung cancer, and stroke; SHS exposure in children causes middle ear disease, impaired lung function, lower respiratory illness, and sudden infant death syndrome.[41]

### *Statistical Adjustment*

Tobacco use is often associated with other health risk factors, including alcohol consumption and low levels of physical exercise. Many smoking-related diseases are related to other risk factors that are

independent of tobacco use. Therefore, the simple formula for SAF in Equation 1 predicts the reduction in the cost of tobacco use when comparing two populations with identical sociodemographic characteristics and risk factors, except for tobacco use. Adjusted attributable fractions can be used to calculate SAFs that are applicable in more general settings,[4,58] and regression techniques can be used to account for correlated health risks and multiple risk factors. Adjustment methods that work well with one set of data or in one country may fail in other settings. Therefore, whenever possible, estimation methods should be modified for the conditions of each country.

Whether cost estimates should be adjusted for other health risk behaviors related to tobacco use is a contentious issue. Some adjustment for these factors is usually done when sufficient data are available. Some evidence suggests that (a) nicotine addiction and other specific risk behaviors associated with tobacco use evolve together[59–62] and (b) people who initiate tobacco use may differ in their risk-taking behaviors from those who do not.[63] However, many other factors in the individual or surrounding environment may influence health behavior, including family and peer influences, socioeconomic status, or exposure to tobacco industry marketing. Therefore, the proper degree of adjustment is unclear.

## Estimates for Individual Countries

This section and Tables 3.1 and 3.2 present cost estimates for individual countries from the late 1990s to 2011. Estimates are given first for LMICs, where data are more limited and the methods used are generally less sophisticated, then for HICs, where more comprehensive data are available and more sophisticated methods are employed. All English-language studies that could be located, including those from both peer-reviewed and gray literature, are included to give as complete a review as possible of work done in different regions. Details are provided for the most recent studies or those that were judged of the highest quality. The cost concept (cross-sectional or longitudinal), types of costs (direct health care, indirect productivity), method and scope of estimate, and relevant period for the estimate are described. Studies that exclude the costs of nonsmokers' exposure to tobacco smoke are noted.

All costs have been converted into U.S. dollars using the average annual market exchange rates from the World Bank. Although converting all currencies to U.S. dollars allows these costs to be more comparable, fluctuations in the exchange rate from year to year can substantially change the U.S. dollar equivalent. When possible, these costs are expressed as a percentage of total health expenditures and GDP, as appropriate. Unless otherwise specified, the percentage of tobacco-attributable health care costs was calculated using national health care expenditure data obtained from the WHO Statistical Information System, and GDP calculations used GDP data from the World Bank.[64,65] Tables 3.1 (LMICs) and 3.2 (HICs) show the results of recent studies that produced estimated costs which can be interpreted as proportions of total direct health care expenditures and GDP in a national accounts framework. Only studies in this section for which there are sufficient data and details on methodology are included in these tables. Direct regression estimates of the difference in, or ratio of, direct health care cost by smoking status and estimates that focus on household expenditure patterns are beyond the scope of this review but will be discussed when appropriate.

## Table 3.1 Summary of Cost Estimations of Smoking for Low- and Middle-Income Countries

| Country and area | Study author(s) and publication year | Year of estimate | Estimation method | | Indirect costs included in cost of premature mortality | Estimate includes SHS exposure | Direct costs | | | Smoking-attributable direct cost as % of total direct health care costs | Estimated costs as % of GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct costs | Indirect costs | | | Diseases included | Services included | Sector included | | |
| **Region of the Americas** | | | | | | | | | | | |
| Mexico | Reynales-Shigematsu et al. 2006[76] | 2004 | AF-R | — | — | No | E, Is, L, S | H, O | S | 1.4 | 0.1 |
| **Eastern Mediterranean Region** | | | | | | | | | | | |
| Lebanon | Chaaban et al. 2010[79] | 2008 | AF-R | AF-R | Yes | No | C, Lr, M, R | H, M, O | A | 6.6 | 1.1 |
| **European Region** | | | | | | | | | | | |
| Czech Republic | Sovinová et al. 2007[81] | 2002 | AF | — | — | No | C, E, H, Is, Lr, M, P, R, S | H | S | 2.7 | 0.2 |
| Estonia | Taal et al. 2004[86] | 1998 | I | I | No | No | C, Lr, M, R, X | A | S | 6.5* | 1.4 |
| Hungary | Barta 2000[87] | 1998 | I | I | Yes | No | C, E, Lr, M | H, M, O | A | 3.5 | 2.5 |
| Uzbekistan | Usmanova et al. 2007[89] | 2005 | AF | AF | Yes | No | C, E, G, H, Is, Lr, M, R, S | H, M, O | A | 2.7 | 0.6 |
| **South-East Asia Region** | | | | | | | | | | | |
| Bangladesh | World Health Organization 2007[91] | 2004 | AF-R | AF-R | Yes | Yes | E, Is, Lr, O, R, S | H, O | A | 19.8† | 1.5 |
| India | Ministry of Health and Family Welfare 2014[92] | 2011 | AF | AF | Yes | No | C, Lr, M, R | H | A | 4.9 | 1.2 |
| Myanmar | Kyaing 2003[97] | 1999 | AF | — | — | No | H, Is, Lr, M, R, S | H, M, O‡ | § | — | 0.2 |
| Thailand | Leartsakulpanitch et al. 2007[98] | 2006 | AF | — | — | No | E, C, L | \|\| | A | 3.6 | 0.1 |

## Table 3.1 continued

| Country and area | Study author(s) and publication year | Year of estimate | Estimation method | | Indirect costs included in cost of premature mortality | Estimate includes SHS exposure | Direct costs | | | Smoking-attributable direct cost as % of total direct health care costs | Estimated costs as % of GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct costs | Indirect costs | | | Diseases included | Services included | Sector included | | |
| **Western Pacific Region** | | | | | | | | | | | |
| China | Yang et al. 2011[101] | 2008 | AF | AF | Yes | No | C, E, H, Is, Lr, M, R, S | H, O | A | 3.0 | 0.6 |
| China, Hong Kong SAR | McGhee et al. 2006[105] | 1998 | AF-R | AF-R | Yes | Yes | C, G, Is, Lr, M, R, S | A | A | 6.4 | 0.4 |
| Lao People's Democratic Republic | Chu et al. 2009[107] | 2006-2007 | AF-R | AF-R | Yes | No | E, L, S | H, M, O | A | 0.2 | 0.1 |
| Malaysia | Al-Junid 2007[108] | 2004 | AF | — | — | No | Is, E, L | A | A | 16.8 | 0.6 |
| Philippines | World Health Organization 2008[109] | 2003 | AF | AF | Yes | No | C, E, L, S | A | A | — | 7.2 |
| Viet Nam | Ross et al. 2007[111] | 2005 | AF-R | — | — | No | E, Is, L | H¶, M | A | 2.4 | 0.1 |

*Percentage of government Sick Fund costs.
†Proportion of direct health care costs in formal sector only, assuming 25% of patients seek care.
‡Variable costs of treatment, prescription drugs, and equipment only.
§Out-of-pocket costs at government institutions only.
||Out-of-pocket expenditures for all utilization.
¶Includes hospital-associated outpatient treatment.
*Direct and indirect costs:* AF = epidemiological approach using attributable fractions; AF-R = epidemiological approach using attributable fractions with relative risks estimated on relevant population; I = indirect method (Peto).
*Diseases included:* A = all diseases for which relative risk estimates exist; C = cardiovascular disease; E = chronic obstructive pulmonary disease; G = gastrointestinal disease; H = hypertension; Is = ischemic heart disease; L = lung cancer; Lr = lung cancer and upper aerodigestive cancer; M = other malignant neoplasms; O = other diseases; P = maternal and/or perinatal complications; R = nonmalignant respiratory disease; S = cerebrovascular disease; X = fires and/or accidents.
*Services included:* A = all; H = hospital; L = long-term care; M = drugs; O = outpatient care; P = physicians' fees for outpatient care; R = rehabilitation.
*Sector included:* A = all; P = private; S = public.
*Note:* SHS = secondhand smoke. SAR = special administrative region.

## Table 3.2 Summary of Cost Estimations of Smoking for High-Income Countries

| Country and area | Study author(s), publication year | Year of estimate | Estimation method | | Indirect costs included in the cost of premature mortality | Estimate includes SHS exposure | Direct costs | | | Smoking-attributable direct cost as % of total direct health care costs | Smoking-attributable direct and indirect costs as % of GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct costs | Indirect costs | | | Diseases included | Services included | Sector included | | |
| **Region of the Americas** | | | | | | | | | | | |
| Canada | Rehm et al. 2007[112] | 2002 | AF | AF | Yes | Yes | A | H, M, O, P | A | 3.9 | 1.5 |
| United States | CDC 2008[116] | 2000-2004 | AF-R | AF-R | Yes* | Yes | A | A | A | 5.8† | 1.8† |
| **European Region** | | | | | | | | | | | |
| Denmark | Rasmussen et al. 2004,[125] 2005[126] | 1999 | AF-R | AF-R | Yes | No | A | H, M, O, R | A | 8.9 | 2.0 |
| Germany | Neubauer et al. 2006[128] | 2003 | AF | AF | Yes | No | C, E, Lr, M, P, R, S | H, M, O, R | A | 3.2 | 1.0 |
| Israel | Ginsberg et al. 2010[131] | 2008 | AF | — | — | No | C, E, G, H, Is, Lr, M, R, S | H‡, O, L, M, R | A | 1.5–3.1‡ | 0.1–0.2‡ |
| Netherlands | van Genugten et al. 2003[132] | 1999 | AF | — | — | No | C, E, L, S | A | A | 8.6 | 0.7 |
| Sweden | Bolin et al. 2011[133] | 2007 | AF | AF | Yes | No | C, E, Is, Lr, M, P, R, S | H, M, O | A | 1.2 | 0.3 |
| Switzerland | Weiser 2009[135] | 2007 | AF | AF | Yes | No | unknown | H, M, O | A | 3.1 | 1.8 |
| United Kingdom | Callum et al. 2011[111] | 2006 | AF | — | — | No | A | H, M, O, P | S | 2.4 | 0.2 |

## Table 3.2 continued

| Country and area | Study author(s), publication year | Year of estimate | Estimation method | | Indirect costs included in the cost of premature mortality | Estimate includes SHS exposure | Direct costs | | | Smoking-attributable direct cost as % of total direct health care costs | Smoking-attributable direct and indirect costs as % of GDP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Direct costs | Indirect costs | | | Diseases included | Services included | Sector included | | |
| **Western Pacific Region** | | | | | | | | | | | |
| Australia | Collins and Lapsley 2008[142] | 2004-2005 | AF-R | AF-R | No | Yes | A | A | A | 2.2 | 0.9 |
| New Zealand | Easton 1997[145] | 1990 | AF | AF | No | No | A | H, M, O | A | — | 1.0 |
| Republic of Korea | Oh et al. 2012[147] | 2008 | AF | AF | Yes | No | L, M§ | H,O | A | 1.4 | 0.3 |
| Singapore | Quah et al. 2002[151] | 1997 | AF | AF | Yes | No | C, Is, Lr, M, S | H | S | 1.8 | 0.4–0.5 |

*Household production included in estimate.
†Average percentage of health care expenditures and GDP across all four years.
‡Lower estimate includes only hosptial care; higher estimate includes rough estimates of the cost of outpatient, home and nursing care, medications, and rehabilitation.
§Nonmedical care costs (transportation and caregivers' expenses) were also included as part of the direct health care cost.
*Direct and indirect costs:* AF = attributable fraction; AF-R = attributable fraction with relative risks estimated on relevant population.
*Diseases included:* A = all diseases for which relative risk estimates exist; C = cardiovascular disease; E = chronic obstructive pulmonary disease; G = gastrointestinal disease; H = hypertension; Is = ischemic heart disease; L = lung cancer; Lr = lung cancer and upper aerodigestive cancer; M = other malignant neoplasms; P = maternal and/or perinatal complications; R = nonmalignant respiratory disease; S = cerebrovascular disease.
*Services included:* A = all; H = hospital; L = long-term care; M = prescription drugs; O = outpatient care; P = physicians' fees for outpatient care; R = rehabilitation.
*Sector included:* A = all; P = private; S = public.
*Note*: SHS = secondhand smoke.

## Estimates for Individual Low- and Middle-Income Countries

### *African Region*

Recent estimates of the costs of smoking are not available for countries in the African Region. Many countries in this region have high mortality from infectious disease and low mortality from chronic disease caused by tobacco use.[66] This region is still in the early stages of the tobacco epidemic,[67] and studies of the cost of smoking may have been viewed as a lower priority for these countries. However, the prevalence of smoking in some countries in the region now approaches that of some higher income countries, so the cost of smoking is probably increasing.[68,69]

Estimates of the cost of smoking in South Africa in the late 1970s to 1980s found that the direct health care cost of smoking was between US$ 20.2 million and US$ 127.4 million (17.6–289.6 million South African rand).[11,70–72] In 1988, the total estimated direct and indirect cost of smoking was as high as US$ 1.1 billion (2.5 billion rand), or 0.9% of GDP. A study by Groenewald and colleagues[73] updated previous estimates of the health burden of tobacco use in South Africa. Using the SAFs developed from country data, this study found a higher prevalence of smoking and higher attributable fractions of smoking-related disease and smoking-related disease burden than earlier studies.

### *Region of the Americas*

Relatively few studies provide estimates of the economic costs of tobacco use in Latin American and Caribbean countries.

***Barbados.*** A study by Lwegaba[74] did not estimate the cost of tobacco use in Barbados but did estimate the relative direct health care cost for current smokers, finding that direct health care costs were higher among current smokers than nonsmokers.

***Brazil.*** Iglesias and colleagues[75] reported cross-sectional estimates of the cost of smoking for Brazil. Using the epidemiological approach and data from 1996 to 2005, the study estimated the direct health care cost—defined as hospital costs for malignant neoplasm, ischemic heart disease, pneumonia, and influenza, but omitting some costs of care due to chemotherapy and radiation therapy associated with hospital admissions. Iglesias and colleagues reported total costs for a 10-year period of analysis (1996–2005). The annual inpatient hospital cost of smoking was US$ 451.9 million (1.1 billion Brazilian reals) in 2005 figures, which accounted for approximately 0.6% of national health care costs. The distribution of costs by disease category was 49% for ischemic heart disease, 38% for influenza and pneumonia, and 12% for cancer. The distribution of costs by gender was 69% for men and 31% for women. The prevalence of hospitalization due to ischemic heart disease and cancers of the lung, larynx, and esophagus increased between 1999 and 2005, indicating that tobacco-attributable costs may rise for these disease types.

***Mexico.*** A study by Reynales-Shigematsu and colleagues[76] used the epidemiological approach to estimate the direct health care cost of smoking in 2004 and estimated the cumulative effects of smoking among current, former, and never smokers age 35 years and older. Estimated direct cost of smoking was US$ 629.1 million (7.1 billion Mexican pesos), or 4.3% of operating expenditures for the Mexican Social Security Institute (IMSS) in 2004. This estimate was significantly lower than a previous estimate of 7.3% of total IMSS health care costs for the state of Morelos only, but that estimate did not use a nationally representative population or a more aggregate approach to estimating the SAFs.[77] The cost of

smoking to the IMSS alone accounted for 0.08% of GDP. The distribution of costs of smoking by disease was 61% for heart attack, 24% for stroke, 14% for chronic obstructive pulmonary disease (COPD), and 1% for lung cancer.

### *Eastern Mediterranean Region*

There are very few published studies estimating the cost of smoking for individual countries in the Middle East and North Africa.

***Egypt.*** A study described in a report by Nassar[78] estimated cross-sectional, tobacco-attributable direct health care costs and the present value of lost years of life due to tobacco use in Egypt in 1989. The combined estimated cost of direct health care and indirect mortality was US$ 218.1 million (189 million Egyptian pounds), or 0.6% of GDP.

***Lebanon.*** Chaaban and colleagues[79] estimated the direct and indirect costs for cancers and cardiovascular and respiratory diseases caused by tobacco among adults age 30 years and older in 2008. They used the epidemiological approach and calculated SAFs for former and current smokers using data from Lebanon. Health care costs were estimated to be US$ 146.7 million (6.6% of national health care costs). Indirect costs totaled US$ 180.4 million, including US$ 13.6 million in environmental costs (fires and collecting smoking-related waste), and US$ 102.2 million and US$ 64.6 million in lost productivity due to morbidity and mortality, respectively. The total cost estimate was US$ 327.1 million, or 1.1% of GDP.

### *European Region*

Only a few estimates are available for the cost of smoking in LMICs in the European Region, although many countries in this region have high smoking prevalence and heavy burdens of disease due to tobacco use.[80]

***Czech Republic.*** Sovinová and colleagues[81] published a study on direct health care costs attributable to smoking in the Czech Republic for 2002. This study used the epidemiological approach to assess the cost of hospital care for current and former smokers above age 35. The cost of direct health care was estimated to be US$ 144.4 million (4.7 billion Czech koruna [CZK]), which accounts for 2.7% of national health care expenditures and 0.2% of GDP.

An older study commissioned by Phillip Morris Czech Republic estimated the cost of smoking to the Czech government for 1999.[82] This study used the epidemiological approach to estimate that the direct health care costs for treating smoking-attributable diseases and fires were US$ 329.8 million (CZK 11.4 billion), or 8.4% of total health care costs. The indirect costs of morbidity were estimated at US$ 49.2 million (CZK 1.7 billion). Additional smoking-attributable costs to the government due to fires, lost income taxes, and exposure to SHS were US$ 75.2 million (CZK 2.6 billion). These researchers also estimated that the total benefit of tobacco to the government, including tobacco tax revenues and savings in elderly care, pensions, and health care costs due to premature mortality, was US$ 621.9 million (CZK 21.5 billion), concluding that smoking saved the Czech government US$ 167.8 million (CZK 5.8 billion).[82] This study attracted a great deal of attention because of its conclusion that the Czech government benefited from the premature deaths caused by smoking.

Ross's[83] critical review of the Philip Morris Czech Republic study highlighted numerous methodological problems, including inconsistent treatment of state tax and income losses due to smoking-related morbidity, a mix of cash flow and net present value analyses in annual cost accounting, neglect of the effect of premature mortality on the future productivity of the Czech economy, and inconsistent analyses of current health care costs of living among smokers and future health care costs that would have been incurred by longer-lived nonsmokers. Also, most of the tobacco excise tax revenue would have been replaced by tax revenue on the production and sales of other products had there been no tobacco sales. After correcting for these issues, Ross[83] estimated smoking costs the Czech government at least US$ 373 million annually, almost 0.8% of Czech GDP. A simpler critique of the Philip Morris Czech Republic study similarly assumed that lost tobacco tax revenues would have been replaced by other commerce and that the cost of tobacco outweighed the benefits by a factor of 13.[84] Philip Morris Czech Republic eventually apologized for the study, stating that "we understand the outrage that has been expressed and we sincerely regret this extraordinarily unfortunate incident. All of us at Philip Morris Czech Republic are extremely sorry. No one benefits from the very real, serious, and significant diseases caused by smoking."[85]

***Estonia.*** Taal and colleagues[86] estimated the direct health care and indirect morbidity and mortality costs of smoking among Estonian adults age 35 years and older in 1998. This study used the Peto approach[56] to estimate the direct health care cost to the national health insurance program, which covers 95% of the population. Direct costs included smoking-attributable fires, lung and other cancers, COPD and other respiratory diseases, and cardiovascular disease. The estimated direct health care cost of tobacco use in 1998 was US$ 13.7 million (193 million Estonian kroon [EEK]), or 6.5% of national health insurance costs, according to the authors. The indirect costs of morbidity and mortality were US$ 48.8 million (EEK 687 million) and US$ 16.1 million (EEK 226 million), respectively. Total estimated costs were 1.4% of GDP.

***Hungary.*** Barta and GKI Economic Research Ltd.[87] estimated the cost of smoking in Hungary for 1995, 1996, and 1998 among individuals age 35 years and older. These researchers used the Peto method[56] to estimate the direct cost of health care and the indirect cost of morbidity, and used the production value approach to estimate the value of years of life lost. Estimated direct health care costs rose from US$ 95.5 million (12 billion Hungarian forints [HUF]) in 1995 to US$ 121.3 million (HUF 26 billion) in 1998, or from 2.9% to 3.5% of total national health expenditures. The estimated indirect cost of morbidity went from US$ 111.4 million (HUF 14 billion) in 1995 to US$ 88.6–93.3 million (HUF 20 billion) in 1998. (Note that while costs measured in Hungarian forints rose during this period, the U.S. dollar equivalent declined due to substantial currency exchange fluctuations.) Estimated indirect mortality costs went from US$ 1.2 billion (HUF 150 billion) in 1995 to US$ 1.0 billion (HUF 217 billion) in 1998. The estimated costs of smoking in Hungary amounted to 3.1% and 2.6% of GDP in 1995 and 1998, respectively.

***Russian Federation.*** An informal analysis of mortality-related productivity losses in the Russian Federation in 2006 used a population-based simulation model to estimate that the indirect mortality costs were US$ 24.7 billion, or 3.2% of GDP.[88]

***Uzbekistan.*** Using the epidemiological approach, Usmanova and colleagues[89] estimated direct health care costs and indirect costs of smoking by males in Uzbekistan age 35 years and older in 2005. The

health care cost estimates included government expenditures for inpatient and outpatient hospital care and out-of-pocket spending to treat smoking-related diseases for which relative risk estimates were available. The estimated direct health care costs of smoking were US$ 17.3 million (20.4 billion Uzbekistani soums [UZS]), or 2.7% of health care expenditures. The indirect cost of smoking to society was US$ 75.2 million (UZS 88.5 billion); 3% of this loss was due to premature mortality, 74% due to disability, and 23% due to sickness. Total estimated costs of smoking were 0.6% of GDP.

### *South-East Asia Region*

National estimates of the costs of tobacco use are available for several countries in this region, including two of the most populous, Bangladesh and India.

***Bangladesh.*** Two major studies have examined the costs of tobacco use in Bangladesh. A 2001 study by Efroymson and colleagues[90] found that tobacco use accounted for a significant proportion of household expenditures, resulting in lower expenditures for food and education in low-income households.

WHO[91] estimated the direct health care cost of smoking and indirect costs of productivity loss due to tobacco-related morbidity (i.e., income lost to temporary work absence and premature disability) and mortality for 2004. This study used the epidemiological approach to examine current and past tobacco use by those age 30 years and older. The study reported that in households that used tobacco, approximately 5.5% of expenditures were for tobacco-attributable illness, which accounted for 41% of these households' direct expenditures on health care. Among those older than 30 years of age, approximately 50% of men and 3% of women were current smokers, and 22% of men and 39% of women were current users of smokeless tobacco. The study did not estimate the actual direct health care cost because of the difficulty of determining actual utilization rates of inpatient care services; the summary reported costs that assumed a baseline utilization rate of 25%.

Total direct and indirect costs of tobacco in Bangladesh were estimated as US$ 855.3 million (50.9 billion Bangladeshi takas [BDT]). Of this amount, US$ 346.1 million (BDT 20.6 billion) was spent on direct health care and US$ 411.7 million (BDT 24.5 billion) on indirect morbidity and mortality from tobacco use. This cost also included US$ 97.5 million (BDT 5.8 billion) on direct and indirect costs of exposure to SHS. The total cost (US$ 855.3 million; BDT 50.9 billion) exceeded the total tax revenue and wage labor earned from tobacco production and consumption (US$ 438.6 million; BDT 26.1 billion). Total estimated cost was distributed as follows: 41% for direct health care costs, 24% for indirect mortality costs, 24% for indirect morbidity costs, and 11% for treating the effects of SHS exposure. Estimated direct health care cost of smoking was 19.8% of total direct health care costs, and the total cost of smoking was 1.5% of GDP.[91]

***India.*** Three studies have assessed the cost of smoking-attributable disease in India. A study published by the government of India[92] estimated the costs of direct health care and indirect morbidity and mortality. The epidemiological approach was used to assess the tobacco-attributable cost of cardiovascular diseases, cancers, respiratory diseases, and tuberculosis in adults ages 35–69. The researchers calculated separate estimates for males and females and by type of tobacco use (e.g., smokeless, smoked). They found that the estimated cost of tobacco-attributable diseases in 2011 totaled US$ 22.4 billion (104,500 crore rupees [Rs]), or 1.2% of GDP. The cost of medical treatment was US$ 3.6 billion (4.9% of national medical expenditures). Indirect costs totaled US$ 18.8 billion (Rs 87,700 crore) with indirect morbidity costs of US$ 3.1 billion (Rs 14,700 crore) and indirect

mortality costs of US$ 15.6 billion (Rs 73,000 crore). Men accounted for 91% of the estimated costs of tobacco use.

An earlier study by John and colleagues[93] estimated the direct health care cost and indirect cost of morbidity (but not mortality) for 2004 using the epidemiological approach with cross-sectional data for people age 35 years and older. This study estimated that the direct health care cost attributable to tobacco was US$ 1.2 billion (3.7% of national health care expenditures), and the indirect cost of morbidity for lost work was US$ 502 million, for a total of US$ 1.7 billion (0.2% of GDP). John and colleagues noted that the cost of smoking in 2004 was greater than the annual total of tobacco control programs and revenue from tobacco taxes. The cost of smoking-related tuberculosis was US$ 311 million, which exceeded the total expenditures on tuberculosis control in 2006.

In a related study, John[94] estimated household expenditures for 1999-2000 and found that tobacco use in the household displaces expenditures for such basic needs as food and education.

***Indonesia.*** Kosen[95] used a variation of the Peto method[56] that was developed as part of the Global Burden of Disease Project[1,55,96] to estimate the cross-sectional direct health costs for 11 tobacco-related diseases, indirect morbidity, and the present value of indirect mortality from smoking in Indonesia for 2005. Estimated direct health care cost was US$ 221.0 million, or 2.7% of total national health care expenditures. Estimated indirect morbidity and mortality costs were US$ 1.9 billion and US$ 4.9 billion, respectively, for a total indirect cost of US$ 6.8 billion. Direct and indirect costs were estimated to total US$ 7.0 billion, or 2.4% of GDP. Including the cost of cigarette purchases, the total cost was US$ 20.9 billion, or 7.3% of GDP.

***Myanmar.*** Kyaing[97] used the epidemiological approach to estimate direct health care costs for 1999. She estimated the cost of smoking for 1999 at between US$ 19.6 million (123 million Myanmar kyats [MMK]) and US$ 24.8 million (MMK 156 million), which was 0.2–0.3% of GDP. Outpatient costs included nonmalignant respiratory illness and hypertension treatment, totaling US$ 11.3 million (MMK 71 million). Inpatient care accounted for US$ 13.5 million (MMK 85 million), or between 55% and 70% of the total cost. The distribution of inpatient costs by disease category was tuberculosis, 53.4%; ischemic heart disease, 14%; stroke, 8%; hypertension, 6.7%; head and neck cancer, 5.7%; lung cancer, 4.9%; other nonmalignant respiratory disease, 4.5%; and COPD, 2.8%.

***Thailand.*** Leartsakulpanitch and colleagues[98] examined the out-of-pocket smoking-attributable cost (i.e., the patient's perspective) of direct health care for lung cancer, COPD, and coronary heart disease in 2006. The estimated direct out-of-pocket cost of these diseases was US$ 261.3 million (9.9 billion Thai baht), or 3.6% of national health care costs, which accounted for 0.1% of GDP. The distribution of costs by disease was 78% for COPD, 18% for coronary heart disease, and 4% for lung cancer.

Sarntisart[99] also conducted an economic analysis of tobacco use in Thailand, estimating the direct health care cost and indirect cost of smoking using a smaller base of diseases and arriving at smaller estimates compared with those of Leartsakulpanitch and colleagues. Sarntisart estimated that the direct and indirect health care cost of treating lung cancer and COPD associated with tobacco use in 1999 was US$ 6.0 million, or 0.1% of Thailand's total health care expenditure.

### *Western Pacific Region*

***The People's Republic of China.*** China presents a challenge for tobacco control in the region and worldwide. China is both the largest consumer and producer of tobacco and includes 27.3% of the world's smokers.[100] Four studies of tobacco-attributable costs were found for China. Yang and colleagues[101] assessed the cost of ever smoking among adults age 35 and older in China over three years: 2000, 2003, and 2008. The epidemiological approach was used to calculate direct and indirect costs of cancer and cardiovascular and respiratory diseases. Between 2000 and 2008, estimated direct health care costs ranged from US$ 2.4 billion to US$ 6.2 billion (3.0–5.3% of national health care costs), and estimated indirect costs ranged from US$ 4.8 billion to US$ 22.7 billion. The total cost was approximately US$ 7.2–22.7 billion (0.6–1.0% of GDP).

Also using the epidemiological approach, Sung and colleagues[102] estimated the direct and indirect cross-sectional costs of cigarette smoking in 2000 among Chinese adults age 35 years and older. They estimated that the direct health care cost in China in 2000 was US$ 1.7 billion, which accounted for 3.1% of total health care costs. The indirect cost of morbidity was US$ 0.4 billion, and the present value of future potential years of life lost was US$ 2.9 billion. The total estimated cost was US$ 5 billion, which was approximately 0.4% of GDP.

In addition, two household expenditure studies found that tobacco use in the household reduces expenditures on such other basic needs as education and medical care.[103,104] Xin and colleagues[104] found that current smokers and former smokers have higher medical care expenditures than never smokers and that exposure to SHS in the household is associated with increased medical expenditures.

***China, Hong Kong Special Administrative Region (SAR).*** McGhee and colleagues[105] estimated the direct and indirect costs of smoking for 1998 among all age groups in China, Hong Kong SAR. Using the epidemiological approach to examine the effects of smoking and exposure to SHS, these researchers estimated that the direct health care cost in 1998 was US$ 459 million, of which 28% was due to exposure to SHS. The productivity cost of morbidity and mortality was estimated to be US$ 230 million.[105]

Total health care expenditures in China, Hong Kong SAR were approximately US$ 7.2 billion (59,661 million Hong Kong dollars).[106] The direct health care cost of smoking was 6.4% of total health care expenditures. The estimated direct health care and indirect productivity costs of smoking totaled US$ 688 million,[105] or 0.4% of GDP in China, Hong Kong SAR.

***Lao People's Democratic Republic.*** Chu and colleagues[107] calculated direct health care costs and the indirect cost of morbidity and mortality in Lao People's Democratic Republic in 2006-2007. Using the epidemiological approach, they calculated attributable fractions using relative risk data from past and current Lao smokers. The estimated health care cost of lung cancer, COPD, and stroke totaled more than US$ 309,000 (3.1 billion Lao kip [LAK]), or 0.2% of total health care costs. Total costs including the cost of morbidity and mortality were estimated to be US$ 2.9 million (LAK 28.5 billion), or 0.1% of GDP.

***Malaysia.*** Al-Junid and the Southeast Asia Tobacco Control Alliance[108] used the epidemiological approach to assess direct health care costs for former and current smokers over the age of 18 years in Malaysia in 2004. Estimated cost of health care totaled US$ 769.7 million (2.9 billion Malaysian ringgit). This accounts for approximately 16.8% of national health care costs and 0.6% of GDP.

***Philippines.*** WHO[109] estimated the direct health care and indirect morbidity and mortality smoking-attributable costs in the Philippines from lung cancer, coronary artery disease, stroke, and COPD in 2003. Two epidemiological approaches were used to provide plausible ranges of estimates: the Peto method[56] of estimating cumulative exposure to tobacco use and the software program Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC) developed by the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services.[110]

WHO estimated that between US$ 501 million and US$ 858 million was spent in 2003 to treat the four major diseases caused by smoking. Using SAMMEC, they estimated that the annual indirect productivity cost of mortality was as much as US$ 5 billion (US$ 2.2 billion using Peto estimates), with as much as another US$ 185 million in lost productivity from smoking-attributable morbidity (US$ 121 million using Peto estimates). The total cost of smoking in 2003 was estimated as US$ 6.0 billion, or 7.2% of GDP according to SAMMEC (using Peto estimates, US$ 2.9 billion, or 3.4% of GDP).[109]

***Viet Nam.*** A study by Ross and colleagues[111] estimated the direct health care cost of ever smoking for inpatient treatment in Viet Nam in 2005. Using the epidemiological approach, the researchers examined the costs to all payers (individual, government, and private insurance companies) for lung cancer, ischemic heart disease, and COPD. They estimated that the inpatient cost of smoking was US$ 73.2 million (1.16 billion Viet Nam dongs) in 2005, which was 2.4% of national health care expenditures and 0.1% of GDP. Of the smoking-attributable inpatient care costs, 51% were paid by government services, 34% by patients, and 15% by private insurance companies. The distribution of costs by smoking-attributable disease was 89% for COPD, 7% for lung cancer, and 4% for ischemic heart disease.[111]

### Estimates for Individual High-Income Countries

Many cost of smoking studies have been conducted in HICs using the various approaches described above. This section reviews the research conducted since 2000; for a comprehensive discussion of older studies from HICs, see the review by Lightwood and colleagues.[11]

#### *Region of the Americas*

***Canada.*** Rehm and colleagues[112] used the epidemiological approach to estimate Canada's costs of direct health care and indirect mortality and morbidity in 2002 for all diseases with estimated relative risks due to tobacco use. Estimated direct health care cost from smoking was US$ 2.8 billion (4.4 billion Canadian dollars [C$]), or 3.9% of national health care expenditures. The total estimated indirect productivity cost was US$ 7.9 billion (C$ 12.5 billion): US$ 6.7 billion (C$ 10.5 billion) for indirect morbidity, and US$ 1.2 billion (C$ 1.9 billion) for premature mortality. The cost of tobacco-attributable fires was US$ 55.1 million (C$ 86.5 million). The total estimated cost of tobacco use was US$ 10.8 billion (C$ 17.0 billion), or 1.5% of GDP.

***United States.*** Many studies have estimated the cost of smoking in the United States.[42,47–49,113] Several earlier studies are reported or discussed in previous reviews.[11,15,16,19] Estimates from the 2014 Surgeon General's report[41] and the CDC[114–116] are discussed here.

The 2014 Surgeon General's report, *The Health Consequences of Smoking—50 Years of Progress*,[41] included three separate analyses to assess the direct health care costs of smoking and one analysis of productivity loss due to premature mortality (but excluding productivity losses due to morbidity). The first analysis was based on an approach used by Miller and colleagues,[49] which provides estimates by type of medical service, using SAMMEC's expenditure SAFs. Estimated health care cost for adults age 19 and older in 2009 was US$ 132.5 billion, which was 5.4% of national health care expenditures and 1.0% of GDP.

The second analysis was based on an approach by Solberg and colleagues,[117] who calculated the health care cost for adults age 35 years and older by age, gender, and smoking status. Estimated health care cost of current and former smoking for 2012 was US$ 175.9 billion, or 6.3% of national health care expenditures and 1.1% of GDP.

The third analysis discussed in the 2014 Surgeon General's report[41] was completed by Xu and colleagues.[118] A regression analysis was used to estimate 2010 health care costs of past and current smokers age 19 years and older by source of funding. Using this method, estimated health care costs were similar to the two other analyses discussed in the 2014 Surgeon General's report: Health care cost was US$ 170.6 billion, or 6.7% of national health care expenditures and 1.2% of GDP.

The 2014 Surgeon General's report calculated productivity losses due to smoking-related mortality for the years 2005–2009. SAMMEC was used to derive cost estimates for 19 smoking-related diseases among adults over the age of 35. The average annual cost of lost productivity attributable to mortality was US$ 150.7 billion, or about 1.1% of GDP.

Studies by the CDC use SAMMEC[110,119] for all smoking-related diseases with sufficient data to estimate relative risks, as reported in several studies.[120–122] The average annual direct health care costs for smoking-attributable disease was US$ 96 billion for the years 2001–2004[116] and US$ 75.5 billion for 1995–1999.[114] The estimated direct health care cost attributable to tobacco use ranged from 5.2% to 7.6% of total national direct health care costs between 1995 and 2004.[114,116] Lost productivity costs for the years 1995–2004 ranged from US$ 81.9 billion to US$ 97.0 billion.[114–116] The direct and indirect cost of smoking between 2001 and 2004 totaled US$ 193 billion per year, which was approximately 1.6% to 1.9% of GDP.[116]

Using the epidemiological approach, Max and colleagues[123] estimated the cost to the U.S. economy of lost productivity due to premature mortality from SHS alone at US$ 6.6 billion.

### *European Region*

***Denmark.*** A series of studies[124–126] assessed the costs of past and current smoking in Denmark, using the epidemiological approach to estimate direct health care costs and indirect costs of morbidity and mortality among adults ages 35–89 years. All smoked tobacco products were included in the analysis. Estimated health care costs in Denmark in 1999 were US$ 1.4 billion (9.7 billion Danish kroner [DKK]), or 8.9% of total direct health care costs. These studies estimated the indirect costs of morbidity and mortality at US$ 2.0 billion (DKK 13.9 billion). Total estimated costs were US$ 3.4 billion

(DKK 23.7 billion), or 2.0% of GDP.[125] Among moderate smokers who quit smoking at age 35, lifetime health care cost savings were estimated at US$ 8,100 (7,600 euros [€]) for men and US$ 13,000 (€12,200) for women. Total direct and indirect cost savings were estimated at US$ 26,400 (€24,800) for men and US$ 36,200 (€34,000) for women.[126] These researchers concluded that lifetime health care costs were higher for ever smokers than for never smokers, with the ratio of costs for ever smokers to never smokers ranging from 1.63 to 1.82.[125]

***Finland.*** Kiiskinen and colleagues[127] estimated the direct health care and indirect productivity costs attributable to smoking in Finland, using data from a cohort of 25- to 59-year-old men followed from 1972 to 1991. Direct health care costs included hospital stays and major drug use, and indirect costs were defined as permanent or temporary work absences of one or more weeks. Compared with never smokers, the discounted costs of hospitalization (at rates of 0% and 5% to the baseline year of 1972) for current smokers over the 19-year study period were approximately 56% greater, and total costs were about 85% greater. The difference in estimated discounted health care costs per person between current smokers and never smokers was US$ 1,900 (€1,800) due to hospitalization, US$ 18,600 (€17,500) due to premature morbidity, and US$ 19,800 (€18,600) due to premature mortality—for a total difference of US$ 40,300 (€37,800) per person.

***Germany.*** Neubauer and colleagues[128] used the epidemiological approach to estimate the direct and indirect costs attributable to current and former smoking in Germany in 2003. They focused on more than 30 smoking-related diseases and included hospital, outpatient, and ambulatory care; rehabilitation; and prescription drugs. Indirect productivity costs included morbidity due to illness, permanent disability, and premature mortality. Estimated health care costs were US$ 8.5 billion (€7.5 billion), or 3.2% of total health care costs. Estimated indirect costs were US$ 9.9 billion (€8.8 billion) for morbidity and US$ 5.3 billion (€4.7 billion) for mortality. Total estimated costs were 1.0% of GDP.

Similar estimates of the total cost of smoking in Germany were produced by Ruff and colleagues[129] in their study using the attributable risk method. Prenzler and colleagues[130] also used the attributable risk method and estimated that the indirect costs of smoking in Germany in 2005 were US$ 11.9 billion (€9.6 billion), or 0.4% of the GDP.

***Israel.*** Ginsberg and colleagues[131] used the epidemiological approach to estimate the direct health care cost of past and current smoking in Israel in 2008. Their main analysis only included the cost of hospitalization of various smoking-related diseases (cancers; cardiovascular, cerebrovascular, respiratory, digestive diseases; burns; etc.), but additional rough estimates were also provided for more extensive services including outpatient service, home and nursing care, medication, and rehabilitation. The estimated cost of inpatient hospital care was US$ 236.1 million ($847 million new shekels [ILS]), which accounts for 1.5% of national heath expense and 0.1% of GDP. Including the rough estimates for additional medical expenses, Ginsberg and colleagues estimated that smoking could cost US$ 486.9 million (ILS 1.7 billion), or 3.1% of national health care costs and 0.2% of GDP.

***Netherlands.*** Van Genugten and colleagues[132] constructed a dynamic population simulation model to estimate and forecast the relative savings of alternative long-term tobacco control programs and estimate the direct health care cost attributable to smoking for 1999, with a focus on lung cancer, COPD,

coronary heart disease, and stroke. Estimated smoking-attributable health care cost was US$ 2.9 billion (€2.7 billion), or 8.6% of total direct health care expenditures (0.7% of GDP).

***Sweden.*** Bolin and colleagues[133] estimated the cost of former and current smoking among adults age 35 and older in Sweden for 2007. They used the epidemiological approach to estimate health care costs and the indirect cost of smoking-related morbidity and mortality. Estimated health care cost was US$ 479.5 million (1.2% of national health care expenditures), and the total estimated cost was US$ 1.6 billion (0.3% of GDP).

In an earlier study, Bolin and Lindgren[134] used the epidemiological approach to estimate the cost of cigarette smoking among 35- to 84-year-old smokers in Sweden for 2001. Estimated direct health care cost of smoking was US$ 212 million, or 1.0% of national health care expenditures. The total indirect cost of smoking was US$ 592 million—US$ 169 million for indirect morbidity and US$ 423 million for indirect mortality. Total cost of smoking was US$ 804 million, or 0.4% of GDP.

***Switzerland.*** Weiser[135] estimated the cost of health care and indirect morbidity and mortality due to smoking in Switzerland for 2007. Hospital, outpatient care, and prescription drug costs were estimated at US$ 1.4 billion (1.7 billion Swiss francs [CHF]), or 3.1% of national health care expenditures. Estimated indirect costs totaled US$ 6.8 billion (CHF 8.3 billion)—US$ 2.2 billion (CHF 2.7 billion) due to morbidity, US$ 1.0 billion (CHF 1.3 billion) due to mortality, and US$ 3.6 billion (CHF 4.3 billion) for other intangibles (such as quality of life and health due to illness or disability). Direct and indirect costs totaled US$ 8.3 billion (CHF 9.9 billion), or 1.8% of GDP.

Priez and colleagues[136] and Vitale and others[137] used the epidemiological approach to estimate the direct health care and indirect productivity costs of smoking in Switzerland for 1995. In a supplemental analysis, the willingness-to-pay approach was used to estimate the production value of household services and intangible losses due to mortality. Estimated direct health care cost of smoking was US$ 1.0 billion (CHF 1.2 billion), or 3.4% of national health care costs.[137] Estimated indirect productivity cost of smoking was US$ 2.4 billion (CHF 2.8 billion), which consisted of US$ 847.5 million (CHF 1.0 billion) for mortality and US$ 1.5 billion (CHF 1.8 billion) for morbidity in the form of both temporary and permanent incapacitation. The total cost of smoking was US$ 3.4 billion (CHF 4.0 billion), or 1.0% of GDP. The total value of lost household production (not included in the definition of GDP) was US$ 1.4 billion (CHF 1.6 billion)—US$ 701.9 million (CHF 830 million) for mortality and US$ 659.6 million (CHF 780 million) for morbidity. The WTP to avoid the health consequences of smoking was US$ 4.3 billion (CHF 5.0 billion).

Hauri and colleagues[138] studied the direct and indirect costs of SHS, which other Swiss studies did not include in their estimates. They used the epidemiological approach to assess the cost of treating the following tobacco-attributable diseases among people age 15 years and older in 2006: ischemic heart disease, stroke, lung and nasal cancer, COPD, asthma, respiratory diseases, and pre-term delivery. Estimated health care costs totaled US$ 51.0 million (CHF 63.9 million), or 0.1% of national health care expenditures. Including indirect costs of morbidity and mortality, total cost of smoking was estimated to be US$ 262.9 billion (CHF 329.7 billion), or less than 0.1% of GDP.

***The United Kingdom of Great Britain and Northern Ireland.*** Three studies have assessed the direct health care cost of smoking in the United Kingdom; none of these studies assessed the indirect cost.

Scarborough and colleagues[139] used the epidemiological approach to assess health care costs of COPD, cancers, and cardiovascular, gastrointestinal, and respiratory disease for 2006-2007. Estimated health care cost was US$ 6.3 billion (3 billion British pounds [£]), which was 2.8% of national health care expenditures and 0.2% of GDP.

Allender and colleagues[140] also used the epidemiological approach to study health care costs for fiscal year 2005-2006. This study was similar to the Scarborough study and assessed the same diseases. Estimated cost of health care was US$ 9.5 billion (£5.2 billion), or 4.8% of national health care expenditures and 0.4% of GDP.

Callum and colleagues[141] used the epidemiological approach to estimate the health care cost of past and current smoking among people age 15 years and older in 2006. This study assessed the cost of hospitalization, outpatient visits, consultations, and prescriptions associated with tobacco-related diseases. Estimated health care costs totaled US$ 5.0 billion (£2.7 billion), or 2.4% of national health care costs and 0.2% of GDP.

### *Western Pacific Region*

***Australia.*** Using the epidemiological approach, Collins and Lapsley[142] conducted a study of direct health care costs and indirect mortality and morbidity costs attributable to current and former smoking in Australia for 2004 and 2005.

The total gross (as opposed to net) direct health care cost of smoking was US$ 1.4 billion (1.8 billion Australian dollars [A$]), 2.2% of total direct health care expenditures. The total gross indirect cost was US$ 4.3 billion (A$ 5.7 billion), which included US$ 584 million (A$ 780 million) for morbidity and US$ 3.7 billion (A$ 5.0 billion) for mortality. The cost of smoking-attributable fires was US$ 47.2 million (A$ 63 million). The total cost of tobacco use was US$ 5.7 billion (A$ 7.6 billion) or 0.9% of GDP.[142]

The estimated net direct health care cost, which accounted for the fact that smokers die younger, was US$ 238.3 million (A$ 318 million). Indirect cost estimates of household production (which are not included in the official GDP statistics) were US$ 514.8 million (A$ 687 million) due to morbidity and US$ 6.9 billion (A$ 9.2 billion) due to mortality. Estimated indirect workforce and household indirect productivity costs totaled US$ 11.7 billion (A$ 15.6 billion).[142]

***Japan.*** The epidemiological approach has not been used to estimate the total direct health care or indirect productivity costs for Japan. A literature review by Shimada and colleagues[143] found that most studies have focused on estimating changes in health care costs due to changes in tobacco control policy or direct regression estimates based on longitudinal data. Although not exhaustive, this review provides evidence that tobacco use increases direct health care costs among the elderly in Japan. A study by Kuriyama and colleagues[144] found that ever smoking increases direct health care costs in individuals when combined with other health risk behaviors, but the analysis did not include estimates of total national costs.

***New Zealand.*** Easton[145] used the epidemiological approach to estimate direct health care and indirect productivity costs for New Zealand for 1990. The study also used the WTP approach to estimate the cost of premature mortality. All smoking-related diseases for which relative risk estimates were available

were included, using attributable fraction estimates from Australia. In 1990, the total estimated cost of smoking in New Zealand was US$ 456.4 million (765 million New Zealand dollars [NZ$]). This total included US$ 122.3 million (NZ$ 205 million) in direct health care costs, US$ 238.6 million (NZ$ 400 million) in production losses to mortality, US$ 86.5 million (NZ$ 145 million) in losses from morbidity due to tobacco use, and US$ 8.9 million (NZ$ 15 million) due to tobacco-related fires. These costs were approximately 1.0% of GDP.

In addition, a study by Thomson and colleagues[146] found that tobacco expenditures displace expenditures for other goods and services in lower income households.

***Republic of Korea.*** Four studies have assessed the cost of smoking in the Republic of Korea. Oh and colleagues[147] used the epidemiological approach to assess direct and indirect costs of past and current smoking among adults age 35 years and older in 2008. They studied 10 types of smoking-related cancers. Estimated health care costs totaled more than US$ 831.6 million (1.4% of national health care expenditures) with men accounting for 70% of the cost. Estimated cost of morbidity and mortality was US$ 2.3 billion. Total direct and indirect costs in the Republic of Korea were US$ 3.1 billion, or 0.3% of GDP.

Kang and colleagues[148] used two different methods to estimate the cost of smoking for adults age 35 and older in 1998: the epidemiological approach, using data on commonly recognized smoking-related diseases, and an "all-cause" direct regression approach that used longitudinal data to compare all health expenditures by smoking status. Costs were estimated for adults age 35 and older by current and former smoking status.

Using the epidemiological approach, Kang and colleagues estimated the medical cost of smoking as US$ 130.3 million for current smokers and US$ 64.0 million for former smokers, totaling US$ 194.3 million in 1998, or 1.3% of national health care expenditures. The estimated indirect morbidity cost of ever smoking was US$ 84.7 million, about two-thirds of which was due to current smoking. Estimated indirect cost of mortality ranged from US$ 2.0 billion to US$ 2.7 billion, almost 80% of which was due to current smoking. The total cost of smoking ranged from US$ 2.3 billion to US$ 3.0 billion (0.6% to 0.8% of GDP).[148]

According to direct regression estimates using all medical care utilization, Kang and colleagues[148] found that current tobacco use reduced direct health care cost, and former smoking did not affect cost. In an earlier study which used a different dataset but a similar method, Jee and colleagues[149] found that tobacco use increased the cost of medical care; they also estimated the cost of smoking using a direct regression approach in the context of multiple modifiable health risk factors. Lee and colleagues[150] used the epidemiological approach to estimate hospital costs attributable to tobacco use, finding that tobacco use increased hospital costs.

***Singapore.*** A 2002 study by Quah and colleagues[151] used the epidemiological approach to estimate the direct health care cost and indirect morbidity and mortality costs of smoking among those age 30 years and older. For 1997, the total estimated cost of smoking ranged from US$ 453.3 million (673 million Singapore dollars [S$]) to US$ 565.1 million (S$ 839 million), or 0.4–0.5% of GDP. The estimated inpatient cost of health care ranged from US$ 49.8 million to US$ 50.1 million (S$ 74 million to S$ 75 million), or 1.8% of national health care expenditures. The indirect cost of

morbidity was approximately US$ 2.2 million (S$ 3.3 million) for both the low- and high-cost cases. The indirect cost of mortality ranged from US$ 401.4 million to US$ 512.5 million (S$ 596 million to S$ 761 million). The costs for women were about 57.6% of those for men for direct costs and 10% of those for men for indirect morbidity and mortality costs.

## Global Estimates

Goodchild and colleagues[152] conducted analyses assessing the total economic cost of smoking-attributable diseases in 152 countries, representing 97% of the world's smokers. To estimate direct health care costs attributable to smoking in 2012, Goodchild and colleagues first completed a literature review to identify any studies on the health care cost of smoking published between 1990 and 2015. A total of 33 studies covering 44 countries were identified, and the SAFs were extracted. Regression analyses were conducted to estimate SAFs for the remaining 108 countries, which together account for only 14% of global health expenditures. The value of production approach was used to measure indirect costs of lost productivity from smoking-attributable morbidity and mortality among smokers ages 15–69. Indirect costs for all WHO Member States were calculated using WHO estimates on smoking-attributable death, disability-adjusted life-years, and smoking-attributable years lost to disability. These estimates do not include costs associated with SHS or smokeless tobacco.[152]

Goodchild and colleagues estimated that the worldwide health care cost of smoking in 2012 was US$ 422 billion, accounting for 5.7% of global health expenditures. Higher proportions of direct health care costs of smoking were seen in HICs (6.5%), the Region of the Americas (6.7%), and the European Region (6.6%) than in others countries/regions. Estimated indirect costs totaled US$ 357 billion for morbidity and US$ 657 billion for mortality. Goodchild and colleagues estimated that the total economic cost of smoking was US$ 1.4 trillion, or 1.8% of the world's annual GDP. HICs and countries in the European and Americas Regions spent the highest amounts proportionally on smoking-attributable disease (2.2%, 2.5%, and 2.4% of GDP, respectively). The direct and indirect cost of smoking-attributable diseases in LMICs make up approximately 40% of the global economic cost of smoking. The cost of smoking is proportionally lowest in the African and the Eastern Mediterranean Regions, which in part reflects the lower smoking prevalence and intensity of smoking in these regions relative to regions with higher levels of tobacco use, such as Eastern Europe.[152]

## Summary

Progress has been made during the past 15 years on estimating the costs of smoking. These estimates are useful in documenting the economic burden of tobacco use, designing tobacco control programs, and identifying the health care needs of vulnerable populations, and, where such studies exist, they have at times motivated policymakers to implement strong tobacco control policies. Reliable cost estimates are lacking for many countries, especially LMICs. Where sufficient data exist for these estimates, they show that the direct cost of tobacco-related disease in LMICs is comparable to that in HICs—that is, the direct health care cost of smoking is similar in terms of the percentage of total health care expenditures. The indirect cost of mortality is also high, at least in countries for which such cost can be measured. Substantial economic resources are lost to other uses because of tobacco-related illnesses, premature disability, and death. These losses are especially harmful in LMICs, where economic resources are urgently needed for economic and social investment.

In countries with underdeveloped formal health care and social insurance systems, the estimated costs of smoking vary widely among studies, most likely because (a) the formal health care system is not fully developed or is changing rapidly and (b) data on utilization and cost of treatment are incomplete or of poor quality.

Similarly, the indirect cost of smoking may be much higher than measured in existing studies. Evidence from household expenditure surveys in several LMICs and HICs shows that tobacco use displaces household expenditures on education and medical care, which are important investments to improve economic well-being. In countries with poorly developed social insurance sectors and large burdens of poverty on households, other expenditures displaced by tobacco use may have very large long-term costs.[153]

Many estimates of the cost of direct health care attributable to smoking have some limitations. For example, cost estimates may be lacking for maternal tobacco use during pregnancy and for exposure to secondhand smoke on perinatal, infant, child, and adult health. Estimates do not always cover the full range of tobacco-related diseases, especially in LMICs, where direct cost estimates focus on only the most prominent diseases (e.g., lung cancer, COPD, and ischemic heart disease) linked to smoking. Furthermore, estimates do not always account for all of the health care costs of tobacco use[154] and often use attributable or relative risk estimates from other countries that may not be applicable to the country under study. Finally, relatively few studies distinguish between internal and external costs of tobacco use. External costs are of particular interest and can vary considerably across countries given the differences in nonsmokers' exposure to secondhand smoke and the extent of the governments' role in providing health care.

## Research Needs

Many of the studies profiled in this chapter lack data in one or more of the following areas:

- Epidemiological data on the incidence or prevalence of many tobacco-related diseases
- Adjusted country-specific estimates of relative risk and attributable fractions of mortality, health care costs, or disability due to tobacco use
- Total utilization and expenditures for treatment, including disease-specific costs
- Insurance, labor force participation, and earnings data that can provide market-based estimates of the productivity costs of death and disability.

Several studies in this review illustrate approaches that can be used to remedy these problems.

Comprehensive estimates of the cost of smoking at the country, region, and global levels should be a high priority. These estimates are important for documenting the economic burden of tobacco use, designing effective tobacco control programs, and identifying the health care needs of vulnerable populations. Even in countries where data are limited, estimates using the available data that can be done at relatively low cost, such as those described in the WHO toolkit on assessing economic costs,[21] can be useful in advancing tobacco control efforts.

## Conclusions

1. The economic costs of tobacco use are substantial and include significant health care costs for treating the diseases caused by tobacco use and the lost productivity that results from tobacco-attributable morbidity and mortality.
2. In high-income countries, lifetime health care costs are greater for smokers than for nonsmokers, even after accounting for the shorter lives of smokers.
3. Evidence on the economic costs of tobacco use in low- and middle-income countries is limited but growing; the comprehensiveness of these studies varies greatly within and across countries, as do the existing cost estimates.
4. Past and current trends in tobacco use, together with improvements in health care systems and access to health care, suggest that the economic costs of tobacco use in low- and middle-income countries are likely to increase considerably in coming years.
5. The public's share of tobacco-attributable economic costs varies significantly among countries, reflecting differences in the role of government in providing health care.

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## Section 3
## Price Determinants of Demand

# Chapter 4
# The Impact of Tax and Price on the Demand for Tobacco Products

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# The Impact of Tax and Price on the Demand for Tobacco Products

Tobacco taxes and prices are key factors in controlling the demand for tobacco products and essential components of an integrated approach to tobacco control. This chapter examines the evidence surrounding tobacco taxation and pricing and the impact of taxation and pricing on the prevalence of tobacco use and the consumption of tobacco products. This chapter discusses:

- Models of the demand for tobacco products, including economic models of addiction
- The evidence on the impact of taxes and prices on the demand for tobacco products
- The effect of factors such as age and gender on sensitivity to changes in the price of tobacco products.

Taxes on tobacco products tend to be higher in high-income countries (HICs) than in low- and middle-income countries (LMICs). Tobacco products are often more affordable in HICs than in LMICs, but over time, cigarettes have generally become less affordable in HICs and more affordable in LMICs. Significant tax and price increases can have a particularly strong impact on some of the groups most affected by the tobacco epidemic, including youth and people in LMICs.

## Chapter Contents



## Figures and Tables

## Introduction

Governments and policymakers have access to a substantial number of tobacco control tools designed to reduce tobacco consumption. There is a consensus that the single most consistently effective tobacco control tool is significantly increasing the excise tax on tobacco products.[1–5] The principle is simple: By increasing excise taxes on tobacco products, retail prices will increase, in turn causing decreases in the consumption of tobacco products. Not only does an increase in the excise tax reduce tobacco use, but overwhelming evidence also suggests that it raises government revenue. (See chapter 5.)

Other tobacco control tools are discussed in subsequent chapters, including bans on tobacco marketing, smoking in public places, and youth access to tobacco, as well as services to help people quit using tobacco, among others. Although these tools are important in a comprehensive tobacco control strategy and help create an environment in which tobacco use is no longer acceptable, their direct effect on tobacco consumption is more modest than the impact of significant increases in the excise tax. Moreover, prohibiting certain practices (e.g., tobacco marketing or indoor smoking) has a limited effect because after such practices are prohibited, they cannot be prohibited further. Increases in tobacco excise taxes are not subject to such constraints; excise taxes can continue to be increased, even if the tax rate is already very high.

Increasing the excise tax, more than any other tobacco control tool, is firmly rooted in economic theory and application,[6] thus economists are well placed to analyze the rationale and workings of this tobacco control tool. Other tobacco control interventions also have an economic aspect, but they typically have a far more multidisciplinary focus and benefit from inputs from a wider variety of disciplines, such as ethics, philosophy, and social policy.[6]

Price elasticity of demand is the key economic concept used to understand or measure changes in cigarette consumption resulting from changes in the excise tax and in the retail price of cigarettes. In an economic context, *elasticity* refers to the responsiveness of one variable to a change in another variable. The price elasticity of demand measures how responsive demand (or consumption) is to a change in the price of the product. Technically, the price elasticity of demand is the percentage change in the consumption of a product in response to a 1% change in the price of the product, with all else remaining constant. As will be discussed below, nearly all empirical studies have found that the price elasticity of demand for tobacco products lies between zero and minus one. Estimates for high-income countries (HICs) are clustered around –0.4; estimates for low- and middle-income countries (LMICs) are more variable and somewhat greater in absolute terms (further from zero), with estimates clustered around –0.5. In other words, for HICs, a 10% increase in the price of tobacco is expected to decrease tobacco consumption by 4%. For LMICs, a 10% increase in price would be expected to decrease tobacco consumption by 5%.[2] Thus, tax and price increases are a potentially potent tobacco control tool in all countries.

Many econometric studies have estimated price elasticities for other aspects of tobacco use beyond consumption, including prevalence, cessation, initiation, duration of smoking, frequency of smoking (e.g., daily vs. non-daily), and conditional demand (amount of the product consumed conditional on being a user of that product).[2] Still others have estimated cross-price elasticities of the demand for tobacco products—that is, the impact of a change in the price of one tobacco product (e.g., cigarettes) on the use of another tobacco product (e.g., smokeless tobacco), or of a change in the price of a subcategory of one product (e.g., premium cigarette brands) on the use of a different subcategory of that product (e.g., discount cigarette brands). Finally, while many studies have estimated income elasticities of

tobacco use, few have estimated affordability elasticities, which focus on the role of price relative to income in influencing the demand for tobacco products.

This chapter reviews the rationale for levying excise taxes on tobacco products; recent theories on how to model the demand for tobacco products; important statistical trends in cigarette consumption, pricing, and taxation; and empirical data on price elasticity of demand from studies in LMICs and HICs.

## Rationale for Levying Excise Taxes on Tobacco Products

Controversial and luxury items have been subject to taxes for centuries. As far back as 1776, Scottish philosopher and political theorist Adam Smith argued in an oft-quoted paragraph that "sugar, rum, and tobacco, are commodities which are nowhere necessaries of life, which are become objects of almost universal consumption, and which are, therefore, extremely proper subjects of taxation."[7,p.775] By taxing these commodities "the people might be relieved from some of the most burdensome taxes; from those which are imposed either upon the necessaries of life, or upon the materials of manufacture."[7,p.777] In Smith's day, the primary rationale for levying a tax on tobacco was to raise revenue for the government. As governments have subsequently expanded greatly and diversified their sources of revenues, the relative share of tobacco excise taxes has decreased in most countries. However, lower income countries typically depend more on indirect taxes, including tobacco and other excise taxes, than on direct taxes, such as income taxes; thus, the contribution of a tobacco excise tax in such countries can be quite substantial (see chapter 5).

The literature identifies a number of reasons for levying an excise tax on cigarettes, of which raising government revenue is only one. In 1995, a group of economists in the United States and the United Kingdom of Great Britain and Northern Ireland proposed the following reasons for raising tobacco taxes: (1) to raise revenue, (2) to have smokers pay for the burden they impose on others through their smoking (the externality argument), (3) to protect children from becoming addicted to a harmful substance at an age when they do not have the capacity to make an informed choice, and (4) to improve public health by reducing the mortality and morbidity impact of smoking.[8]

The second and third of these reasons reflect the notion that tobacco taxes can be used to address the failures that exist in the markets for tobacco products. As Jha and colleagues[9] describe, these market failures include (a) imperfect information about the harms caused by tobacco use and the addictiveness of tobacco products, which is complicated by the uptake of tobacco use during childhood and adolescence—that is, at ages when people lack the cognitive ability to make informed choices, and (b) the physical and financial impacts (or externalities) that result from tobacco use.

As described further in chapter 8, many people are either unaware of or underestimate the numerous adverse health effects of tobacco use and secondhand smoke (SHS) exposure.[10,11] Smokers tend to hold erroneous beliefs about smoking and health: They think they will be able to quit when they want to, that low-tar cigarettes are less harmful than other cigarettes, that they are in a lower risk group compared with other smokers, or that the general health risks do not apply to them as individuals.[12] In fact, many adult tobacco users struggle with quitting, the great majority of smokers regret having started,[13,14] and young people taking up tobacco use significantly underestimate the addictive potential of these products and overestimate their likelihood of quitting in the future.[15]

These market failures provide an economic rationale for governments to intervene in tobacco product markets, in addition to the clear public health rationale resulting from the considerable death and disease caused by tobacco use. According to Jha and colleagues,[9] while other interventions may more directly address these market failures (e.g., prominent warning labels on cigarette packs and comprehensive smoke-free policies), their reach and effectiveness may be more limited, particularly when it comes to reducing tobacco use in the most vulnerable populations. Tobacco taxes have a greater impact on tobacco use among young people, those who are less educated, and the poor, as described below.

## Modeling the Demand for Cigarettes

The relationship between price and cigarette consumption has become the subject of a lively methodological economic debate. One major source of contention is how to model consumption of an addictive product, because the assumptions underlying the different models used have fundamentally different implications for the optimal tax level.[16] Modeling of tobacco consumption, rooted in traditional economic models of choice, has undergone continuous evolution in response to expanding knowledge and insights into addictive behavior. This section outlines the evolving models of tobacco consumption and their strengths and weaknesses.

### The Rational Choice Model

Conventional models of demand assume that consumers are fully rational and self-controlled and that utility in each period depends solely on the consumption during that period. Conventional models explicitly embrace the paradigm of consumer sovereignty: Consumers are the best judges of their own behavior and of what goods and services to buy. Within this framework, a chosen behavior is *a priori* assumed to be optimal simply because a person has rationally chosen it. Based on this assumption, it is held that the government has no reason, in the absence of market failures, to interfere with this revealed preference.

However, conventional models of demand either ignore the addictive nature of goods like cigarettes when estimating demand or assume that behavior such as smoking is rational. Under an assumption of irrationality, addictive goods might not follow the fundamental economic law of an inverse relationship between price and consumption.[17] If this is the case, higher cigarette prices through increased cigarette taxes would not be an effective way to reduce consumption. This view has been overturned by a substantial body of economic research that demonstrates that the demand for cigarettes clearly responds to changes in price.

### Economic Models of Addiction

Early economic models of addiction and their applications to tobacco use generally assumed myopic behavior, recognizing that current consumption of tobacco was dependent on past consumption, while ignoring the dependence of future consumption on current and past consumption.[18] This is in contrast to the rational addiction model, developed by Becker and Murphy,[19] which treats consumers as "rational" addicts and tobacco consumption as rational behavior involving "forward-looking maximization with stable preferences."[19,p.675] Addicts are postulated to be forward-looking if current consumption depends on past and future consumption, and by implication, on past and future prices. In this context, price includes the retail price and all costs associated with obtaining and consuming tobacco, such as medical expenses and even intangible costs like social disapproval. Empirical studies testing whether expectation

of higher prices in the future will tend to lower consumption today, as would be expected with forward-looking addicts, provide some support for the model.[20–23]

The rational addiction model has become widely used when modeling the consumption of addictive goods such as cigarettes. By definition, rational addicts formulate decisions about current consumption by accounting for both current and future costs of their behavior. If this is the case, then price-based policies are more effective than models that ignore the addictive nature of tobacco use would predict, because a tax will reduce current consumption by raising expectations about future prices. However, the rational addiction model has been criticized on several grounds, most notably for its underlying assumptions of perfect foresight and consumer rationality. The assumption of perfect foresight implies that addicted individuals are "happy addicts" who do not regret their past decisions.[24] This assumption is contradicted by the evidence that most smokers would like to quit and regret having started. For example, Fong and colleagues[13] found that more than 90% of adult smokers in the United States, Canada, Australia, and the United Kingdom regret having started smoking and say they would not start if they had to do it over again. Feelings of regret are not exclusive to Western countries. Sansone and colleagues[14] reported that regret about smoking was common in four non-Western countries: In Thailand (93%) and Republic of Korea (87%) expressions of regret were comparable to those in the four countries analyzed by Fong and colleagues; lower prevalences were found in Malaysia (77%) and the People's Republic of China (74%). Similarly, numerous studies contradict the assumption that consumers possess adequate knowledge on which to base their consumption decisions and that they use this knowledge to maximize their long-term welfare.[16] For example, Chaloupka and Warner[17] observed that adolescents often underestimate the addictive nature of smoking.

Some economic models of addiction attempt to address this lack of perfect foresight by treating behavior as "boundedly rational," implying that individuals make current consumption choices that maximize current utility rather than choosing a lifetime consumption path.[25,26] Bounded rationality can help explain seemingly incongruous behaviors—for example, smokers who buy single packs of cigarettes instead of cartons, which are priced lower than single packs, in an effort to limit their consumption and/or increase their likelihood of quitting. This approach has important implications for the relative effectiveness of other tobacco control policies. Suranovic[26] applied this concept of bounded rationality to youth smoking initiation, concluding that policies that raise the present costs of smoking will be more likely to reduce youth smoking initiation than policies that highlight the long-term health consequences of smoking.

Becker and Murphy's[19] original rational addiction model also assumes that people's preferences do not change over time. However, results from laboratory experiments and psychological research suggest that consumers generally have time-inconsistent preferences and exhibit self-control problems.[27] For example, consumers may place a higher value on smoking a cigarette now but have a desire to quit tomorrow. But when tomorrow arrives and they have the desire to smoke another cigarette rather than quit, they will be in conflict with their own previously stated preference. Preferences become time inconsistent when the tradeoff between two time periods changes, such that a person's relative preference for well-being may not necessarily be the same when asked on different occasions.

## Internality Theory

Self-control problems are introduced into economic models through the idea of a competing internal self, whereby an individual's preferences change at different times with a view to improving the welfare of the current self, sometimes at the expense of the welfare of the future self.[28] Most people exhibit present-biased preferences; they have a tendency to pursue gratification now in a way that they may disapprove of later. The large time delay between the onset of tobacco use and the onset of disease makes smokers particularly prone to this phenomenon, because the health consequences of their current actions are most often realized at a distant future date.[9] Thus, smoking can be viewed as an outcome of "multiple selves."[28] Many smokers want to quit smoking, but the immediate desire to relieve intense withdrawal symptoms dominates the desire to quit. In this framework, the model of cigarette consumption assumes that consumers are time inconsistent. The existence of an "internality" arising from the psychological phenomena of hyperbolic discounting, present bias, and unstable preferences supports an argument for a cigarette tax, not only on the grounds of externalities that result in costs to others, but also because smoking creates internal costs such as disease and income loss that markets fail to correct.

If consumers exhibit present-biased preferences (i.e., the time inconsistency model), then assumptions of rational and time-consistent behavior (i.e., the rational addiction model) may be seriously flawed. More importantly, the optimal tax rate prescribed by each model will differ significantly. Under the rational addiction hypothesis, decisions about tobacco consumption are governed by the same rational decision-making process as any other good, and they invoke the same normative rules as "normal" goods.[24] Under this paradigm, the optimal role for government is to correct for the external costs of smoking. The imposition of an excise tax on cigarettes makes smokers worse off, in the same way that the imposition of a tax on any normal good makes the consumers of that good worse off. According to this approach, "addiction per se does not constitute market failure and the costs that smokers impose on themselves are irrelevant for taxation unless rooted in misperceptions about the harmfulness of smoking."[16,p.6] In contrast, internality theory concludes that government policies should account for internality costs in the same way that they account for externality costs. Thus, taxation may be justified theoretically even without externalities.[23]

As a result, time inconsistency (internality theory) models generally prescribe an optimal tax level that is higher than that of the rational addiction model because internal costs often dwarf external costs.[27] In contrast to Becker and Murphy's rational addiction model, internality theory holds that an increase in taxation can increase smokers' utility. To test this hypothesis, Gruber and Mullainathan[24] linked data for cigarette excise taxes to surveys of self-reported happiness in the United States and Canada. The study found that higher excise taxes on cigarettes are associated with increased happiness of smokers. Similarly, Choi and Boyle[29] found that Minnesota smokers who tried to quit smoking were more likely to perceive the 2009 federal cigarette tax increase in the United States as helpful in promoting smoking cessation, a finding they ascribe to the tax increase being seen as a commitment device by smokers who want to quit.

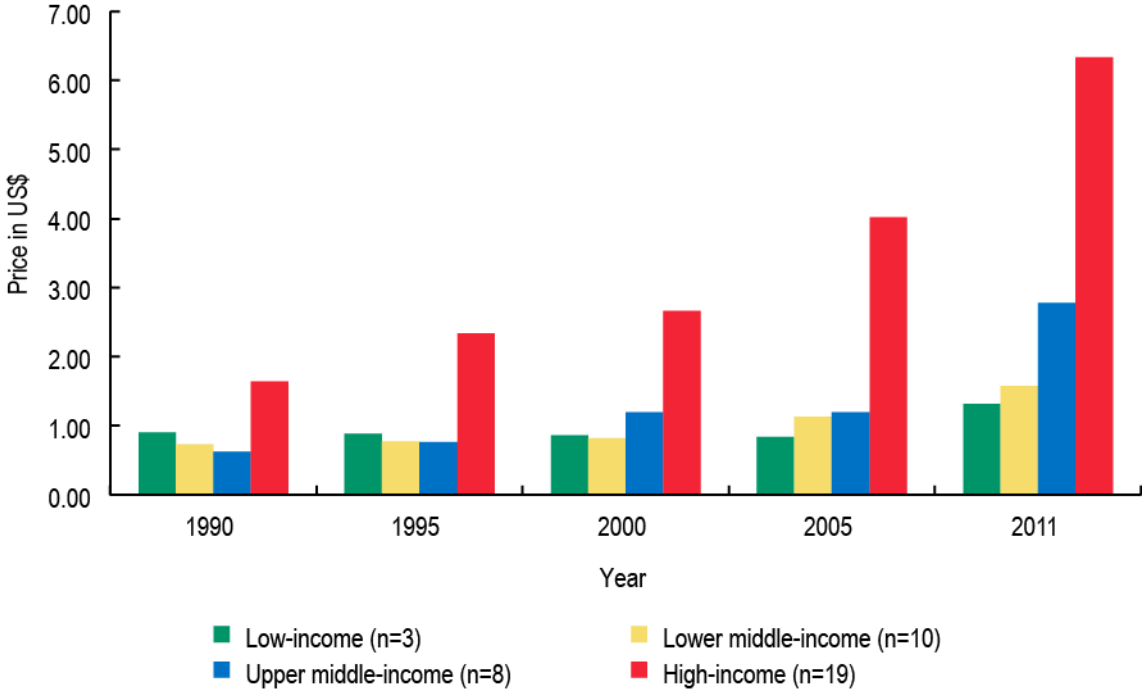
## Empirical Data on Cigarette Price, Affordability, and Taxes

### Cigarette Prices

Empirical studies have shown unambiguously that the retail price of cigarettes is a crucial determinant of cigarette consumption. Some studies have focused on differences in cigarette prices between countries.[3,30] Figure 4.1 displays the median price of a pack of cigarettes in 40 countries (low-income [n=3], lower middle-income [n=10], upper middle-income [n=8], and high-income countries [n=19]), for which data are available, between 1990 and 2011.[31]

Figure 4.1 shows that cigarette prices, expressed in U.S. dollars, are highest in HICs and lowest in low-income countries. Additionally, historical data show that while cigarette prices have increased in HICs, they have remained relatively flat in low-income countries. This reflects both the generally higher tax levels and more frequent tax increases in HICs.[31,32] Furthermore, the differences in cigarette prices have become more pronounced, in both absolute and relative terms, between HICs and the rest of the world since 2000.

**Figure 4.1 Median Price of a Pack of Cigarettes, by Country Income Group, 1990–2011**




*Notes:* Using the official exchange rate, the prices of local brands of cigarettes, as collected by the Economist Intelligence Unit, were converted to U.S. dollars (not adjusted for inflation). Countries were discarded from the dataset if more than approximately one-third of the time series data were missing, if the country experienced a serious bout of hyperinflation or introduced a new currency, or if price data were so unstable over time that they were simply not credible. With these countries removed, the subsequent analysis was performed on 40 countries. Data were collected from large urban areas and may not reflect the full range of prices within the country.
*Source:* Economist Intelligence Unit 2012.[31]

Consumers respond to price changes. It is *changes in* the retail price, not the *level of* the retail price, that drive changes in the consumption of cigarettes. The current price level is the result of price changes from previous years, which would have influenced changes in the consumption of cigarettes in the past; any significant future changes in cigarette consumption will depend on future price changes, holding

other factors constant. A price increase gives consumers an incentive to change their smoking behavior, but if cigarette prices are stable, whether high or low, consumers have no reason to change their consumption, again holding other factors constant.

From an econometric perspective, to estimate the price elasticity of demand for cigarettes in a particular country using time series data, the inflation-adjusted (real) price of cigarettes must change over time. If the price does not change, then the impact that price has on the consumption of cigarettes cannot be determined.

### Cigarette Consumption and Prices

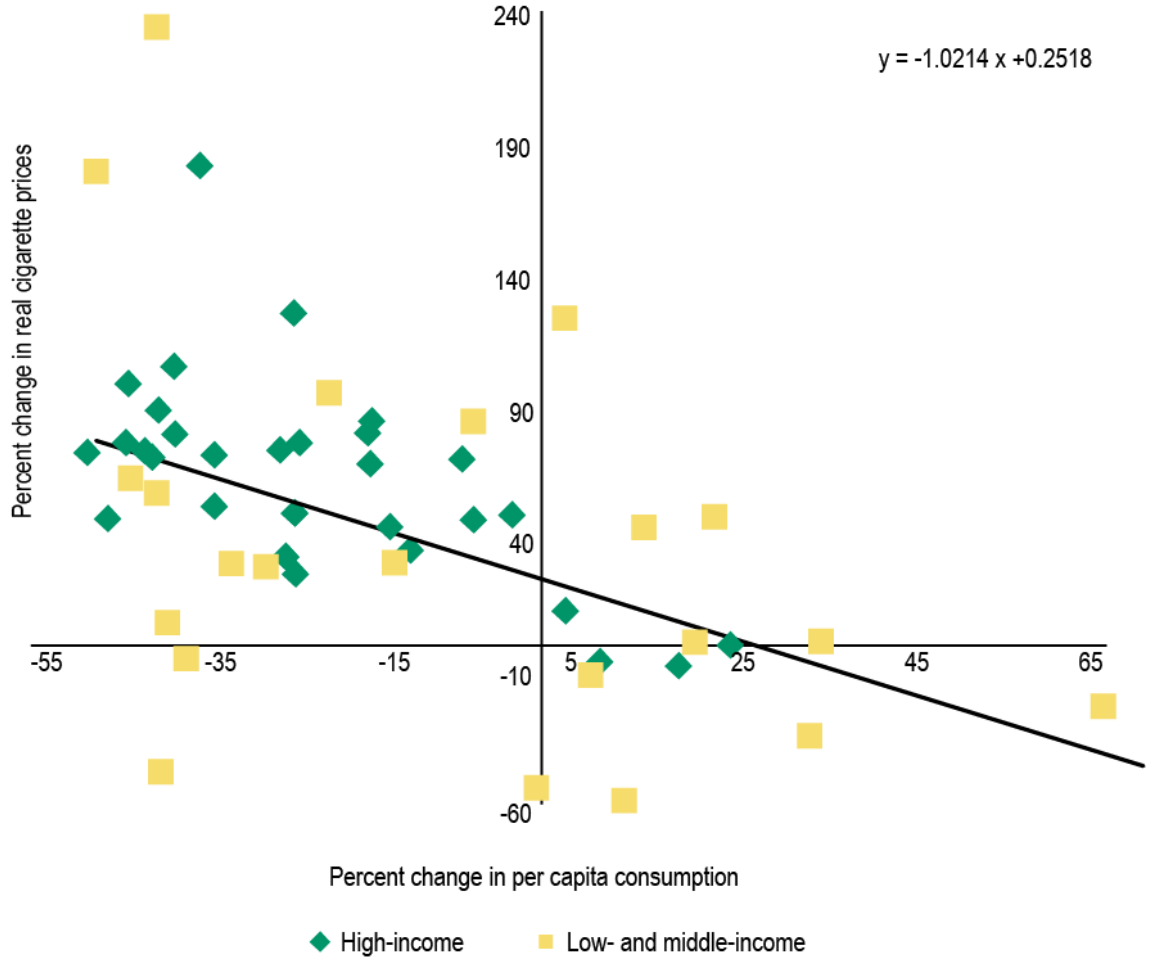
Analyzing trends in cigarette consumption and the real prices of cigarettes can help to determine how successful countries have been at curtailing the consumption of cigarettes. Successful countries are primarily high- and middle-income countries that have implemented strong tobacco control strategies, including significant tax increases. Conversely, countries where the consumption of cigarettes has increased have generally experienced very rapid economic growth but only modest increases or, more often, decreases in the real price of cigarettes. The World Health Organization[33] (WHO) reported that, compared with other tobacco control strategies in the WHO Framework Convention on Tobacco Control (WHO FCTC), countries have made limited progress so far in increasing the price of tobacco products by raising taxes.

Comparative data also show that increases in the price of cigarettes are a particularly powerful tobacco control tool. In a sample of countries for which appropriate data are available (n=52; 29 high-income, 21 middle-income, and 2 low-income countries), the simple correlation coefficient between changes in the real price of cigarettes and changes in per capita consumption of cigarettes for the period 1996–2011 was –0.56 (Figure 4.2).[31]

### Cigarette Affordability

Cigarette consumption is sensitive to changes in income. Since 2000, many LMICS have experienced periods of rapid economic growth during which cigarette taxes and prices have not kept up with the growth in income. In many LMICs, the demand for cigarettes increases as the average income increases, but the demand for cigarettes usually increases by a smaller percentage than the percentage change in average income (meaning that demand is relatively inelastic with respect to income). Since 2000, several studies[34,35] have used the concept of cigarette affordability, which refers to the quantity of resources that are required to buy a pack of cigarettes. The term incorporates both the price of cigarettes and the average level of income. With all other factors remaining constant (i.e., income), the higher the price of cigarettes, the less affordable they are. However, in countries where the average per capita income is high, cigarettes may be more affordable than in a country where cigarettes are cheaper but the average level of income is proportionally much lower.

**Figure 4.2 Percentage Change in Real Cigarette Prices Versus Percentage Change in Per Capita Consumption of Cigarettes, 1996–2011**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2011.
*Sources:* Economist Intelligence Unit 2012.[31] ERC Group 2011.[252]

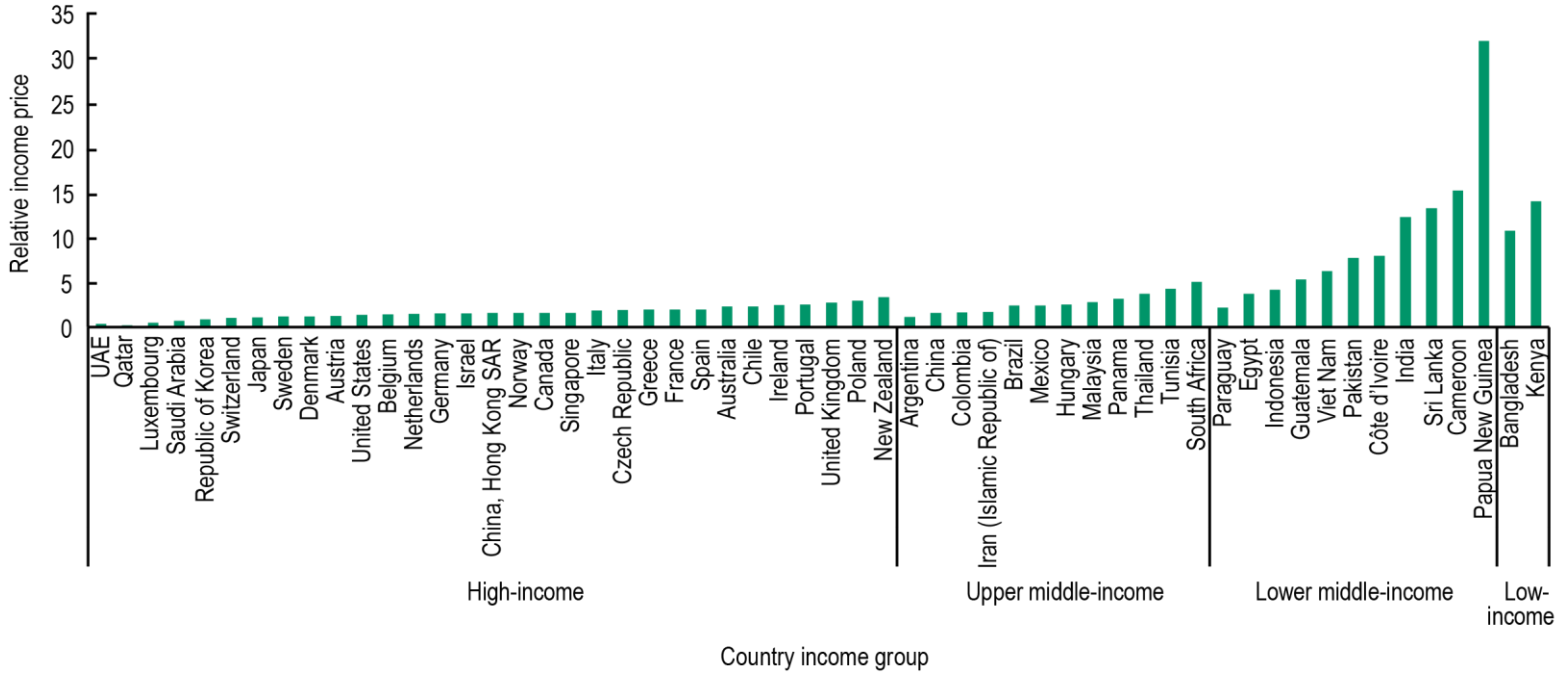
Two metrics are available to measure the affordability of cigarettes: (1) the number of minutes of labor (at a representative or average job) required to buy a pack of cigarettes, and (2) the percentage of per capita gross domestic product (GDP) required to buy 100 packs of cigarettes. The latter measure, also called the relative income price, tends to be used for a large sample of countries but may be most useful when considering the affordability of cigarettes in LMICs.[35] The relative income price increases as cigarettes become less affordable because of an increase in cigarette prices or a decrease in per capita GDP. However, if both cigarette prices and per capita GDP increase, as is often the case, then the affordability of cigarettes depends on the relative magnitudes of these changes. While relative income price is an easily constructed measure of affordability given the ready availability of per capita GDP, cross-country comparisons of affordability may be distorted when there are significant differences in income inequality across countries and when there are significant socioeconomic differences in tobacco use within and across countries. A measure of income that better reflects the income of the tobacco-using population (e.g., average or median income of a tobacco user, or the minutes of work required to purchase a pack of cigarettes by the average tobacco user) would help to address this problem, but is difficult to use in practice given the lack of consistent data across countries.

In their study using data from 1990 to 2006, Blecher and van Walbeek[35] found that, on average, cigarettes were far more affordable in HICs than in LMICs, despite being more expensive in HICs when expressed in a common currency. An updated analysis using more recent data (Figure 4.3) shows the relative income price, categorized by the standard World Bank country income group classification, for a sample of 56 countries. This analysis confirms that cigarettes remain more affordable in HICS than in LMICs. One hundred packs of cigarettes cost more than 2% of per capita GDP in only seven HICs (Australia, Chile, Ireland, Portugal, the United Kingdom, Poland, and New Zealand). In contrast, in both of the low-income countries for which data are available, 100 packs of cigarettes would cost more than 10% of GDP. In the upper and lower middle-income countries reporting data, the percentage of GDP required to purchase 100 packs of cigarettes would range from 0.5% to 31.8%. In general, cigarettes are less affordable as country income decreases.

Cigarette consumption is generally higher in countries where cigarettes are more affordable than in countries where cigarettes are less affordable. Using cross-sectional data, Blecher and van Walbeek[34] showed that differences in the *level* of cigarette affordability can explain, to some extent, differences in per capita consumption of cigarettes between countries. These authors estimated the affordability elasticity of demand, defined as the quantity by which cigarette consumption decreases in response to cigarettes becoming less affordable by 1%, to be –0.53. This elasticity estimate falls in the same range as typical price elasticity estimates, but it emphasizes affordability, which is conceptually quite different from price.

In the same way that changes in prices (rather than the level of prices) are more useful as a tobacco control tool, changes in cigarette affordability (rather than the level of cigarette affordability) are expected to drive changes in cigarette consumption over time. Figure 4.4 shows average annual percentage changes in cigarette affordability from 2000 to 2013 for a sample of 49 countries. An increase in the relative income price implies that cigarettes have become less affordable. As shown in Figure 4.4, between 2000 and 2013, cigarettes became less affordable in 17 of 25 HICs but in only 9 of 24 LMICs. The result is predictable: a strong divergence in cigarette consumption between these two groups of countries. Thus, despite the fact that cigarettes remain, overall, less affordable in LMICs compared with HICs, changes in affordability over time have led to a decrease in consumption of cigarettes in HICs but an increase in the rest of the world.

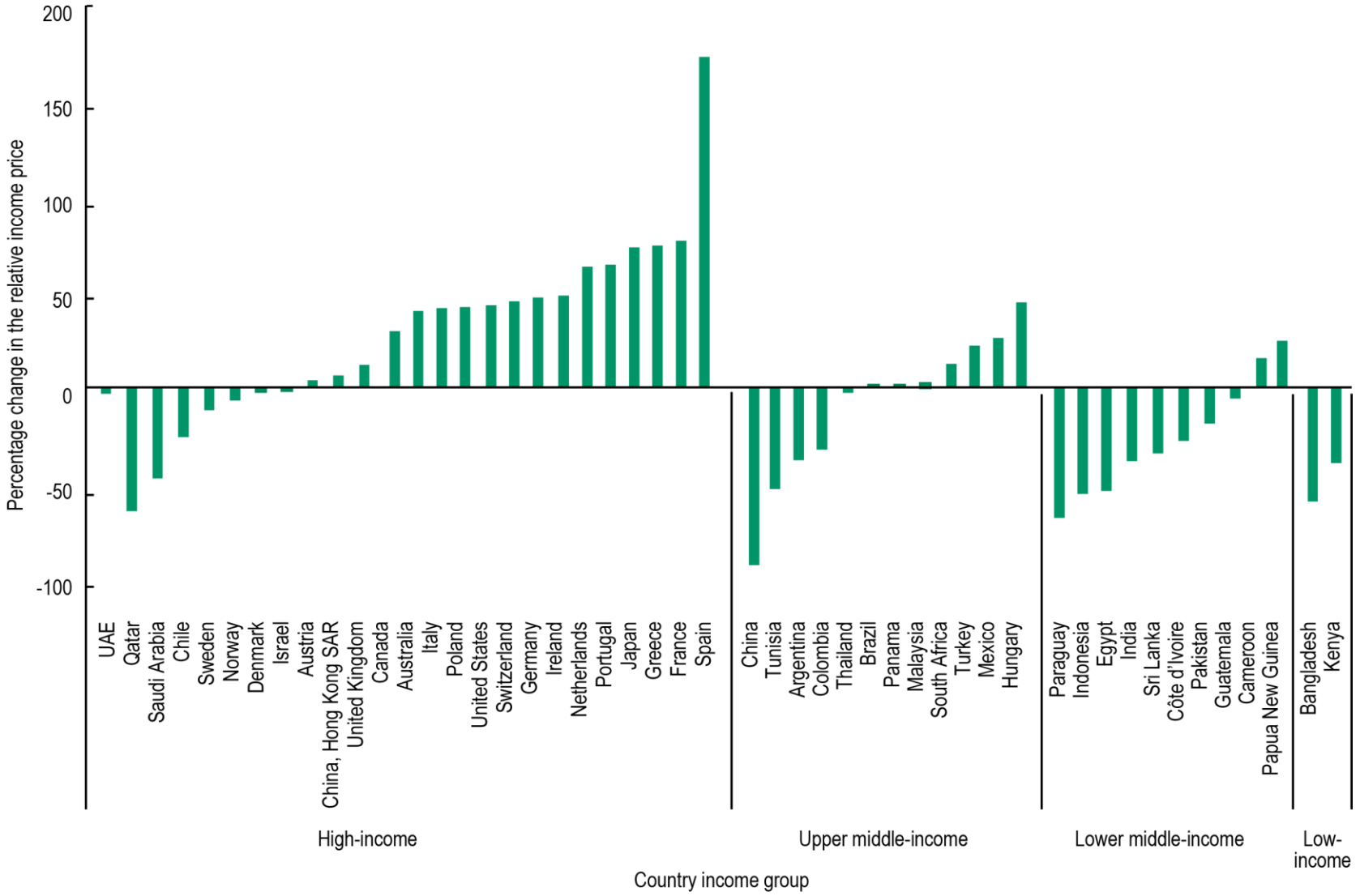
## Figure 4.3 Cigarette Affordability in Selected Countries, by Country Income Group, 2013




*Notes:* Relative income price is the percentage of annual per capita GDP required to buy 100 packs of cigarettes. Country income group classification based on World Bank Analytical Classifications for 2013. UAE = United Arab Emirates. SAR = Special Administrative Region.

*Source:* Adapted from Blecher and van Walbeek 2009[35] using data from Economist Intelligence Unit 2015.[31]

## Figure 4.4 Percentage Change in Cigarette Affordability, by Country Income Group, 2000–2013




*Notes:* Relative income price is the percentage of annual per capita GDP required to buy 100 packs of cigarettes. Country income group classification based on World Bank Analytical Classifications for 2013. UAE = United Arab Emirates. SAR = Special Administrative Region.

*Source:* Economist Intelligence Unit 2015.[31]

## Taxation on Cigarettes

*Total tax burden* is defined as the sum of all taxes—including general sales taxes, such as a value-added tax—expressed as a percentage of the retail price. According to the 1999 World Bank publication *Curbing the Epidemic: Governments and the Economics of Tobacco Control*,[30] the total tax burden on cigarettes is highest in HICs and decreases as a country's income level decreases. Using 1996 data for the sample of countries in this study, the average tax burden was 67% in HICs, 50% in upper middle-income countries, 46% in lower middle-income countries, and 40% in low-income countries.[30] A similar analysis based on 180 countries was performed by WHO[36] in 2014 (Table 4.1) using the World Bank's income categories. Although the choice of descriptive statistics (i.e., unweighted/simple average, weighted average, and median) substantially influences the results, the 2014 WHO data confirm the earlier World Bank findings that the tax burden is higher for HICs and lower for LMICs. In fact, considering unweighted average tax burdens, the picture in 2014 is not different from that in 1996.

Table 4.1 shows the average tax burdens weighted by the number of current adult cigarette smokers, thus giving more weight to countries with more smokers. This weighting results in a significant compression of tax burdens among the four groups of countries, which is what happens if low-income countries with high smoking rates have above-average tax burdens and HICs with low smoking rates have below-average tax burdens.

Table 4.1 also shows the proportion of the total tax burden that is made up of various types of excise tax, which are taxes applied on certain goods consumed within a country. A specific excise tax is a fixed amount levied per given measure of a particular commodity and an *ad valorem* excise tax is a percentage of the value of the commodity, which can be measured in a variety of ways (see chapter 5 for more detailed definitions).

Table 4.1 reveals that as a country's income level increases, the proportion of specific taxes (based on a measure of weight or quantity) in the total excise tax amount generally increases at the expense of the *ad valorem* tax (based on value) component, although some differences are seen when the data are weighted by the number of adult smokers (weighted average). In low-income countries, the bulk of the excise taxes are made up of *ad valorem* taxes, and specific taxes generally account for only a small part of the excise tax. In contrast, in both lower middle-income countries and HICs, the specific tax component accounts for most of the excise tax. Among upper middle-income countries, the *ad valorem* tax accounts for the largest proportion of excise tax when weighted by the number of adult smokers, mainly due to the large number of smokers in China which relies primarily on an *ad valorem* tax.

Most countries also levy a general sales tax or value-added tax (VAT) on cigarettes, as on many other products and services. The base for calculating the sales tax or VAT varies from country to country. Most countries levy the tax on the final retail price exclusive of the VAT, others levy it based on the final retail price. A few other countries with weaker capacity to collect VAT at all levels of the supply chain levy it only at the value of production/import. These other taxes also include import duties, but these are relatively unimportant in most countries.

## Table 4.1 Total Tax Burden, by Country Income Group, 2014

| Descriptive statistics | Average price, $ PPP* | Specific excise, as a % of price | *Ad valorem* excise, as a % of price | Value-added tax, as a % of price† | Other taxes, as a % of price | Total tax burden, as a % of price |
|---|---|---|---|---|---|---|
| **Unweighted average** | | | | | | |
| Low-income countries | 2.32 | 7.80 | 14.70 | 10.40 | 1.80 | 34.74 |
| Lower middle-income countries | 3.59 | 27.40 | 7.60 | 11.90 | 1.60 | 48.55 |
| Upper middle-income countries | 4.68 | 26.90 | 16.80 | 11.60 | 3.10 | 58.38 |
| High-income countries | 6.07 | 33.80 | 17.70 | 13.60 | 1.30 | 66.48 |
| **Weighted average (by current adult cigarette smokers [2013 estimate])** | | | | | | |
| Low-income countries | 2.03 | 6.70 | 25.90 | 11.80 | 1.40 | 45.76 |
| Lower middle-income countries | 2.78 | 35.20 | 8.70 | 12.70 | 0.10 | 56.64 |
| Upper middle-income countries | 2.94 | 7.90 | 32.10 | 13.70 | 0.60 | 54.35 |
| High-income countries | 5.53 | 33.80 | 17.90 | 12.70 | 0.30 | 64.78 |
| **Median** | | | | | | |
| Low-income countries | 1.93 | 0.00 | 10.21 | 11.88 | 0.00 | 30.86 |
| Lower middle-income countries | 2.51 | 16.00 | 6.69 | 11.50 | 0.00 | 40.87 |
| Upper middle-income countries | 3.87 | 25.65 | 0.00 | 13.04 | 0.00 | 58.86 |
| High-income countries | 5.66 | 30.18 | 8.72 | 15.97 | 0.00 | 72.90 |

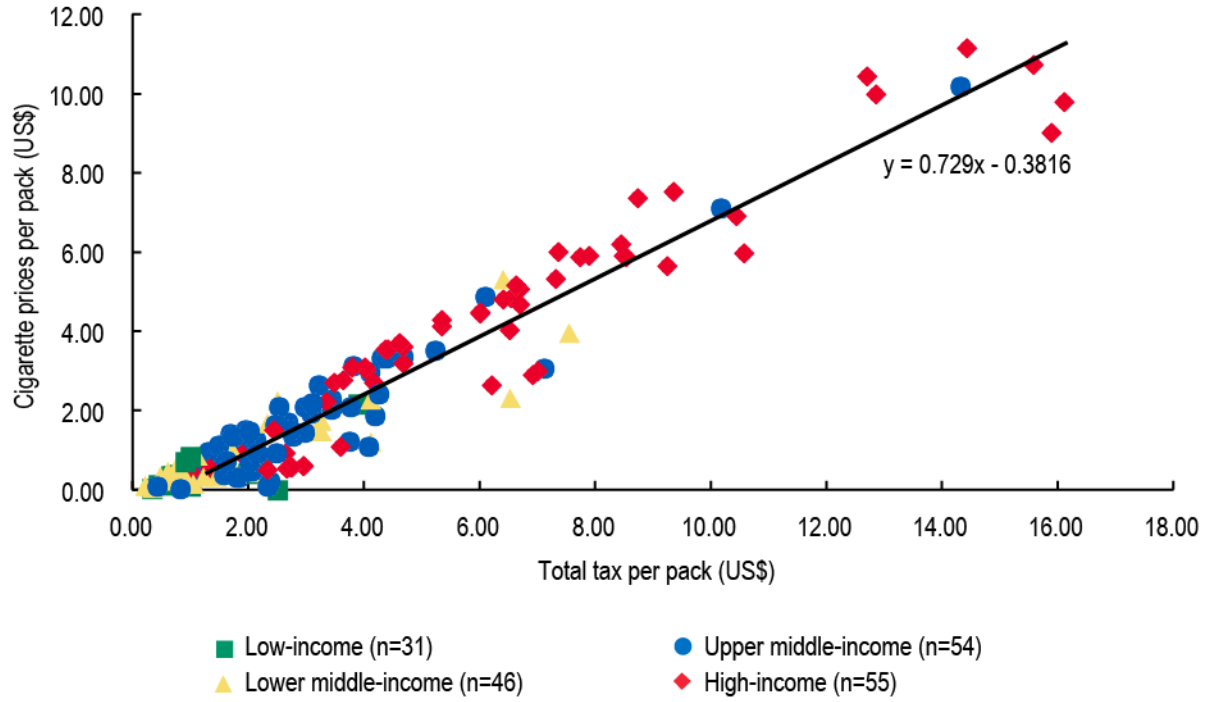
*Average price reflects the price of a 20-cigarette pack of the most sold brand in each country included in the country groupings. PPP = Purchasing Power Parity.
†This column also includes sales taxes, not tabulated separately in this table.
*Notes:* Low-income countries (n=29), lower middle-income countries (n=45), upper middle-income countries (n=53), and high-income countries (n=53). Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* World Health Organization 2015.[36]

Microeconomic theory suggests a positive relationship between tax burden and the price of cigarettes—that is, as the government increases the tax burden, the manufacturer would be expected to pass the tax on to the consumer in the form of a higher retail price. Evidence from 186 observations (31 low-income, 46 lower middle-income, 54 upper middle-income, and 55 high-income countries) broadly supports this view, as shown in Figure 4.5.[36]

The correlation between cigarette price (expressed in U.S. dollars) and tax burden is very high (0.95). However, a closer look at Figure 4.5 suggests that the positive relationship is influenced primarily by highly taxed, high-priced cigarettes in HICs. When examining only LMICs (n=131), the correlation coefficient between price and tax burden drops slightly, to 0.88. For relatively low tax burdens, between 20% and 60% of the retail price, the tax burden percentage is unrelated to the retail price. This suggests that other factors (e.g., input, labor, logistical and distributional costs, and profit margins in the manufacturing, wholesale, and retail sectors) play as important a role in determining the retail price of cigarettes as the excise tax. Moreover, as described in chapter 5, simpler cigarette tax structures, particularly those that emphasize specific taxes and do not involve tier-based taxes, are associated with less variability in the prices smokers pay for cigarettes across brands. Thus, increases in cigarette taxes

in countries with simpler tax structures will likely be more effective in reducing smoking prevalence compared with tax increases in countries that have more complex tax structures.[37,38]

**Figure 4.5 Price of a Pack of Cigarettes Versus Total Tax on Cigarettes, by Country Income Group, 2014**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* World Health Organization 2015.[36]

The tax burden clearly affects the price of cigarettes. Figure 4.5 offers a static (cross-sectional) picture of different combinations of the price-to-tax burden for 2014 but not the impact of a *change* in the tax burden on the price in any particular country. Examining the impact of changing the tax burden would require tracking changes in the excise tax and in the price of cigarettes for each country over time. Given the diversity and complexity of some excise tax regimes and changes in these regimes over time, consistent data to investigate the relationship between the excise tax and retail prices for a large sample of countries over a sizable time period are not currently available.

Several studies have investigated the impact of excise tax changes on the retail price of cigarettes.[39–42] These studies have typically focused on the United States. Early studies were inconclusive, but more recent (2010) studies have generally found that increases in the excise tax are mostly, fully, or more than fully passed on to consumers.[43] When cigarette manufacturing firms have significant market power, as they typically do, the strategic interactions between these firms make it more difficult to predict how an increase in the excise tax will impact the retail price. In some cases, the excise tax increase could be the signal for all firms to increase the retail price by the full amount of the excise tax, or even more. In other cases, cigarette manufacturers might not pass on the increased excise tax to consumers in the form of a higher retail price, hoping to gain market share from competitors. However, where cigarette manufacturers are monopolies or near-monopolies, the uncertainty is diminished.

According to Becker and colleagues,[21] the best strategy for a monopolist would be to set the retail price lower than the short-run profit-maximizing position when the business environment is good. However, when the environment is unfavorable to the industry (e.g., when tobacco control legislation is passed or when the excise tax increases consistently), a more appropriate strategy would be to set the retail price much higher in order to maximize short-run profits, given the expected lower future profits. The implication of this strategy is that the monopolist cigarette manufacturer would increase the retail price by more than the actual increase in the tax. As discussed in Box 4.1 below, growing evidence suggests that this strategy is becoming more popular in some countries where government policies are unfavorable toward the tobacco companies.

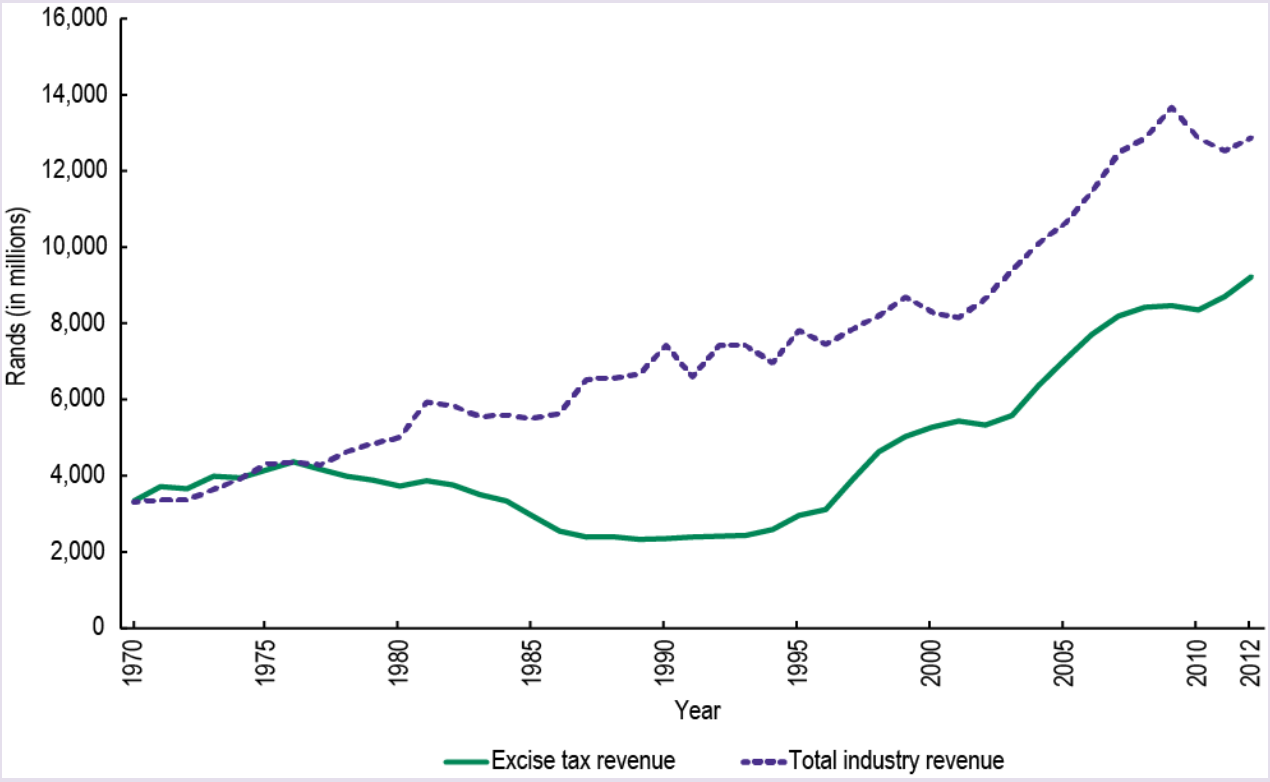
### Box 4.1: Examples of Tobacco Industry Responses to Increased Taxes

The response of the tobacco industry is an important variable in the impact of tobacco taxation on both public health outcomes and government revenue. Two countries, South Africa and Jamaica, serve as case studies for the impact of tobacco industry pricing moves in response to changes in taxation.

South Africa levies a specific excise tax on cigarettes. During the 1970s and especially the 1980s, inflation, averaging about 15% annually, eroded the real value of this excise tax. During the mid-1990s, the government moved to raise the excise tax burden on cigarettes from approximately 32% of the retail price to a total tax burden (i.e., excise tax plus VAT) of 50% of the retail price. During this period, the tobacco industry, a near-monopoly in South Africa, initiated retail price increases which brought manufacturers substantial gains in net-of-tax prices (after taxes have been paid).[44] An original analysis by van Walbeek of data from Statistics South Africa and Budget Reviews found that between 1991 and 2000, the real net-of-tax price increased by 88%; this was a substantial change from the 17% decrease in the real net-of-tax price between 1970 and 1991. Between 2000 and 2010 the real net-of-tax price of the most popular price category (the market segment in which the near-monopoly has a particularly strong presence) increased by an additional 86%.

The government tax increase and the industry price increase had a beneficial impact on both government tax revenues and tobacco industry revenues, allowing the industry to make greater profits on fewer cigarette sales. Despite a 42% decrease in legal cigarettes sold, the following figure from van Walbeek's original analysis shows that the industry's real revenues increased by 95% between 1991 and 2012, owing to the relative price inelasticity of cigarettes. Ironically, the industry engineered a greater decrease in cigarette consumption in the short term by raising prices than the government was able to achieve by increasing the excise tax alone.

**Excise Tax Revenue and Industry Revenue in South Africa, in Rands, Adjusted for Inflation, 1970–2012**




*Notes:* Currency adjusted for inflation using 2008 rands. Original analysis by van Walbeek.

In contrast, in Jamaica the tobacco industry, rather than the government, captured most of the benefit from price increases implemented in response to a substantial increase in the excise tax. In 2005, the Jamaican Ministry of Health commissioned a report, *The Economics of Tobacco Control in Jamaica: Will the Pursuit of Public Health Place a Fiscal Burden on the Government?,*[45] on the benefits of increasing the excise tax on cigarettes. Given Jamaica's fiscal situation at the time, the primary objective of the increase was to raise government revenues, with decreased cigarette consumption being a secondary objective.

Before 2008, Jamaica had a complex cigarette tax model. Cigarettes were subject to three kinds of taxes: (1) a special consumption tax (SCT), (2) an excise tax, and (3) a general consumption tax (GCT). In 2005, the SCT was levied as a specific tax, but if the net-of-tax value of cigarettes (known as the ex-factory price) exceeded a certain threshold value (expressed in nominal prices), an *ad valorem* tax was levied on the difference between the ex-factory price and the threshold value. The excise tax, a tax earmarked to finance the National Health Fund, was levied at a rate of 23% of the sum of the ex-factory price and the SCT. The GCT was levied at a rate of 15% of the sum of the ex-factory price, the SCT, and the excise tax.[45]

In April 2005, the Minister of Finance announced a 51% increase in the specific component of the SCT. Carreras, the Jamaican subsidiary of British American Tobacco, responded by recommending that the retail price of cigarettes be increased from Jamaican dollars (J$) 180 to J$ 220 because of the increased tax on cigarettes.[45] However, total taxes only increased marginally, because the threshold for implementing the *ad valorem* component of the SCT was also raised, thus reducing the amount of the *ad valorem* component of the tax. Based on the most pessimistic assumption, the tax increased by no more than J$ 6.70 per pack compared with the J$ 40 per pack increase in the recommended retail price. The industry clearly was able to capture most of the revenues from the change in cigarette taxes.[45]

Jamaica's experience following the 2005 tax increase rather dramatically illustrates that a combination of industry market power (Carreras is a monopoly in Jamaica) and a complex tax structure can result in a situation in which the primary purpose of increasing the tax on cigarettes—that is, increasing government revenues—is thwarted by the industry.[46] To address this situation, Jamaica further revised its tax system in 2008, removing the *ad valorem* component of the tax and increasing the specific component to J$ 120 per pack, with several subsequent increases bringing the tax to J$ 240 in 2015.[46]

These examples highlight two important principles: (1) simple excise tax systems are more efficient than complex tax systems, and (2) an industry with significant market power has a strong incentive to increase its net-of-tax price when faced with increases in the specific tax. These principles are discussed further in chapter 5.

## Methods of Assessing the Impact of Tax and Price on Use of Tobacco Products

Empirical analyses of the demand for cigarettes and other tobacco products first began to appear in the mid-20th century as economists analyzed the impact of price and income on the demand for a variety of products.[47–49] These early studies relied on aggregate time series data and focused entirely on HICs. For example, Stone[49] used annual time series data from the 1920s and 1930s and estimated that the price elasticities of tobacco demand were –0.24 in the United States and –0.53 in the United Kingdom. Similarly, Koutsoyannis[48] used annual time series data from the 1950s to estimate price elasticities for 14 HICs, which ranged from insignificant in several countries to –0.95 in Austria.

As evidence of the adverse health consequences of tobacco use accumulated and grew stronger in the 1950s and 1960s, an increasing number of economists began to focus analyses on tobacco use alone, rather than as one of many consumer products. Many of the early studies examined the impact of information shocks (e.g., the 1964 Surgeon General's report[50]), tobacco company advertising, restrictions on tobacco advertising, and price.[51–56] Analyses of tobacco use became increasingly sophisticated during the next few decades as data on tobacco use, prices, and tobacco control policies became more widely available, econometric methods improved, and high-speed computing technology became easily accessible. In addition to the continued analysis of time series data, researchers began to analyze pooled cross-sectional time series data (e.g., data over time for U.S. states) as well as data from a variety of individual and household surveys.

By the end of the 20th century, a substantial body of evidence demonstrated that higher taxes and prices led to reductions in overall tobacco use and in the prevalence and intensity of use, with greater impact on key subpopulations (e.g., young people and those earning low incomes). A few of these studies focused on LMICs,[57] but most examined HICs, particularly the United States.[58] Chaloupka and colleagues[59] provided a comprehensive review of global evidence available up to the year 2000, concluding that price elasticity of cigarette demand in HICs centered on –0.4. Based on the limited evidence available at the time, the authors estimated that demand was about twice as responsive to price in LMICs.

Economic research on the impact of tax and price on tobacco use has expanded greatly since 2000. Many of these more recent studies focus on LMICs, mainly because of the changing patterns of tobacco use globally and the growing health and economic burdens that tobacco use imposes on these countries. The rapid growth of this research has been driven by the increasing availability of high-quality data on tobacco use, the growing cadre of well-trained economists, and the availability of funding to support

such research in LMICs. At the same time, the body of research from HICs has also grown and become stronger because of continued improvements in time series and microeconometric methods, the availability of more extensive and better integrated data, and the increased feasibility of complex econometric analyses of large data made possible by advances in computing technology.

Findings from this increasingly sophisticated and rapidly growing literature strengthen the conclusions reached earlier—that is, that higher taxes and prices for tobacco products lead to significant reductions in tobacco use. Tobacco use has declined because more adult users have quit, fewer former users have restarted, potential users have been deterred from beginning to use, and those who continue to use have decreased their consumption. Reductions also stem from other changes in tobacco use behaviors, including product and brand choices and aspects of purchasing behavior. A more extensive review of this research, including comprehensive tables summarizing the numerous studies based on aggregate and survey data, as well as studies of key subpopulations (young people and low-socioeconomic-status populations), is available in the International Agency for Research on Cancer (IARC) handbook *The Effectiveness of Tax and Price Policies for Tobacco Control*.[2]

Econometric studies of the impact of tax and price on tobacco use employ two primary measures of tobacco use: (1) macro-level aggregate measures of consumption, such as country-level data on tobacco sales (this literature developed earlier, growing rapidly before the 1990s); and (2) household or individual-level data taken from surveys such as national surveys of drug use or health risk behavior. Economic studies using survey data have come to dominate the literature in the past two decades. Most analyses of aggregate data are time series analyses for a particular country or geographic area (e.g., state, province, region, or city), but many studies pool time series data from multiple areas. These analyses use data from a single cross-sectional survey, or pooled data from multiple cross-sectional surveys, or longitudinal data from repeated surveys of the same individuals or households over time. As briefly described below, each type of data has its own strengths but is also subject to limitations that pose challenges to estimating the demand for tobacco. However, the rapidly growing literature comprised of studies that use diverse data and methods from an increasing number of countries has produced strong and consistent evidence that higher taxes and prices reduce tobacco use. A more thorough discussion on methodological and related issues is available in *Methods for Evaluating Tobacco Control Policies*[60] and in *Global Efforts to Combat Smoking*.[61]

### Analysis of Aggregate Data

Aggregated data on tobacco consumption are frequently obtained from government agencies through publications and other circulated materials, and are typically based on tax-paid sales or derived from production and trade statistics (production plus imports minus exports). Such data are most often available annually but can be available on a quarterly, monthly, or more frequent basis (e.g., scanner-based retail sales data, which are available in a growing number of countries and obtained from stores selling tobacco products). Using aggregated data, the price elasticity of demand is estimated by measuring the change in an aggregate measure of tobacco consumption (e.g., cigarette sales) in response to a 1% increase in the price of tobacco.

Econometric analyses of aggregate data generally include measures of real price and income as key independent variables, and many of these analyses control for a variety of other factors, such as tobacco companies' marketing expenditures, indicators of key tobacco control policies, prices of other tobacco and/or nontobacco products, various population characteristics, and other potentially relevant determinants of demand.

Time series data are used to study the impact of price on behavior over time. However, researchers face a variety of challenges when using time series data to estimate the demand for tobacco:

1. Key explanatory variables, such as price and income, can be highly correlated over time, making it difficult to obtain precise estimates of the independent impact of each on demand.
2. Other important determinants of demand may be difficult to measure (e.g., attitudes and norms regarding tobacco) and may be correlated with determinants for which data are available (e.g., price and tobacco control policies); omitting these difficult-to-measure variables from the demand equation can result in biased estimates for the variables of interest.
3. Using official statistics on tax-paid sales or production and trade-based measures as proxies for actual consumption may result in measurement error in the dependent variable when opportunities for tax avoidance and evasion exist. To the extent that these opportunities are not modeled and are correlated with price, this can result in upwardly biased estimates of price elasticity. Additionally, using proxies can result in measurement errors due to timing issues as these proxies precede actual consumption, with the relative error larger for data reflecting shorter periods (e.g., monthly data rather than annual data). For example, wholesalers, cigarette smokers, or retailers may stock up on cigarettes in anticipation of a tax increase, consuming or selling these cigarettes weeks or months later.
4. Observed consumption and prices result from the interaction of demand for and supply of tobacco products; failing to account for this simultaneity can bias the resulting estimates of price elasticity.

Time series methods have advanced significantly since about 1990.[2] For example, newer methods have addressed the fact that variables used in time series analyses are often following long-term trends (i.e., nonstationarity), which could result in spurious associations. However, these more sophisticated methods are complex and data-intensive, and relatively few time series analyses of tobacco demand have applied such techniques. This is particularly true for time series studies of LMICs that rely on annual data over a relatively short time period.

Relatively few significant methodological advances have occurred with respect to the analysis of pooled cross-sectional time series data. Most of these analyses have pooled data for subnational areas from the same country or region (e.g., U.S. states, Canadian provinces, or European countries) where comparable data are available on a regular basis. In recent years, comparable data have become more regularly available for an increasing number of countries, so a few such analyses have used pooled data at the country level. The most significant advance in the analysis of pooled cross-sectional time series data has been the inclusion of time- and geographic-fixed effects. Time-fixed effects control for time-varying factors that affect all locations. Geographic-fixed effects capture time-invariant and place-specific factors that are not accounted for by other variables included in the models. To the extent that these unmeasured factors are correlated with included variables, the inclusion of fixed effects in estimated models will reduce or eliminate biases from potentially omitted variables.[2] However, including fixed

effects can often make it difficult to obtain precise estimates for price and other variables of interest, especially when there is little within-location variation in these measures over time.

### Analysis of Survey Data

While aggregate data are useful in understanding the overall impact of tobacco taxes and prices on tobacco use, survey data can help to explain how tobacco use is affected by changes in taxes and prices. Researchers use individual- and household-level survey data to disentangle the effects of price on decisions to consume from the impact of price on the intensity of consumption (conditional demand); that is, they distinguish between prevalence and intensity of use. With these data, researchers can assess how various subpopulations—defined by age, gender, socioeconomic status, race/ethnicity, or other characteristics—respond to changes in taxes on and prices of tobacco products. Additionally, individual-level data may be used to study the impact of price on a range of behavioral changes, including tobacco use initiation, cessation, and product switching.

Individual- and household-level data are generally collected in large cross-sectional surveys that are representative at the national or subnational level. In some countries, surveys are conducted regularly so that data from multiple waves can be pooled in analyses of tobacco demand. Less often, these data are collected at regular intervals from the same cohort of respondents, allowing researchers to conduct longitudinal analyses that can better assess the causal role of taxes, prices, and other influences on patterns of tobacco use.

Some surveys collect limited information on tobacco use as part of a larger effort (e.g., household expenditure surveys or health-focused surveys). Other surveys collect detailed information on tobacco-related knowledge, attitudes, beliefs, and use (e.g., the Tobacco Use Supplement to the Current Population Survey[62]). Beginning in 1998, global tobacco surveillance efforts have systematically collected comparable, detailed data on tobacco use (the cross-sectional Global Adult Tobacco Survey [GATS][63] and Global Youth Tobacco Survey [GYTS],[64] and the longitudinal International Tobacco Control Policy Evaluation [ITC] Project[65]), allowing researchers to pool data across countries in analyses that assess the impact of national tobacco control efforts on tobacco use.

Survey-based analyses of tobacco demand overcome some of the challenges that researchers face when working with highly aggregated data. For example, the high correlations between key determinants of demand often encountered with aggregate data (e.g., between price and income at the country level) will generally be much lower in individual-level survey data, making it easier to obtain more precise estimates of the independent effects of these factors on tobacco use. Additionally, survey data are less subject to the simultaneity biases in aggregate data that result from supply and demand jointly determining price and consumption, given that any one individual's tobacco use is too small to influence price. Survey-based measures of consumption include both licit and illicit consumption, unlike aggregate sales data that reflect licit, tax-paid sales only.

Researchers who use survey data to conduct analyses of demand face some of the same challenges that arise in aggregate data analyses, as well as challenges that are unique to survey data. Key determinants of demand, most notably exposure to tobacco company marketing efforts and underlying attitudes and norms regarding tobacco, are either not available at disaggregated levels that allow researchers to link these data to surveys based on respondents' locations, or are collected as part of the survey itself, which makes it difficult to sort out the causal relationships between these potentially endogenous variables and

demand (e.g., smokers are more likely than nonsmokers to be aware of cigarette marketing). Biases can result from the extent to which these and other key determinants of demand (e.g., sentiment toward tobacco) are omitted from the analysis but correlated with included measures (e.g., tobacco control measures).

Similar biases can result from the measure of price used in demand analyses that use survey data.[60] Prices of tobacco products that are matched to surveys based on location may not accurately reflect the prices that tobacco users encounter in that location, particularly when there are opportunities for tax avoidance and tax evasion, or when these prices do not fully reflect the price-reducing marketing activities of tobacco companies (e.g., discount coupons, two-for-one offers), which can lead to estimated price elasticities biased toward zero. The use of self-reported prices collected as part of a survey can create an endogeneity bias, because the price that a given user pays can be related to his or her tobacco use. For example, compared with light smokers, heavy smokers may be more likely to buy cigarettes by the carton, smoke less expensive brands, buy at discount outlets, engage in tax avoidance, or take advantage of price-reducing promotions. Researchers have attempted to overcome this potential endogeneity by developing average measures of price from the prices reported by individuals residing in the same geographic area, or by using instrumental variables and two-stage least-squares methods.

In addition, measurement errors that result from reporting biases may be present in the dependent variables, particularly with respect to tobacco consumption, which is often under-reported.[60] Because of the inability to address problems with under-reporting, researchers typically assume that the proportion of under-reporting is the same at different consumption levels; if this is not the case, however, resulting estimates will be biased.

Since the early 1980s, an increasing number of studies have used survey data to analyze the demand for tobacco. This is in large part because significant gains in computing power have made such analyses possible, and because high-quality survey data have become available for an increasing number of countries.

## Evidence on the Impact of Tax and Price on Tobacco Use

### Aggregate Demand Findings

In the 1970s, as awareness of the adverse health consequences of tobacco use began to grow, economists, statisticians, and other researchers in the United States and United Kingdom began to focus on studying tobacco demand. For example, in a series of papers extending one another's work, Sumner,[53] Atkinson and Skegg,[66] McGuinness and Cowling,[67] and others analyzed the demand for cigarettes in the United Kingdom. These studies estimated price and income elasticities, as well as how demand was affected by the 1962 release of the Royal College of Physicians report[68] on the health consequences of smoking and cigarette advertising. Price elasticity estimates from these studies varied widely, from –0.13 to –1.05, depending on the time period analyzed, type of data employed, and methods used. U.S. studies published between 1972 and 1980 by Hamilton,[51] Warner,[54] Fujii,[69] and others also focused on cigarette demand, using time series data to estimate price and income elasticities as well as the effects on consumption caused by other events, such as the 1964 Surgeon General's report[50] and other "health scares," the 1971 ban on tobacco advertising in broadcasts, and other factors. Price elasticity estimates from these early U.S. studies[51,54,69] were more consistent than those from the early studies in the United Kingdom. The price elasticities in these three studies fell in a narrower range, from –0.37 to –0.92, with most clustering around –0.5.[2]

During the 1980s and early 1990s, similar studies began to emerge from other HICs, including West Germany,[70] Australia,[71] Austria,[72] Finland,[73] Greece,[74] and New Zealand.[75,76] Meanwhile, in the United Kingdom researchers continued to update and extend earlier analyses.[77,78] These studies produced a range of price elasticity estimates that varied depending on country, time period, methods, and models. But the range of these estimates continued to narrow, with most falling between –0.2 and –0.6. In the United States, in addition to continued analysis of national time series data,[79–81] economists began to take advantage of the considerable differences in taxes and prices across states in analyses that used pooled cross-sectional time series data.[82,83] With few exceptions, estimated price elasticities from this wave of studies fell into the same –0.2 to –0.6 range.

Fewer studies have examined the impact of prices on the aggregate demand for other tobacco products, generally confirming that the use of these products is also responsive to changes in their prices. For example, the Pricing Policies and Control of Tobacco in Europe project estimated price elasticities for a variety of tobacco products—including pipe tobacco, roll-your-own tobacco, and snus—in 11 European countries where sufficient data were available. These price elasticities were in the same range as these countries' estimated price elasticities for cigarettes.[84] In contrast, recent studies of e-cigarette demand based on aggregate sales data have produced price elasticity estimates suggesting that the demand for the products is more responsive to price than cigarette demand is.[85,86] Using quarterly sales data from U.S. markets covering 2009 through 2012, Huang and colleagues[85] estimated price elasticities centered on –1.2 for disposable e-cigarettes and –1.9 for reusable e-cigarettes. Similarly, using sales data from 2011 through 2014 for six European Union (EU) countries, Stoklosa and colleagues[86] estimated that the price elasticity of e-cigarette demand was –0.82 based on static models, and up to –1.15 in the long run based on dynamic models.

A variety of methodologies were improved during this wave of research, particularly in U.S. studies. For example, several studies accounted for the interactions of supply and demand; however, estimated price elasticities from these studies tended to be quite similar to those that ignored such simultaneity.[87,88] Other studies began to model addiction more explicitly, first using a myopic addiction framework and eventually the rational addiction framework. These studies found clear evidence of intertemporal dependence between cigarette smoking and estimates of higher long-run than short-run price elasticities.[21,88,89]

Several studies that used state-level data from the United States explicitly modeled the potential for cross-border shopping and other tax avoidance and evasion tactics. These models reduced the bias often produced when using state-level data to estimate price elasticities. The resulting estimates showed the importance of interstate tax and price differentials in explaining differences in tax-paid sales; the resulting elasticity estimates were consistent with those based on national time series data, which are not subject to the same problems.[83,91] Other studies included a variety of other tobacco control measures in their analyses, including restrictions on smoking in public places and workplaces,[92] restrictions on advertising,[93,94] and tobacco control program efforts.[95,96]

As these analyses grew increasingly diverse and sophisticated, estimated price elasticities became more and more consistent. A general consensus emerged by the end of the 1990s, based largely on these aggregate demand analyses, that the short-run price elasticity of cigarette demand in HICs was approximately –0.4, with long-run elasticity about twice as high. The short run is considered the first 1 to 2 years following a tax increase; the long run is considered the period after which consumers fully adjust to the changes.

The first published study of tobacco demand in an LMIC appeared in 1990; Chapman and Richardson[57] analyzed tobacco demand in Papua New Guinea using annual time series data from 1973 to 1986. They estimated the tax elasticity of cigarettes as –0.71 and of non-cigarette tobacco as –0.50, well above price elasticity estimates from HICs. After the Chapman and Richardson study, several studies were produced in the 1990s for other LMICs, including Brazil,[97] China,[98,99] Poland,[100] South Africa,[101–103] Turkey,[104] and Zimbabwe.[105] These studies used a variety of methods and approaches; some accounted for addiction using myopic or rational addiction models.[97,101,104] All studies used annual time series data, some covering as few as 12 years.[97]

These early studies of LMICs produced a wide range of price elasticity estimates; short-run elasticities ranged from –0.11 to –0.99, and long-run elasticities ranged from –0.37 to –1.52. In general, and consistent with economic theory, most of the price elasticity estimates from this early small set of studies using aggregate data from LMICs suggested that cigarette demand in these countries was less inelastic than in HICs. By the late 1990s, a consensus had emerged that demand was about twice as sensitive to price in LMICs as in HICs.[30]

Many other aggregate demand studies were conducted in the 2000s using data from LMICs. These include studies from Argentina,[106] Bangladesh,[107,108] Bolivia,[109] Brazil,[110] Chile,[111] China,[112,113] Egypt,[114] Estonia,[115] Indonesia,[108,116] Malaysia,[117] Maldives,[108] Mexico,[118] Morocco,[119] Myanmar,[108] Nepal,[108] South Africa,[120] Sri Lanka,[108] Thailand,[108] Turkey,[121,122] Ukraine,[123] and Uruguay.[124]

Price elasticity estimates from these studies in LMICs varied widely. Short-run elasticity estimates ranged from insignificant to –2.18, and some long-run elasticity estimates were several times larger.[2] Despite this wide range, most of the estimates fell between –0.2 and –0.8, indicating that cigarette demand in LMICs is at least as responsive and often more responsive to price than in HICs. Studies from countries where at least some cigarettes were relatively affordable (e.g., Ukraine and, in recent years, China) tended to produce more price-inelastic estimates. However, studies in countries where incomes were relatively low tended to produce less price-inelastic estimates.

A small but growing number of studies published since 1990 have pooled aggregate data from a number of countries. Many of these studies focused largely on assessing the impact of bans on advertising by tobacco companies and other marketing practices, but they also estimated price elasticities. Three of these studies pooled at least two decades' worth of data from countries in the Organisation for Economic Co-operation and Development.[93,125,126] Estimates of price elasticities from these studies ranged from –0.20 to –0.55. Blecher[127] extended these analyses to include 51 low-, middle-, and high-income countries using annual data from 1990 to 2003. The estimates produced by this study were more inelastic, ranging from –0.09 to –0.13.

In summary, the number of studies based on aggregate measures of tobacco use in HICs is growing. These studies are becoming increasingly sophisticated over time, and the resulting estimates of price elasticity are remarkably consistent. Regarding the short-run price elasticities for cigarette demand, most estimates have clustered around –0.4, with the majority ranging from –0.2 to –0.6. Early studies of tobacco use in LMICs produced wide estimates of price elasticity, with most suggesting that cigarette demand in LMICs is much more responsive to price than cigarette demand in HICs. The rapid expansion of research in LMICs in recent years indicates that the range of price elasticity estimates has narrowed somewhat, with the majority of short-run price elasticity estimates falling between –0.2 and –0.8, with many clustering around –0.5. In all countries, studies that model the addictive nature of tobacco use

conclude that the long-run price elasticity of demand is greater than that estimated for the short run. Price elasticity estimates tend to be more inelastic in countries where low-priced, relatively affordable cigarettes are widely available.

### Findings From Survey-Based Studies of Adult Tobacco Use

The first studies using survey-based data were published in the early 1980s by Lewit and colleagues for the United States.[128,129] A rich body of survey-based literature exists for the United States due to variation in cigarette taxes and prices subnationally (i.e., across states) and over time (more than four decades).

Lewit and Coate[129] were the first to assess the impact of price on cigarette smoking among adults using survey data, which were taken from the 1976 wave of the U.S. National Health Interview Survey (NHIS) and augmented with state-level cigarette prices. This study used a two-step approach, first estimating the effect of price on smoking prevalence and then estimating the effect of price on cigarette consumption among those who smoked. The estimated overall price elasticity of cigarette demand was –0.42, which is consistent with estimates from previous studies based on aggregate data. The study found that price influenced smoking largely by affecting smoking prevalence (elasticity of –0.26) and concluded that higher prices would also reduce cigarette consumption among those who continued to smoke (elasticity of –0.10).

During the next 10 years several additional survey-based studies of demand in adults were completed in the United States, including a few studies that modeled the addictive nature of smoking and studies that looked at taxes and demand for smokeless tobacco products.[20,130–133] In the 2000s, survey-based studies of the demand for cigarettes among adults used increasingly large samples obtained by pooling datasets from multiple waves of various nationally representative surveys.[134] For example, in constructing their sample of more than 355,000 adults, Farrelly and colleagues[135] pooled multiple waves of data from the NHIS conducted between 1976 and 1993. Using two-part methods, they estimated overall price elasticity as –0.28, for which the impact of price was split about evenly between its effects on smoking prevalence (–0.13) and conditional demand (–0.15).

Starting in the late 1990s, similar studies began to emerge from HICs other than the United States. The first were conducted in Canada and Australia,[136] which have subnational prices that vary similarly to those of the United States, followed by Italy,[137] Republic of Korea,[138] and Spain.[139–141] For example, to estimate the price elasticity of cigarette demand in Canada, Gruber and colleagues[142] used household expenditure data from eight waves of the Canadian Survey of Family Expenditure, conducted from 1982 to 1998, finding an overall price elasticity of –0.45.

The number of survey-based studies of the demand for tobacco increased from the late 1990s through the 2000s. New research continued in the United States and in other HICs for which previous studies had been done, and research also started to emerge from a few other HICs. In general, the findings from these studies were consistent with those from other HICs, and with the estimates that were obtained for these countries in studies based on aggregate data. Most of this research produced overall price elasticity estimates between –0.2 and –0.6, finding that price influenced both smoking prevalence and conditional demand. Estimates for the relative impact on prevalence and conditional demand varied, with some studies finding a greater impact on prevalence and others finding a greater impact on conditional demand. Two of these studies modeled addiction[140,141] and estimated that long-run price elasticities were

greater than short-run elasticities, which is consistent with theory and other empirical evidence. A Community Preventive Services Task Force (U.S.) review,[143] based on 116 studies from the United States and other HICs, concluded that "an intervention that increases the unit price for tobacco products by 20% would reduce overall consumption of tobacco products by 10.4%, prevalence of adult tobacco use by 3.6%, and initiation of tobacco use by young people by 8.6%."[143,p.1] The overall median price elasticity estimates were –0.37 for adults and –0.74 for youth.

The first survey-based study of adult cigarette demand in LMICs was produced in China in 1997 by Mao and Xiang.[99] These researchers used cross-sectional data on adults in China's Sichuan province, augmented with data on cigarette prices collected from local retailers. As with the early aggregate demand studies, Mao and Xiang found that cigarette demand in China was relatively responsive to price, with a larger impact on prevalence (elasticity of –0.89) than on conditional demand (elasticity of –0.18).

Survey-based studies of tobacco demand in LMICs increased rapidly, in part because of support for this type of research from such international organizations as the World Bank and WHO. Given the relative availability of different types of survey data, studies of tobacco demand in LMICs are more commonly based on measures of tobacco use constructed from household expenditure surveys than from representative surveys of adults. Using household-level data limits researchers' ability to assess the impact of price on prevalence of tobacco use because researchers cannot evaluate the effects on each household member's decision to use. This limitation likely accounts for the very small prevalence elasticities that result from these studies. However, household-level data are more useful for understanding the impact of price on tobacco consumption in households that consume.

Studies have used several methods to obtain price data. Many have used measures of price derived from self-reported expenditures and consumption or obtained from respondents as part of a survey. Other studies have used data collected from local tobacco vendors or obtained from archival sources. To reduce the previously noted bias in price elasticity estimates that can result from using price measures derived from self-reported data, several studies have averaged prices across respondents in the same geographic area and constructed a market-level price measure (e.g., Bishop et al. 2007,[144] Mao et al. 2008[145]). Others have used the Hausman test[146] or other methods to examine the endogeneity of price. Although successfully performing these tests requires instruments that may not be available, many of the studies that have used this approach have concluded that prices can be treated as exogenous (e.g., Karki et al. 2003,[147] Kyaing 2003[148]).

Estimates of price elasticity from survey-based studies of tobacco demand in LMICs vary considerably, from those that find little impact of price on either prevalence or conditional demand for cigarette smoking (e.g., in China and the Russian Federation),[149] to those that find that tobacco use is highly responsive to price (e.g., in Myanmar).[148] Some of the differences likely result from the price measure used in the study. Studies that treat self-reported prices as exogenous are more likely to estimate greater elasticity. Studies that use locally collected prices for selected brands may introduce measurement errors based on the choice of brands and the retailers from whom prices are obtained. This type of price measure may bias elasticity estimates toward zero, as Bishop and colleagues[144] suggested was the case with the price measure used by Lance and colleagues[149] in their analysis for China.

As discussed previously, it is likely that part of the difference in price elasticity can be explained by the relative affordability of cigarettes. For example, the highly price-inelastic estimates for cigarette demand among Russian men[149,150] have been attributed to the widespread availability of the very inexpensive and

highly affordable brands they smoke.[151] Similarly, rapidly rising incomes in China that have far outpaced increases in cigarette prices can help explain the increasingly price-inelastic estimates obtained in studies of cigarette demand in China such as the 2008 study by Hu and colleagues.[152] Additionally, because of the wide range of prices across brands in the Chinese market, Chinese smokers may be more likely to switch to cheaper cigarette brands in response to price increases, thereby diluting the impact of tax policies on smoking prevalence.[153,154]

From 2000 to 2014, numerous survey-based studies were conducted to assess the impact of price on the use of tobacco by adults in LMICs, including Bangladesh,[155] Bulgaria,[156] China,[144,145,149] Estonia,[115] Egypt,[157] India,[158] Indonesia,[159] Jordan,[160] Mexico,[161] Myanmar,[148,162] Nepal,[147] Poland,[163] the Russian Federation,[149,150] South Africa,[164,165] Sri Lanka,[166] Thailand,[167] Turkey,[121,168] Ukraine,[169] and Viet Nam.[170]

Price elasticity estimates from these studies vary considerably. Many, particularly those based on household expenditure surveys, found very little impact of price on smoking prevalence.[121,144,149,150,161] Other studies concluded that prevalence is quite responsive to price—for example, Kyaing's[148] estimate of –1.28 for Myanmar and Van Kinh and colleagues'[170] estimate of –0.94 for men in Viet Nam. Similar variability exists in the estimates of the price elasticity of conditional demand, with some finding little impact,[145,149,150] and others concluding that consumption among those who use tobacco is relatively responsive to price—for example, John's[158] estimates of the price elasticity of conditional demand for bidis (–0.91) and tobacco leaf (–0.87) in India. In general, the estimates for overall price elasticity vary, and most range from –0.2 to –0.8—that is, the same range that encompasses most of the estimates obtained for overall demand from studies in LMICs based on aggregate data.

Using GATS cross-country data from approximately 200,000 participants, Kostova and colleagues[171] estimated a total price elasticity of cigarette demand in LMICs at approximately −0.53. Higher prices were associated with lower demand across countries in terms of both smoking prevalence and daily number of cigarettes smoked among smokers, even after controlling for a number of country characteristics. Thus, while patterns of tobacco use may differ across countries, these results suggest that the relationship between price and smoking prevalence holds across different cultural and policy environments.

### *Taxes/Prices and Cessation*

A small number of studies, nearly all from HICs, have looked at the impact of taxes and prices on smoking cessation. Several studies constructed respondents' smoking histories using data from cross-sectional surveys that asked about past cigarette use; these data were then matched to price data from each respondent's location. This approach can introduce measurement errors in the dependent variable (due to errors in recall about the timing of cessation) and in the price variable (due to potential mismatching of prices for individuals who changed locations between cessation and the time of the survey). Douglas[172] was the first to follow this approach, applying ordered probit, split-sample duration methods to data from the 1987 U.S. NHIS in a rational addiction framework. This study found that (a) the price elasticity of smoking duration was about –1.0, implying that a 10% permanent price increase would reduce the length of time an individual smoked by about 10%, and (b) the probability of quitting in response to price increases rose with the duration of smoking.

Since 2000, a few studies using cross-sectional data with retrospective information to examine the impact of price on smoking cessation have been conducted in the United Kingdom,[173] Spain,[174] France,[175] and the United States.[61,176] These studies produce similar evidence that higher cigarette prices increase the likelihood of smoking cessation.

Only a few studies have used longitudinal data to examine the impact of taxes and prices on cessation, but these findings provide similar evidence that higher prices increase the likelihood of smoking cessation.[177,178] Tauras and Chaloupka[179] used longitudinal data from the Monitoring the Future cohorts with baseline surveys from 1976 to 1993 and biennial follow-ups through 1995; they estimated cessation elasticities between survey waves of 0.34 and 1.00 for women and 0.27 and 1.30 for men in the mostly young adult sample, implying that a 10% increase in price reduced the likelihood that a smoker was smoking 2 years later by between 3.4% and 10% for female smokers and between 2.7% and 13% for male smokers. Additionally, Hyland and colleagues,[180] using data from the first two waves of the ITC Survey for the United States, United Kingdom, Canada, and Australia, found that smokers who purchased cigarettes from low-tax or untaxed sources were less likely to make a quit attempt or to have successfully quit between waves of data collection. Further analyses, using three waves of ITC data from the United States and Canada found that smokers living in areas with higher cigarette prices and taxes are significantly more motivated to quit; the study also found suggestive evidence that further price increases over time increase quit motivation and the likelihood of actual quitting.[181]

To date, few studies have looked at the impact of prices on cessation of tobacco use in LMICs. A recent review using GATS data from 14 countries, primarily LMICs, examined the association between the probability of being a recent quitter and several tobacco control policy factors, including exposure to warning labels, worksite smoking bans, anti-smoking media messaging, tobacco marketing, and current cigarette and bidi prices.[182] After accounting for country-specific attributes in pooled analyses, they found that higher cigarette prices were associated with a higher probability of quit attempts, and higher bidi prices were associated with higher probabilities of both quitting and quit attempts in South-East Asian countries where bidi use is common. The strength of the impact of these policy factors on cessation varied across countries and policies.

Ross and colleagues[183] analyzed the impact of changes in cigarette excise taxes on smoking cessation rates with data from three neighboring Eastern European countries (the Russian Federation, Poland, and Ukraine) during the 1990s and 2000s. They estimated that a 10% increase in cigarette taxes increased the probability of smoking cessation among smokers by 1.6% to 2.3%.

### Differences by Gender

A few studies of cigarette demand have examined the impact of taxes and prices on tobacco use in relation to gender. In some countries, men and women may respond differently to price because of differences in life stages or gender-related characteristics. For example, smoking among women often increases as women enter the labor force in greater numbers and begin to earn their own incomes. As a result, cigarettes become more affordable to them, and gender differences in response to price may become less pronounced.[184] Alternatively, to the extent that women are more weight conscious than men and may see smoking as a weight control mechanism, women could be less sensitive to price than men.[185]

Research estimating gender differences in the price elasticity of adult tobacco use in HICs has produced mixed evidence.[135,186] Some studies have found that men are more responsive to price than women. Chaloupka[187] estimated that the long-run price elasticity of cigarette demand for men centered around –0.60, while demand among women was unresponsive to cigarette prices. Other studies found the opposite: Aristei and Pieroni[137] estimated conditional demand elasticities of –0.13 for Italian men and –0.65 for Italian women. Still other studies—for example, in France[175] and Spain[174]—found little difference by gender.

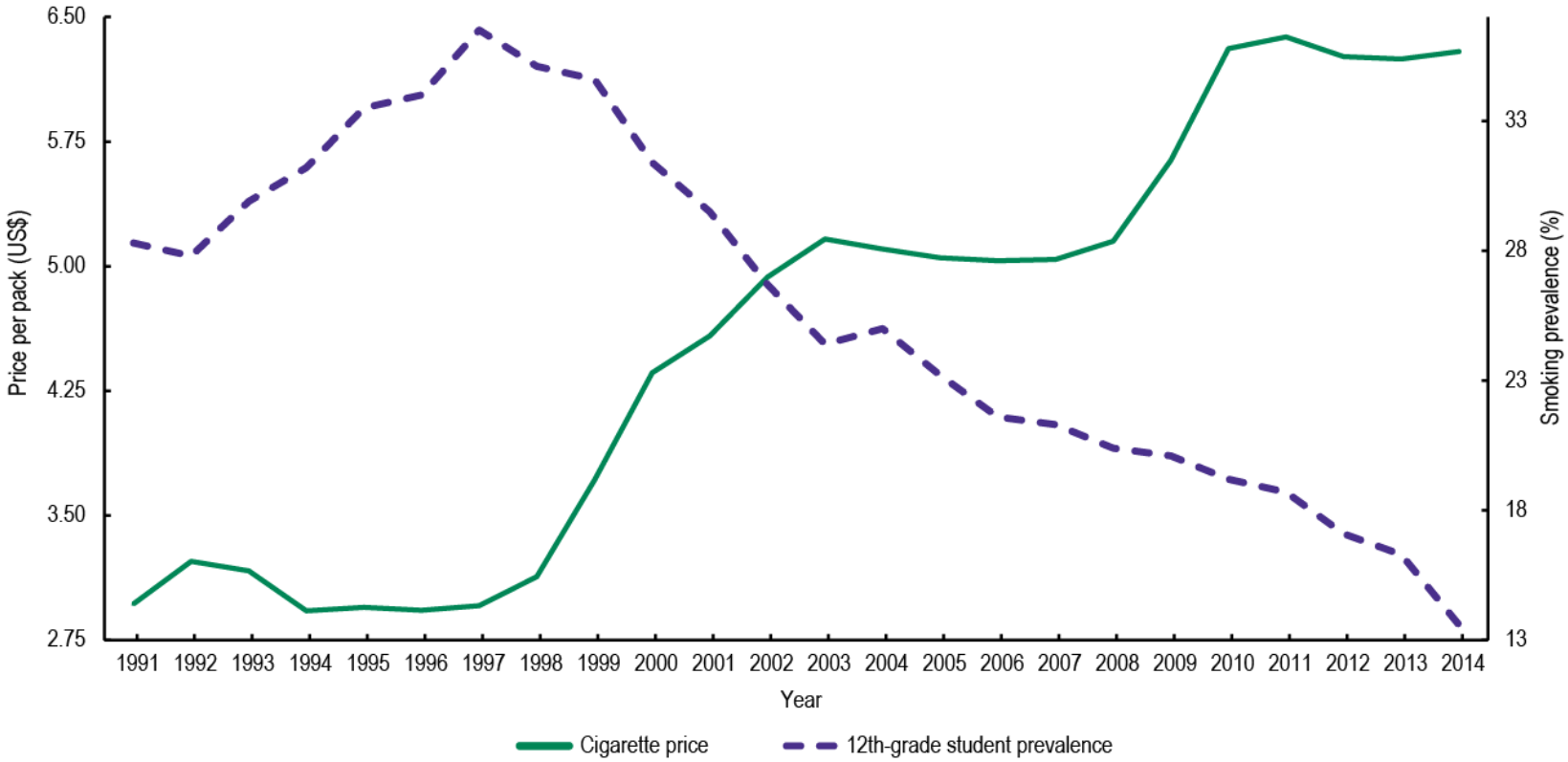
Almost no demand studies from LMICs have examined gender differences in the price elasticity of tobacco use, in part because research in these countries relies greatly on household expenditure survey data and thus is unable to examine data separately for men and women. The few existing analyses have not yielded a clear pattern. For example, Ogloblin and Brock[150] found that smoking prevalence among Russian women was much more responsive to price than smoking prevalence among Russian men (elasticities of –0.63 and –0.08, respectively). Ross and colleagues[151] attributed this finding to differences in brand choices by gender, because men tend to smoke inexpensive local brands, and women are most likely to view smoking as a luxury and tend to smoke expensive foreign brands.

### Differences by Age Group

Economic theory suggests several reasons why young people are likely to be more responsive than adults to changes in tobacco product prices.[128,188,189] Young tobacco users are likely to spend a greater share of their limited disposable income on tobacco products and therefore may be more sensitive to price than adult tobacco users. Compared with adults, youth are more influenced by the behavior of their peers. Thus, changes in tobacco use by some youth as a result of changes in prices will lead to changes in tobacco use by other young people. Furthermore, because of their relatively shorter time consuming tobacco products, young people may be less addicted to tobacco than adults, suggesting that youth will respond more quickly to changes in price. Similarly, young people are generally more present-oriented than adults, implying that they will respond more to changes in the immediate cost of tobacco use (e.g., prices) than to changes in long-term costs (e.g., health consequences).

Since 1990, an extensive evidence base has accumulated on the effects of taxes and prices on tobacco use among youth. Much of the data comes from HICs, but the availability of data from the GYTS has led to comparable studies in LMICs.[190] Much of the research on youth demand for tobacco products has been conducted in the United States because of the considerable variation in taxes and prices between different states and the availability of survey data on youth tobacco use. In addition to variations in state and local taxes, the tobacco industry twice induced substantial changes in prices in the 1990s. In April 1993, Philip Morris initiated “Marlboro Friday,” cutting the price of cigarettes by approximately 25% in response to competition from generic brand cigarettes. Later that month, other tobacco companies followed suit, cutting the price of their premium cigarettes. In late 1998, tobacco companies significantly increased prices in response to the adoption of the Master Settlement Agreement (MSA).[58] As suggested by Figure 4.6, cigarette tax and price changes have significantly influenced youth smoking in the United States.

## Figure 4.6 Inflation-Adjusted Cigarette Prices and Prevalence of Youth Smoking in the United States, 1991–2014




*Note:* Currency adjusted for inflation using a 2014 base.
*Sources:* Johnston et al. 2016.[253] Orzechowski and Walker 2014.[254]

Lewit and colleagues[128] were the first to assess the impact of cigarette prices on smoking by U.S. youth. Using data from the nationally representative 1966–1970 National Health and Nutrition Examination Survey (Cycle III), this study estimated an overall price elasticity of –1.44. The strongest impact of price was seen on prevalence, for which the price elasticity was estimated to be –1.20; the price elasticity for consumption among young smokers was –0.25. These estimates were more elastic than those found by Lewit and Coate[129] in a study of adult cigarette demand.

Since the early 1990s, many studies based on U.S. cross-sectional data have confirmed Lewit and colleagues' 1981 conclusion[191] that youth smoking is more responsive to price than adult smoking. For example, using data from the 1992–1994 Monitoring the Future surveys, Chaloupka and Grossman[192] estimated an overall price elasticity of –1.31 for youth smoking. In a later study with similar findings, Lewit and colleagues[191] examined the impact of cigarette prices on youth smoking prevalence and intentions to smoke. Data for this study came from cross-sectional surveys of 9th-grade students in 1990 and 1992 from the 22 U.S. and Canadian sites in the Community Intervention Trial for Smoking Cessation. This study estimated that the price elasticity of youth smoking prevalence was –0.87, and the price elasticity of intentions to smoke by nonsmoking youth was –0.95. These results indicate that youth are somewhat more sensitive to price than adults.

Similarly, Gruber and Zinman[193] found consistent evidence that youth smoking responds to changes in cigarette prices, particularly among older youth. Using data from a variety of U.S. surveys and estimates from fixed-effects models for high school seniors, the study estimated a prevalence elasticity of –0.67, which is three to four times higher than comparable estimates for adults. The study also concluded that the decline in the price of cigarettes between 1991 and 1997 explained 26% of the rise in smoking among high school seniors over this period. Likewise, Tauras and colleagues,[194] using data from the 1997 National Longitudinal Surveys of Youth baseline and annual follow-up data through 2001, found the overall price elasticity of youth smoking to be –0.83, about double the consensus elasticity estimate for adult cigarette demand.

Other studies of cigarette demand among U.S. youth have produced similar findings,[195] and studies of other tobacco use by U.S. youth have found that use of smokeless tobacco by youth is also responsive to price.[196,197] Because of the very low prevalence of smokeless tobacco use among girls, these studies have focused on use of smokeless products by boys. In one study using data from the 1992–1994 Monitoring the Future surveys, Chaloupka and colleagues[196] estimated prevalence elasticities of –0.35 to –0.52 for smokeless tobacco use among 8th-, 10th-, and 12th-grade boys. In another study, using data from the Youth Risk Behavior Surveys of 1995 through 2001, Tauras and colleagues[197] estimated tax elasticities that ranged from –0.12 to –0.20 (for prevalence of smokeless tobacco use) and from –0.04 to –0.08 (for intensity of smokeless tobacco use) among high school boys. Price elasticities were larger than tax elasticities because smokeless tobacco taxes account for a modest share of prices.

Several studies conducted in the United States during the 1990s and 2000s assessed the impact of price on smoking behavior by age group. In general, studies found that cigarette demand becomes more price-inelastic among older age groups.[135,198] Canadian studies of youth cigarette demand have reached similar conclusions.[199] Youth smoking prevalence in Canada had been falling steadily in the early 1990s, but 1994 tax cuts led to a significant rise in the prevalence of youth smoking, and subsequent price increases led to reductions in prevalence.[200]

Several U.S. studies have investigated the differential impact of price on youth at different stages of smoking uptake.[201,202] After finding that cigarette demand was more price sensitive among older adolescents than younger adolescents, Gruber and Zinman[193] concluded that price has a greater impact on regular smoking than on early experimentation with smoking. Similarly, Ross and colleagues,[203] using a nationally representative survey of high school students in 1996, found that price had the greatest impact on progression to later stages of uptake. The authors suggest that smokers at earlier stages (trying, experimentation) are smoking few cigarettes and are likely to rely on social sources for those cigarettes. As they progress toward regular smoking, they begin to buy their own cigarettes, become more aware of prices, and consequently become more sensitive to price. Similarly, Slater and colleagues[204] found that price-reducing promotions for cigarettes had little impact on early stages of uptake but were strongly associated with progression beyond experimentation and into more regular and established smoking.

However, the evidence for a relationship between price and youth smoking initiation is mixed.[2] Several studies have used retrospective data to assess price and initiation in various countries, including Australia,[205] France,[175,206] Spain,[174] Germany,[207] the United States,[172,208] and the United Kingdom.[173] These findings may be limited due to measurement problems inherent in using retrospective data and because of lack of variation in price over many years. A recent review cited methodological limitations in studies of the impact of cigarette prices on smoking onset.[209]

A few U.S.-based studies have used longitudinal data to assess smoking among youth as they move from adolescence to adulthood. Some earlier studies yielded mixed findings,[210,211] possibly because few changes in cigarette taxes occurred during the 1980s. Later studies using data from the 1990s did find that price had an impact on initiation. For example, as part of the Monitoring the Future project, Tauras and colleagues[212] followed several cohorts of 8th-grade and 10th-grade students throughout the 1990s, a decade of substantial U.S. cigarette price changes (the "Marlboro Friday" price reductions and the 1998 post-MSA price increases) and state and federal tax increases. These researchers found that cigarette prices significantly influenced smoking initiation. Price may impact youth differently by gender.

As Cawley and colleagues[185,213] conclude, smoking initiation among adolescent girls is significantly influenced by weight-related factors (e.g., self-described overweight, body mass index, reports of trying to lose weight), while smoking initiation among adolescent boys is significantly affected by cigarette prices, with neither factor being significant for the opposite gender.[185,213] For boys, Cawley and colleagues[185] found that price had a greater impact on the initiation of more regular smoking, estimating elasticities of –0.86 for any smoking initiation, and –1.49 for initiation of frequent smoking. However, for girls, Cawley and colleagues[213] found a price elasticity of initiation of –0.24 compared to –1.2 for boys. These findings suggest that gender-specific differences in the impact of price may account for the mixed findings about price and initiation from previous studies.

There are a variety of mechanisms through which price might have a greater impact on youth smoking than on smoking by adults. For example, higher cigarette prices may indirectly influence youth smoking by reducing parental modeling of smoking and by reducing cigarette availability to youth who might sneak cigarettes from their parents.[188] A few other studies conducted in the United States during the 2000s explored some of the factors that may explain why youth smoking would be more responsive to price than adult smoking. Powell and colleagues[214] examined the role that peer influence plays in responsiveness to price, using data from the 1996 Study of Smoking and Tobacco Use Among Young People. In controlling for peer influence, the study estimated a price elasticity for youth smoking

prevalence of –0.32, compared with a price elasticity of –0.50 found by models that do not account for peer influences. The difference—an elasticity of –0.18—represents the indirect effect of price that works through peers, or the "social multiplier" effect, suggesting that peer influences account for more than one-third of the overall impact of price on the prevalence of youth smoking.[214]

In another analysis of these data, Ross and colleagues[215] looked at other mechanisms through which changes in prices could influence youth smoking. In response to survey questions about their anticipated reaction to alternative price increases, young people indicated that higher prices would make them less likely to smoke in the future and would lead to reductions in cigarette consumption among those who continued to smoke, with larger effects for larger price increases. In addition, 60% of future smokers indicated that they would be less likely to share cigarettes with their friends if prices increased. Other studies have found that while higher prices significantly reduce smoking among buyers, they have less impact on borrowers (those who get cigarettes from friends), possibly because price has more impact on youth at later stages of the smoking uptake process, when they are more likely to be purchasing their own cigarettes.[215,216]

As of 2015, relatively little research has been conducted on the differential impact of taxes and prices by age in LMICs, in large part because of the lack of good data on youth tobacco use and tobacco product taxes and prices. Early studies used household expenditure survey data to examine differences in price elasticity by age. More recent studies are based on data from the GYTS.

Van Walbeek[44] compared trends in smoking prevalence by age in South Africa, using data from the national, repeated cross-sectional All Media and Products Survey for 1993–2003, a period during which the inflation-adjusted price of cigarettes more than doubled. This price increase was due largely to a series of tax increases and coincided with significant reductions in smoking prevalence among all age groups, but the largest reduction occurred among people ages 16–24 years. In another analysis using data from GYTS surveys conducted in 1999 and 2002 in South Africa, van Walbeek[43] found a significant drop in the prevalence of youth smoking (from 23% in 1999 to 18.5% in 2002), and an even larger drop in the prevalence of frequent youth smoking (from 10.1% in 1999 to 5.8% in 2002). These findings are consistent with evidence from the United States that price impacts regular youth smoking more than it does youth experimentation.[193,216] However, van Walbeek's analysis controlled for other determinants of demand, making it difficult to quantify how much of the declines in prevalence can be attributed to the increases in cigarette taxes and prices.

Other studies, which used household data, have generally found that younger smokers are more responsive to price than older smokers, and that demand becomes less elastic with age. Such findings have been reported from Ukraine,[169] Thailand,[167] Nepal,[147] Myanmar,[148] and Viet Nam.[217]

Several studies have used data from the GYTS to estimate the impact of price on tobacco use among youth. For some countries the surveys include questions on cigarette prices, relying on the respondents' own self-reports for the information. Self-reported price information can have an endogeneity bias, as discussed earlier, meaning that heavier smokers are more likely to seek out less expensive cigarettes, which could account for part of the estimated effect of price on smokers' cigarette consumption. For this reason, economic analyses of GYTS data have generally used self-reported prices to produce aggregated measures of price, usually at the school level. Ross[218] was the first to conduct an economic analysis of GYTS data, using data from 1999 for Kiev, Ukraine. Estimated price elasticities for smoking prevalence in this study ranged from –0.29 to –0.51, but estimated price elasticities for conditional cigarette demand

were considerably higher, ranging from –1.42 to –1.83. Ross[219] used data from the 1999 GYTS to conduct a similar economic analysis of tobacco use by youth in Moscow. Using a school-level measure of price, prevalence elasticities ranged from –0.47 to –0.51, and conditional demand elasticities ranged from –0.32 to –0.69. With an average elasticity of –1.15, these estimates are well above the demand elasticities found by the limited number of studies on adult smoking in the Russian Federation.[149,150]

Joseph and Chaloupka[220] used GYTS data to estimate the price elasticity of demand for cigarettes, bidis, and gutka among youth in India. Focusing on data collected in 26 of 28 states and 2 of 7 union territories between 2000 and 2004, they found that bidis have the highest price elasticity (–2.70), followed by gutka (–0.58) and cigarettes (–0.40).[220] The authors also found that girls were more responsive to price increases than boys, possibly because of tighter constraints on their spending.

At least two studies have used pooled data from multiple waves of the GYTS from many countries, matched to prices from the Economist Intelligence Unit's World Cost of Living Survey by country and year, to estimate the impact of cigarette prices on youth smoking. Kostova and colleagues,[221] using data from 20 countries, found an estimated prevalence elasticity of –0.63 and a conditional demand elasticity of –1.2. Nikaj and Chaloupka,[222] using data from 38 countries, estimated a total price elasticity of –1.5 for the entire sample, including some HICs, and –2.2 when they limited their sample to LMICs only, suggesting that youth in poorer countries are more sensitive to cigarette price changes than youth globally.

## Tax, Price, and Tobacco Use: Other Key Findings

Many studies based on both aggregate and survey data have assessed the impact of tobacco taxes and prices on a variety of other outcomes. For example, several studies have considered the impact of relative prices on product and brand choices, individuals' tax avoidance, and other aspects of purchasing behavior. Some studies have looked at the role of tax and price differentials in larger scale tax evasion. Other studies have examined the impact of tobacco taxes and prices on: (a) health-related outcomes, from exposure to SHS to death and disease caused by tobacco use, (b) other substance use, such as alcohol consumption and marijuana smoking, (c) other household spending, particularly in poor households, and (d) employment. Several studies have assessed the impact of higher taxes on the revenues that governments receive from those taxes.

This section briefly reviews findings from studies that look at the impact of tobacco taxes and prices on substitution among tobacco products, other substance use, and health outcomes. Other chapters of this monograph explore other outcomes in more detail: revenues in chapter 5, tax avoidance and tax evasion in chapter 14, employment impact in chapter 15, and impacts on household spending in chapter 16. Chapter 16 also addresses differences in price elasticity by socioeconomic status.

### Relative Prices and Substitution Among Tobacco Products

Several studies from HICs have examined the impact of changes in the relative prices of tobacco products on substitution among these products. In general, these studies have concluded that increases in the price of one tobacco product relative to the prices of other products will reduce the use of products that are now more expensive and lead to an increase in use of products whose relative prices have fallen. Evidence from LMICs is mixed, likely reflecting cultural factors associated with the use of different products. The small number of studies that have examined how changes in prices influence brand choice have nearly all come from HICs. Generally, these studies have concluded that changes in the relative

prices of different brands lead smokers to substitute with brands whose relative prices have fallen, and that overall increases in taxes and prices lead to other forms of compensation among continuing smokers.

In an analysis of aggregate demand for cigarettes, cigars, and pipe tobacco in Finland, Pekurinen[73] found that an increase in the price of one product, holding other prices constant, results in some substitution with the other two products. Similarly, in analyses of adult cigarette and smokeless tobacco use based on U.S. survey data, Ohsfeldt and colleagues[131–133] consistently found that higher cigarette taxes led some adult smokers to substitute with smokeless tobacco products, but found little evidence that higher taxes on smokeless tobacco products led to substitution with cigarettes. In contrast, Tauras and colleagues[197] found that higher cigarette prices led to reductions in use of both cigarettes and smokeless tobacco only among high school boys in the United States. Taurus and colleagues analyzed an adolescent population that was in its early stages of uptake and experimentation with multiple tobacco products; this may help explain why their findings differ from those of Ohsfeldt and colleagues. Early studies have produced mixed results of the impact of cigarette and other tobacco product prices on the demand for electronic nicotine delivery systems (ENDS) (battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user). The mixed evidence for substitution between ENDS and other tobacco products is likely due to the rapid evolution of the ENDS market during the periods covered by these studies.[85,86]

Mixed evidence also results from the few studies that have estimated cross-price effects in LMICs. For example, Chapman and Richardson[57] analyzed aggregate data from Papua New Guinea and concluded that changes in the relative taxes on cigarettes and non-cigarette tobacco result in significant substitution between the two. A study in Viet Nam by Laxminarayan and Deololikar[217] produced similar findings. Using household survey data, this study found evidence of substitution between cigarettes and rustic tobacco, with higher cigarette prices leading to increased use of rustic tobacco, but not the reverse. In contrast, John's[158] analysis of household survey data on tobacco use in India found little evidence that changes in relative prices result in substitution between cigarettes, bidis, and leaf tobacco. This study's positive but largely insignificant cross-price elasticity estimates suggest that these products are complements in India.

A few studies have examined how changes in relative prices affect substitution among brands. For example, Tauras and colleagues,[223] analyzing scanner-based cigarette sales data, found that changes in the relative prices of premium, discount, and deep discount cigarette brands in the United States accounted for much of the observed changes in the market shares for the three price tiers. Similarly, White and colleagues[153] found that changes in the relative prices of cigarettes among brands in different price tiers led Chinese smokers to switch brands, with the greatest impact on smokers of less expensive brands.

A few studies have found that higher taxes lead to compensating behaviors among some continuing smokers that may reduce the public health impact of higher taxes. For example, two studies conducted in the United States concluded that higher taxes and prices lead some smokers to switch to longer cigarettes and brands that are higher in (machine-measured) tar and nicotine in an effort to maintain nicotine levels even as they reduce their daily consumption.[224,225]

## Tobacco Product Prices and Other Substance Use

A few studies have examined the impact of tobacco product taxes and prices on the use of other substances, including alcohol and marijuana (cannabis). In general, these studies have found evidence of complementarity between tobacco use and other substances, with higher prices for one substance leading to reductions in consumption of both substances. However, some studies find evidence of substitution, with higher prices for one substance leading consumers to substitute use of another.

Jones[226] analyzed aggregate expenditure data for tobacco and four categories of alcoholic beverages in the United Kingdom and found that tobacco is a complement for each category. Bask and Melkersson[227] reached the same conclusion based on their analysis of aggregate sales data in Sweden, as did Jimenez and Labeaga[228] in their analysis of household expenditure survey data in Spain. Cameron and Williams[136] and Zhao and Harris,[229] in analyses of individual-level survey data from the Australian National Drug Strategy Household Surveys, had similar results—namely, that higher tobacco and alcohol prices reduce consumption of both tobacco and alcohol. Guindon and colleagues,[230] using household expenditure survey data from India, found some suggestive evidence of substitutability between cigarettes, bidis, and a locally made liquor among urban households.

Evidence of complementarity is mixed when examining U.S. data on adults. Goel and Morey[231] concluded that alcohol and cigarettes are substitutes for one another, based on an analysis of pooled cross-sectional time series data on state-level sales. Decker and Schwartz[232] analyzed individual-level adult survey data from the Behavioral Risk Factor Surveillance System and found mixed results: Higher alcohol prices were associated with reduced smoking (indicating complementarity), but higher cigarette prices were associated with increased drinking (suggesting substitutability). Picone and colleagues'[233] analysis of longitudinal data from the first six waves of the Health and Retirement Survey found that stronger smoke-free policies reduce drinking, but that higher cigarette prices lead to increased alcohol consumption, and higher alcohol prices increase cigarette consumption for both men and women.

Studies of U.S. youth have also produced mixed evidence. Pacula[234] used data from the 1983 and 1984 waves of the 1979 National Longitudinal Survey of Youth to model the uptake of tobacco, alcohol, and marijuana use among young people. This study found that higher past cigarette prices lead to increased current alcohol consumption, suggesting that cigarettes and alcohol are economic substitutes. In contrast, Dee[235] analyzed teen smoking and drinking using state-level aggregated data from the 1977–1992 Monitoring the Future surveys of high school seniors. This researcher concluded that cigarettes and alcohol are economic complements, with stronger alcohol control policies reducing the prevalence of youth smoking, and higher cigarette taxes reducing the prevalence of youth drinking. Markowitz and Tauras[236] used data from the 1997 National Longitudinal Survey of Youth and its annual follow-up surveys through 2001 to examine the relationships between youth smoking and drinking and the consumption of other goods. This study found mixed evidence for relationships between youth smoking, drinking, and drug use, with alcohol and marijuana complements for smoking, but smoking substituting for alcohol and marijuana.

A few studies from Australia and the United States have considered the relationships between cigarette taxes and prices and marijuana use. These studies have consistently found that cigarette and marijuana smoking are complements. For example, in analyses of survey data from Australia, Cameron and Williams[136] and Zhao and Harris[229] found that a higher cigarette price reduces both cigarette and marijuana smoking. Chaloupka and colleagues[237] reached the same conclusion in an analysis of data on

U.S. youth from the Monitoring the Future surveys. This study found that higher cigarette prices are associated with reduced frequency of marijuana use, and that there was a negative, but not significant, association between cigarette prices and the prevalence of youth marijuana use. Similarly, Farrelly and colleagues[238] analyzed data from the U.S. National Household Surveys on Drug Abuse for youth ages 12–20 years and found that higher cigarette taxes reduce the intensity of youth marijuana use. Some evidence from their study indicates that higher cigarette taxes also lower the probability that young males will use marijuana.

Pacula's[234,239] analyses of data from the 1979 National Longitudinal Survey of Youth further supported conclusions that cigarettes and marijuana are economic complements for young people in the United States. In models based on the 1984 data that examined contemporaneous associations, these studies reported that youth marijuana use was lower in states with higher cigarette taxes, but these estimates were not statistically significant.[239] In a further analysis that considered the onset of addiction and used the 1983 and 1984 data, Pacula[234] found that higher past and current cigarette prices significantly reduced current youth marijuana use. Similarly, an analysis by Markowitz and Tauras[236] of the 1997 National Longitudinal Survey of Youth produced generally significant negative estimates for the effect of higher fines for marijuana use on the prevalence of youth smoking.

### Tobacco Product Prices and Health-Related Outcomes

A few studies have directly assessed the impact of tobacco taxes and prices on the health consequences of tobacco use. Not surprisingly, these studies find that higher tobacco taxes and prices would reduce the incidence of disease and mortality caused by tobacco use. This research, based entirely on U.S. data, is briefly reviewed below.

Moore[240] examined the impact of cigarette taxes on death rates from diseases attributable to tobacco use, using pooled cross-sectional time series data for U.S. states from 1954 to 1988. This study estimated that a 10% increase in cigarette taxes would reduce the number of premature deaths caused by smoking in the United States by 6,000 per year.

Many studies have found that higher cigarette taxes and prices significantly reduce the prevalence of smoking among pregnant women.[241–243] Because of the serious adverse health consequences of smoking during pregnancy, these findings imply that tax- and price-induced reductions in maternal smoking would significantly improve birth outcomes. For example, Evans and Ringel[242] estimated that a US$ 1.10 tax increase would reduce smoking prevalence among pregnant women by 32% and, as a result, would reduce the probability of giving birth to a low birth weight baby by 5%.

To examine the impact of cigarette taxes on exposure to secondhand smoke, Adda and Cornaglia[244] analyzed data from the U.S. National Health and Nutrition Examination Survey (the 1988–1994 and 1999–2006 waves) on cotinine levels in body fluids. These researchers found that higher cigarette taxes are associated with reduced cotinine levels in nonsmokers, especially children, and conclude that excise taxes are an effective way to reduce nonsmokers' SHS exposure. In another study, Markowitz[245] analyzed annual state-level data on the number of sudden infant death syndrome cases from 1973 through 2003. Estimated cigarette price elasticities of deaths from sudden infant death syndrome ranged from –0.69 to –0.76, suggesting that increases in cigarette taxes would have a significantly positive impact on infant health.

Finally, a few studies have found some evidence that higher cigarette taxes have contributed to higher obesity rates in the United States, but this evidence is inconsistent.[246–248]

### Using Price Elasticity Estimates to Project the Future Impact of Tobacco Tax Increases

The price elasticity estimates described in this section have been used to develop projections of the public health and fiscal impacts of tobacco tax increases. For example, in the United States, the American Cancer Society's Cancer Action Network (ACS-CAN)[249] has used estimates of the price elasticities of cigarette demand, adult prevalence, and youth prevalence, along with other information, to project the effect of a US$ 1.00-per-pack increase in each state's cigarette tax on the number of adults who would quit smoking, the number of youth who would not initiate smoking, tax-paid cigarette sales and cigarette excise tax revenues, the health care costs of treating various consequences of smoking, and state Medicaid spending on health care to treat the diseases caused by smoking. This study estimated that a US$ 1.00 increase in the cigarette tax of every U.S. state would induce 1.4 million adults to quit, deter 1.69 million youth from starting to smoke, avert 1.32 million smoking-related deaths, and save more than US$ 645 million in health care costs over 5 years.

Similarly, country-specific and regional or global estimates of various cigarette price elasticities were used to estimate the public health and revenue impact of tax increases in China, India, Mexico, Turkey, and several other countries for a series of reports by the Bloomberg Global Initiative to Reduce Tobacco Use.[250]

These and other projections generally start with the overall price elasticity of cigarette demand, typically obtained from econometric estimates based on tax-paid cigarette sales data, and assume that the tax increase being modeled will be fully passed on to consumers in the price paid for cigarettes. For example, if a state's average cigarette price is US$ 5.00 per pack, the current state tax is US$ 1.00 per pack, and 1 million tax-paid packs of cigarettes are sold in the state (generating US$ 1 million in tax revenues), a simple projection of the sales and revenue impact of a US$ 1.00 tax increase, assuming an overall elasticity of –0.4, would have prices rising by 20% (from US$ 5.00 to US$ 6.00 per pack), sales falling by 8% (to 920,000 packs), and cigarette excise tax revenues rising by 84% (from US$ 1 million to US$ 1.84 million).[249]

Many projections allow for increased tax avoidance and evasion in response to a tax increase and employ a less inelastic estimate of elasticity. For example, the ACS-CAN[249] projection used an elasticity of –1.0 for tax-paid cigarette sales, allowing for considerable tax avoidance and evasion in response to a given state's tax increase. In the example above, this would lead to a 20% reduction in sales and a 60% increase in revenues. It is also important to use both adult and youth prevalence elasticities in projecting the public health impact of a cigarette tax increase because youth and adults are not equally price sensitive.

Similarly, adult and youth prevalence elasticities are used in projecting the public health impact of a cigarette tax increase. Given the available estimates, many of these projections assume that the impact on adult prevalence is half of the overall elasticity and that youth uptake of tobacco use is two to three times as responsive to price. When projecting the impact on youth, these projection models often assume that young people will take up smoking at the same rate as adults or young adults have. Continuing the example above, if the state has one million adults and adult smoking prevalence is 20% (200,000 adult smokers), the US$ 1.00 tax increase will reduce the prevalence of adult smoking by 4%, or induce

8,000 adult smokers to quit smoking. If there are 500,000 young people in the state, and it is assumed that they will take up smoking at the same rate as adults have and youth smoking is twice as sensitive to price, then the US$ 1.00 tax increase maintained over time in real terms will prevent 8,000 young people from taking up smoking.

These simple projection models also may model the impact of a tax increase on deaths caused by smoking. These models make some basic assumptions about the fraction of lifelong smokers who will die prematurely from a disease caused by smoking (a typical assumption is 50%, based on the epidemiological evidence) and the fraction of quitters who, by quitting, will avoid a premature death caused by smoking (often assumed to be around 70%, again based on the epidemiological evidence). In the example above, the reduction in deaths among adult smokers would be 2,800 (4,000 of the quitters would have died from a disease caused by smoking, and 70% of these would have avoided a premature death by quitting), and the reduction in deaths among young people prevented from taking up smoking would be 4,000 (half as many as those who would have otherwise taken up smoking and died prematurely as a result).

A study published in 2016 modeled the global cigarette market, using 2014 data for 181 countries, to quantify the impact of raising the cigarette excise tax in each country by PPP$ 1 per pack (roughly US$ 0.80 per pack).[251] The study found that such a tax increase would increase the amount of cigarette excise revenue generated throughout the world by 47% from PPP$ 402 billion (US$ 328 billion) to PPP$ 593 billion (US$ 470 billion), producing an extra PPP$ 190 billion (US$ 141 billion) in revenue. Using the 2014 data, the prevalence rate of daily adult cigarette smoking worldwide would decrease from 14.1% (740 million smokers) to 12.9% (674 million smokers), for a relative decrease of 9%, or 66 million fewer smokers globally. The expected number of smoking-attributable deaths from among the world's adult population would decrease by 15 million, reflecting a decline of about 6% in smoking-related mortality among this cohort.[251]

While relatively simple, these types of projections have proven to be very helpful in illustrating the public health and revenue benefits of tobacco tax increases. More sophisticated models incorporate more detailed epidemiologic, economic, and other evidence and produce more refined, but similar, projections.

## Summary

Failures in the markets for tobacco products, including consumers' imperfect information about the health harms of tobacco use and the health and financial impacts of tobacco use, provide an economic rationale for governments to reduce tobacco use through economic interventions such as higher taxes on tobacco products and other tobacco control policies. Excise taxes on tobacco products are the most direct policy for influencing cigarette and other tobacco product prices. The total tax burden on tobacco products is defined as the sum of all taxes on the product expressed as a percentage of the retail price, and there is a close correlation between the tax burden on tobacco and the price of tobacco products, particularly in countries with a high tax burden. In general, the total tax burden on cigarettes is highest in HICs.

The retail price of cigarettes is a key determinant of cigarette consumption, and changes in the retail price induce changes in consumption. Tobacco consumption is also sensitive to changes in consumer income—the more affordable a product, the more likely it is to be purchased. As with price, consumers

respond to changes in affordability. The affordability of cigarettes can be measured by either the number of minutes of labor required to purchase a pack of cigarettes or the percentage of per capita gross domestic product required to purchase 100 packs of cigarettes. In general, studies find that although cigarette taxes and prices tend to be highest in HICs and lowest in LMICs, cigarettes tend to be more affordable in HICs than in lower income countries. Since the 1990s, however, cigarettes have become relatively less affordable in HICs and relatively more affordable in LMICs, which has contributed to decreased consumption in HICs but increased consumption in LMICs.

Econometric studies of the impact of tax and price on tobacco use employ two primary measures of tobacco use: (1) macro-level aggregate measures of consumption, such as country-level data on tobacco sales (this literature developed earlier, growing rapidly before the 1990s); and (2) household or individual-level data taken from surveys, such as national surveys of drug use or health risk behavior. Over time, a substantial body of evidence has accumulated that demonstrates that higher taxes and prices lead to reductions in overall tobacco use and in the prevalence and intensity of use, with greater impact on key subpopulations (e.g., young people and people with low incomes). Additionally, studies have assessed the impact of tax and price on specific outcomes, such as prevalence of tobacco use, smoking cessation, initiation of smoking by youth, cross-price elasticity, and health outcomes.

Changes in tobacco consumption induced by changes in the excise tax and retail price are reflected in the price elasticity of demand: the responsiveness of consumption to increased price. Much of the recent evidence indicates that demand for tobacco products in LMICs is at least as responsive to price as demand in HICs, and likely more responsive. In HICs, most estimates of elasticities of demand range from –0.2 to –0.6, clustering around –0.4. In LMICs, elasticity estimates range from –0.2 to –0.8, clustering around –0.5. Thus, in HICs a 10% increase in the price of cigarettes may be expected to decrease tobacco consumption by 4%, while in LMICs a 10% increase in price may be expected to decrease consumption by 5%.

An extensive and increasingly sophisticated body of research clearly demonstrates that higher tobacco product taxes and prices lead to reductions in tobacco use by motivating current users to quit, preventing young people from taking up tobacco use, and reducing the frequency and intensity of consumption among those who continue to use tobacco. In addition, research generally shows that vulnerable populations, most notably young people and lower income populations, are more responsive to tax and price increases than older people and higher income populations. Finally, a small but growing literature demonstrates that the reductions in tobacco use that result from higher taxes and prices reduce the morbidity and mortality caused by tobacco use.

## Research Needs

Much is known about the impact of taxes and prices on tobacco use, particularly in HICs, but further research could be useful. Reliable estimates of overall price elasticities of demand for tobacco products and estimates of the effects of price on prevalence, initiation, and cessation are not available for many LMICs. Relatively little is known about how price elasticity changes over time, at different levels of tax and price, or for larger and smaller price changes. Although cigarettes are the predominant form of tobacco used around the world, other tobacco products (smokeless tobacco, waterpipe tobacco, bidis, and others) are commonly used in some countries. However, few studies have assessed the price elasticity of demand for tobacco products other than cigarettes, and even fewer have estimated cross-price elasticities; where applicable, these studies will be very useful. Although a small but increasing

number of studies have emphasized the importance of affordability of tobacco products, more research is needed to understand how changes in affordability affect tobacco use.

## Conclusions

1. A substantial body of research, which has accumulated over many decades and from many countries, shows that significantly increasing the excise tax and price of tobacco products is the single most consistently effective tool for reducing tobacco use.
2. Significant increases in tobacco taxes and prices reduce tobacco use by leading some current users to quit, preventing potential users from initiating use, and reducing consumption among current users.
3. Tobacco use by young people is generally more responsive to changes in taxes and prices of tobacco products than tobacco use by older people.
4. Demand for tobacco products is at least as responsive and often more responsive to price in low- and middle-income countries as it is in high-income countries.

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## Section 3
## Price Determinants of Demand

# Chapter 5
# Design and Administration of Taxes on Tobacco Products

# Chapter 5
# Design and Administration of Taxes on Tobacco Products

Tobacco taxation has become a critical component of tobacco control policy as well as an effective tool for raising government revenue. This chapter examines the impact of the design and administration of tobacco tax policies on both public health and revenue outcomes. The following topics are considered:

- Tobacco taxation approaches, with examples of the way tobacco excise taxes are implemented around the world
- The effects of types of excise taxes on factors such as pricing, product substitution, product differentiation, and tax avoidance
- The challenges of tobacco tax administration, particularly for low- and middle-income countries with limited resources
- Political considerations in formulating tobacco tax policy.

At present, tobacco taxes and tax policies vary widely across different countries. Further increases in tobacco taxes remain a promising avenue in the global effort to reduce tobacco use.

## Chapter Contents



## Figures and Tables

## Introduction

As described in chapter 4, research has shown that increases in tobacco taxes which result in significant increases in prices are highly effective in reducing tobacco use, particularly by youth and the poor.[1–6] Article 6 of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC) notes that "price and tax measures are an effective and important means of reducing tobacco consumption." Article 6 requires Parties to the treaty to implement "tax policies, and where appropriate, price policies, on tobacco products so as to contribute to the health objectives aimed at reducing tobacco consumption." (See Appendix 5A for recommendations provided in the guidelines for implementation of Article 6.) This chapter examines key issues related to manufactured tobacco product tax policy and administration, including the implications of tax structure for prices and tobacco tax revenue.

Taxing tobacco products is an efficient way to raise government revenues because these products are typically produced by a small number of manufacturers, have few ready substitutes, and are an addictive consumer good with relatively inelastic demand—at least in the short term. Consequently, taxes on tobacco products have the potential to generate considerable revenue, and tobacco products are a common target for tax increases. Taxes and import duties have also been used to protect domestic tobacco growers and manufacturers from foreign competition.

Increasingly, tobacco taxation has become part of a public health agenda to reduce tobacco use; increased prices serve as a particularly effective intervention for youth and other population groups at risk of smoking initiation.[7,8] Tobacco taxation may also serve to fund the societal costs of morbidity and mortality caused by tobacco use.[7,8] WHO notes that "raising the price of tobacco through increased tobacco taxes is the most effective and efficient way to reduce tobacco use, yet it is the least-used MPOWER measure, with only 10% of the world's population living in countries with a sufficiently high tax of more than 75% of the retail price of cigarettes in 2014."[9,p.78] As a result, "cigarettes are still inexpensive in much of the world,"[9,p.80] a missed opportunity to reduce tobacco use and improve public health.

This chapter explores best practices in tax design and administration, and highlights how differences in tax structure and administration affect both public health and revenue objectives. The first section of the chapter provides an overview of global excise and other consumption taxes on tobacco products, specifically on cigarettes, which are examined with an emphasis on identifying and discussing differences in types and levels of taxes. Next is a discussion of the implications of using different types of excise taxes on tobacco products. These implications are important when designing tobacco taxes to achieve tax revenue and public health objectives in different market structures. Third, the chapter considers tobacco tax administration and its relation to tobacco control, including issues such as tax code complexity, institutional capacity, the effect of inflation, and prevention of tax avoidance. Finally, political considerations are examined, such as the impact of tobacco taxation on inflation and consumer price indexes, as well as the earmarking of tobacco tax revenues for specific purposes such as tobacco control programs. Additional information and a more in-depth discussion of these issues can be found in the *WHO Technical Manual on Tobacco Tax Administration*.[6]

## An Overview of Taxes on Tobacco Products

### Tobacco Product Taxes

Taxes on tobacco products can be classified into two general categories: taxes that are applied only to tobacco products (i.e., excise taxes or other similar special consumption taxes), and taxes that affect tobacco products but are levied on other goods and services as well (e.g., import duties, sales taxes, and value-added taxes [VAT]). Because the latter taxes are not specific to tobacco products, they are generally not considered a tobacco control policy tool.

#### *Excise Taxes*

Excise taxes are consumption taxes levied on a narrow range of goods consumed within a country, independent of whether they are produced domestically or imported. They differ from import duties which are only levied on imported products and not on domestically produced goods. Excise taxes are either "specific" or "*ad valorem.*" A specific excise tax is a fixed monetary amount per quantity, volume, or weight of tobacco (or a combination of these). An *ad valorem* excise tax is a percentage of some measure of the value of tobacco products; retail, manufacturer, or wholesale prices are often used as the base value.

Excise taxes differ from general consumption taxes or VATs in terms of their taxable objects. Excise taxes target specific products (e.g. tobacco, alcohol, and gasoline) with the following common characteristics:

1. Because the products are typically produced by a small number of manufacturers, their production, distribution, and sale can be closely supervised by governments.
2. The demand for these products is relatively inelastic, so taxing them can generate considerable revenues, while creating few distortions in the market.[10]
3. These products are often luxury goods or non-necessities.
4. Use of these products often creates negative externalities, or social costs. (An excise tax is sometimes referred to as a Pigovian tax, or a tax intended to reduce these social costs.[11])

Some countries use different names and descriptions for such taxes on tobacco products, even though they may serve the same purposes as excises. These various names and descriptions include: general sales taxes set at a higher rate for cigarettes and other tobacco products, supplementary duties, turnover taxes or special fiscal duties, surtaxes, surcharges, and luxury taxes. A few countries levy additional taxes on tobacco products for which the revenues are earmarked for particular programs (discussed in more detail later).

#### *Value-Added Tax*

A VAT is a widely used consumption tax that is applied as a single rate to a broad range of goods and services. It is a general tax on the consumption of commodities, leaving relative prices unaffected, and thus has great practical appeal for revenue generation with minimal distortionary effects. With value-added taxation, there is no double taxing or incidence of cascading. Final consumers bear the full VAT when they purchase the goods. VAT is charged as a percentage of price, and thus the actual tax burden is discernible at each stage in the production and distribution chain. When managing VAT, tax administration does not need detailed information about goods as long as the total value of sales is

recorded at each stage. VAT is generally not considered a tobacco control policy tool since adjusting the rate of VAT does not change the relative prices of products because the rate increases on all substitutes.

### *Import Duties*

In addition to consumption taxes, countries levy import duties, or taxes on selected imported commodities destined for domestic consumption (i.e., not in transit to another country). In general, import duties are collected from the importer at the point of entry into the country, and the rate is often levied on the cost, insurance, and freight (CIF) value declared by the importer. Since import duties only change the relative prices between imported and domestically produced tobacco products, import duties are rarely seen as a tobacco control policy tool. Increasing import duties will increase the cost of imported products relative to domestic products, thereby encouraging consumption of domestic products versus imported products, but not discouraging consumption in the aggregate. In general, countries with no substantial cigarette production and no cigarette excise taxes in place levy import duties on cigarettes for revenue-generating purposes. Some cigarette-producing countries also levy import duties—at widely varying levels—to protect their domestic industry and generate government revenue.

Although almost all countries have historically levied a tariff on imported tobacco products, the growth of international, regional, and bilateral free trade agreements has limited the ability of importing countries to levy import duties on imports, especially from many neighboring countries (discussed in chapter 13). As the effectiveness of import duties in generating higher revenues has fallen, some countries have introduced excise taxes to replace the lost revenues and maintain higher cigarette prices. Reliance on import duties increases the likelihood of abusive transfer pricing, with import prices set at artificially low levels, resulting in low import duties. Because destination-based taxes (as opposed to origin-based taxes) are widely accepted, countries rarely levy taxes on tobacco products destined for export. However, as explained in chapter 14, a few countries have taxed some tobacco product exports to deter those products' entrance back to the country by illegal routes.

## Excise Taxes on Cigarettes Around the World

Excise taxes are often applied differently to different categories of tobacco products as well as to different brands within product categories. This chapter focuses primarily on cigarette excise tax application and administration because manufactured cigarettes accounted for 92.3% of total global tobacco product sales in 2015.[12] Furthermore, excise taxes, rather than import duties and VAT, have the most significant ability to affect tobacco product prices.

### *Types of Excise Systems*

Data from a sample of 186 countries demonstrate the substantial variation in the use of specific and *ad valorem* excises. As shown in Table 5.1, as of 2014, only 18 of 186 countries do not levy an excise tax on cigarettes. Of the 168 countries that do levy an excise tax on cigarettes, the types, rates, and base of the excise tax vary; 61 countries levy only a specific excise tax, 46 countries levy only an *ad valorem* excise tax, and 61 countries levy a mixed system of both specific and *ad valorem* excise taxes.

**Table 5.1 Types of Excise Taxation on Cigarettes, 2014**

| Type of tax | Number of countries |
|---|---|
| Specific excise only | 61 |
| *Ad valorem* excise only | 46 |
| Mixed system | 61 |
| No excise | 18 |
| Total | 186 |

*Note:* Countries included are those for which data are available.
*Source:* World Health Organization 2015.[9]

Several types of mixed tax systems involve using both *ad valorem* and specific taxes. For example, countries could implement an *ad valorem* system with a specific floor—that is, an *ad valorem* tax is applied unless the value of the tax is less than a specified minimum amount, at which point a specific tax applies instead. Until November 2015, Kenya implemented such a system: An *ad valorem* rate of 35% of retail prices was levied unless the value of the excise was less than 24 KES (Kenyan shillings) per pack of 20 cigarettes; at that point, a specific tax was applied.[13] A minimum specific floor could also apply in a mixed system. Another mixed system involves setting a tax as an *ad valorem* rate, but implementing it as a specific tax. For example, South Africa uses a uniform specific tax, but the rate is adjusted each year, such that the total tax (specific tax plus VAT) is set to 52% of the retail price of the most popular brand.[14]

Countries within similar income groups and regions often have similar excise systems (Table 5.2). Most low-income countries rely on *ad valorem* taxes (19 of 31). In contrast, most high-income countries (HICs) rely on systems that use both specific and *ad valorem* taxes (29 of 55), and most countries that employ mixed systems are members of the European Union (EU). Most countries in the Western Pacific Region rely solely on specific excises (17 of 26), and a large number of countries in the African Region rely only on *ad valorem* taxation (27 of 45). The Eastern Mediterranean Region has the largest number of countries that do not have an excise tax on cigarettes (10 of 20).

The EU has a harmonized tax system which requires member states to employ a mixed tax system. The EU Directive has two main features, a minimum excise tax burden (percentage share of excise tax in price) of 60% of the weighted average price (WAP), and an excise tax floor (minimum value of excise tax) of 90 euros (€) per 1,000 cigarettes. However, countries need not meet the excise tax burden if the value of the excise tax exceeds €115 per 1,000 cigarettes.[15]

The current directive was agreed to in 2010, and EU member states were required to meet their obligations by the beginning of 2014 (2018 for some countries). The current directive replaces a 2006 directive which required an excise tax burden of 57%, an excise tax floor of €64 per 1,000 cigarettes, and an exemption of the excise tax burden if the value of the tax excise exceeded €101 per 1,000 cigarettes. The previous directive also used the Most Popular Price Category (MPPC) rather than the more comprehensive WAP as the base. The revised directive placed greater emphasis on the specific component, requiring that the specific share of the total excise be no less than 7.5% (5.5% previously) or no more than 76.5% (55% previously) of the total tax share.[15]

**Table 5.2 Types of Excise Taxation on Cigarettes, by WHO Region and Country Income Group, 2014**

| | Excise system on cigarettes | | | | |
|---|---|---|---|---|---|
| **WHO Region** | **Only specific** | **Only *ad valorem*** | **Mixed system** | **No excise** | **Total countries** |
| African | 13 | 27 | 4 | 1 | 45 |
| Americas | 15 | 9 | 7 | 2 | 33 |
| Eastern Mediterranean | 3 | 3 | 4 | 10 | 20 |
| European | 11 | 2 | 39 | 0 | 52 |
| South-East Asia | 2 | 2 | 4 | 2 | 10 |
| Western Pacific | 17 | 3 | 3 | 3 | 26 |
| **Global** | **61** | **46** | **61** | **18** | **186** |

| | Excise system on cigarettes | | | | |
|---|---|---|---|---|---|
| **World Bank country income group** | **Only specific** | **Only *ad valorem*** | **Mixed system** | **No excise** | **Total Countries** |
| High-income | 16 | 3 | 29 | 7 | 55 |
| Upper middle-income | 20 | 8 | 18 | 8 | 54 |
| Lower middle-income | 17 | 16 | 12 | 1 | 46 |
| Low-income | 8 | 19 | 2 | 2 | 31 |
| **Global** | **61** | **46** | **61** | **18** | **186** |

*Notes:* Countries included are those for which data are available. WHO = World Health Organization. Country income group classification was based on World Bank Analytical Classifications for 2014.
*Source:* World Health Organization 2015.[9]

These reforms created different binding constraints on countries, as Blecher and colleagues[16] noted. Older EU members, which are mostly high-income countries and have higher cigarettes prices, are bound more by the excise tax burden than the minimum excise. Newer EU member states, which have lower cigarette prices, are bound more by the minimum excise than the excise tax burden. The larger increase in the minimum excise relative to the tax burden, together with the greater reliance on specific taxes, is likely to cause significantly greater excise tax and price increases in newer member states and in member states with lower prices, thus reducing price variation between and within EU countries.

### *Tax Base and Tiers*

The base for excise taxes varies by country. A specific excise tax may be levied based on the number of cigarettes or cigarette packs, or based on the weight of cigarettes. The base value for *ad valorem* taxes also varies across countries, and can be levied on the manufacturer's price (CIF for imported, or ex-factory price for domestically produced), the wholesaler's price/value, or the retail price. More rarely, the base price can be a minimum price set by the government, or a maximum price provided by manufacturers.

Many countries apply a uniform tax rate to all types of cigarettes, while others levy different excises or tiers depending on one or more characteristics of the product or the value of the product. Table 5.3 shows examples of the bases for tiered tax systems in use by various countries as of 2014. Most countries also differentiate the tax rates based on type of tobacco product; higher tax rates are applied more often to cigarettes than to other tobacco products (e.g., smokeless tobacco, roll-your-own tobacco, etc.).

### Table 5.3 Bases for Tiered Tobacco Tax Systems, 2014

| Base of tiers | Country |
|---|---|
| Retail price | Bangladesh, Belarus, Indonesia, Mozambique, Pakistan, Philippines* |
| High, standard, and low-end cigarettes | Burkina Faso |
| Producer price | China |
| Production volume | Indonesia |
| Type of tobacco product | |
| Filter/non-filter | Armenia, Belarus, Georgia, India, Kyrgyzstan, Moldova, Nepal, Papua New Guinea, Tajikistan, Ukraine, Uzbekistan |
| Hand- or machine-made | Indonesia |
| Kretek/white cigarette, cheerot/cigarette, bidi/cigarette | India, Indonesia, Myanmar |
| Tobacco content (dark/blonde or dark/light) | Algeria, Andorra |
| Packaging (soft/hard) | Mozambique, Uganda, Brazil† |
| Cigarette length | India, Nepal, Sri Lanka |
| Trade (domestic/imported) | Uzbekistan |
| Weight (tobacco content in cigarette) | New Zealand |
| Leaf content (domestic/imported) | Fiji, Tanzania |

*Philippines will move to a uniform system in 2017.
†Brazil moved to a uniform system as of January 2015.
*Note:* In 2014, 27 (16%) of 168 countries that levied an excise tax had a tiered system.
Source: Based on data from World Health Organization 2015.[9]

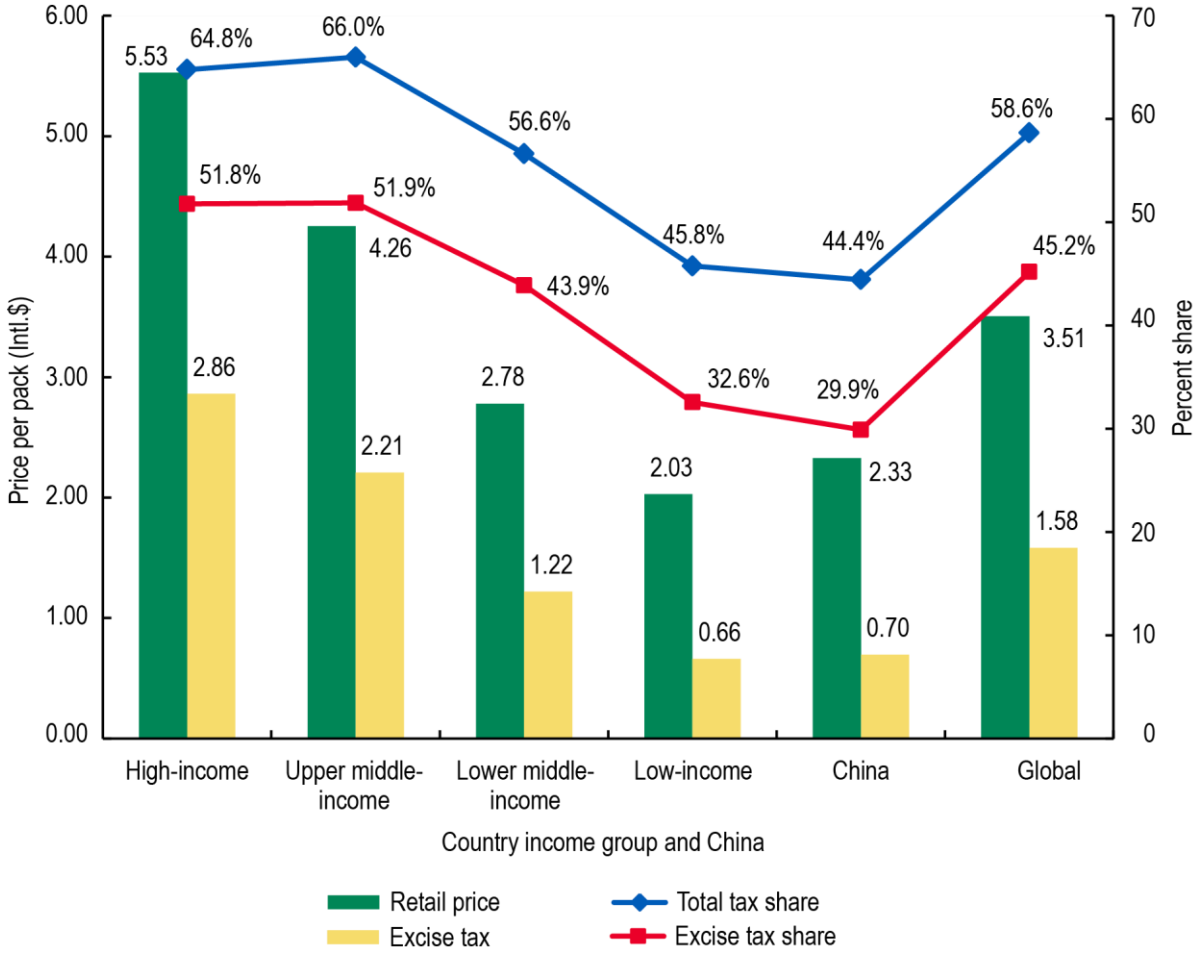
## *Tax Shares in Retail Prices of Cigarettes*

In most countries excise tax is the most significant of all taxes levied on cigarettes. The share of excise and total tax in weighted average prices varies by country income group (Figure 5.1) and WHO Region (Figure 5.2). Total tax includes excise taxes but also includes sales taxes and import duties.

The global average price for a pack of the most popular brand in international dollars purchasing power parity (PPP) was PPP$ 3.51/pack in 2014 (Figure 5.1), where the PPP exchange rate is the number of units of a country's currency required to buy the same amounts of goods in the domestic market as U.S. dollars would buy in the United States. The price is highest in high-income countries (PPP$ 5.53) and decreases as country income decreases. The People's Republic of China is a notable exception, with very low taxes and prices despite its status as an upper middle-income country; for these reasons and because of its share of consumption, China is shown separately in Figure 5.1. At the global level, excise taxes and total taxes account for 45.2% and 58.6% of prices, respectively. High-income and upper

middle-income countries have similar tax shares (64.8% and 66.0%, respectively, for total tax; and 51.8% and 51.9%, respectively, for excise tax). The lowest excise and total tax shares are found in lower middle-income countries (excise: 43.9%, total tax: 56.6%) and low-income countries (excise: 32.6%, total tax: 45.8%).

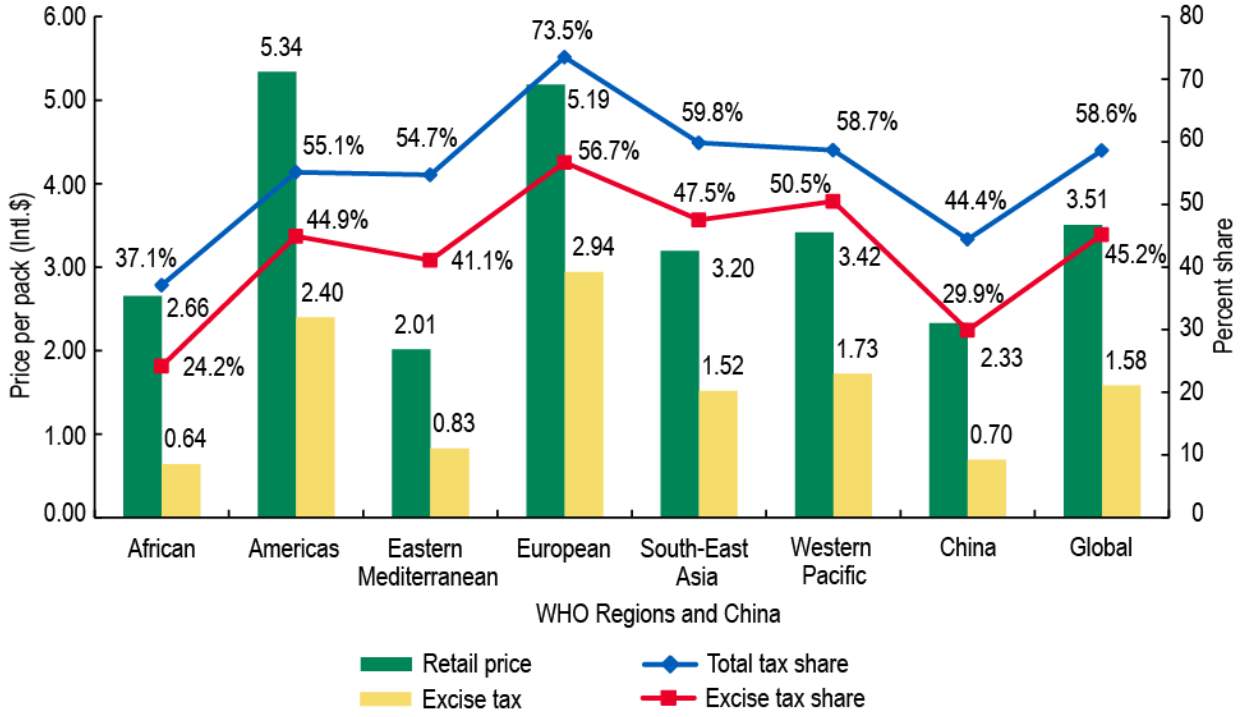
**Figure 5.1 Price per Pack in International Dollar Purchasing Power Parity (PPP) of Most Popular Brand and the Share of Excise and Total Tax in Price, by Country Income Group, 2014**




*Notes:* Averages were weighted by number of current cigarette smokers in each country. Because of its large population, China's estimates were removed from the upper middle-income grouping and displayed separately. Country income group classification was based on World Bank Analytical Classifications for 2014.
*Source:* Based on data from World Health Organization 2015.[9]

As shown in Figure 5.2, prices are highest in the Region of the Americas (PPP$ 5.34) and lowest in the Eastern Mediterranean Region (PPP$ 2.01). The European Region has the highest tax share (73.5%) of all regions. The African Region has the lowest excise (PPP$ 0.64) and the lowest total (37.1%) tax share.

**Figure 5.2 Price per Pack in International Dollar Purchasing Power Parity (PPP) and the Share of Excise and Total Tax in Price, by WHO Region, 2014**




*Notes:* Averages were weighted by number of current cigarette smokers in each country. WHO = World Health Organization.
*Source:* Based on data from World Health Organization 2015.[9]

VATs have been adopted in many countries, and the rates and bases for these taxes vary considerably across countries. For example, in 2014, the VAT as a percentage of retail price ranged between 0.1% and 9.9% (inclusive) in 44 countries, 10.0% and 14.9% (inclusive) in 58 countries, 15.0% and 19.9% (inclusive) in 56 countries, and 20.0% or greater in 11 countries.[9] Some countries either do not impose a VAT or exclude tobacco products from their VATs or sales taxes. In 2014, 17 of 188 countries did not levy any VAT or sales tax on tobacco products.[9] In general, countries levy their VAT on the wholesale price including excise taxes and any import duties (excluding VAT).

### *Taxes on Other Tobacco Products*

In some countries, tobacco products other than cigarettes account for a significant share of total tobacco consumption. These other tobacco products are often taxed at much lower rates than manufactured cigarettes or in some cases are not taxed at all. For example, in India, the lowest tax rate on cigarettes is Indian Rupee (Rs) 669 per 1,000 pieces; in contrast, the excise tax on manufactured bidis is Rs 26 per 1,000 pieces and Rs 14 per 1,000 pieces for hand-rolled bidis.[17] Consequently, a significant increase in taxes on other tobacco products would be needed to narrow the price gap between these products and cigarettes.

Electronic nicotine delivery systems (ENDS) are a very diverse product class without standardized products or contents, which presents challenges to developing ENDS tax policies. Several governments have begun to apply taxes to these products, and others are considering doing so. For example, as of

June 2016, four U.S. states and the District of Columbia levied taxes on ENDS,[18] but few countries levied ENDS taxes (e.g., Togo, the Republic of Korea, and Portugal).[19,20]

### *Considering the Appropriate Type of Excise on Tobacco Products*

Whether to implement specific or *ad valorem* excise taxes is a long-standing question in tobacco tax policy, and the level and structure of excises have different implications for different stakeholders. Given the market structure of the tobacco industry—typically a monopoly or oligopoly for most products in most countries—excise taxes may have differing effects on government revenues, manufacturer profits, consumer prices, product variety, and tax administration.[6,21–29] Specific and *ad valorem* excise taxes increase the level of consumer prices and affect the price gaps between higher and lower priced brands differently. To the extent that the two types of excise taxes affect consumer prices and product differentiation, they may affect consumption and have different implications for public health.

Excise taxes give governments the ability to influence demand by increasing prices as well as by affecting the appeal and variety of available products, while at the same time raising revenue and improving public health. The key challenges for policymakers are to determine which type of excise to levy and what rate to use, and to find the appropriate balance between specific and *ad valorem* taxation so that public health and revenue objectives are achieved. Using the two together in a mixed system reveals the advantages and disadvantages of both, as well as the complexities associated with their administration. The main differences between the types of excises, individually and as a mixed system, are summarized in Table 5.4.

**Table 5.4 Comparison of Uniform Specific and *Ad Valorem* Excise Regimes**

| Factor | Specific excise | *Ad valorem* excise | *Ad valorem* with specific floor | Mixed system | Mixed specific and *ad valorem* excise with a minimum specific tax floor |
|---|---|---|---|---|---|
| Tax base | Unit of the product (e.g., 1,000 cigarettes) | Value of the product (e.g., retail, wholesale, or manufacturer's price) | Calculated on an *ad valorem* basis. If the calculated tax falls below a specified minimum floor, a specific tax rate applies | Unit and value of product | Both unit and value unless the tax falls below a specified minimum, in which case the tax base is only the unit |
| Administrative requirements* | Administration cost is low (only the volume of the products is ascertained) | Requires strong tax administration with technical capacity | Requires strong tax administration with technical capacity | Requires strong tax administration with technical capacity (requires assessing and collecting both *ad valorem* and specific excises) | Requires strong tax administration with technical capacity (requires assessing and collecting both *ad valorem* and specific excises, and monitoring minimum floor compliance) |

## Table 5.4 continued

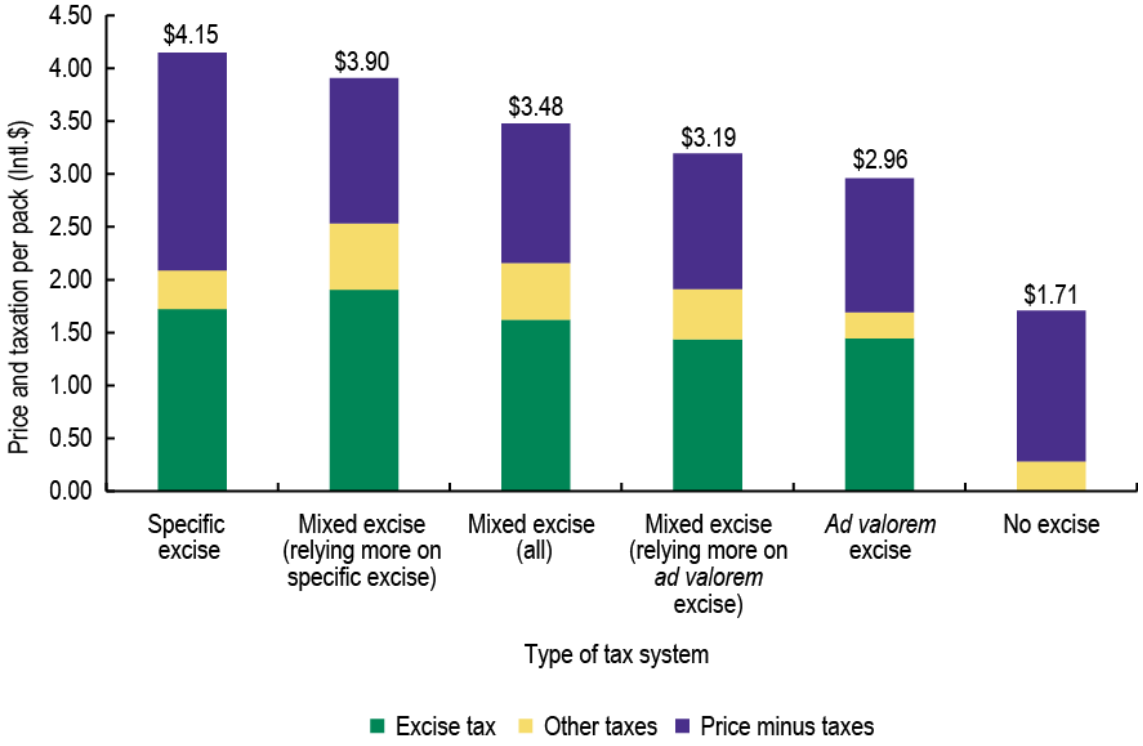
| Factor | Specific excise | *Ad valorem* excise | *Ad valorem* with specific floor | Mixed system | Mixed specific and *ad valorem* excise with a minimum specific tax floor |
|---|---|---|---|---|---|
| Undervaluation | Not applicable | Susceptible to undervaluation (but can be overcome by establishing a minimum retail sale price) | Provides an easy tool to prevent undervaluation of low-priced brands subject to the specific floor | The *ad valorem* part of the excise collection may be susceptible to undervaluation, depending on the choice of tax base | The specific tax floor prevents possible *ad valorem* tax base undervaluation of low-priced brands |
| Impact on product "quality" | Upgrading effect tends to reduce the relative tax on higher priced brands | Multiplier effect provides a disincentive to costly "quality" improvement | No incentive to upgrade to higher priced brands | No incentive to upgrade to higher priced brands | Eliminates incentive to upgrade to higher priced brands, but provides such an incentive for lower priced brands |
| Impact on price | Tends to lead to relatively higher prices, particularly for low-priced cigarettes | Tends to lead to relatively lower prices; price reductions will be "subsidized" if the multiplier effect is strong | Tends to lead to relatively higher prices, particularly for low-priced cigarettes | An increase in the specific tax will increase the *ad valorem* payment as well | An increase in the specific tax will increase the *ad valorem* tax amount as well. Increases in the *ad valorem* and/or specific tax will raise the minimum tax paid, if floor is a percentage of total tax on, e.g., WAP. It will reduce price gaps given impact on "quality." |
| Inflation | The real value of the excise will be eroded unless adjusted for inflation | The real value of the excise will be preserved as prices increase, at least, to the extent that tobacco product prices follow inflation | The real value of the specific floor will be eroded over time unless adjusted for inflation | The real value of the specific excise will be eroded unless adjusted for inflation | The real value of the specific excise tax and floor will be eroded unless adjusted for inflation |
| Health benefits | Discourages consumption of tobacco products irrespective of the price | Encourages more trading down in favor of less expensive cigarettes, reducing health benefit | Specific floor reduces incentives for trading down | May reduce trading down | Reduces trading down |

*The tax should be collected at the point of manufacturing and at the time of importation.
*Note:* "Trading down" = switching from high- to low-priced brands.
*Source:* World Health Organization 2010.[6]

## Excise Taxes and Retail Prices

Specific and *ad valorem* taxes have differential effects on the retail prices of cigarettes. Systems that rely more on specific excises tend to result in higher prices than systems that rely more on *ad valorem* taxes. Furthermore, tax increases result in larger price increases when excise tax systems rely more on specific taxes than *ad valorem* taxes. As shown in Figure 5.3, cigarette excise taxes and prices are higher in countries that apply a specific excise system or a mixed system that relies more heavily on the specific component. Tax and price levels are lower for mixed systems that rely more on *ad valorem* excises, and lower still for those with a purely *ad valorem* system. Where countries apply a mixed tax structure, taxes and prices are higher in countries where specific taxes are a larger proportion of the price than the *ad valorem* proportion; taxes and prices are lower in countries where the *ad valorem* component dominates.

**Figure 5.3 Price per Pack in International Dollar Purchasing Power Parity (PPP) and the Share of Excise and Total Tax in Price, by Tax Structure, 2014**




*Note:* Averages were weighted by number of current cigarette smokers in each country.
*Source:* Based on data from World Health Organization 2015.[9]

Also, under a specific excise system, consumer prices often rise by more than the tax increase, an effect known as tax overshifting. Empirical evidence indicates that the degree of overshifting depends on industry characteristics. Empirical evidence from the United States suggests that increases in specific cigarette taxes are overshifted to retail prices, with differences by brand and purchase type (i.e., carton vs. single pack), although substitution to cheaper brands by some smokers leads to a smaller impact on the average price paid by consumers.[30–33]

Under specific taxation, any increase in the net-of-tax price will go to the manufacturer, distributors, or retailers as revenue and thus would increase the incentives in the supply chain to increase net-of-tax prices, given the price-inelastic demand. This is not the case under *ad valorem* taxation, where part of an increase in price accrues to the government as tax revenue (e.g., as a multiplier effect). For example, when retail prices increase in response to a tax increase of $1, the retail price will increase by $1 under specific taxation if the increase is fully passed on to the consumer. However, with a tax-inclusive *ad valorem* excise of 20%, for example, the price needs to increase by $1.25 (the price will have to increase by 1/(1–0.20) to cover a $1 cost increase). Consequently, the *ad valorem* tax generates a price increase higher than the increased cost, and the government receives a part of the price increase. An *ad valorem* tax subsidizes an industry price reduction, with the retail price falling by more than the reduction in industry price, adversely impacting government tax revenues.

To the extent that such cost increases reflect improvements in the quality of a product, specific taxes create greater incentives for manufacturers to raise quality compared with *ad valorem* taxes. In the case of cigarettes, improvements in quality do not refer to the health impact of the product; rather, they reflect features such as packaging, flavoring, or other product design features which may increase the appeal to consumers.

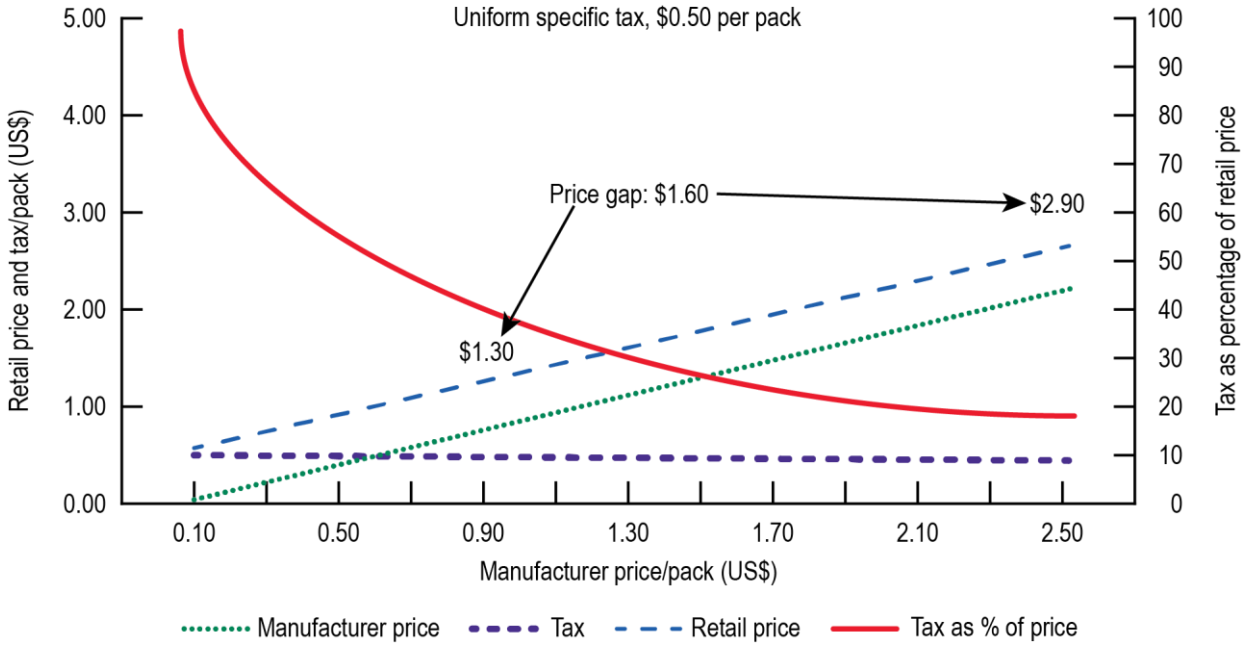
### Excise Taxes and the Price Gap on Cigarettes

Given public health and revenue objectives, price gaps between different tobacco brands and different tobacco products limit the effect of tobacco tax increases on tobacco consumption and government revenues because these differentials create opportunities for consumers to substitute lower priced brands or products in response to tax increases. When facing tax or price increases, some smokers will quit smoking, others will reduce consumption (i.e., smoke fewer cigarettes), and others will trade down—that is, move from a higher priced brand to a lower priced brand. Although price increases that result from increased taxes reduce overall cigarette consumption, the degree to which consumption decreases depends, in part, on whether opportunities to trade down exist.[6]

An increase in a uniform specific tax reduces the ratio of prices of higher priced brands *relative* to lower priced brands (i.e., the tax as a percentage of price is lower for higher priced brands than for lower priced brands). Such a change in relative prices reduces smokers' incentives to substitute downward from higher to lower priced cigarette brands. In contrast, an increase in a uniform *ad valorem* tax (based on the retail price) does not change the relative prices of higher and lower priced brands.

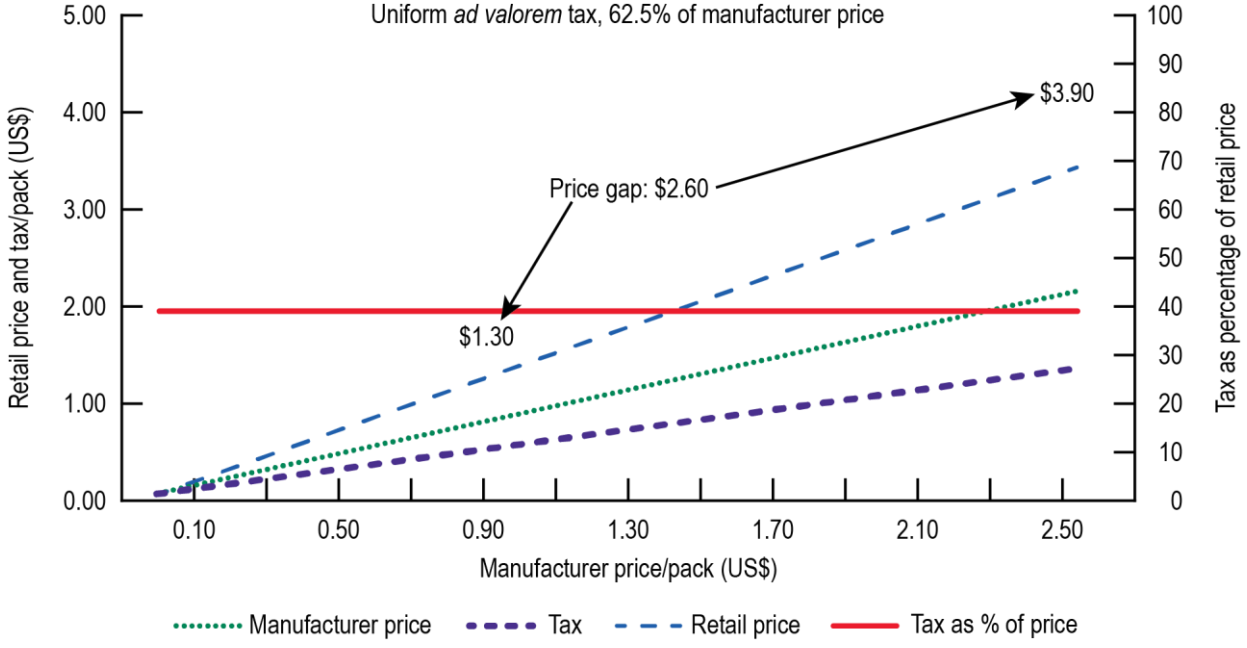
Figure 5.4 shows how levying a uniform specific tax of US$ 0.50 per pack affects low- and high-priced brands (assuming manufacturer prices of US$ 0.80 and US$ 2.40, respectively). Figure 5.5 shows that an *ad valorem* tax that results in the same price for a low-priced brand raises the price of a high-priced brand considerably, creating a larger gap in prices between brands and increasing the incentive for consumers to trade down from high- to low-priced brands in response to a tax increase.

## Figure 5.4 Uniform Specific Tax and Price Gap Between Cigarettes




*Source:* World Health Organization 2010.[6]

## Figure 5.5 Uniform *Ad Valorem* Tax and Price Gap Between Cigarettes



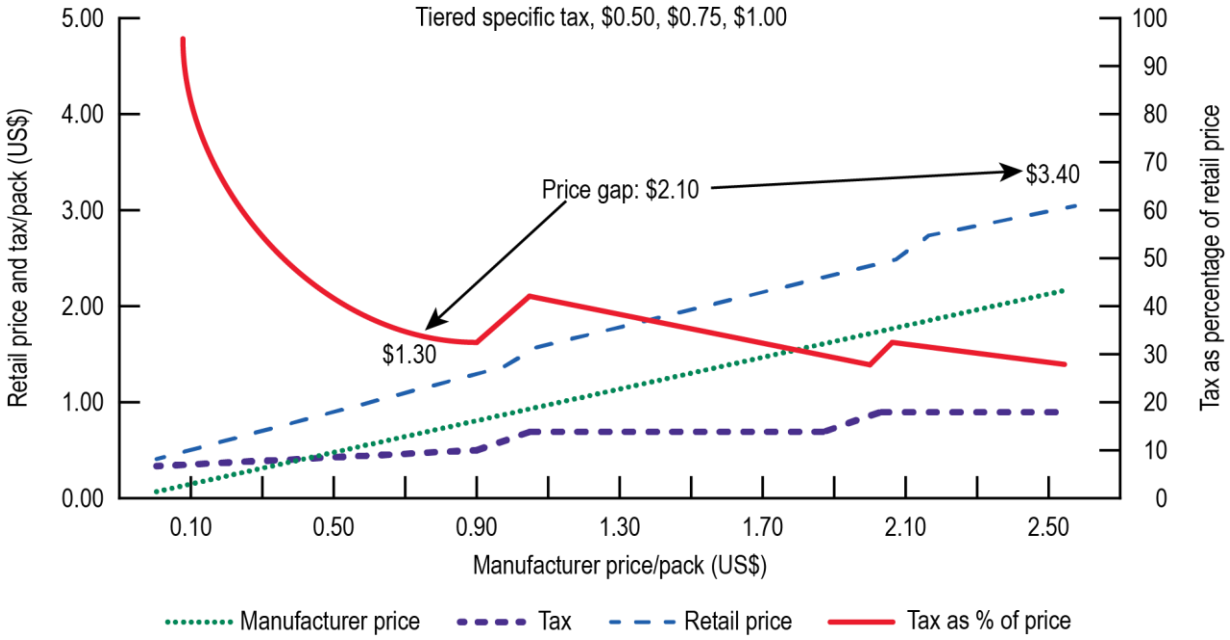

*Source:* World Health Organization 2010.[6]

The previous examples suggest that there would be less trading down (downward substitution) under a specific excise system than under an *ad valorem* excise system. In particular, more price-sensitive consumers, such as youth and the poor, will have less incentive to substitute downward as specific excise taxes increase. Furthermore, increases in specific excise taxes may encourage consumers to substitute higher priced products for lower priced products as the price gap between these narrows; price increases due to higher taxation may increase consumers' marginal willingness to pay for more appealing, higher priced brands. This is positive from a public health perspective because it is important to maintain or increase the cost of cigarettes to consumers. The hypothesis that the market share of low-priced cigarettes falls when specific excises increase, because the gap between high- and low-priced cigarettes is reduced, is supported by empirical evidence. Sobel and Garrett[34] found that increases in specific taxes significantly reduce the market share of generic (low-priced) brands in the United States.

A number of countries, including some large cigarette-producing and -consuming countries, levy different tax rates on different brands and products. Under this tiered system, a lower rate is applied to lower priced cigarette brands and other tobacco products, and a higher rate is applied to higher priced cigarette brands and other tobacco products. (Tiers need not be based on product prices; the same principles apply when tiers are based on product or other characteristics.) Tiered systems can be applied to both specific and *ad valorem* systems.

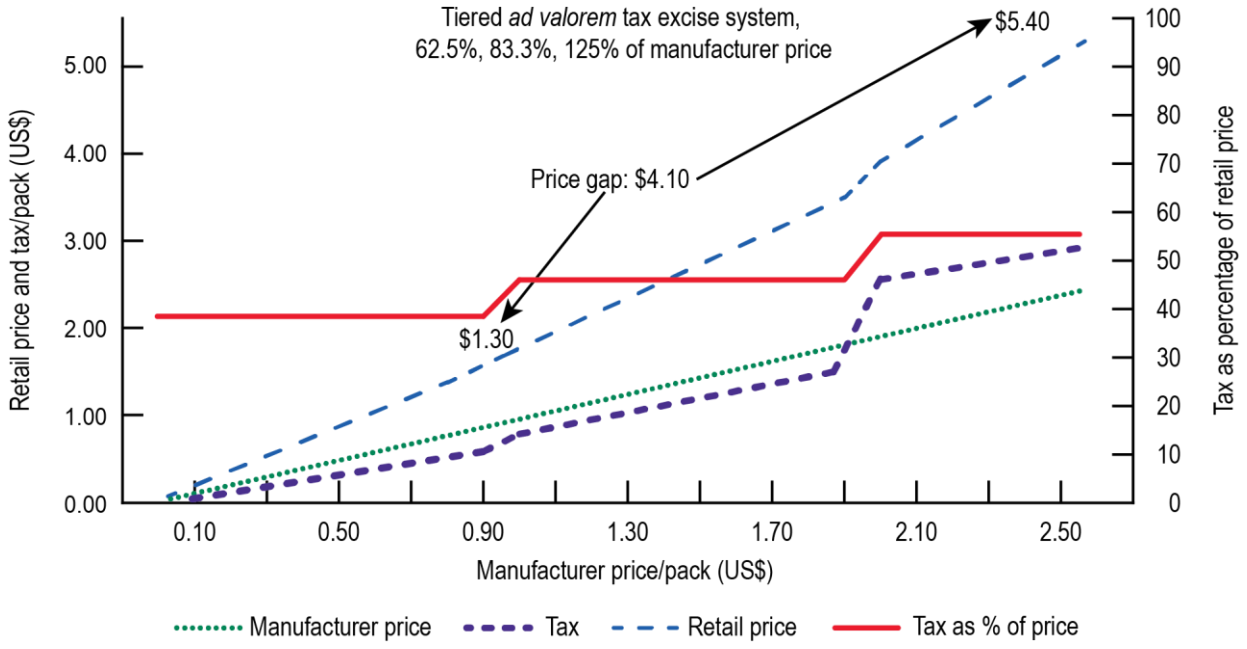
Figure 5.6 illustrates the gap in price between different tobacco products when a tiered specific excise tax is in place. Figure 5.7 depicts the gap in price between different tobacco products when a tiered *ad valorem* excise tax is in place. With both specific and *ad valorem* taxes, as the tax rate increases, so does the retail price of the tobacco products. Following manufacturer price increases there is a large gap between the retail price of expensive and inexpensive tobacco products—that is, the expensive products become more expensive and inexpensive products remain lower priced—but this gap is greater with *ad valorem* taxes than with specific taxes.

**Figure 5.6 Price Gap in a Tiered Specific Excise System**




*Source:* World Health Organization 2010.[6]

**Figure 5.7 Price Gap in a Tiered *Ad Valorem* Excise System**




*Source:* World Health Organization 2010.[6]

A greater reliance on specific excise taxes rather than *ad valorem* taxes will have a greater effect on public health, narrowing the price gap between higher and lower priced brands and thus reducing incentives for consumers to trade down. Furthermore, the greater the number of tiers, under either specific or *ad valorem* systems, the stronger the incentives will be for consumers to trade down.

### Effects of Excise Taxes on Product Differentiation

Specific and *ad valorem* excise taxes have different effects on product differentiation. Product differentiation can be vertical or horizontal. Horizontal differentiation refers to discrimination between products according to characteristics that cannot be objectively ordered; rather, the characteristics are subjective, the result of the consumer's personal preference (e.g., taste). Vertical differentiation occurs when products are ordered from highest to lowest according to their objective quality, so that one product can be said to be objectively better than another. As a general rule, better products have higher prices because of higher production costs and greater expected advantages for consumers. Economists consider higher priced brands better products; as noted previously, in the case of tobacco products, "better" means more appealing to consumers; it does not mean less damaging to health.

Cigarette manufacturers differentiate their products because differentiation provides them with additional market power. Manufacturers' ability to pass taxes on to consumers depends on market power. The structure of the excise tax system, whether it is specific or *ad valorem*, affects the variety, quality, and prices of products available.[22–26,35,36] Similarly, the tax structure affects the number of brands produced. Specific taxation tends to lead to greater product variety by giving the tobacco industry an incentive (the ability to charge a higher price) to invest in different product characteristics.

### Excise Taxes and Tax Revenues

Historically, efficient revenue generation has been the primary aim of all excise taxes, and tobacco is no different. This is the case because most excisable goods are considered luxuries and have relative price-inelastic demand, meaning that higher taxes result in higher revenues and that revenues are predictable and do not vary much over time for a constant tax rate and structure. High taxes on tobacco products ensure high revenues because of the price-inelastic demand and the low share of taxes in retail prices of tobacco products in most countries. In addition to generating revenue, governments may also aim to sustain these revenues over time. In a noncompetitive environment (a market controlled or supplied by a small number of manufacturers), which is the case for tobacco, specific and *ad valorem* taxes of equal amounts have different effects on government revenue both in terms of revenue levels and revenue stability.

A tax system that is independent of the tobacco industry's pricing strategy increases the stability of tax revenue. The *ad valorem* excise tax revenue per pack depends on the industry's pricing strategy, independent of the base. In contrast, specific excise tax revenues per pack are relatively independent of changes in industry price. Thus, a strong case can be made for favoring specific excise taxes to generate a more stable stream of revenue for governments. Even under *ad valorem* systems there are steps that governments can take, without violating competitive market rules, to increase the stability of tax revenues and limit the ability of industry pricing strategies to undermine revenue stability; one such step is to set a minimum base (i.e., ex-factory price or retail price) on which the tax liability is assessed.

To illustrate these effects of increased cigarette taxes, a 2016 study modeled the impact of raising cigarette taxes on government tax revenues and on public health. Using data for 181 countries, Goodchild and colleagues[37] estimated that raising the tax by one international dollar per pack of 20 cigarettes would increase average cigarette prices by 42%, reduce smoking prevalence by 9%, and prevent 15 million smoking-attributable deaths among adults alive in 2014. At the same time, they estimated that tax revenues would increase by 190 billion international dollars, a 47% increase in revenues.[37]

## Tobacco Product Tax Administration

Even well-designed tobacco excise taxes cannot be successful in achieving health and revenue objectives without strong tax administration. It is typically less complex and less costly to administer tobacco taxes and collect tobacco tax revenue than to administer and collect other taxes. This efficiency is partly because excises are often collected from manufacturers and importers and collection requires follow-up with a small number of taxpayers. Nevertheless, as discussed below and in greater detail in the *WHO Technical Manual on Tobacco Tax Administration*,[6] tobacco tax administration involves many challenges.

### Technical Capacity of Tax Administrators

The technical capacity of tobacco tax administration ensures effectiveness and efficiency by achieving a high level of tax compliance at the lowest possible administrative cost per unit of tax revenue raised. An effective administrative agency has the technical capacity to (1) identify and evaluate the effects of both current tax policies and tax policies under consideration, (2) implement as simple a tax system as appropriate given the economic and political spectrum, (3) keep up with any changes in the law and with emerging tax avoidance and evasion practices, and (4) maintain a connection between the rule of law

and tax administration.[6] A tax administration with strong technical capacity is able to design the excise tax system and determine the tax levels to achieve its objectives effectively and efficiently.

### *Identifying and Evaluating Tax Policies*

Effective tax administrators will be aware of and able to analyze current and alternative excise systems with respect to their effect on revenues, production type, product appeal, and prices. They will also be aware of tobacco manufacturers' ability to alter production levels in anticipation of or in response to changes in the tax system. Effective tax administrators will have full information on major tobacco manufacturers in the market—their production capacities, the types and variety of products they produce, quantities of products by price, share of price brands (premium-, high-, and low-priced products) in the market, quantity and value of production for domestic consumption and exports, and retail prices of products. Understanding the many economic factors that affect consumer purchasing behavior, particularly the impact of price and income on demand for tobacco products, is also useful to tax administrators.

### *Industry Pricing Strategies and Production Behavior*

Close monitoring of manufacturers' production and pricing strategies is important to effective tax administration, given that these activities affect government revenue and may influence the effect of tobacco control policies. For example, when cigarette manufacturers expect major new tobacco control interventions, such as the introduction of pictorial health warnings and/or higher taxes, they may overproduce cigarettes before those measures become effective—a practice known as stockpiling or frontloading. In 2012 in the Philippines, the tobacco industry closely followed the development of legislation raising the tax on tobacco products; in anticipation of the new law taking effect, the industry frontloaded a substantial amount of cigarettes to the market.[38] As a consequence of such tactics, governments may receive lower revenues than expected in the short term. Stockpiling in anticipation of a tax increase or policy change can be discouraged by applying new taxes to existing stocks.[38]

### *Reducing the Complexity of the Tax System*

A well-designed excise tax system is simple, transparent, easily defined, and efficient. It minimizes administrative costs and increases the efficiency of the taxing authority. Simplifying the structure of tobacco excise taxes facilitates tax administration, reduces tax avoidance and evasion, enhances revenues, and has a greater effect on tobacco use by reducing incentives to substitute different tobacco products or brands in response to tax increases.

Conversely, complex tax structures are difficult to administer, create opportunities for tax avoidance and evasion and, as a result, are less effective than simpler tax structures in achieving public health and revenue goals. The complex tobacco tax structures in many countries are often the result of political considerations, such as ensuring the availability of inexpensive tobacco products for the poor, protecting domestic manufacturers, maintaining employment in tobacco production, and maintaining revenue from tobacco taxes. Countries with complex tax structures can reduce the variations in taxes over time, with the eventual aim of implementing a single, uniform tax on a given tobacco product and extending the same uniform tax to other tobacco products.

### *Effects of Inflation on Excise Taxes*

Inflation erodes the value of a specific tax, leading to lower inflation-adjusted tax revenues and less potential for reducing tobacco consumption and prevalence. Of several approaches that can be used to deal with this issue, the most straightforward is to incorporate an automatic adjustment for inflation. The main technical issue with this approach is the frequency of adjustment. When the inflation rate is low, annual adjustment is adequate; a high inflation rate requires more frequent adjustment. Authority may be granted to the tax administration to make appropriate periodic changes in the specific tax to maintain or increase its inflation-adjusted value. Examples of countries that index specific taxes to inflation include Costa Rica and Turkey, which index a specific tax to inflation monthly, and Australia, which indexes the tax to nominal wages twice a year (although nominal wages are not a proxy for inflation but are a proxy for affordability, which replaced the consumer price index as the benchmark).[9] When currency volatility is an issue, the excise amount may be expressed in a hard currency, such as the U.S. dollar or the euro. Many low-income countries with weak tax administration prefer *ad valorem* tobacco taxes because these taxes keep up with inflation. However, the same weak tax administration is likely to result because of the challenges of undervaluation which are experienced with *ad valorem* taxes.

## Tax Policy Compliance and Monitoring

Monitoring the tobacco products market increases the strength of tax administration by improving administrators' technical capacity to analyze and evaluate tax policies and enabling them to reduce complexities in the tax system. Monitoring the tobacco products market also enables administrators to limit both tax evasion and tax avoidance, thereby ensuring full tax compliance and the maintenance of expected revenues despite changes in tax systems and rates.

Tax administrators in many countries may implement compliance measures as part of their tax laws, including:

- Requiring registration and licensing for production, distribution, and retail sales
- Monitoring domestic production and trade activities, either by exerting physical control, requiring tax stamps, or requiring monitoring devices on production premises
- Requiring manufacturers and importers to file tax returns and pay the tax liability within a specific period of time after the tobacco products leave the factory or before the products enter the country.

Tax avoidance and evasion cost governments revenue, harm public health, and pose significant challenges for tobacco control. Minimizing tax avoidance/evasion and verifying compliance require enforcement actions by tax administrators, which may include periodically auditing taxpayers' account books, imposing physical control over the production/manufacturing process, requiring tracking and tracing systems for tobacco products, and applying state-of-the-art technology (monitoring scanners) at production facilities. This topic is discussed at greater length in chapter 14.

### *Tax Avoidance*

As discussed in chapter 14, tax avoidance is defined as legal methods of circumventing tobacco taxes. Depending on a country's enforcement mechanisms and penalty procedures, a change in the structure or an increase in the rate of tobacco excises may give manufacturers and consumers an incentive to engage in tax avoidance.

Tax avoidance by consumers involves legal activities such as purchases for personal consumption within a limit determined by law from a lower tax jurisdiction or from duty-free shops.

Tax avoidance by manufacturers also involves legal activities and is more likely to occur under complex tax systems or structures. Depending on the tax base, manufacturers can reduce their tax liability by changing the characteristics of the product, its packaging, the amount produced, the production plan, and/or the price charged, in order to move brands into lower tax tiers (see Table 5.3). Even the most sophisticated tax administrations are likely to encounter tax avoidance. For example, under specific taxation, if the tax is based on the length of the cigarette, the manufacturer can change the length to reduce the effective tax payment. The same can occur when tiers are based on price, type, or size of package. Under *ad valorem* taxation, tobacco manufacturers could sell their products to a related marketing company at an artificially low price to reduce the excise tax liability (referred to as transfer pricing). This is particularly prevalent when cigarettes are imported, because tax administrators have limited ability to audit the declared prices of cost, insurance, and freight.

In some low- and middle-income countries where multi-tiered tax systems are in place, industry responses have varied. Indonesia, for example, has an extremely complex tobacco tax system, with tax rates varying by type of product, mode of production, and scale of production. Because the tax rate favored small-scale production, tobacco companies reduced their tax burden by dividing production among a large number of small-scale manufacturers. In response, Indonesia changed its law so that subsidiaries of large companies are no longer allowed to file their taxes independently from the parent company.[38]

In general, systems that tax tobacco products differently as a function of vertical or horizontal differentiation provide opportunities for tax avoidance. Closing loopholes in the tax law can help reduce or eliminate tax avoidance, achieve higher revenues, and produce a greater health benefit. However, as governments amend legislation to close loopholes, manufacturers look for new loopholes in the amended rules. Loopholes are likely to be more plentiful when the tax structure is overly complex, as is the case in many low- and middle-income countries.

## Political Considerations

The decision to increase tobacco taxes requires considering the impact of higher taxes on various factors, such as tax avoidance/evasion, employment, inflation, and the affordability of tobacco products, especially for low-income smokers. The effects of excise taxes on inflation as well as the earmarking of tobacco tax revenues for tobacco control, health promotion, or other activities are discussed below. The effects of tobacco taxes on affordability are discussed in chapter 4; on tax avoidance/evasion, in chapter 14; on employment, in chapter 15; and on the poor, in chapter 16.

### *Effect of Excise Taxes on Inflation*

Governments may be concerned about the possible effect of higher taxes on the inflation rate. The extent to which tobacco product tax increases lead to increases in inflation depends on several factors, most notably the share of these taxes in prices and the weight tobacco prices are given in computing a consumer price index. An increase in tobacco taxes will contribute more to inflation when taxes account for a greater proportion of the tobacco product price. Similarly, as tobacco products are given more weight in computing a price index, a tax increase will have a greater inflationary effect. For most countries, the inflationary effect of tobacco product tax increases will be relatively small.

Table 5.5 shows inflationary impacts of different combinations of tax levels as a percentage of price and tobacco weights in the price index.

### Table 5.5 Inflationary Impact of Tobacco Tax Increases

| Tax as a share of price | | | Tobacco weight in price index | | | Inflationary impact | | |
|---|---|---|---|---|---|---|---|---|
| Low (<40%) | Medium (40–70%) | High (>70%) | Low (<2%) | Medium (2–4%) | High (4–8%) | Low (<1.0%) | Medium (1–2.5%) | High (>2.5%) |
| X | | | X | | | X | | |
| | X | | X | | | X | | |
| | | X | X | | | X | | |
| X | | | | X | | X | | |
| | X | | | X | | | X | |
| | | X | | X | | | X | |
| X | | | | | X | | X | |
| | X | | | | X | | X | |
| | | X | | | X | | | X |

*Note:* Midpoints of ranges for tax and tobacco weight are used for computing inflationary effect.
*Source:* World Health Organization 2010.[6]

The consumer price index is an important economic indicator for most countries and is often a key determinant of monetary policy. In many countries, changes in wages, social security benefits, and other payments are tied to inflation, as measured by a price index. Price indexes provide more accurate comparisons of changes in expenditures, incomes, and prices for specific goods over time; they also allow comparisons across countries.

Because of the many uses of consumer price indexes and the potential inflationary effect of tobacco tax increases, some governments exclude tobacco products (and sometimes other goods) from the consumer price indexes for some uses. For example, since 1992, France has excluded tobacco products from its price index used for adjusting minimum wages.[39] Similarly, Luxembourg (since 1991) and Belgium (since 1994) have excluded tobacco products and alcohol from their consumer price indexes. In 2010, New Zealand removed tobacco product prices from its indexing formula for social assistance payments.[39]

### *Earmarking*

Earmarking refers to the dedication of revenue from a specific tax source to a particular expenditure. Earmarks can be classified according to (1) the nature of the link between the tax and the expenditure it finances, and (2) the type of expenditure that benefits from the revenue. The link can be *strong*/*tight*, meaning that all or most of the tax revenue goes toward financing a particular expenditure and that this expenditure does not benefit significantly from other sources (e.g., a general fund); or *weak*/*loose*, meaning that only a portion of the tax revenue goes toward financing a particular expenditure, and/or the expenditure benefits significantly from other financing sources. The type of expenditure that benefits

from earmarking can be *specific/narrow* (e.g., a tobacco control program) or *broad/wide* (e.g., social security or education programs).

One key argument of modern public finance theory advises that government tax and spending policies should be undertaken independently of one another. Proponents of this theory believe that earmarking introduces various rigidities in the budgetary process that can limit the optimal allocation of resources and cause social harms. Indeed, governments rely mainly on general funds for financing public goods and services. Earmarking is used in many instances at the central and subcentral levels of government, but almost always with financing from the general funds. Common examples of earmarking include road building and maintenance (financed by taxes on fuel products), social security (financed by payroll taxes), primary education (financed by local property taxes), and health promotion and health-related activities (financed by tobacco taxes).

Earmarking in modern public finance finds its strongest support in the principle of benefit taxation and user fees, which states that public goods and services should be priced at their marginal cost and should be provided to those individuals who pay for them. In other words, there should be a *tight* link between the tax (user fee) and the service provided. Without this link, earmarking in the presence of general fund financing is likely to be motivated by narrowly defined interests and could impair the welfare of society. Bird[40] and Wilkinson[41] argued that if taxpayers vote on a series of public goods and services, each financed by a corresponding tax, the outcome of their choice is likely to reflect their preferences better than voting on a package of expenditures financed from a general fund.

A number of arguments have been put forward to explain why certain types of earmarking may be desirable or justified. For example, Buchanan[42] justified the desirability of earmarking by assuming that the decision-maker in the tax-spending process is the median taxpayer and not a benevolent government. A study by Pirttilä[43] described the earmarking of tax revenue from a corrective environmental tax to compensate those most negatively affected by the tax, arguing that the earmarking was desirable because it could alleviate compensation problems and facilitate more efficient environmental policy. Marsiliani and Renstrom[44] argued that in the presence of time inconsistency, earmarking can act as a commitment mechanism; that is, future politicians can be prevented from either eliminating or reducing the tax. Similarly, according to Brett and Keen,[45] earmarking can be seen as a means by which a weak incumbent politician can lock in the use of revenues from certain Pigovian taxes and thus prevent any future change. Dhillon and Perroni[46] saw earmarking as a means to improve the monitoring of government spending by private individuals.

For the benefit principle to apply, taxes would be paid by those who benefit from tobacco-related health services—a condition that is impossible to satisfy completely both because not all tobacco users suffer from diseases caused by tobacco, and because tobacco tax revenue may not be enough to finance spending needs. As of 2014, 30 countries reported earmarking tobacco taxes or tobacco tax revenues for a specific health purpose.[9] Relatively few countries earmark tobacco tax revenues for tobacco control efforts; those that do tend to allocate only a small percentage to these efforts.[47]

In 1987, the State of Victoria, Australia, passed the Victorian Tobacco Act, which established the Victorian Health Promotion Foundation (VicHealth), funded by tobacco taxes. This foundation, the world's first health promotion entity to be funded by a tax on tobacco products, focuses on diverse health promotion activities, including reducing tobacco use, and has served as a model for many other countries.[48] In 2001, Thailand established the Thai Health Promotion Foundation (ThaiHealth), using a

2% surcharge levied on the tobacco and alcohol excise taxes. In 2008, approximately 23% of the tobacco revenue for ThaiHealth was allocated to tobacco control programs, including tobacco control campaigns, smoke-free projects, and other tobacco control projects and research.[49]

In the United States, the state of California offers the longest-running and most successful example of earmarking of tobacco taxes. Proposition 99 (approved in 1988) increased the state's cigarette tax by 25 cents, and dedicated 20% of the new tobacco tax revenues to comprehensive tobacco control programming and an additional 5% to tobacco-related research.[50] Over time, the California Tobacco Control Program has substantially reduced smoking prevalence, cigarette consumption per smoker, and per capita health care expenditures.[51] As of 2014, all U.S. states and the District of Columbia have tobacco control programs funded by various revenue streams, including tobacco excise taxes, tobacco industry settlement payments, state and federal revenue, and nonprofit organizations.[52] States that have made larger investments in comprehensive tobacco control programs have been more successful at reducing adult and youth smoking prevalence and overall cigarette consumption than other states.[53–55]

## Summary

Tobacco products, particularly cigarettes, are subject to a number of taxes, including excise taxes, value-added taxes (VAT) or sales taxes, and import duties, with excise taxes accounting for the largest share of retail prices in most countries. Since excise taxes increase the prices of tobacco products relative to other goods and services, they are considered an important tobacco control tool. A majority of countries tax cigarettes, but the structure of excise taxes varies greatly across countries.

Higher taxes on tobacco products increase tax revenues and improve public health, but they are an underused intervention. Governments can promote public health and collect higher revenues in an efficient and effective way by selecting and imposing the appropriate types and rates of tobacco excise taxes. Compared to *ad valorem* taxation, specific taxation better achieves public health objectives because it increases retail prices and narrows price gaps, thus reducing consumers' incentives to change from higher priced to lower priced brands or to other (non-cigarette) tobacco products.

Tobacco products are often subject to differential tax treatment. Typically, higher taxes are levied on cigarettes and lower taxes are levied on other tobacco products. Increasing excise taxes on cigarettes but not on other tobacco products (or increasing excises on other tobacco products at a lower rate) will result in lower prices for those tobacco products relative to the price for cigarettes. Consequently, the overall reduction in tobacco use will be smaller than if taxes on cigarettes and other tobacco products are increased by comparable amounts. To reduce the already existing price gap, lessen the likelihood that consumers will switch to less expensive tobacco products, and maximize the public health impact, tax increases may need to be greater for other tobacco products than for cigarettes.

The various types of excise taxes each have their relative advantages and disadvantages. Although specific excise taxation improves public health and tax administration more than *ad valorem* excises, which type of tax should be relied on is less clear when revenue is the primary objective. Specific excises are better for predicting both the level and stability of revenues, especially when adjusted regularly to keep pace with inflation. Governments may prefer one type of tax over the other, or prefer a combination of both, depending on tobacco industry characteristics and political considerations.

A well-designed tax system is one that is simple and easy to administer in order to minimize tax avoidance and evasion, generate expected revenues, and result in tax increases being passed on to consumers as price increases. Simplicity in tax systems improves transparency and limits opportunities for tax avoidance and tax evasion. However, being well-designed is not enough to ensure that a tax system will have a positive impact on public health and revenues. To ensure high compliance levels, strong tax administration is needed to implement and administer tax policies efficiently. Compliance can be strengthened by adopting state-of-the-art monitoring and tracking and tracing systems combined with strong enforcement.

## Research Needs

Much is known about the advantages and disadvantages of specific and *ad valorem* taxes with respect to their impact on consumption, prices, and government revenues. However, additional research on how the tobacco industry's pricing strategies are influenced by tax structure, tax increases, and market structure would be informative. Guidance for tax authorities on best practices in tax administration would also benefit from further research. As more new products, such as electronic nicotine delivery systems (ENDS), emerge, research will be needed to inform the optimal strategies for taxing these products.

## Conclusions

1. Governments have a variety of reasons for taxing tobacco products, including generating revenue and improving public health by reducing tobacco use. Although price and tax measures are among the core demand reduction measures of the WHO FCTC, they are among the least implemented.
2. Almost all governments tax tobacco products, applying a variety of different taxes and using different tax structures. The different taxes and tax structures vary in their impact on public health. Relying on import duties to generate revenue is not an effective tax policy and does not substantially affect public health. More reliance on high, uniform, and specific excise taxes on tobacco products will have the greatest public health impact.
3. Because of the low share of tax in the retail prices of cigarettes and the relative inelasticity of demand for tobacco products, increases in tobacco taxes will ensure higher revenues.
4. A number of countries dedicate part of their tobacco tax revenues for health promotion and/or tobacco control. Dedicating part of tobacco tax revenues for comprehensive tobacco control or health promotion programs (i.e., earmarking) increases the public health impact of higher tobacco taxes.
5. An effective tax system is one that is well-designed and -administered. A well-designed system sets appropriate tax rates to achieve public health and revenue objectives; a well-administered system ensures high tax compliance and minimizes tax avoidance and evasion.

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## Appendix 5A. Recommendations From Guidelines for the Implementation of Article 6 of the WHO FCTC

| Category | Section | Recommendation |
|---|---|---|
| Relationship between tobacco taxes, price, and public health | Taxation and affordability (income elasticity) | When establishing or increasing their national levels of taxation, Parties should take into account—among other things—both price elasticity and income elasticity of demand, as well as inflation and changes in household income, to make tobacco products less affordable over time in order to reduce consumption and prevalence. Therefore, Parties should consider having regular adjustment processes or procedures for periodic revaluation of tobacco tax levels. |
| Tobacco taxation systems | Other taxes on tobacco products | Parties should implement the simplest and most efficient system that meets their public health and fiscal needs, taking into account their national circumstances. Parties should consider implementing specific or mixed excise systems with a minimum specific tax floor, as these systems have considerable advantages over purely *ad valorem* systems. |
| | Level of tax rates to apply | Parties should establish coherent long-term policies on their tobacco taxation structure and monitor on a regular basis, including targets for their tax rates, in order to achieve their public health and fiscal objectives within a certain period of time.<br>Tax rates should be monitored, increased, or adjusted on a regular basis, potentially annually, taking into account inflation and income growth developments in order to reduce consumption of tobacco products. |
| | Comprehensiveness/similar tax burden for different tobacco products | All tobacco products should be taxed in a comparable way as appropriate, in particular where the risk of substitution exists.<br>Parties should ensure that tax systems are designed in a way that minimizes the incentive for users to shift to cheaper products in the same product category or to cheaper tobacco product categories as a response to tax or retail price increases or other related market effects.<br>In particular, the tax burden on all tobacco products should be regularly reviewed and, if necessary, increased and, where appropriate, be similar. |

## Appendix 5A continued

| Category | Section | Recommendation |
|---|---|---|
| Tax administration | Authorization/licensing | Parties should ensure that transparent license or equivalent approval or control systems are in place. |
| | Warehouse system/movement of excisable goods and tax payments | Parties are urged to adopt and implement measures and systems of storage and production warehouses to facilitate excise controls on tobacco products.<br>In order to reduce the complexity of tax collection systems, excise taxes should be imposed at the point of manufacture, importation, or release for consumption from the storage or production warehouses.<br>Tax payments should be required by law to be remitted at fixed intervals or on a fixed date each month and should ideally include reporting of production and/or sales volumes, and price by brands, taxes due and paid; payments may include volumes of raw material inputs.<br>Tax authorities should also allow for the public disclosure of the information contained within the reports, through the available media, including those online, taking into account confidentiality rules in accordance with national law. |
| | Anti-forestalling measures | In anticipation of tax increases Parties should consider imposing effective anti-forestalling measures. |
| | Fiscal markings | Where appropriate, Parties should consider requiring the application of fiscal markings to increase compliance with tax laws. |
| | Enforcement | Parties should clearly designate and grant appropriate powers to tax enforcement authorities.<br>Parties should also provide for information sharing among enforcement agencies in accordance with national law.<br>In order to deter non-compliance with tax laws, Parties should provide for an appropriate range of penalties. |
| Use of revenues – financing of tobacco control | | Parties could consider, while bearing in mind Article 26.2 of the WHO FCTC, and in accordance with national law, dedicating revenue to tobacco control programs, such as those covering awareness raising, health promotion and disease prevention, cessation services, economically viable alternative activities, and financing of appropriate structures for tobacco control. |
| Tax-free/duty-free sales | | Parties should consider prohibiting or restricting the sale to and/or importation by international travelers, of tax-free or duty-free tobacco products. |

*Note:* WHO FCTC = World Health Organization Framework Convention on Tobacco Control.
*Source:* World Health Organization (no date).[56]

## Section 4
## Non-Price Determinants of Demand

# Chapter 6
# The Impact of Smoke-Free Policies

# Chapter 6
# The Impact of Smoke-Free Policies

Secondhand smoke (SHS) exposure causes numerous serious adverse health effects in adults and children. Movement toward comprehensive smoke-free policies—those that, by law, completely prohibit smoking in all indoor workplaces, indoor public places, and forms of transportation—has intensified on an international scale in response to growing awareness of the negative economic and health consequences of SHS exposure. This chapter examines:

- The economic rationale for comprehensive smoke-free policies
- The effect of comprehensive smoke-free policies on SHS exposure, demand for tobacco, and health outcomes
- The economic implications of comprehensive smoke-free policies for various stakeholders
- The cost-effectiveness of comprehensive smoke-free policies
- The implications of the current literature for low- and middle-income countries.

The evidence clearly demonstrates that comprehensive smoke-free policies reduce exposure to SHS, have high public support and compliance levels, and do not have negative economic effects on businesses. These policies also generate reductions in smoking, improve health outcomes, increase productivity, and reduce health care costs. The tobacco industry has long recognized the potential for comprehensive smoke-free policies to reduce tobacco use and has sought to weaken or delay implementation of these policies around the world. Today, however, comprehensive smoke-free policies are increasingly the norm.

## Chapter Contents



## Figures

## Introduction

Secondhand smoke (SHS), sometimes referred to as environmental tobacco smoke, other people's tobacco smoke, or tobacco smoke pollution, is the smoke emitted from the burning end of a cigarette or from other tobacco products in combination with the smoke exhaled by the smoker. Exposure to SHS is also sometimes referred to as passive or involuntary smoking. As described in chapter 2, scientific evidence has unequivocally demonstrated that exposure to SHS causes disease and premature death.[1,2] There is no safe level of exposure to SHS, and even brief periods of exposure to low levels of SHS are harmful.[1,3] Chapter 2 presents data on SHS exposure across World Health Organization (WHO) Regions and by country income groups; these data show that, overall, much of the world's population is exposed to SHS, with a disproportionate burden of exposure occurring among women and children, particularly those living in low- and middle-income countries (LMICs).

People can be exposed to SHS in homes, vehicles, workplaces, and other public places, such as bars, restaurants, and recreational settings, even hours and days after smoking has stopped in these environments. To protect individuals from SHS, the source of tobacco smoke must be permanently removed from at least all indoor workplaces, indoor public places, and public transportation. The term *smoke-free policy* has been used to refer to measures of varying scope and strength, and has sometimes included policies that do not adequately protect the public from SHS exposure. This monograph uses the term *smoke-free policy* to refer only to comprehensive smoke-free policies, defined as measures that prohibit smoking by law in all indoor workplaces, indoor public places, and public transportation, with no exceptions, including bars and restaurants, to establish 100% smoke-free environments.[4] Comprehensive smoke-free measures are the only effective means of fully protecting the public from the risks associated with SHS exposure.[3,5] Partial measures that restrict rather than eliminate smoking indoors (e.g., designated smoking sections, separate ventilation) may reduce SHS exposure but do not offer adequate protection from the harmful effects of SHS.[5] As the U.S. Surgeon General has concluded, "separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposure of nonsmokers to second-hand smoke."[3,p.11]

The tobacco industry has long been the major opponent of smoke-free policies because of the broad-based threat these policies pose to cigarette sales and the social acceptability of smoking. Numerous studies have described industry efforts around the world to undermine and discredit the science linking SHS to disease.[6–10] In the final opinion in *United States of America v. Philip Morris USA, Inc.*, U.S. District Judge Gladys Kessler found that the companies "crafted and implemented a broad strategy to undermine and distort the evidence indicting passive smoke as a health hazard. [Their] initiatives and public statements with respect to passive smoking attempted to deceive the public, distort the scientific record, avoid adverse findings by government agencies, and forestall indoor air restrictions."[11,p.693] Hyland and colleagues[4] summarize the many strategies the tobacco industry uses to weaken or delay smoke-free policy implementation, including promoting false claims of an "economic downturn" following implementation of these policies. These authors conclude that "the fact that <11% of the world population is protected by comprehensive, national smoke-free laws is in great part due to the tobacco industry's interference with evidence-based policymaking."[4,p.156]

## Economic Rationale for Comprehensive Smoke-Free Policies

Key information failures and inefficiencies in the tobacco market provide an economic rationale for governments to intervene to reduce the harms caused by SHS exposure. SHS exposure imposes substantial external costs on individuals, governments, and societies. These negative externalities

include the direct physical costs imposed by smokers on nonsmokers, as well as financial costs related to health care expenditures, premature loss of life, reduced productivity, residential and commercial property damage, higher insurance costs, and tobacco-related cleaning and maintenance. In addition, consumers' imperfect knowledge about the health consequences of SHS exposure may prevent them from making fully informed decisions about the risks that smoking imposes on nonsmokers. Potential government responses to these market failures include implementation of comprehensive smoke-free policies and public education campaigns on the serious adverse health effects of SHS exposure. To the extent that comprehensive smoke-free policies lead to a reduction in morbidity and mortality caused by smoking and SHS exposure, these policies have the potential to generate health care cost savings.

### Economic Costs Attributable to Secondhand Smoke Exposure

A number of studies have attempted to quantify the economic costs attributable to SHS exposure. Max and colleagues[12] estimated the number of deaths attributed to SHS exposure, years of potential life lost (YPLL), and productivity losses attributable to SHS exposure among U.S. racial/ethnic groups. They concluded that in 2006, SHS-attributable deaths resulted in approximately 600,000 YPLL and 6.6 billion U.S. dollars (US$) in productivity losses, with communities of color experiencing the greatest losses. Behan and colleagues[13] estimated the total economic cost of SHS exposure in the United States by combining exposure data, data on mortality and morbidity, and medical and indirect cost data. These authors concluded that total annual costs for SHS exposure (excluding economic losses related to pregnancy and the newborn) exceeded US$ 10 billion each year.

Using locally derived data, McGhee and colleagues[14] estimated that in 1998, 1,324 deaths in People's Republic of China, Hong Kong Special Administrative Region (SAR) were attributable to SHS, resulting in direct medical costs, long-term care, and productivity loss of US$ 156 million. Cai and colleagues[15] examined the economic burden of chronic disease attributable to both smoking and exposure to SHS in four rural areas of Yunnan Province, China. In this study population, the authors estimated that the overall cost attributable to SHS exposure was US$ 79.35 million (5.94% of local health care costs), with the burden of SHS-attributable disease falling disproportionately on women. Similarly, a study that calculated individual-level excess medical expenditures for nonsmoking Japanese women found that those ages 70–79 years who were highly exposed to SHS at home (3 to 4 days per week or more) had significantly higher total medical expenditures compared with those living in smoke-free households.[16] In a study of the costs attributable to substance use and misuse in Canada in 2002, Rehm and colleagues[17] estimated the cost of tobacco use, including SHS exposure, to be 541 Canadian dollars (CA$) per capita, for a total of approximately CA$ 17 billion. The YPLL attributable to SHS exposure represented about 2.2% of the total YPLL attributable to smoking, for a total cost of about CA$ 371 million.

Many studies have focused on the costs of infants' and children's exposure to SHS in particular. For example, Hill and Liang[18] used linked data from two nationally representative U.S. surveys (conducted in 1999 and 2001) to quantify the impact of SHS on children's health and health care. The authors found that, overall, indoor smoking is associated with US$ 117 in additional health care expenditures for respiratory conditions for each exposed child from birth to age 4 years. Leung and colleagues[19] examined the population impact and economic costs associated with SHS exposure in infants of nonsmoking mothers. Using the 1997 birth cohort for China, Hong Kong SAR, they estimated that 9% of the total direct medical expenses in the first year of life were attributable to exposure to SHS. Miller and colleagues[20] investigated the cost of services to remediate children's developmental delays that were

attributed to maternal SHS exposure in New York City. The authors estimated that the annual cost of these remedial services due to SHS exposure is more than US$ 50 million per year for New York City Medicaid births, and US$ 99 million per year for all New York City births. Florence and colleagues[21] used the U.S. National Health Interview Survey and the U.S. Medical Expenditure Survey to test for a relationship between children's SHS exposure and annual health care expense. The authors did not observe a statistically significant effect but suggest that their findings may in part reflect caregiver characteristics, especially adult smokers' decreased use of health services.

The Royal College of Physicians[22] looked at SHS-related health care costs for children up to age 16 in the United Kingdom of Great Britain and Northern Ireland, estimating that the total annual cost of primary care visits for diseases in children caused by SHS exposure in the home was 9.1 million British pounds (£). This report also estimated that the cost of hospital admissions attributable to SHS exposure among children from birth to age 14 was £12.1 million annually. Frijters and colleagues[23] calculated the income equivalence of SHS exposure costs for child health using a large nationally representative sample of children in England. They concluded that, for a child exposed to a high number of SHS risk factors, the income equivalence of such exposure is approximately £16,000 per year. In another study, Batscheider and colleagues[24] examined data from two birth cohorts of German children and found that children living in homes where smoking was reported showed significantly higher medical costs (144 euros [€] for those exposed indoors; €87 for those exposed on patios/balconies) than children not exposed to SHS.

Some studies have estimated the health care costs of exposure to SHS as well as the health benefits associated with the introduction of smoke-free policies. For example, Hauri and colleagues[25] estimated the direct health care costs of exposure to SHS in public places and the indirect health benefits from reduced tobacco consumption in Switzerland. These authors included all health outcomes with sufficient or suggestive causal links to exposure to SHS according to the 2006 U.S. Surgeon General's report. They concluded that SHS exposure created health care costs of 330 million Swiss francs (CHF) in 2006, of which CHF 129 million were attributable to lung cancer and CHF 93 million to ischemic heart disease.

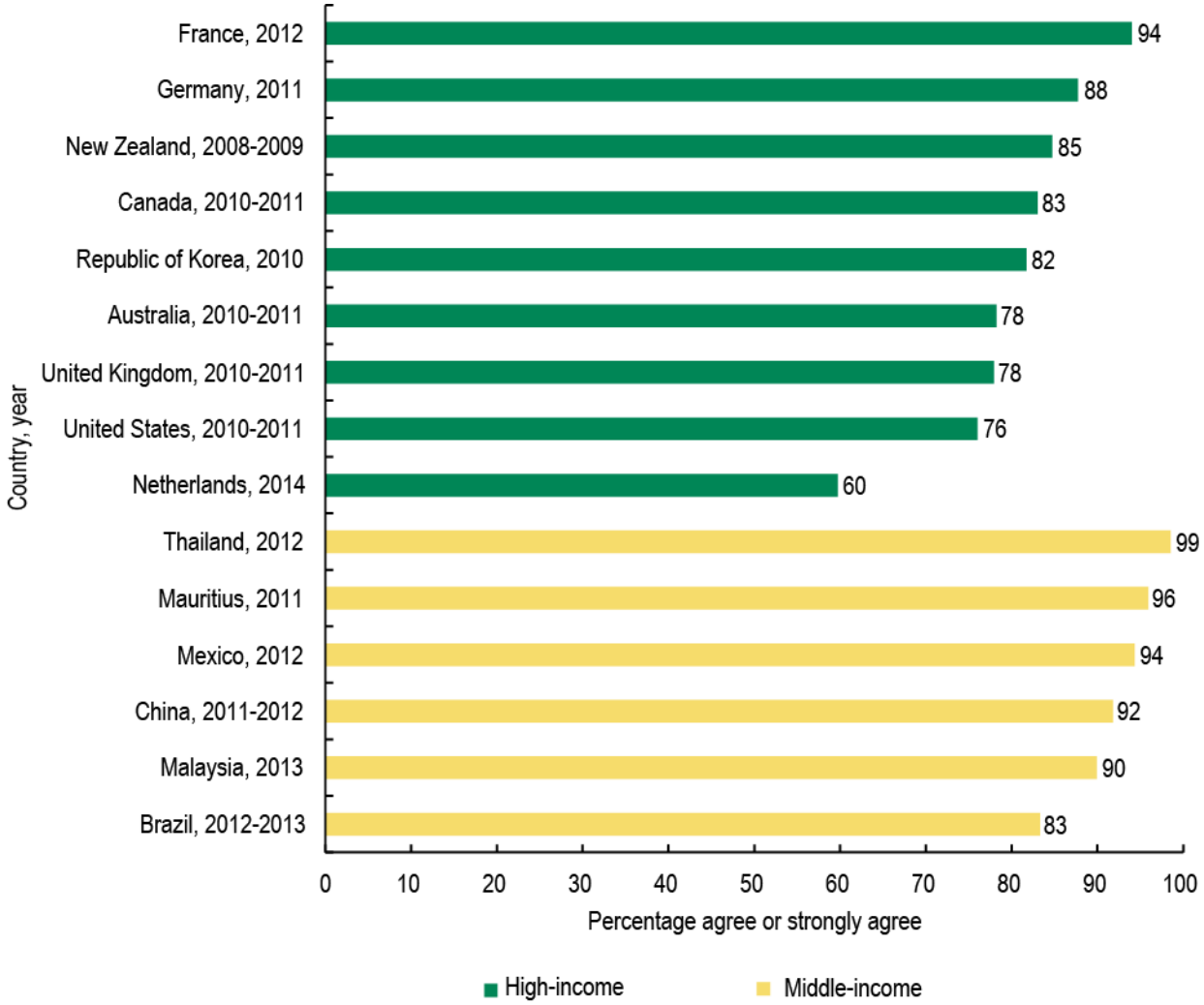
Some studies have determined the economic impact of the decrease in disease and hospitalizations attributed to comprehensive smoke-free policies. For example, Ong and Glantz[26,27] examined the effect of a national comprehensive smoke-free policy on cardiovascular health and the resulting cost savings in the United States. They estimated that as many as 6,250 fewer myocardial infarctions and 1,270 fewer strokes would occur if all U.S. workplaces were smoke free, and US$ 224 million would be saved in direct medical costs each year.

### Knowledge of the Health Impact of Secondhand Smoke Exposure

As described in more detail in chapter 8, studies demonstrate that many people, both smokers and nonsmokers, lack knowledge of the health consequences of SHS exposure; this information failure is an important motivator of smoke-free policies. For example, the International Tobacco Control Policy Evaluation (ITC) Project asked smokers in 15 countries whether they agreed that cigarette smoke is dangerous to nonsmokers. As shown in Figure 6.1, agreement varied substantially by country. Additionally, the Global Adult Tobacco Survey (GATS), conducted in 22 countries, investigated the beliefs of adults age 15 or older about the link between smoking and serious illness in nonsmokers; in

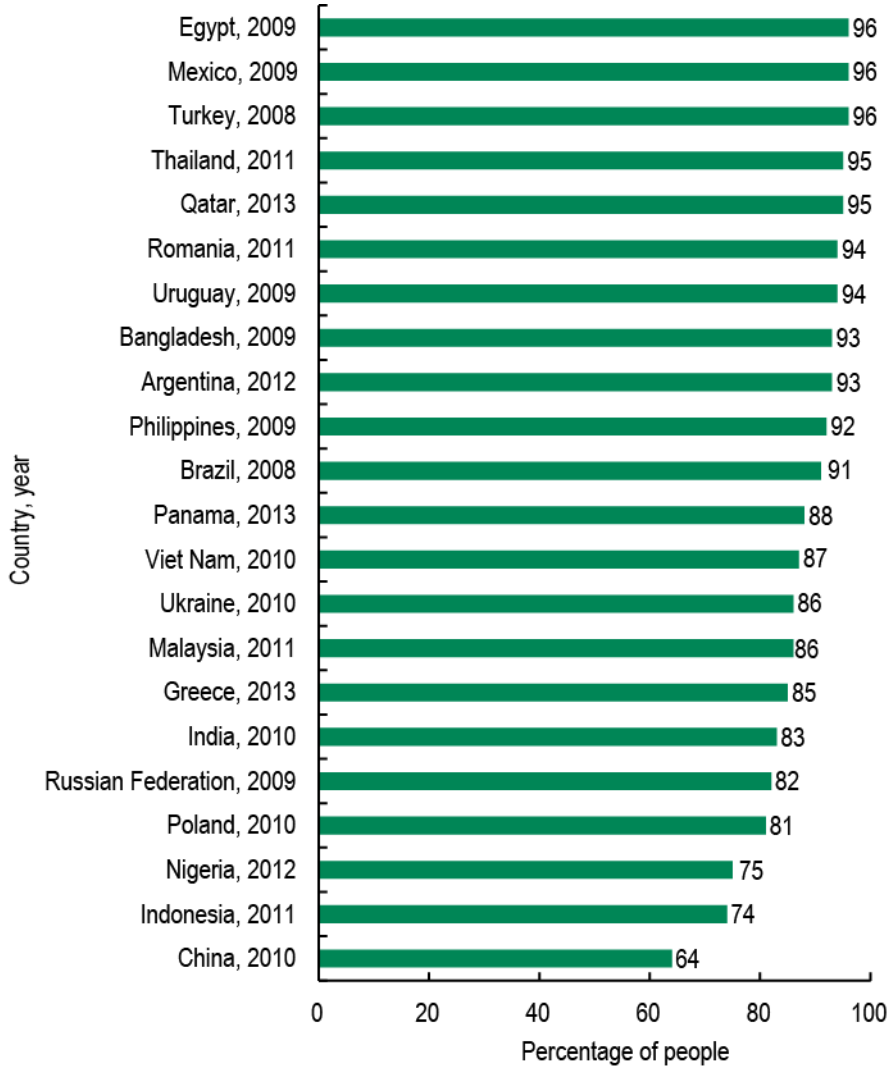
about half of surveyed countries, less than 90% of adults believed SHS causes serious illness in nonsmokers (Figure 6.2).

**Figure 6.1 Percentage of Smokers in Middle-Income and High-Income Countries Who Agree That Cigarette Smoke Is Dangerous to Nonsmokers**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* Based on unpublished data from the International Tobacco Control Policy Evaluation Project 2015.

**Figure 6.2 Percentage of People Age 15 and Older Who Believe Secondhand Smoke Causes Serious Illness in Nonsmokers**

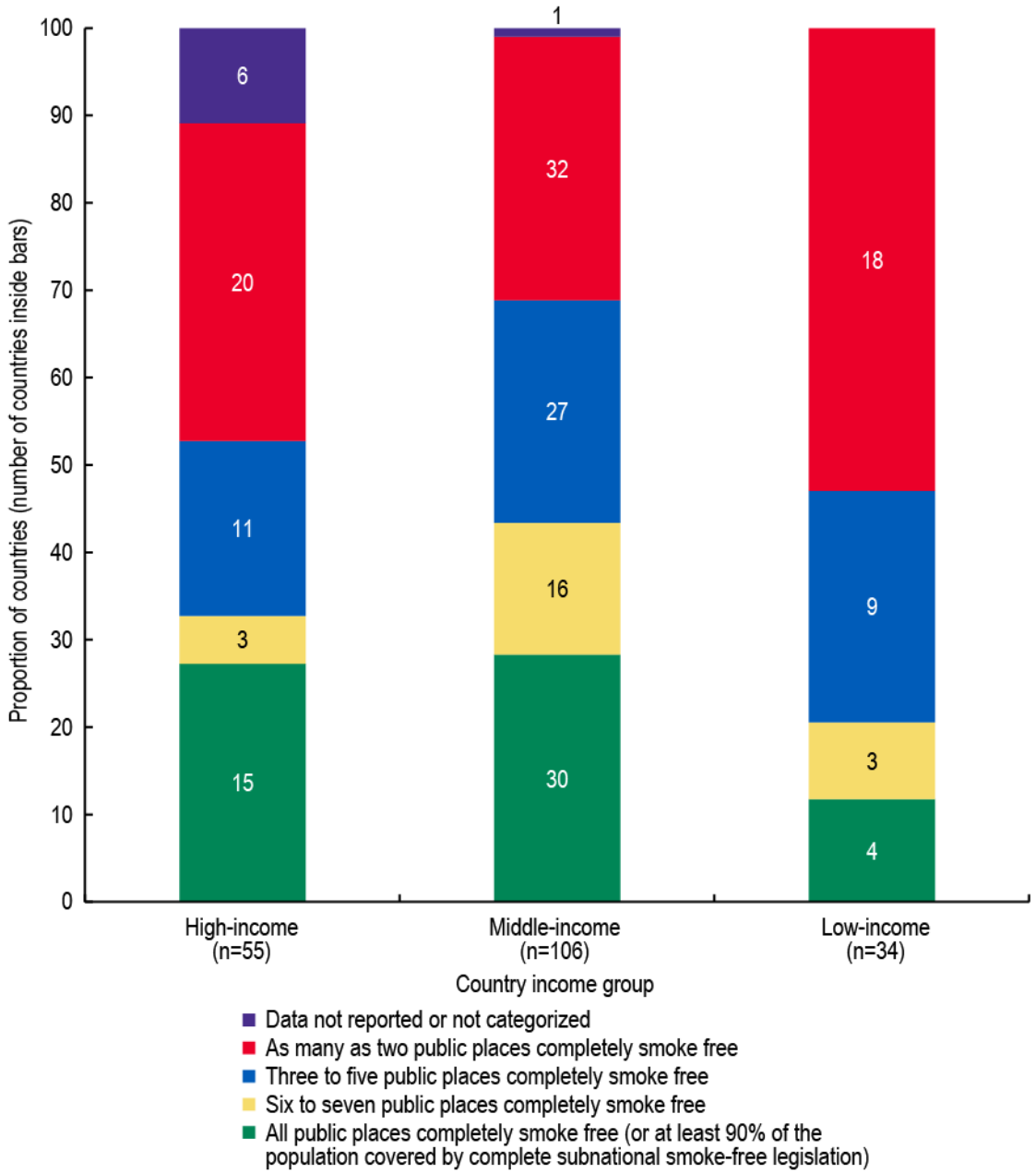



*Source:* Asma et al. 2015.[158] Reprinted with permission.

## Country Adoption of Comprehensive Smoke-Free Policies

By the 1990s and early 2000s, many U.S. states and localities, subnational jurisdictions in Australia and Canada, and a few countries (e.g., Norway and Singapore) had adopted strong smoke-free policies.[28] These policies increased in number and strength over time as evidence grew about the harms of SHS to nonsmokers, and public tolerance of exposure to SHS decreased. In 2004, Ireland became the first country to enact a comprehensive smoke-free policy at the national level covering all enclosed workplaces, including bars and restaurants.[29] At the end of 2014, a total of 49 countries had implemented national comprehensive smoke-free legislation. As a result, approximately 18% of the world's population (1.3 billion people) is protected from the dangers of SHS by a comprehensive smoke-free law.[30] Figure 6.3 provides an overview of the adoption of smoke-free laws by country, stratified by country income group.

**Figure 6.3 Smoke-Free Laws: Global Coverage, by Country Income Group, 2014**




*Note:* Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* World Health Organization 2015.[30]

A key factor in the recent increase of adopted national comprehensive smoke-free policies has been the adoption in 2003 and subsequent entry into force in 2005 of the WHO Framework Convention on Tobacco Control (WHO FCTC). The WHO FCTC requires its Parties to adopt and implement effective measures to protect people from exposure to SHS in indoor workplaces, public transportation, indoor public places, and other public places, as appropriate according to Article 8 of the WHO FCTC.[31] And, as required by Article 8,[32] the WHO FCTC Conference of the Parties adopted guidelines to assist Parties to the treaty in protecting the public from SHS. The guidelines emphasize that only 100% smoke-free

environment laws provide appropriate protection for the public, and that all indoor workplaces, all indoor public places, and public transportation should be entirely smoke free.

WHO reports that strong smoke-free legislation is the most widely adopted tobacco control measure, but low-income countries are less likely to have adopted comprehensive smoke-free laws than high- and middle-income countries. Policies in many countries still include exemptions or waivers and allow for designated smoking areas or include other loopholes which weaken the law. Variations in the rigor of legislation also have implications for how smoke-free regulations are implemented, which in turn affects the costs incurred or saved. Protecting employees and patrons of restaurants, pubs, and bars from SHS is an area of particular need; only one-third of countries completely ban smoking in these establishments.[30]

Adoption of smoke-free policies by hospitals and other health care settings is important to protecting patients and staff, providing a strong health message, and promoting a nonsmoking norm to the community. In the United States, the Joint Commission on Accreditation of Healthcare Organizations (now the Joint Commission) required all accredited U.S. hospitals to prohibit indoor smoking by December 1993; essentially 100% compliance was soon reached.[33] Around the world, 63% of countries ban smoking in all health facilities, indicating that progress remains to be made in this important area.[30] As of 2012, unpublished data collected by WHO showed eight countries (Bhutan, Lithuania, Luxembourg, Maldives, Mauritius, Serbia, Seychelles, and Uruguay) had implemented national-level bans on smoking in the outdoor spaces of all health care facilities, schools, and universities, all of which are influential sectors because of their substantial role in modeling workplace policies and behavior.

In a growing number of countries, smoke-free policies have been extended beyond workplaces and indoor public spaces to include previously unregulated areas such as outdoor spaces. The City of Vancouver (Canada) has banned smoking on public beaches and in public parks,[34] and New York City (U.S.) has enacted legislation banning smoking in all public parks, on beaches, and in pedestrian plazas.[35] Private spaces such as cars and multiunit housing have increasingly been the subject of regulation. Based on evidence showing very high levels of tobacco smoke within the confines of motor vehicles, a number of jurisdictions in Australia, Canada, and the United States have introduced laws banning smoking in cars when children are present. Bahrain, Cyprus, England, South Africa, and Wales ban smoking in cars when children are present, and Mauritius is the first country to implement a vehicle smoking ban in cars carrying any passengers.[36]

There is growing recognition that, because SHS moves throughout buildings, smoking in a common area or in an individual unit of multiunit housing exposes residents of other units—including those who do not smoke within their own unit—to SHS.[37] Smoke-free policies have been shown to protect residents of multiunit housing from SHS infiltration into individual units and common areas.[3,38,39] Policies vary in their strength and comprehensiveness; they may apply to indoor common areas, outdoor common areas, individual units, and/or entire buildings. In high-income countries (HICs), operators of privately owned multiunit dwellings are implementing voluntary, non-legislated policies with increasing frequency. In addition to voluntary bans, some local governments have begun to restrict smoking in multiunit dwellings. As of July 2015, 16 communities in the state of California (U.S.) had legislated policies requiring all multiunit housing complexes to be smoke free.[40] Efforts to establish smoke-free policies within government-subsidized public housing have also been undertaken.[40] In Australia, smoking has been banned in indoor common areas of government-owned public housing properties since 2005.[41] In November 2016, the U.S. Department of Housing and Urban Development (HUD)[42] finalized a rule that requires the nation's public housing agencies to implement a smoke-free policy for all public housing

indoor areas. HUD estimated that, as of 2016, over 600 U.S. public housing agencies had already voluntarily implemented smoke-free policies in at least some of the properties they manage.[42] Such policies have the potential to protect more than 7 million people who are served by public housing in the United States, many of them families with children.[43]

Electronic nicotine delivery systems (ENDS) are battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user. Secondhand aerosol is the ENDS aerosol exhaled by the user diluted with ambient air. It consists of fine and ultrafine particles, nicotine, 1,2-propanediol, some volatile organic compounds, and metals.[44,45] With the exception of metals, compounds in ENDS secondhand aerosol are generally at lower concentrations than those found in SHS, although reported variability is high.[46–48] The level of contaminants produced by ENDS is higher than the background level in the environment and may pose an increased risk to the health of bystanders, although at present the magnitude of this risk is not known.[49,50] In addition to protecting bystanders, inclusion of ENDS in comprehensive smoke-free policies helps simplify enforcement by eliminating confusion (due to the similarities in appearance of cigarette smoke and ENDS aerosol) about whether people are using conventional cigarettes or ENDS. As WHO has noted, "the use of ENDS in places where smoking is not allowed (i) increases the exposure to exhaled aerosol toxicants of potential harm to bystanders, (ii) reduces quitting incentives, and (iii) may conflict with the smoking de-normalizing effect."[51,p.8]

Some governments have taken action to prohibit ENDS use where smoking is prohibited by interpreting existing smoke-free policies as inclusive of ENDS or by explicitly passing laws to include ENDS in their smoke-free policies (e.g., France, Turkey).[52] Use of ENDS is banned in enclosed public spaces, including bars, restaurants, and other workplaces in 15 countries, and an additional 8 ban use in selected enclosed places.[52] In Canada, 5 of the 10 provinces ban the use of ENDS where smoking is prohibited, which includes all enclosed workplaces and public places including bars and restaurants.[53] In the United States, 10 states ban the indoor use of ENDS in bars and restaurants. In addition, 516 municipalities across the United States ban the indoor use of ENDS in some workplaces or public places, many including bars and restaurants.[54] In contrast, as of October 2015, England and Scotland did not plan to include ENDS in existing smoke-free legislation.[55] The evolution and effect of policies that prohibit ENDS use where smoking is prohibited is an important area for further study.

## Smoke-Free Policies: Enforcement, Compliance, and Public Support

Enforcement is an important element of smoke-free policies. These policies work best when there is a strong social consensus against smoking in public places, and therefore self-enforcement of the restrictions. In practice, implementation of smoke-free legislation entails a transition period; strong enforcement of smoke-free policies is needed until high levels of compliance are reached, after which most policies become self-enforcing. Comprehensive and carefully planned educational efforts well in advance of the implementation date help business owners and the public understand the purpose of the law and what is necessary to comply with the regulations.

The WHO FCTC guidelines for implementing Article 8 provide practical guidance for countries as they enact and implement smoke-free policies.[32] The guidelines note that legislation should be simple, clear, and enforceable in order to be effective. They also emphasize the importance of appropriate planning and adequate resources, as well as the involvement of civil society as an active partner in the process of developing, implementing, and enforcing legislation. The guidelines also call for monitoring and

evaluation of the enforcement and impact of smoke-free legislation, which should extend to monitoring and responding to tobacco industry activities to undermine the legislation.

Callinan and colleagues[56] conducted a systematic review of the impact of legislative smoking bans, including public support for the policies, and found that both public approval and compliance with smoking policies increased after their implementation. Similarly, the International Agency for Research on Cancer (IARC) reports that, in those HICs for which data are available, a majority of the public supported smoke-free indoor workplaces, and compliance with these policies was usually fairly high and increased over time.[28]

More recent evidence indicates that public support for smoke-free policies extends to the multiunit housing setting. In the United States, numerous surveys have found broad population-level support for smoke-free policies in multiunit housing.[57] In Denmark, a study using a population-based sample of multiunit housing residents found that 41% would prefer to live in a building with a smoking ban.[58] As might be expected, the acceptability of smoke-free policies in multiunit housing establishments has been shown to vary by smoking status.[59] For example, a U.S. survey found that only 30% of current smokers living in subsidized housing covered by a smoke-free policy supported the policy, compared with 85% of former smokers and 92% of never smokers.[60]

A few studies have looked specifically at public support for or compliance with smoke-free policies in LMICs. The 2009 IARC handbook *Evaluating the Effectiveness of Smoke-Free Policies* found evidence of support for these laws in LMICs. This review also found some degree of compliance with smoke-free policies in the workplace but poor compliance in particular settings.[28] A WHO review found that an increasing number of LMICs have adopted comprehensive smoke-free policies. Of the 29 LMICs with comprehensive smoke-free policies that reported compliance, 16 had high or very high levels of compliance with these policies.[30]

A study by Yang and colleagues[61] found that 60% of the Chinese population supported bans on smoking in public places in general, although respondents were not asked about specific locations such as restaurants or pubs. A 2007 document from the Chinese Ministry of Health reported that about one-half of those living in urban areas of China supported smoke-free restaurants and bars, and 90% supported smoking bans in hospitals, schools, and public transportation.[62] In an analysis of data from the ITC China Survey conducted in six Chinese cities in 2006, Li and colleagues[63] found that most respondents supported smoke-free policies in hospitals, schools, and public transportation; support for smoke-free policies in workplaces, restaurants, and bars was considerably lower. Support for smoke-free policies was positively associated with knowledge of the health harms of SHS, and was greater among respondents who either worked in a smoke-free workplace or visited smoke-free indoor entertainment venues.

Viriyachaiyo and Lim[64] surveyed 5,550 tourists staying in hotels in Thailand regarding their views on the country's ban on smoking in air-conditioned hotel lobbies. Nearly 90% of tourists surveyed recognized SHS as harmful, and more than 80% supported the ban. The authors concluded that enforcing the smoking ban is more likely to attract than to dissuade tourists from visiting Thailand.

## The Impact of Comprehensive Smoke-Free Policies

Comprehensive smoke-free legislation is a major policy intervention that works at several levels. It improves air quality and reduces nonsmokers' SHS exposure; it encourages smokers to reduce their tobacco consumption by limiting the times and places where they can smoke; and it can motivate smokers to attempt to quit.[65–67] Smoke-free legislation makes tobacco use less acceptable by changing social norms.[68] Comprehensive smoke-free policies are also associated with declines in youth smoking, and limits on smoking in schools reduce average cigarette consumption among youth who smoke.[28,69]

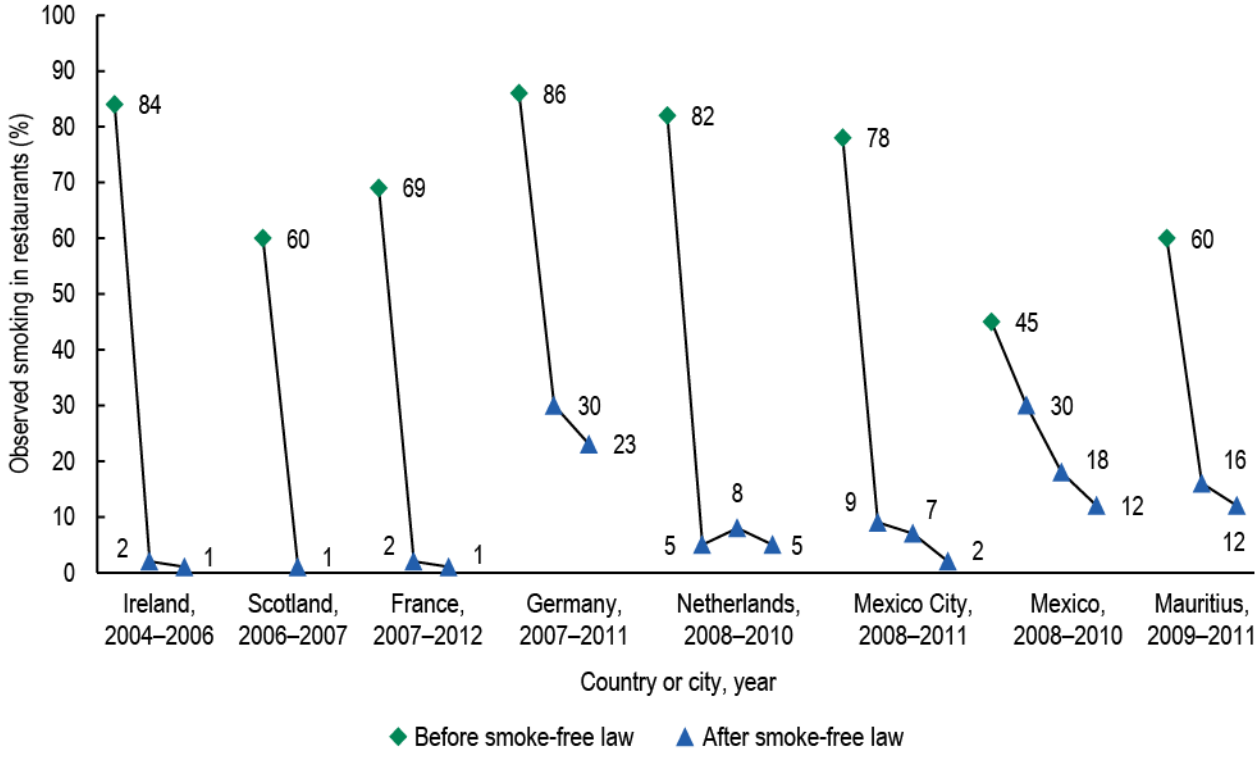
### Impact on Secondhand Smoke Exposure and Indoor Air Quality

Numerous studies have evaluated the impact of smoke-free policies on indoor air quality and exposure to SHS. Callinan and colleagues[56] conducted a systematic review of existing studies to determine whether the introduction of comprehensive smoke-free policies or smoking restrictions affects exposure to SHS. In 31 studies that examined the impact of local, regional, or national policies on exposure to SHS, these researchers found consistent evidence that smoking bans reduce exposure to SHS, but they noted a greater reduction in exposure for hospitality workers (i.e., bar and restaurant employees) compared to the general population. The Community Preventive Services Task Force (U.S.)[70] built on the findings of Callinan and colleagues, incorporating studies from January 2000 through December 2011. Their review concluded that smoke-free policies were associated with significant decrease in self-reported exposure to SHS, decreased biomarkers of SHS exposure, and decreased indoor air pollution, as measured by vapor-phase nicotine or respirable suspended particle mass. In addition, the IARC review of studies of workplace smoking bans conducted between 1990 and 2008 concluded that "in every country…the introduction of comprehensive legislation banning smoking in workplaces has been associated with a substantial reduction in exposure to SHS."[28,p.136]

Hyland and colleagues[71] used a standardized protocol to measure tobacco-smoke-derived particulate levels in 1,822 transportation, hospitality, and other venues in 32 countries, encompassing all WHO World Regions. These authors found that countries with comprehensive smoke-free policies had indoor air particle concentration ($PM_{2.5}$) levels about 89% lower than those in countries where smoking is permitted without restriction. Schoj and colleagues[72] measured mean $PM_{2.5}$ in 15 cities in Argentina, including those with and without a comprehensive smoke-free policy, and found high compliance with smoke-free laws in most jurisdictions that had these laws. Most of the participating cities had significantly lower $PM_{2.5}$ levels after implementing 100% smoke-free legislation compared to cities with no legislation, or those with only partial smoking restrictions.

The ITC Project found that the prevalence of observed smoking in hospitality settings, including restaurants and bars, decreased dramatically in many countries that have implemented smoke-free laws in these settings. Figure 6.4 shows the prevalence of observing smoking in restaurants as reported by smokers in seven countries and Mexico City before and after a smoke-free law covering restaurants was implemented.[73] Except in three countries (Germany, Mexico, and Mauritius), observed smoking decreased from above 60% to below 10%.

## Figure 6.4 Prevalence of Observed Smoking in Restaurants Before and After Smoke-Free Laws

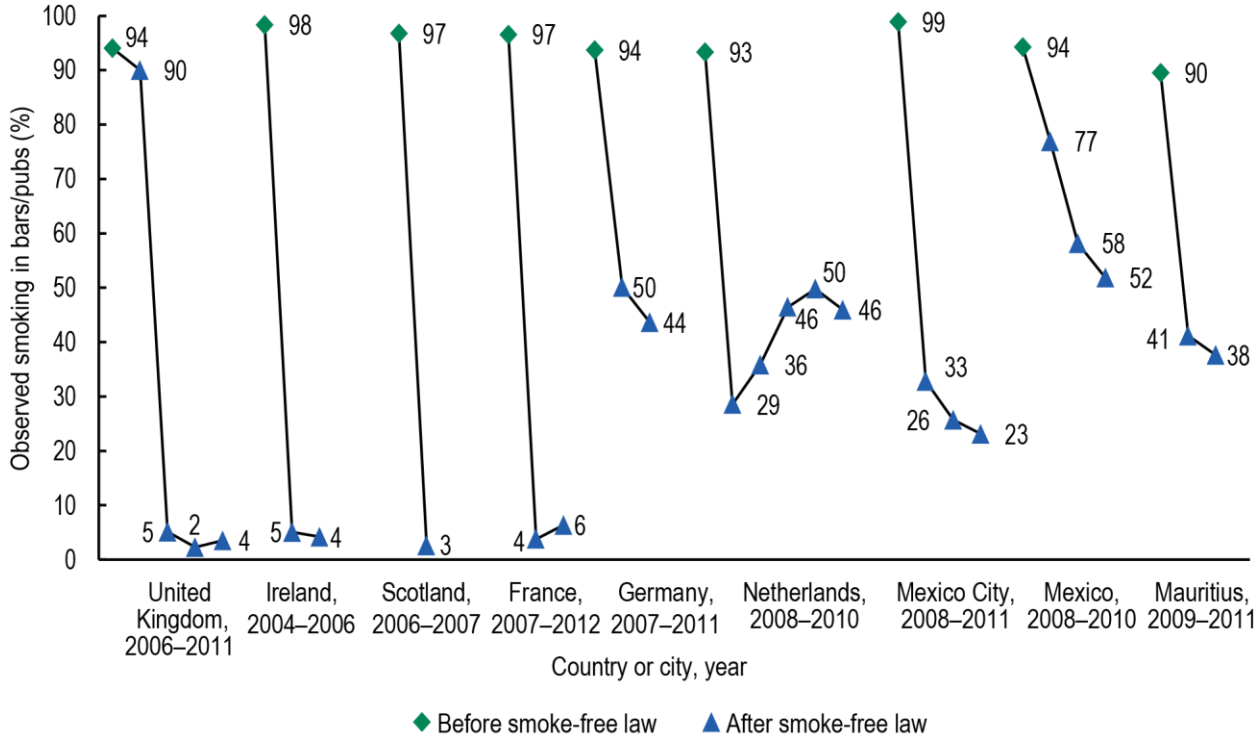



*Source:* World Health Organization Western Pacific Region and University of Waterloo, ITC Project 2015.[159]

Similarly, Figure 6.5 shows the prevalence of observed smoking reported by smokers before and after implementation of a law requiring smoke-free bars in eight countries and Mexico City.[74] Observed smoking declined dramatically in four countries (United Kingdom, Ireland, Scotland, and France) following implementation of their laws. In each of these four countries, the law contained few exemptions; enjoyed considerable government support; was introduced by a public information campaign well in advance of the law's effective date in order to increase awareness about the law and the health hazards of SHS; and was accompanied by strong enforcement mechanisms. In contrast, observed smoking in bars decreased much less in other countries (Germany, the Netherlands, Mexico, and Mauritius) after the implementation of their smoke-free laws, which had none of these characteristics.

Information on the effects of smoke-free laws in LMICs is limited. In 2006, Uruguay became the first Latin American country to implement a comprehensive nationwide smoke-free policy. In 2008, Mexico City implemented a comprehensive smoke-free policy covering enclosed public places and workplaces. Thrasher and colleagues[75] analyzed data from the 2008 and 2010 waves of the ITC surveys conducted in Mexico and Uruguay to determine prevalence, correlates, and changes in SHS exposure during this period. In both countries, smoke-free policies reduced SHS exposure compared to jurisdictions without such policies, but a significant degree of non-compliance was found, especially in bars and workplaces. The authors concluded that "new enforcement efforts are needed to enhance compliance and ensure the equitable impact of smoke-free policy, especially in the Latin American region."[75,p.797]

**Figure 6.5 Prevalence of Observed Smoking in Bars/Pubs Before and After Smoking Bans**




*Source:* Fong 2011.[74]

Household smoking restrictions have been shown to effectively reduce exposure to SHS in the home.[28] Complete smoking bans in homes are consistently associated with lower levels of biochemical markers of SHS exposure and lower health risks among children and nonsmoking adults.[18,76–80] Smoke-free home rules have also been shown to promote quit attempts and smoking cessation among smokers in the household, with total bans having a stronger effect than partial bans.[81–84] A recent review of smoke-free homes and adult smoking behavior concluded that smoke-free home environments may have an even stronger association with smoking cessation and decreased cigarette consumption than workplace restrictions.[85]

Accumulating evidence suggests that enactment of smoke-free legislation may promote voluntary adoption of smoking restrictions in the home.[86,87] In the ITC Ireland Survey, Fong and colleagues[88] found that the percentage of smokers reporting that they allowed smoking in their homes decreased significantly (from 15% to 10%) following the implementation of Ireland's comprehensive smoke-free law. In an analysis conducted both before and after implementation of smoke-free legislation in Scotland, Hyland and colleagues[71] found that the percentage of households allowing smoking in the home decreased significantly. Similar results were found by a study of the effect of a comprehensive smoke-free law on in-home smoking in Ireland, France, Germany, and the Netherlands: In all four countries the number of smoke-free homes increased significantly after the law took effect.[89] Germany and the Netherlands also had a significant decrease in the reported consumption of cigarettes at home while France had no significant change. Cigarette consumption at home was not measured in Ireland.

Gilpin and colleagues[90] analyzed data from the California Tobacco Survey and found that the percentage of adults with smoke-free homes in California increased from 37.6% in 1992 to 73.7% in 1999, and the proportion of children and adolescents with smoke-free homes increased from 38.0% to 82.2% during the same period. These authors conclude that "heightened public awareness of the dangers of SHS may be partly responsible for the steadily increasing numbers of Californians reporting that their homes are smoke-free."[90,p.790] Another study found that after the introduction of smoke-free legislation in Scotland, the proportion of children reporting a complete ban on smoking in their household increased, compared to the period before the law took effect.[91]

### Impact on Smoking Behavior

Evidence that comprehensive smoke-free policies influence smoking behavior has accumulated over time. Hopkins and colleagues[92] explain why smoke-free policies and smoking restrictions might be expected to have an effect on smoking behavior:

> Smoke-free policies might provide a motivation for tobacco users to initiate a cessation effort. By reducing opportunities to smoke, these policies might reduce relapses and increase the success rate for cessation attempts. More quit attempts and higher rates of success will translate into more successful quitters and fewer continuing smokers.[92,p.S277]

The IARC review summarizing literature published between 1990 and 2008 concluded: (1) the different lines of evidence reviewed indicate that workplace smoking restrictions reduce cigarette consumption among continuing smokers and (2) the evidence from earlier studies concerning reduced prevalence and/or increased cessation is mixed, but more recent evidence suggests that smoke-free workplaces reduce prevalence and increase quitting.[28]

The impact of smoke-free policies on active smoking was not clear in the 15 studies that met the criteria for inclusion in the systematic review conducted by Callinan and colleagues.[56] This review noted that, in most cases, a change in smoking prevalence was not the primary outcome, but was often reported as a confounder or covariable to interpret exposure to SHS. These authors reported no consistent evidence of a reduction in smoking prevalence attributable to comprehensive smoke-free policies. They did point to some studies that compared a jurisdiction with smoke-free policies to an adjacent jurisdiction without such policies and found significant reductions in smoking prevalence in the intervention region[93,94]; however, this cross-sectional comparison is ambiguous with respect to causal direction. Callinan and colleagues[55] also noted evidence provided by Helakorpi and colleagues,[95] who developed a logistic model using data from 1981 to 2005 and found that the odds of smoking were reduced among both men and women compared with the period before smoke-free policies (pre-1994).

Anger and colleagues[96] suggest that a reason for the mixed findings among the relatively small studies reviewed by Callinan and colleagues[56] may be that the impact on individuals depends on how frequently they visit establishments affected by smoke-free policies. Using longitudinal data from the German Socio-Economic Panel Study and a difference-in-differences approach, Anger and colleagues found that the introduction of smoke-free policies in Germany did not change the population's average smoking behavior in the short term, but that policies did affect smoking rates among individuals who reported regularly going to bars and restaurants.

Bauer and colleagues[97] reported larger effects on cessation and consumption the longer a smoke-free worksite policy was in force, suggesting that the effects may grow over time. Grassi and colleagues[98] examined the effect of Italy's 2005 smoke-free law on smoking cessation treatment and concluded that the law was associated with both increased motivation to quit and higher 12-month abstinence rates among smokers enrolled in a smoking cessation program. Similarly, England's national smoke-free law, implemented in 2007, was associated with a significant, albeit temporary, increase in the percentage of smokers attempting to quit; importantly, the increase appeared equally across social grades and among both younger and older smokers.[99]

Callinan and colleagues[56] also reviewed 13 studies that included reported tobacco consumption as an outcome. This review concluded that evidence is inconsistent regarding whether smoking restrictions reduce the number of cigarettes consumed, but studies that found a decline in smoking prevalence also tended to find a decline in consumption. An updated analysis continued to find inconsistent evidence that smoking bans reduced smoking prevalence rates and tobacco consumption.[100] In an analysis of the effects of comprehensive smoke-free laws in several European countries, Mons and colleagues[89] found that overall cigarette consumption decreased to a statistically significant degree after the laws were implemented in Ireland, the Netherlands, and Germany, but not in France.

To study the prevalence, trends, and determinants of smoke-free home policies, and the effect of these policies on cessation, Borland and colleagues[86] analyzed data from the ITC Four Country Survey (Australia, Canada, United Kingdom, and United States) and found that smoke-free homes increased interest in quitting and, independent of other variables, contributed to maintenance of cessation. Mills and colleagues[85] reviewed the literature on the effect of smoke-free homes on adult smoking behavior and found strong and consistent evidence from both longitudinal and cross-sectional studies that smokers who had a smoke-free home, or who had recently made their homes smoke free, were significantly more likely to attempt to quit and to abstain from smoking, even after controlling for confounding factors. A subsequent study of four European countries (Ireland, France, Germany, and the Netherlands) provides evidence that smoke-free legislation leads smokers to ban smoking in their homes.[101]

Using a multivariate longitudinal analysis of data from 1,012 adult smokers who participated in the four waves of the ITC Netherlands Survey conducted over three years, Nagelhout and colleagues[66] tested pathways of change that explain the effect of smoke-free legislation on smoking cessation (quit attempts and quit success over a year). These researchers found that smoke-free legislation influences smoking cessation by first increasing two policy-relevant variables: support for the smoke-free law and awareness of the harms of SHS. These variables in turn lead to increases in three psychosocial mediators (attitudes toward quitting, subjective norms, and self-efficacy for quitting) which lead to stronger quit intentions, a greater likelihood of quit attempts and, when intentions to quit and self-efficacy for quitting are high, increased quit success.

The Community Preventive Services Task Force (U.S.) has conducted three reviews of the evidence on smoke-free policies. In 2012, the Task Force review again recommended adoption of smoke-free policies to reduce SHS exposure and tobacco use on the basis of strong evidence of effectiveness. The Task Force found that legislated smoke-free policies are effective at increasing quit rates among tobacco users, and at reducing exposure to SHS, prevalence of tobacco use, tobacco consumption among tobacco users, initiation of tobacco use among young people, and tobacco-related morbidity and mortality, including acute cardiovascular events.[70]

In 2014, the U.S. Surgeon General asserted that "the evidence is sufficient to conclude that smoke-free indoor air policies are effective in reducing exposure to SHS and lead to less smoking among covered individuals."[2,p.827]

## Impact on Health Outcomes

Abundant evidence from HICs, including several comprehensive reviews of the literature, demonstrates that smoke-free policies improve health outcomes. For example, Hahn[102] reviewed the literature published between 2000 and 2010 on health outcomes following implementation of smoke-free legislation. She found that these bans lead to improved indoor air quality, fewer acute myocardial infarctions (AMIs) and asthma exacerbations, and improved infant and birth outcomes, for an overall improvement in the health of hospitality workers and the general public. Goodman and colleagues[103] reviewed studies published between 2004 and 2009 that looked at the impact of smoke-free laws on health outcomes. They concluded that significant and consistent evidence from around the world shows that comprehensive smoke-free laws are associated with improved respiratory health and reduced cardiovascular disease. Finally, a 2016 review of 77 studies from 21 countries concluded that "the evidence supports a temporal association between the introduction of national smoke-free bans and subsequent reductions in smoking-related morbidity and mortality," and that the "evidence for smoking bans in improving cardiovascular, respiratory and perinatal health outcomes for both smokers and nonsmokers is persuasive."[100,p.20]

Evidence on the health impact of smoke-free laws in LMICs is limited. Uruguay was the first Latin American country to implement a comprehensive nationwide smoke-free law. Implementation of Uruguay's 100% smoke-free law was followed by reduced hospitalizations for AMI and fewer emergency visits for bronchospasm.[104,105]

### *Respiratory Health Outcomes*

The respiratory health outcomes of hospitality workers in particular are immediately affected when smoke-free legislation is implemented.[102] For example, one month after the implementation of a smoke-free law in Scotland, asthmatic bar workers demonstrated improvements in airway inflammation and self-reported quality of life. Among hospitality workers in Norway, a smaller decrease in lung function was observed from the beginning to the end of a work shift after smoke-free legislation was implemented compared to before the law took effect.[102,106] Bartenders in California (U.S) and Ireland also experienced improvements in lung function and decreases in the frequency of adverse respiratory symptoms after a smoke-free bar/pub law was implemented.[107] Hospitality workers in New York State (U.S.) were less likely to report adverse symptoms such as wheezing, coughing, and shortness of breath in the months after that state's smoke-free law took effect, but the decrease was not significant.[108]

Several studies have also found that smoke-free laws reduced asthma incidence, symptoms, and hospitalizations and/or emergency room visits in adults and/or children.[109–111] A recent U.S. study using data from the 2007–2011 Behavioral Risk Surveillance System found that nonsmoking adults in states that had enacted smoke-free laws were likely to report fewer current asthma symptoms and fewer physician visits because of asthma symptoms, compared with nonsmoking adults in states without such laws.[112]

### *Cardiovascular Health/Acute Myocardial Infarction*

With regard to population-level health outcomes, a meta-analysis of 12 studies and reports estimated that during the first year in which smoke-free legislation is in effect, communities experience a 15% drop in AMI hospital admissions, and this decline reaches 36% by the third year after implementation.[113] Similarly, a 2009 review of the evidence from 11 studies reported an 8% overall decline in AMI hospital admissions after implementation of smoke-free legislation; younger and nonsmoking populations experienced the greatest declines.[114] The Institute of Medicine (U.S.)[115] concluded that there is a causal relationship between indoor smoking bans and reduced AMI risk.

Mackay and colleagues[116] assessed the evidence for reduced risk of acute coronary events after the introduction of comprehensive smoke-free legislation. Their meta-analysis, which was based on a total of 35 estimates of relative risk obtained from 17 studies, found that substantial evidence supports the conclusion that acute coronary events are reduced by approximately 10% after the implementation of smoke-free legislation. A meta-regression carried out by the reviewers indicated that the beneficial effects of this legislation increase over time.

### *Perinatal and Child Health*

Maternal and young child SHS exposure is causally related to numerous adverse health conditions. Been and colleagues[117] conducted a systematic review and meta-analysis of the effect of smoke-free legislation on perinatal and child health, examining five North American studies and six European studies. They found that smoke-free legislation reduced rates of both preterm birth and pediatric hospital admissions for asthma by 10%, and was also associated with reductions in the risk of infants being born very small for gestational age.

## Smoke-Free Policies: Implications for Businesses and Government, and Other Intangible Costs

### Impact of Smoke-Free Policies on Businesses

Opposition to smoke-free policies has often focused on concerns that these policies will reduce revenues and increase costs in hospitality industry workplaces, especially restaurants and bars. Opponents maintain that revenues will decrease because smokers will visit smoke-free venues less frequently or for shorter periods, and that costs will increase because businesses will need to establish and maintain smoking and nonsmoking sections and implement and enforce the policies, and because smoking employees will become less productive as they take longer or more frequent breaks for smoking. However, as described below, the evidence clearly demonstrates that smoke-free policies do not cause adverse economic outcomes for businesses, including restaurants and bars.[3,28] In fact, smoke-free policies often have a positive economic impact on businesses.

The most common indicators used to assess the impact of smoke-free regulations on hospitality venues such as restaurants and bars are sales, employment, number of establishments/licenses, and business value/revenue. Some studies also present subjective assessments by business owners. Most studies to date have been conducted in the United States and other HICs. The economic effect of smoke-free policies in LMICs has rarely been examined,[28] in part because the uptake of smoke-free policies in these countries has been slow.

### *Overview of the Evidence*

Several comprehensive reviews of the economic impact of smoke-free policies provide an overview of the state of the evidence. Scollo and colleagues[118] reviewed 97 studies conducted before August 31, 2002, in 31 subnational jurisdictions in 8 countries (the United States, Spain, China, Australia, Canada, England, New Zealand, and South Africa) that examined economic outcomes in hospitality venues after smoke-free regulations were implemented. Of these 97 studies, 21 met the criteria for strongest scientific rigor: (1) use of objective data on employment statistics (e.g., tax receipts); (2) inclusion of all data points after the law was implemented plus data from well before; (3) use of statistical methods that control for secular trends and random fluctuations in the data; and (4) appropriate control for underlying economic trends. All 21 of the most rigorous studies concluded that smoke-free regulations do not cause adverse economic outcomes for the hospitality industry. In contrast, no studies that concluded that smoke-free regulations harm business met the most rigorous scientific study standards; all were funded by the tobacco industry or by entities with ties to the tobacco industry.[118]

This analysis was subsequently updated to include 68 studies conducted through January 2008, bringing the total number of studies to 165.[119] Of the additional 68 studies, 49 met the above criteria for strongest scientific rigor, of which 47 concluded that no overall negative impact occurred. These data reinforce the earlier reported findings that smoke-free policies do not harm the hospitality industry.

In its comprehensive review of the evidence, published in 2009, IARC concluded that "existing evidence from developed countries indicates that smoke-free workplace policies have a net positive effect on businesses; the same is likely to be the case in developing countries."[28,p.91]

Additionally, in 2014, Cornelsen and colleagues[120] published a systematic review of the literature on the economic impact of smoking bans in bars and restaurants. They identified 56 studies and concluded that their meta-analysis showed no substantial economic gains or losses as a result of smoking bans in the hospitality sector. Although different business types and outcome variables experienced differential impacts, these appeared to balance out at the aggregate level.

Several individual studies measured particular economic outcomes; their findings are presented in the following sections. Taken together, they demonstrate that smoke-free policies, whether comprehensive or partial, do not have a negative effect on bar or restaurant sales or employment. Indeed, they may lead to marginally better financial or employment outcomes.

### *Evidence From Studies of Bar and Restaurant Sales Data*

A number of studies have examined the effect of smoke-free policies on bar and restaurant sales.[121–128] Glantz and Smith[123] found that businesses in California and Colorado (U.S.) communities that had adopted and implemented smoke-free policies for restaurants were not adversely affected. A 1997 update to their study reinforced this earlier finding.[124] Similarly, monthly restaurant sales in South Australia did not decline after restaurants were required to be smoke free, even after adjustment for underlying retail sales, nor were declines observed relative to the rest of Australia, where smoke-free regulations were not in force.[128]

Norway, where a comprehensive smoke-free law was enacted in 2004, provides an opportunity to study the impact of a smoke-free law on restaurant and bar revenue in a harsh climate, presenting a particular challenge to outdoor smoking. Melberg and Lund[129] found that Norway's smoke-free law did not affect restaurant revenue directly, or as a share of private consumption; however, the authors did find some evidence for a short-term effect on bar revenue, as a share of private consumption, but no evidence of a long-term impact on bar revenue. In the Canadian capital city of Ottawa, where a smoke-free law that includes restaurants and bars was implemented in 2001, restaurant and bar sales had been trending downward compared to retail sales before the law. Implementation of the smoke-free law was shown to be unrelated to changes in sales under a variety of different assumptions about the potential effect the policy could have had (i.e., an abrupt or gradual, permanent or temporary effect).[125]

In contrast, a study conducted in Ireland found a reduction in the volume of sales in pubs after implementation of a comprehensive smoking ban.[122] In addition, Pakko[127] examined the short-term effects of a January 2007 ordinance in Columbia, Missouri (U.S.), which banned smoking in all bars, restaurants, and workplaces, and found that the ban was associated with statistically significant losses in sales tax revenues of about 3.5% to 4.0%.

Blecher[121] examined the impact of the Tobacco Products Control Amendment Act implemented in South Africa in 2000, which prohibits smoking in workplaces, including restaurants. This study used provincial value-added tax receipts from 1995 to 2003 as a proxy measure of restaurant sales. The author compared levels before and after the policy, controlling for changes in the efficiency of tax collection over time, and found a statistically nonsignificant increase in restaurant tax revenue after the smoke-free regulations took effect. Additionally, a survey of 1,011 restaurant owners/managers in South Africa found that 59% reported no change in revenue after the smoke-free law, 19% reported a decrease, and 22% reported an increase.[130]

Guerrero Lopez and colleagues[131] examined the effect of Mexico City's 2008 smoke-free law (the NonSmokers' Health Protection Law) on restaurants, bars, and nightclubs. Using monthly data from a survey of businesses from January 2005 to April 2009 and a difference-in-differences approach, the authors found that the smoke-free law did not affect restaurants' income or employees' wages or employment.

Candioti and colleagues[132] conducted a time series analysis of restaurant and bar revenues in the Argentinean province of Santa Fe before and after the implementation of a 100% smoke-free law in August 2006. These researchers found no evidence of a decline in bar and restaurant taxable revenue after the implementation of the legislation. In addition, when compared with a neighboring province which did not have smoking restrictions, there was no significant difference in taxable revenues of bar and restaurants before and after the law. Lastly, Cornelsen and colleagues[120] conducted a 2014 systematic literature search and meta-analysis of studies assessing the impact of smoking bans in bars and restaurants. Consistent with previous reviews, these authors found no large economic effects resulting from the implementation of smoking bans, or small positive effects; they did find a reduction in absolute bar sales.

### *Evidence From Studies of Employment in Bars and Restaurants*

The economic impact of smoke-free policies on bars and restaurants can also be assessed in terms of employment. Specific indicators include number of employees, unemployment, insurance claims, and payroll tax collections.[28] For example, Pyles and colleagues[133] found that restaurant employment in a county in the state of Kentucky (U.S.) rose after a 2004 smoke-free policy was put in place, although bar employment remained unchanged. A study from Canada reached similar findings,[134] specifically, that restaurant, bar, and pub employment rose immediately following the implementation of comprehensive smoke-free policies, despite a decrease in employment in the broader labor market during that period. Additionally, a study conducted in New Zealand found that employment in cafés and drinking establishments (pubs, taverns, and bars) rose by 9% and 24%, respectively, despite a small decline (8%) in employment in clubs after the implementation of that country's 2004 smoking ban.[135] As previously mentioned, Guerrero Lopez and colleagues[131] examined the effect of Mexico City's 2008 smoke-free law on employees' wages and levels of employment and did not find that these variables were affected.

One study found that smoke-free policies had a negative effect on bar employment.[136] Using county-level data on employment from across the United States, these researchers found that communities where smoking is banned experienced reductions in bar employment, especially in geographic areas with high smoking prevalence; in contrast, the effects of smoking bans on restaurant employment were neutral or slightly positive.

Overall, studies meeting the strongest criteria for scientific rigor have generally found that smoke-free policies have either no significant impact or a small positive impact on employment.[28]

### *Evidence From Studies Based on the Number of Establishments*

Some studies have measured how smoke-free policies affect the number of restaurants and bars in operation, the number of openings and closings of hospitality businesses, and the number of bankruptcies of such businesses. For example, Pyles and colleagues[133] concluded that a smoke-free policy in a Kentucky (U.S.) county had no significant effect on business openings and closings, regardless of whether the establishment served alcoholic beverages. Immediately following a smoking ban in Ottawa (Canada), bankruptcy and insolvency indicators were lower compared to the previous two years.[134] Overall, the findings from rigorous studies of this nature are largely consistent with the findings from sales and employment studies, indicating that smoke-free policies do not have an adverse economic impact on restaurants and bars.[28]

### *Evidence From Studies Based on Business Value*

Some researchers have assessed the effect of smoke-free policies on the value of restaurant and bar businesses. Alamar and Glantz[137,138] measured the sale price of restaurants and bars sold in smoke-free jurisdictions and in jurisdictions without smoke-free laws. After controlling for underlying economic conditions, they concluded that the value of restaurants was 16% higher in smoke-free jurisdictions. The value of bars was unaffected by smoke-free policies.

### *Evidence From Studies on Gaming Revenue*

A few studies have assessed the economic impact of smoke-free policies on gaming venues in the United States. One study found that bingo revenue in several Massachusetts communities did not decrease after the implementation of smoke-free regulations.[139] Another study found that slot machine

revenue did not decrease after the state of Delaware's smoke-free regulations took effect,[140] although this conclusion has been challenged.[141] A recent study examined the effect of a local smoke-free law on wagering at an off-track betting facility in Indiana and found no significant change.[142]

In contrast, Lal and Siahpush[143] concluded that the September 2002 policy enacted in Victoria, Australia, banning smoking in most gaming venues led to a significant decline (about 14%) in electronic gaming machine expenditure. The researchers note that several strategies to minimize the harm from gambling were introduced around the same time. Hirschberg and Lye[144] assessed the differential effects of the Victoria smoking ban based on the location of gaming establishments. They found that after this legislation was implemented, the percentage decline in gaming revenue was greatest for establishments located in higher income areas and for those that were closest to the border with New South Wales, where smoking in gaming venues was not restricted. After the introduction of this policy, the actual total state revenue for 2003-2004 was approximately 234 million Australian dollars (in 2002 dollars) less than the amount forecasted.

In their 2015 review of the literature, Babb and colleagues[145] documented that casinos which allow smoking often expose both their nonsmoking workers and nonsmoking patrons to high levels of SHS. They note that few studies of the economic impact of smoke-free policies on casinos have examined the potential cost savings and other economic benefits that could result from these measures.[145] More information on the economic effects of smoke-free regulations on gaming establishments will be forthcoming as these provisions become more widespread.

### Other Effects of Smoke-Free Policies on Businesses

Rather than reducing businesses' revenues or increasing their costs, smoke-free policies could have the opposite effect. For example, smoke-free policies could result in increased business in hospitality venues due to nonsmokers visiting more frequently or staying longer. These measures could also lower cleaning and maintenance costs and reduce fire, accident, and life insurance premiums. Productivity might also increase as smoking employees quit or cut back their consumption and require fewer smoking breaks, are absent less frequently, and experience improved health. Finally, potential litigation costs from nonsmoking and smoking employees and/or customers could be avoided.[28]

#### *Decreased Cleaning and Maintenance Costs*

A smoke-free business may have lower cleaning and maintenance costs as a result of smoke-free policies. As summarized by Javitz and colleagues,[146] as of 2005, the additional smoking-related costs for housekeeping and maintenance per 1,000 square feet in workplaces that allow smoking ranged from US$ 305 for warehouse space to US$ 728 for office space, compared to workplaces that were completely smoke free. Mudarri[147] estimated that adoption of a proposed comprehensive national smoke-free policy in 1994 would have reduced building operations and maintenance costs for U.S. businesses by US$ 4 billion to US$ 8 billion per year.

#### *Lower Insurance Premiums*

Studies have shown that individual smokers and workplaces that allow smoking incur higher insurance costs. For example, Penner and Penner[148] estimated that, for one large U.S. employer, average health care insurance premiums for employees who smoked were about 50% higher than for nonsmokers. Javitz and colleagues[146] estimated that fire insurance costs caused employer losses of

US$ 11–21 per smoker annually (in 2005 dollars adjusted for the Consumer Price Index), while Parrott and colleagues[149] concluded that the fire insurance costs attributable to smoking in Scottish workplaces are approximately £5 million annually. Similarly, the Conference Board of Canada[150] estimated that smoking increases life insurance premiums by CA$ 75 per smoking employee; Javitz and colleagues[146] estimated that it would cost an additional US$ 30 per year to provide US$ 25,000 in life insurance for a smoker.

### *Increased Worker Productivity and Decreased Absenteeism*

Smoke-free policies may result in improved health and reduced absenteeism among nonsmoking employees, lower health care costs to employers, and increased productivity. Smoke-free policies may also decrease absenteeism indirectly by facilitating smoking cessation.[28] Many studies show that smokers are absent from work more frequently than nonsmokers. In Sweden, Lundborg[151] estimated that smokers were absent between 7.7 and 10.7 additional days each year compared to nonsmokers. An Australian study found that, in 1989-1990, male smokers were 66% more likely to be absent, and female smokers were 23% more likely to be absent than their never smoking counterparts.[152] Parrott and colleagues[149] estimated that absenteeism among Scottish smokers reduced productivity by nearly £46 million, while productivity losses due to premature death caused by smoking totaled more than £500 million. The economic and productivity impact of smoking for countries at all income levels is discussed in detail in chapter 3.

Because smokers may take more break time than their nonsmoking colleagues, policies that require workplaces to be smoke free could increase worker productivity. Javitz and colleagues[146] estimated that productivity is decreased by 4–30 minutes per day due to on-the-job smoking breaks. Based on similar estimates, the Conference Board of Canada[153] concluded that smoking breaks cost Canadian employers an average of CA$ 3,053 in 2005.

### Impact of Smoke-Free Policies on Government Costs and Revenues

As this chapter has described, exposure to SHS imposes substantial costs on nonsmokers, governments, and society. Governments that enact smoke-free policies are likely to benefit from potential savings in health care costs.[25–27] On the other hand, governments that enact smoke-free policies will incur costs related to implementing and enforcing these laws and, to the extent that smoke-free policies reduce cigarette consumption, will receive less tobacco tax revenue. The net effect on government finances will depend on the cigarette tax rate, the decrease in consumption attributable to the smoke-free policies, how monies previously spent on tobacco are reallocated throughout the economy, and potential government health care savings due to decreased morbidity and mortality.

## Smoke-Free Policies: Cost-Effectiveness

Numerous studies have examined the effectiveness of smoke-free policies in relation to health outcomes, but relatively little research has explored the cost-effectiveness of smoke-free policies. Two recent reviews of tobacco control programs identified only two studies that addressed the cost-effectiveness of smoke-free policies.[154,155] Ong and Glantz[27] examined the cost-effectiveness of a statewide smoke-free workplace policy in Minnesota. They conducted a one-year simulation and estimated that a smoke-free workplace policy generated 10,400 quitters at a cost of about US$ 800 per quitter, or US$ 500 per quality-adjusted life-year. Using a simulation model, Mudarri[147] examined the potential benefits and

costs of a proposed U.S. national smoke-free environment act to restrict or ban smoking in public buildings; they estimated societal net benefits in the range of US$ 42 billion to US$ 78 billion.

Two studies have examined the cost-effectiveness of smoke-free policies in low-income countries. Higashi and colleagues[156] examined the cost-effectiveness of four tobacco control interventions, including smoking bans in public places and worksites, in Viet Nam, a low-income country with very high smoking rates among men. The modeling of the costs of the smoke-free intervention included initial investment in passing legislation, mass media advocacy in the first year, production of nonsmoking signs in different forms in the first and sixth years, 5 years of ongoing management, and 10 years of law enforcement activities. The implementation of effective smoking bans in both public places and worksites, relative to the status quo, was found to avert the loss of approximately 3.7 million disability-adjusted life-years, and bans in both public and workplaces were found to be cost-effective.

Donaldson and colleagues[157] investigated the cost-effectiveness of implementing a complete ban on smoking in public places in the Indian state of Gujarat relative to the existing partial ban. Costs of implementation as well as direct medical costs associated with smoking were included. Using a societal perspective and a 10-year time horizon, this study found that, after one year, a complete ban in Gujarat would avert 17,000 AMIs and gain 438,000 life-years. The authors concluded that a complete ban is a cost-saving alternative to the existing partial ban.

Lastly, a WHO study of the cost-effectiveness of five interventions to reduce tobacco use found that smoke-free policies were cost-effective in all WHO subregions (average cost-effectiveness ranged from 18.70 to 150.90 International dollars per healthy life-year gained, based on unpublished calculations from the WHO CHOICE model, 2016). For additional information on CHOICE model findings, see chapter 17.

## Summary

SHS exposure is an important cause of disease and death among both children and adults, and imposes substantial external costs on individuals, governments, and societies. Key information failures, including inadequate public knowledge of the health hazards of SHS exposure and inefficiencies in the tobacco market, provide an economic rationale for governments to intervene to reduce the harms caused by SHS exposure.

Increasingly, national and subnational jurisdictions are adopting comprehensive smoke-free laws in order to eliminate the negative health effects of SHS exposure on the population. Article 8 of the WHO FCTC requires Parties to the treaty to adopt and implement effective measures to protect people from exposure to tobacco smoke in indoor workplaces, indoor public places, public transportation, and, as appropriate, other public places. The guidelines for Article 8 provide practical guidance for countries to enact and implement smoke-free policies, and stress that smoke-free legislation should be simple, clear, and enforceable and should involve civil society as an active partner. Despite recent progress, much of the world's population continues to be exposed to SHS in the workplace, in public places, or in the home. Additionally, in many countries smoking is still permitted in hospitals and other health care settings, a situation that is particularly important to address because health care professionals and health care workplaces often serve as examples for other professions and settings. Around the world, the tobacco industry has been a key factor impeding the enactment of comprehensive smoke-free laws,

because these laws work to reduce tobacco use prevalence and consumption and decrease its social acceptability, and thus pose a serious threat to the tobacco industry.

Abundant evidence conclusively demonstrates that the implementation of comprehensive smoke-free policies improves the public's health. Hospitality industry workers, because of the intensity and duration of their exposure, often experience the most immediate benefits of smoking restrictions, including rapidly improved respiratory and cardiac health. Positive health outcomes associated with smoke-free policies are observable immediately and are sustained over time. Research also shows that smoke-free homes yield a double dividend: they reduce exposure to SHS for nonsmoking family members, and they lead to increased cessation rates among smokers.

Partial restrictions on smoking may reduce SHS exposure but are insufficient to fully protect the health of exposed individuals. In contrast, comprehensive smoke-free policies are far more effective in reducing exposure to SHS and improving health outcomes, and are also easier to implement and enforce.

A consensus across much of the literature, particularly among those studies that adhere to rigorous methodological criteria, is that implementation of smoke-free policies does not cause negative economic effects for businesses, including hospitality venues such as bars and restaurants. Rather, benefits may accrue to businesses, including improved productivity, reduced absenteeism, and lower employee health care costs.

The current research literature is largely focused on the experience of implementing smoke-free laws in HICs. Fewer studies have been conducted in LMICs, where smoke-free laws have generally been enacted more recently. With the recent proliferation of smoke-free policies throughout the world, it is expected that more studies will be conducted in LMICs, which will increase our understanding of how best to implement laws in these countries and document their health and economic impact.

## Research Needs

The WHO FCTC requires Parties to the treaty to implement comprehensive smoke-free policies; the experience of HICs in implementing these laws has been extensively studied. As these policies become more common in LMICs, additional research could help determine how best to maximize the ability of these laws to reduce exposure to SHS, improve health outcomes among nonsmokers, and reduce smoking. Studies should also assess the economic impact of these laws, both on health care costs and business revenues, particularly for hospitality sector businesses. Exposure to SHS is not limited to workplaces and public places; significant exposure—especially of infants and young children—also occurs in the home, including multiunit housing settings, in HICs and LMICs. Research is needed to enhance understanding of how best to encourage individuals, landlords, and governments to ban smoking in these private indoor settings, and to assess the health and economic consequences of these bans. The question of how comprehensive smoke-free policies affect overall government revenues remains an area for further study. Finally, as smoking bans in outdoor locations such as beaches, parks, and other settings become more common, it will be important to understand the health and economic implications of these measures.

## Conclusions

1. Comprehensive smoke-free policies reduce exposure to secondhand smoke; compliance with these policies is generally high, and public support for them is strong.
2. Comprehensive smoke-free policies in workplaces reduce active smoking behaviors including cigarette consumption and smoking prevalence.
3. Overall, rigorous empirical studies (largely from high-income countries) using objective economic indicators find that smoke-free policies do not have negative economic consequences for businesses, including restaurants and bars, with a small positive effect being observed in some cases. Findings from the limited existing research conducted in low- and middle-income countries are generally consistent with those from high-income countries.
4. Around the world, the tobacco industry is the greatest obstacle to enacting comprehensive smoke-free policies, often by arguing, despite strong evidence to the contrary, that smoke-free policies harm businesses.
5. Other economic benefits of smoke-free policies for businesses include increased worker productivity, health care savings, reduced cleaning and maintenance costs, and reduced insurance costs.

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## Section 4
## Non-Price Determinants of Demand

# Chapter 7
# The Impact of Tobacco Industry Marketing Communications on Tobacco Use

# Chapter 7
# The Impact of Tobacco Industry Marketing Communications on Tobacco Use

The tobacco industry employs a wide array of communications tools to market its products to the public, from mass media advertising, sponsorship, sales promotions, and packaging, to Internet and new media strategies. Researchers have examined the influence of industry communications strategies on tobacco use, particularly among young people, as well as policy interventions to restrict tobacco industry marketing. Topics covered in this chapter include:

- Econometric studies of the impact of tobacco marketing on tobacco use
- Econometric studies of tobacco marketing bans and related policies
- Population-level cross-sectional and longitudinal studies on consumer response to tobacco marketing, particularly among young potential smokers and current smokers
- The impact of other tobacco marketing efforts such as sponsorship, loyalty incentives, and tobacco advertising and placement in entertainment media.

An extensive body of research shows that tobacco marketing and tobacco use are causally linked, and that comprehensive marketing bans are effective in reducing tobacco use. Findings from this research support the implementation of the World Health Organization Framework Convention on Tobacco Control, which, under Article 13, legally binds Parties to the treaty to implement a comprehensive ban on tobacco advertising, promotion, and sponsorship, or restrictions for Parties that are not in a position to implement a comprehensive ban due to their constitution or constitutional principles.

## Chapter Contents



## Figures and Tables

## Introduction

The term "tobacco marketing communications" encompasses the diversity of tobacco industry strategies to communicate with both current and potential customers, including conventional mass media advertising, sponsorship, sales promotions, packaging, and a range of other activities. Since the 1920s, critics have argued that the tobacco industry has tried to "transform the school girls, the growing boys, and the youth of the country into confirmed cigarette addicts, regardless of established medical and health findings."[1,p.2991] Concerns about tobacco industry marketing have sparked research in many fields, including economics, public health, psychology, sociology, and marketing. Findings from this research, in turn, have led governments to implement restrictions on tobacco marketing communications.

As this chapter will describe, a wealth of research demonstrates a causal link between tobacco marketing and tobacco use,[2–8] which has led a growing number of governments, including many low- and middle-income countries (LMICs), to ban tobacco marketing. Indeed, the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC) explicitly recognizes that a "comprehensive ban on advertising, promotion and sponsorship would reduce the consumption of tobacco products,"[9,p.11] Article 13 of the WHO FCTC (Tobacco advertising, promotion, and sponsorship) must be implemented within 5 years after the Convention enters into force for that Party. The guidelines for implementing Article 13 assist Parties to the treaty in introducing and enforcing comprehensive bans on tobacco advertising, promotion, and sponsorship (TAPS); for those Parties that are not able to undertake comprehensive bans because of their constitutions or constitutional principles, the guidelines assist them with applying restrictions that are as comprehensive as possible.[9,10]

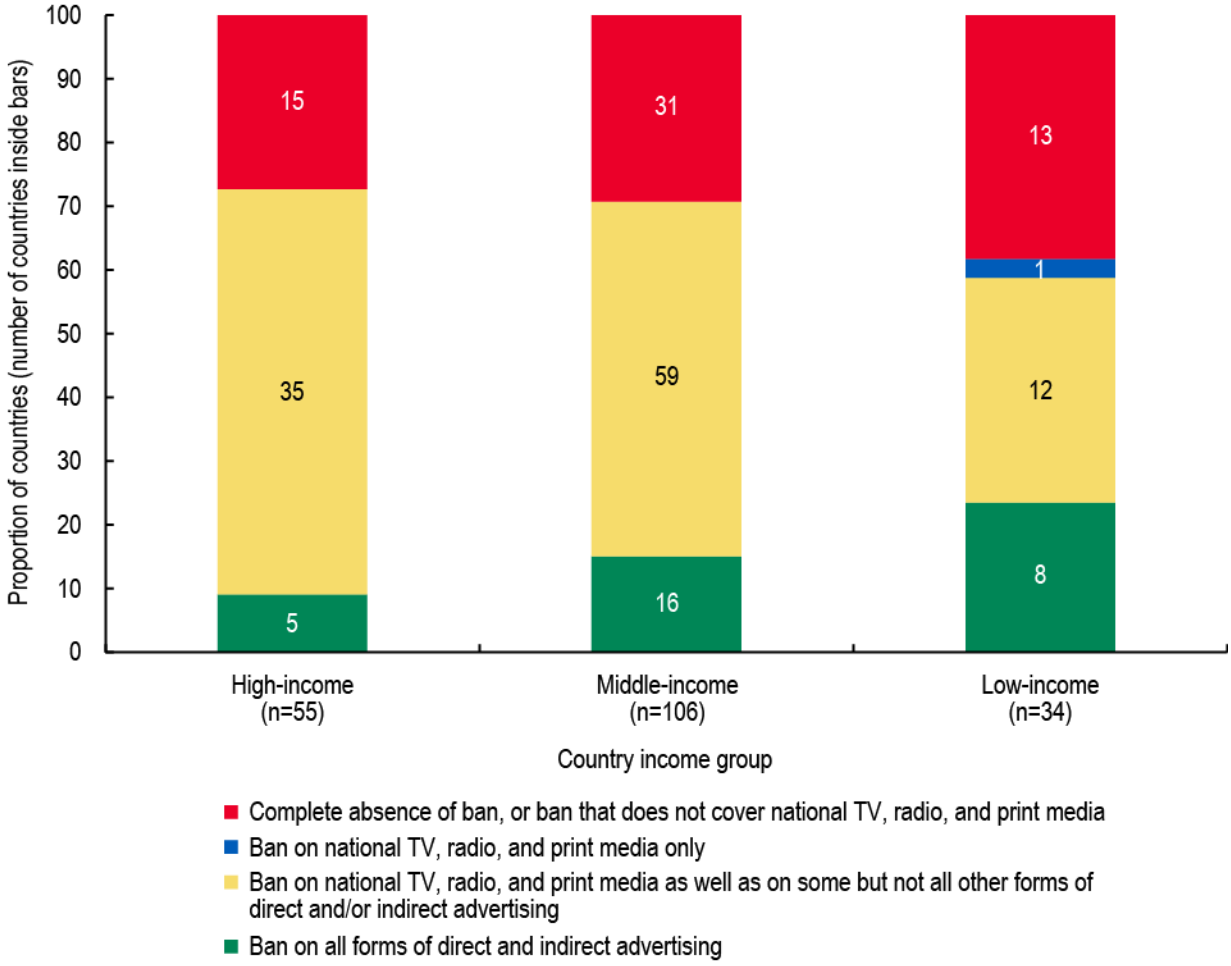
Comprehensive bans on TAPS are a cost-effective means of tobacco control. WHO has concluded that TAPS bans are one of the "best-buy" measures to reduce tobacco use—that is, these bans accrue the most benefit for the lowest cost. This conclusion was based on analyses of data from LMICs which demonstrated that average annual cost of all best-buy tobacco control interventions (which include TAPS bans) in LMICs was 0.12 U.S. dollars (US$) per person annually (in 2012 US$).[11]

This chapter first discusses implementation of restrictions on tobacco marketing around the world. It then examines the findings of four broad types of research into the relationship between tobacco marketing communications and tobacco use and related outcomes: (1) econometric studies that assess the influence of tobacco marketing on tobacco consumption; (2) econometric studies that examine the effects of tobacco marketing bans; (3) cross-sectional and longitudinal consumer studies correlating advertising awareness and appreciation with smoking knowledge, attitudes, and behavior; and (4) studies that assess the effect of indirect forms of marketing communications (e.g., sponsorship, loyalty programs, point-of-sale displays, and product placement in entertainment media). This chapter builds upon the comprehensive reviews contained in *The Role of the Media in Promoting and Reducing Tobacco Use*,[3] Monograph 19 in the Tobacco Control Monograph series produced by the National Cancer Institute (NCI) of the National Institutes of Health, an agency of the U.S. Department of Health and Human Services; and the U.S. Surgeon General's report *Preventing Tobacco Use Among Youth and Young Adults*.[7] The chapter also highlights more recent research on these topics, especially research conducted in LMICs.

## Global Implementation of Tobacco Marketing Restrictions

As shown in Figure 7.1, the majority of countries across income groups have adopted restrictions on TAPS. Although comprehensive bans on TAPS have been proven to reduce tobacco consumption in countries regardless of income level, only 29 countries, with 832 million people (12% of the world's population), had passed a comprehensive ban as of 2014.[12] Of these 29 highest achieving countries, 5 are high-income countries (HICs) and 24 are LMICs.

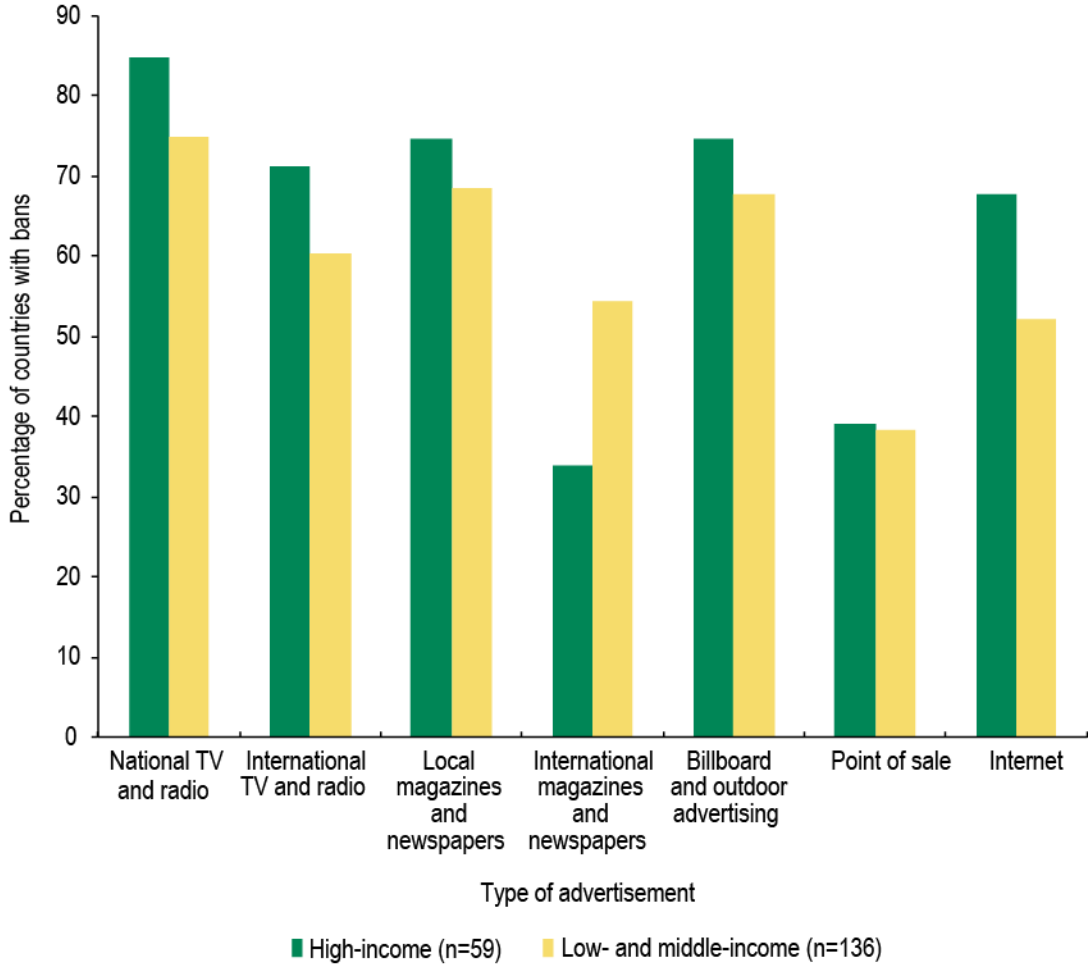
**Figure 7.1 Bans on Advertising, Promotion, and Sponsorship, 2014**




*Source:* World Health Organization 2015.[12]

Figures 7.2 and 7.3 show the extent of bans on various forms of TAPS in both HICs and LMICs (195 reporting countries) in 2014. The Internet is a global forum in which tobacco products can be promoted in a mostly unregulated manner, and as Figure 7.2 shows, Internet advertising and promotion of tobacco are banned in 57% of countries, including almost 70% of HICs.[13] As of 2014, almost 80% of reporting countries banned national radio and television advertising, and 63% banned international radio and television advertising. Most countries also banned tobacco advertising in magazines and newspapers (local, 70%; international, 48%), and on billboards and outdoor advertising (almost 70%). Only about 11% of countries banned the display of tobacco products at the point of sale, despite the fact that 38% banned tobacco advertising at the point of sale.[13,14]

## Figure 7.2 Global Prevalence of Bans on Tobacco Product Advertising, 2014

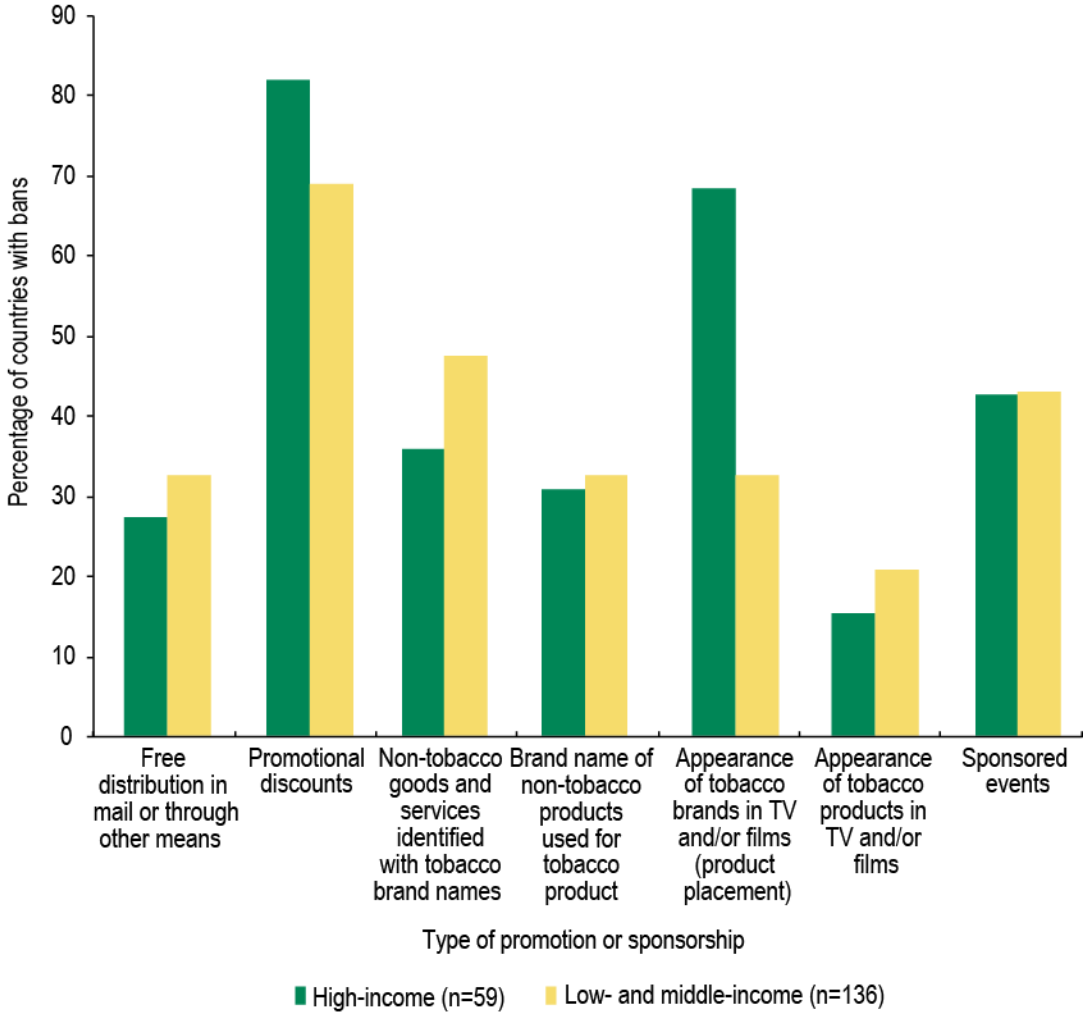



*Source:* World Health Organization 2015.[13]

As of 2014, 43% of reporting countries had adopted bans on tobacco-sponsored events.[15] As shown in Figure 7.3, less than one-third of LMICs and HICs banned the free distribution of tobacco products. Similarly, only 31% of HICs and 32% of LMICs banned non-tobacco products identified with tobacco brand names. About 55% banned tobacco product placement on television and in movies. Less than one-sixth of HICs and one-fifth of LMICs had a ban on the appearance of tobacco products in television and/or movies.[12]

In the United States, federal law prohibits advertising of cigarettes, little cigars, smokeless tobacco, and chewing tobacco on radio and television. This prohibition does not include electronic nicotine delivery systems (ENDS),[16] which are battery-powered devices designed to heat a liquid, typically containing nicotine, into an aerosol for inhalation by the user. ENDS have been advertised on television in the United States since at least 2012,[17] and there is evidence that this advertising is reaching both youth and young adults.[18,19]

**Figure 7.3 Global Prevalence of Bans on the Promotion and Sponsorship of Tobacco Products, 2014**




*Source:* World Health Organization 2015.[15]

## Econometric Studies of the Impact of Tobacco Marketing

Econometric studies employing aggregate data to examine the effects of tobacco marketing on overall sales of tobacco products have produced mixed findings, in part because of methodological differences between studies. Although econometric studies face inherent challenges in disaggregating specific outcomes in response to tobacco marketing, several have found a significant positive relationship between tobacco marketing and tobacco sales.

Most econometric studies have assessed the effect of cigarette marketing expenditures on aggregate demand, typically represented by cigarette sales, and controlling for other variables including price and income. Econometric studies are complex, and these models try to account for a large number of other social, political, and economic factors which may have a confounding effect on consumption, as well as addressing the short- or long-term effects of marketing on sales.

The first econometric studies of the impact of advertising on tobacco use were conducted in the United States. Hamilton[20] concluded that the 1971 U.S. ban on broadcast cigarette advertising probably raised cigarette consumption because it also eliminated the anti-smoking advertising that had been required by the Fairness Doctrine. Schmalensee[21] examined annual data on cigarette sales and advertising expenditures from 1955 through 1967 to assess the influence of advertising on demand, but findings from this study were mixed and inconclusive.

McGuinness and Cowling[22] conducted one of the first and most influential studies of the impact of cigarette advertising in the United Kingdom of Great Britain and Northern Ireland. They used data from 1957 to 1968 to model the aggregate demand for cigarettes in terms of price, income, and advertising (measured in terms of "messages" instead of expenditure). Their findings suggested that advertising led to a statistically significant increase in cigarette sales and that health publicity reduced the effect of cigarette advertising.

The numerous studies conducted since these important early works have been divided almost equally between those that found no statistically significant effect of advertising and those that found advertising to have a positive and significant effect on tobacco consumption.[3,23,24]

Econometric analysis of cigarette advertising's effects has serious limitations. Chapman[25] noted the inability of this type of study to examine all the forms of promotion used by the tobacco industry, such as loyalty programs or point-of-sale promotions, because disaggregated expenditure data are not always available. Chapman also questioned the assumptions of advertising effects inherent in this type of approach. Econometric analysis examines only the effects of advertising on overall sales (aggregate data), and does not address advertising's important influence on smoking-related cognition and beliefs. In addition, these studies cannot examine effects on vulnerable population subgroups (e.g., young people, women, ethnic minorities, or the poor). Therefore, Chapman argued that a more relevant analysis would deploy qualitative and quantitative methodologies to examine consumers' *use* of marketing communications. Saffer[26] supported this view, arguing that because (where allowed) cigarettes are heavily advertised products, the marginal effect of advertising is very small, as diminishing marginal returns have already set in. Along with the high level of aggregation of advertising expenditure data, very little variation remains to correlate with consumption data in time series studies; therefore, finding any relationship between advertising expenditure and consumption is unlikely.

## Econometric Studies of Bans on Tobacco Advertising

Most econometric studies of the impact of tobacco marketing bans on tobacco use find a statistically significant negative relationship between relatively comprehensive bans and consumption in HICs. The few studies that have examined the impact of tobacco marketing bans in LMICs, as well as the original analysis conducted for this monograph, confirm the importance of comprehensive versus partial restrictions on tobacco marketing.

Early econometric studies of marketing bans largely focused on the experience of individual countries. For example, Smee and colleagues[27] conducted an analysis of Norway's Tobacco Act of 1975 on per capita consumption, and their findings suggest that the Act decreased demand by between 9% and 16%. Pekurinen[28] studied the effects of Finland's 1977 Act on Measures to Reduce Tobacco Smoking, which included a ban on tobacco advertising and promotion. Analyzing data from 1960 to 1987, this study

concluded that the Act and the anti-tobacco publicity preceding its implementation reduced cigarette demand by 7%.

Cox and Smith[29] were among the first to examine the effects of advertising bans in multiple countries, conducting time series regressions for 15 Organisation for Economic Co-operation and Development (OECD) countries between 1962 and 1980. These authors examined the impact of legislated and voluntary marketing restrictions on tobacco consumption, controlling for price, income, and time trends, and concluded that legislated advertising restrictions were more effective than voluntary agreements. Laugesen and Meads[27] conducted a similar study of the factors affecting demand in 22 OECD countries between 1960 and 1986, using a pooled cross-sectional time series analysis. They found that tobacco advertising restrictions increased in OECD countries since 1973 and were associated with declining tobacco consumption, controlling for rising tobacco prices.

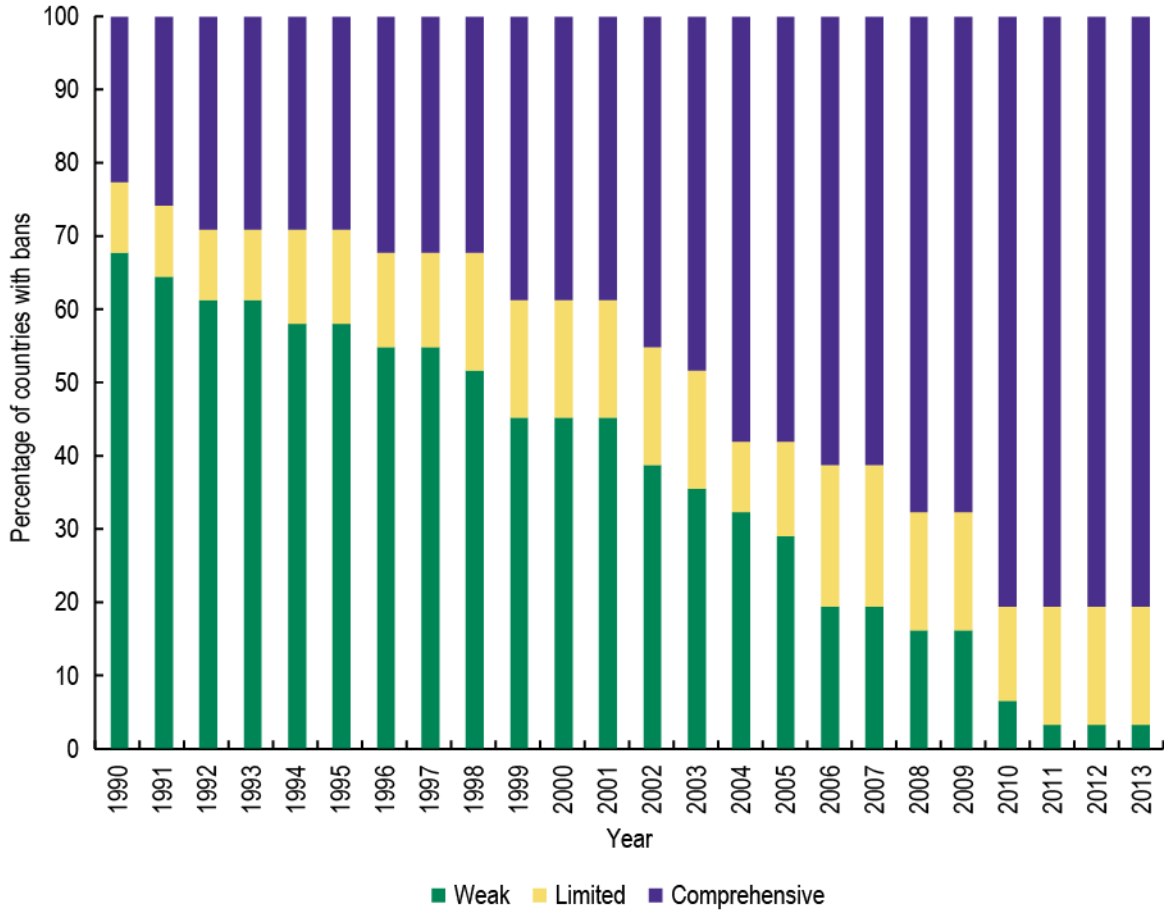
Saffer and Chaloupka[24] examined both comprehensive and partial bans, concluding that a weak or limited set of advertising regulations had little effect on reducing cigarette consumption, whereas a comprehensive ban on tobacco advertising had a significant effect on tobacco use. This study demonstrated the importance of comprehensive advertising bans, rather than restrictions or partial bans that allow tobacco products to be marketed using other methods. Blecher[23] built upon this work by examining advertising bans in LMICs, where they were less prevalent than in HICs. Both comprehensive and limited bans played a role in reducing tobacco consumption in LMICs, although comprehensive bans had a far greater impact than limited bans. Blecher also concluded that advertising bans were more effective in reducing tobacco consumption in LMICs than in HICs.[23]

NCI reviewed the evidence on this topic and concluded that:

> Studies of tobacco advertising bans in various countries show that comprehensive bans reduce tobacco consumption. Noncomprehensive restrictions generally induce an increase in expenditures for advertising in "nonbanned" media and for other marketing activities, which offset the effect of the partial ban so that any net change in consumption is minimal or undetectable.[31,p.281]

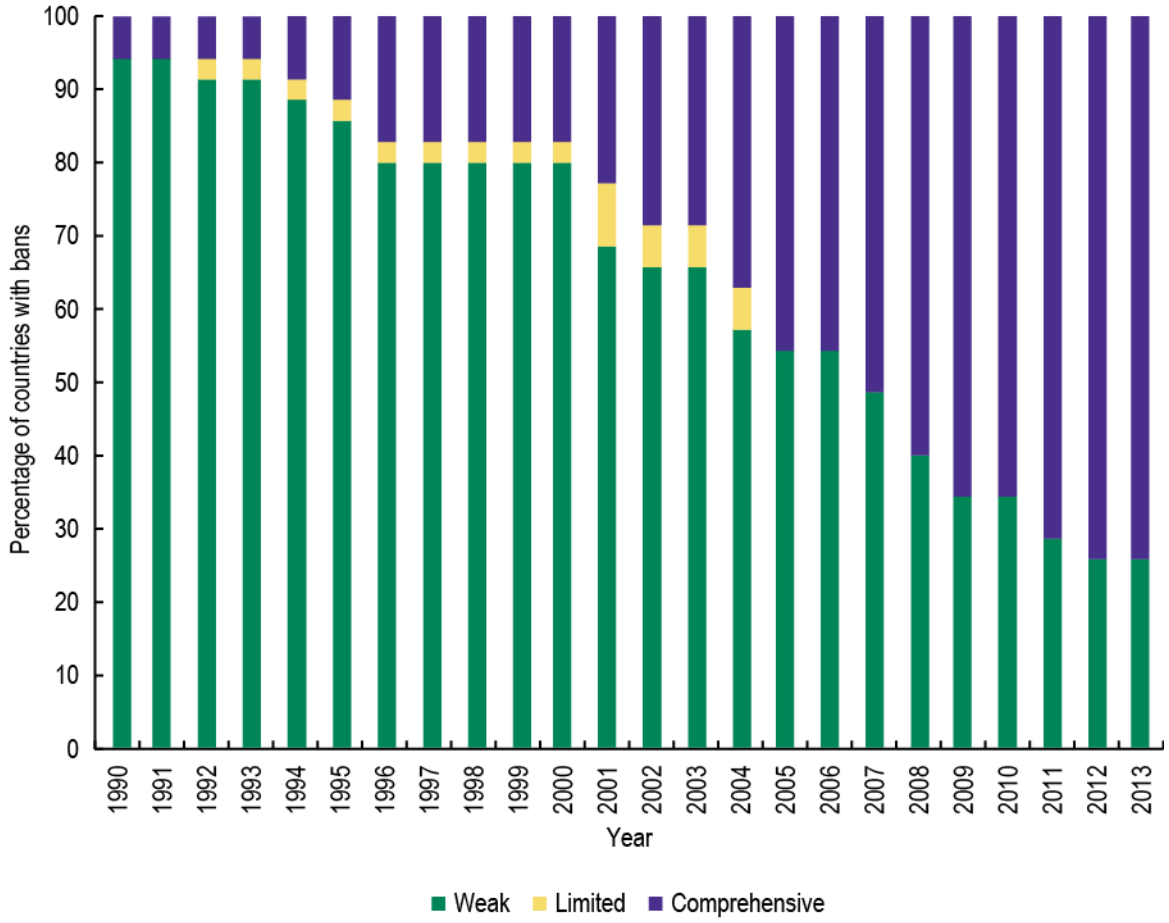
This chapter extends and updates the Blecher analysis[23] using a larger sample of 66 countries (31 HICs and 35 LMICs) and data from more recent years, as well as the sources and methods described in Blecher's 2008 study. Figures 7.4 and 7.5 show the proportion of HICs and LMICs that had weak, limited, and comprehensive advertising bans in place, as defined by Saffer and Chaloupka,[24] between 1990 and 2013. Per capita consumption is modeled as a function of price, income, and advertising bans. The updated analysis used consumption data from 1990 to 2013 from the ERC Group,[32] an independent market research firm, along with cigarette prices from the Economist Intelligence Unit.[33] The price measure reflected the cheaper of two brands: Marlboro (or an equivalent international brand) and the most popular local brand.[34] Per capita gross domestic product, from the World Bank's World Development Indicators, was used as a proxy for income. The convention of using an adult population to calculate per capita tobacco consumption was used, although using the total population provides nearly identical regression parameters.

## Figure 7.4 Weak, Limited, and Comprehensive Tobacco Advertising Bans in High-Income Countries, 1990–2013




*Note:* n=31.
*Sources:* Based on data from ERC Group 1990–2013[32] and Economist Intelligence Unit 1990–2013.[33]

**Figure 7.5 Weak, Limited, and Comprehensive Tobacco Advertising Bans in Low- and Middle-Income Countries, 1990–2013**




*Note:* n=35.
*Sources:* Based on data from ERC Group 1990–2013[32] and Economist Intelligence Unit 1990–2013.[33]

First, pooled estimates were obtained for all 66 countries, including both country- and time-fixed effects. Next, estimates for a subset of the 35 LMICs were obtained, controlling for country-fixed effects. (This method is preferred statistically to the two-way fixed effects obtained using an *F*-test.) Saffer and Chaloupka's[24] definition was used to classify advertising bans as weak, limited, or comprehensive by counting the bans in seven types of media. A ban in five or more media was considered comprehensive, a ban in three or four media was considered limited, and a ban in one or two media was considered weak. The regression results are shown in Table 7.1.

The assessment of data from all 66 countries showed that comprehensive bans on tobacco advertising had a significant negative effect on consumption, but limited bans had no statistically significant effect. The same result was found when only LMICs were considered. The magnitude of the comprehensive ban coefficients indicates that advertising bans reduced tobacco consumption by 28.3% in LMICs and by 11.7% in the full sample of 66 countries (HICs and LMICs).

## Table 7.1 Summary of Regression Results of the Updated Analysis of Tobacco Advertising Bans, 1990–2013

| | Per capita adult tobacco consumption | |
|---|---|---|
| Variables | All countries Model 1 β (SE) | Low- and middle-income countries Model 1a β (SE) |
| Income (ln) | 0.538 (0.041)* | 0.403 (0.048)* |
| Price | | |
| Minimum (ln) | –0.151 (0.014)* | –0.148 (0.019)* |
| Advertising ban | | |
| Limited (ln) | –0.013 (0.028) | –0.093 (0.067) |
| Comprehensive (ln) | –0.117 (0.020)* | –0.283 (0.030)* |
| n | 1,511 | 785 |
| $R^2$ | 0.923 | 0.927 |

*Statistically significant at the 0.01 level.
*Notes:* Country-fixed effects, year-fixed effects, and a constant are included in the model with all countries, while only country-fixed effects are included in the model with low- to middle-income countries. No variables were statistically significant at the 0.05 or 0.10 level.
*Sources:* Based on data from ERC Group 1990–2013[32] and Economist Intelligence Unit 1990–2013.[33]

These results confirm previous studies showing that comprehensive advertising bans reduce tobacco consumption, particularly in LMICs, where such policies appear to be more effective than in HICs. In contrast to the Blecher[23] study based on data for a smaller number of LMICs over a shorter time period, these results indicate that a less than comprehensive ban does not significantly reduce consumption.

Another group of studies examines how tobacco advertising bans exert their effects on tobacco consumption via their impact on producer behavior. Tremblay and Tremblay[35] theorized that, in addition to directly affecting demand, advertising bans reduce competition between individual tobacco companies. As a result, prices increase, thereby reducing consumption, and the increased market power that results from the ban leads to increased profits for tobacco companies. Farr and colleagues[36] provide empirical support for this theory by examining the impact of the 1971 U.S. Broadcast Advertising Ban. By estimating the demand equation and supply relationship simultaneously, they found that eliminating the Broadcast Advertising Ban would reduce the equilibrium price by 9.9%, increase cigarette production by 8.9%, and lower industry profits by 18.9%. Iwasaki and colleagues[37] supported this conclusion, adding that the advertising restrictions in the Master Settlement Agreement also reduced consumption in the United States by reducing price competition. Tan[38] drew a similar conclusion, using a dynamic oligopoly model in a game theoretic framework, finding that prices would rise by 11% in the long run as a result of the increased market concentration and reduced price competition created by strong advertising restrictions. Gallet[39] found that the effects of advertising restrictions on market power varied across U.S. states, with little effect in some states but sizable effects in others due to differences in estimated state-level price elasticities of demand.

The tobacco industry has frequently argued that tobacco marketing has little or no influence on nonsmokers, especially youth. Box 7.1 below presents key tobacco industry arguments, as derived from the testimony of industry witnesses during litigation. The industry has employed these and other

arguments to oppose bans on tobacco marketing in order to protect and promote its own interests.[40] As in other industry domains, this has sometimes included supporting the work of academicians without disclosing their relationship with industry. For example, Davis[42] used previously internal tobacco industry documents to show that British American Tobacco ghost-wrote a report for the International Advertising Association on tobacco advertising bans and tobacco use, and that the Tobacco Institute (the trade and lobbying association for the U.S. tobacco industry until it was dissolved in 1998[41]) helped arrange for an academician to present these findings to the U.S. Congress and the media.

These and other findings underlie the WHO FCTC's recognition that the Parties "need to be alert to any efforts by the tobacco industry to undermine or subvert tobacco control efforts and [need] to be informed of activities of the tobacco industry that have a negative impact on tobacco control efforts."[9,p.2] Article 5.3 of the Convention requires that "in setting and implementing their public health policies with respect to tobacco control, Parties shall act to protect these policies from commercial and other vested interests of the tobacco industry in accordance with national law."[9,p.7] The WHO FCTC Conference of Parties has also adopted guidelines for Article 5.3, with specific recommendations to be implemented without prejudice to the sovereign right of the Parties to determine and establish their tobacco control policies to the extent possible, in accordance with their national law.[9]

### Box 7.1: Tobacco Marketing's Influence and Tobacco Marketing Bans: Arguments Posed by the Tobacco Industry

The Tobacco Deposition and Trial Testimony Archive (DATTA) study, funded in part by NCI, collected and analyzed deposition and trial transcripts to determine themes put forth by witnesses for the tobacco industry on a variety of topics.[164] Industry witnesses' statements on the role of tobacco advertising and promotion were among the topics analyzed. Goldberg, Davis, and O'Keefe[165] summarized the major themes put forward by witnesses who testified on behalf of the tobacco industry (including three academic experts, six senior tobacco company executives, and one advertising consultant) on tobacco advertising and promotion, together with counterarguments to these themes, based on the peer-reviewed literature and other sources. Highlights of their findings are as follows:

**Industry theme 1:** Tobacco advertising has a relatively weak "share of voice" in the marketing environment and is a weak force in affecting smoking behavior.

*Counterarguments: The tobacco industry has been a major advertiser in the United States and around the world. Based on spending patterns, the tobacco industry regards advertising as highly persuasive and effective in influencing consumer behavior. Price promotions are highly influential, especially for adolescents. Tobacco advertising combines with product attributes to help shape the consumer's experience of the product.*

**Industry theme 2:** Tobacco advertising and promotion do not create new smokers, expand markets, or increase total tobacco consumption.

*Counterarguments: Abundant scientific studies as well as the conclusions of several authoritative bodies, including the Institute of Medicine (U.S. [IOM]), the U.S. Surgeon General, and the Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, (in its 1996 rule-making on the sale and distribution of cigarettes and smokeless tobacco), have determined that advertising increases the number of smokers, in particular among young people.*

**Industry theme 3:** The tobacco industry does not target, study, or track youth smoking.

*Counterarguments: The tobacco industry's own internal documents directly contradict these assertions, and demonstrate that the major tobacco companies were concerned about the smoking behavior of youth, studied them, and targeted them; the sheer amount of advertising ensures that young people will be exposed.*

**Industry theme 4:** Tobacco advertising and promotion do not cause smoking initiation by youth; or, advertising plays a minor role compared to the powerful influence of smoking by peers, siblings, and parents.

*Counterarguments: "The U.S. Surgeon General, the IOM, and the FDA, respectively, have concluded that cigarette advertising and teenage smoking are [causally] linked."*[165,p.iv63] *Evidence on which this conclusion was based was derived from: studies that documented youth exposure to tobacco advertising and promotion, studies that involved experimental manipulation of exposure to cigarette marketing, and studies that showed associations between cigarette advertising and brand preference among youth. Evidence was also based on cross-sectional and longitudinal studies that found that youth smoking status and initiation are correlated with awareness, recognition, and approval of tobacco advertisements and promotions; advertising and interpersonal influences (e.g. peers, siblings, parents) operate synergistically; and previously internal documents show that this is recognized by the tobacco industry.*

**Industry theme 5:** Tobacco companies and the industry adhere closely to relevant laws, regulations, and industry voluntary codes.

*Counterarguments: Several studies have documented poor compliance with the various versions of the Cigarette Advertising and Promotion Code. R.J. Reynolds and other cigarette companies violated provisions of the 1998 Master Settlement Agreement and have shifted their marketing activities to mitigate its effects.*

As Goldberg and colleagues conclude:

> Tobacco industry-affiliated witnesses have marshalled many arguments to deny the adverse effects of tobacco marketing activities . . . [but] effective rebuttals to these arguments exist. . . . Federal Judge Gladys Kessler, in an encyclopaedic decision issued on 17 August 2006 in a civil lawsuit waged against the industry by the U.S. Department of Justice, chronicled this evidence in a lengthy section under the heading, "From the 1950s to the present, different defendants, at different times and using different methods, have intentionally marketed to young people under the age of twenty-one in order to recruit 'replacement smokers' to ensure the economic future of the tobacco industry."[165,p.iv64]

## Population-Level Studies of Tobacco Advertising

Additional evidence on the effects of tobacco marketing on tobacco use comes from studies based on population surveys, particularly surveys of young people, who are most at risk for smoking initiation. This literature includes: (1) cross-sectional studies on the associations between advertising and smoking behavior at a point in time, and (2) longitudinal cohort studies that follow a specific population group across time. In theory, if advertising influences smoking, then smokers should be more aware and appreciative of such advertising than their nonsmoking counterparts. This logic can be expanded to cover knowledge and attitudes about tobacco as well as behavior.

Cross-sectional studies typically demonstrate a relationship between awareness of or receptivity to tobacco advertising and tobacco use; alone, these types of studies cannot establish causal relationships. In comparison, longitudinal cohort studies can track the relationship between advertising

exposure or awareness and smoking outcomes in individuals over time, and are better suited to identify causal relationships. Both cross-sectional and longitudinal cohort studies have found consistent and significant correlations between advertising awareness and appreciation and between current and future pro-smoking knowledge, attitudes, and behavior.

## Cross-Sectional Studies

The NCI review[31] of evidence on the effects of exposure to tobacco marketing on adolescents' smoking identified cross-sectional studies from both HICs and LMICs. This review concluded that "the vast majority of cross-sectional studies find an association between exposure to cigarette advertising, measured in numerous ways, and adolescent smoking behavior, measured in numerous ways, indicating a robust association."[31,p.280] Highlights of the findings are provided below; NCI Monograph 19 provides a more detailed discussion.[3]

### *Awareness, Recognition, and Attitudes Toward Advertising*

The NCI review[31] identified 23 cross-sectional studies that measured the relationship between adolescents' self-reported exposure to advertising, awareness of cigarette advertising, or recall of specific tobacco advertisements and smoking behaviors or intentions. Except for one, all studies were conducted in HICs and in People's Republic of China, Hong Kong Special Administrative Region. Eight of the 23 studies reported a significant positive relationship between exposure, awareness, or recall and susceptibility to smoking or positive intention to smoke. Additionally, the 23 studies reported 17 significant positive relationships between measures of exposure recall/awareness and smoking status. Five studies reported finding no significant relationship; none reported finding a negative relationship. One study included in the NCI's review was conducted in an LMIC; this study of Gambian adolescents reported no significant relationship between advertising exposure and smoking.[43]

Research conducted mostly in the 1990s demonstrated that young people who smoke tend to smoke the most heavily advertised brands, and that these brands dominate sales to underage youth.[44,45] For instance, Pollay and colleagues[46] found that teenagers are approximately three times more sensitive than adults to advertising (as measured by brand choice strongly related to brand advertising). Furthermore, the advertisements most popular with young people (i.e., most likely to be recalled and liked) were for those brands most likely to be smoked by young people.[45,47] NCI[31] identified 12 studies that assessed adolescents' recognition of tobacco brands or products. All but one study found a positive relationship between brand recognition and smoking status. Emri and colleagues[48] analyzed recognition of brand names and logos for cigarettes and other popular consumer products in a sample of Turkish school youth ages 7–13. This study found high recognition of tobacco brands, but it did not find a relationship between recognition of tobacco brands/logos and smoking status of the youth surveyed.

Additional cross-sectional studies conducted in LMICs have also found positive correlations between tobacco advertising and smoking behavior. For example, a cross-sectional, self-report study by Stigler and colleagues[49] found that exposure of youth from two Indian cities to tobacco advertising was significantly related to increased tobacco use among students in the 6th grade (mean age 11.2 years), but not among students in the 8th grade (mean age 12.9 years).

Some studies have focused on youth exposure to advertising in particular media. A study of adolescents from Blantyre City, Malawi, found that heavy exposure to tobacco advertising in magazines and exposure to tobacco brands on television were associated with current tobacco use.[50] A study by

Ramezankhani and colleagues[51] reported that often or always viewing cigarette commercials on television or at sporting competitions was associated with greater odds of smoking among students in Tehran, Iran. A study of 13- to 15-year-old schoolchildren in southern Brazil found that tobacco advertising exposure and possessing an item with a cigarette logo on it were associated with greater odds of cigarette smoking.[52]

Kostova and colleagues[53] assessed self-reported awareness of cigarette advertising, as measured by the fraction of youth in each school participating in the survey who reported seeing print cigarette advertising around the time of the survey. In their analysis of Global Youth Tobacco Survey (GYTS) data from 17 LMICs that had conducted the survey multiple times through 2006, these researchers found that greater exposure to print advertising was associated with higher youth smoking prevalence. In a subsequent study using GYTS data from 19 countries, Kostova and Blecher[54] used instrumental variables to account for the likelihood that young smokers would be more aware of cigarette advertising and, as a result, report greater exposure; these models also controlled for anti-smoking sentiment and cigarette prices. The authors concluded that the positive association between smoking and advertising exposure was largely due to the greater propensity of smokers to report seeing advertising rather than a direct causal effect of advertising on smoking.

Agaku and colleagues[55] analyzed survey data from the 2007-2008 GYTS conducted in 20 LMICs, representing the six WHO Regions. These authors found high levels of reported exposure to pro-tobacco advertising on television (ranging from 48.7% in Togo to 91.7% in the Philippines) and from other sources. In 7 of the 20 LMICs, exposure to two or more sources of pro-tobacco advertising was associated with significantly greater odds of smoking among the youth surveyed.

### *Receptivity*

Researchers have developed the concept of young people's "susceptibility to smoking," meaning not having made a firm commitment *to avoid* starting to smoke.[56] Research has demonstrated that many youth are receptive to cigarette advertising, and that receptivity to advertising helps to predict their smoking attitudes and behavior, including their susceptibility to smoking. The NCI review[31] identified 18 studies of receptivity to cigarette marketing, including owning or willingness to use cigarette promotional items; all of these studies found that receptivity to cigarette marketing was significantly related to smoking status or smoking susceptibility. A similar conclusion was reached by Kaufman and colleagues[57] in a nationally representative cross-sectional survey of U.S. adolescents in grades 9–12. Controlling for family and social influences, these authors found that alternative measures of receptivity to tobacco advertising were significantly associated with being susceptible to smoking, experimentation, and regular smoking. Similarly, in school-based surveys of adolescents in Germany, appreciation of tobacco advertisements (assessed with the question "do you think that cigarettes and tobacco advertisements are well-made") was strongly associated with smoking intensity.[58]

In a 2014 study, Madkour and colleagues[59] analyzed GYTS data from five North African countries (Libya, Morocco, Tunisia, Egypt, and Sudan). Almost all (98%) adolescents had reported exposure to one or more types of advertising or promotion, and both advertising and promotion were significantly and positively associated with susceptibility to initiating cigarette smoking among both boys and girls. Similarly, a study conducted among vocational high school students in Wuhan, China, documented a significant association between tobacco media receptivity (assessed using the Adolescent Tobacco Media Receptivity Scale) and initiating and continuing cigarette smoking.[60] In addition, a cross-sectional

study among secondary school students in Argentina analyzed tobacco marketing exposure at the point of sale together with marketing receptivity; the study's four-stage index of marketing receptivity ranged from neither exposure nor ownership of branded tobacco merchandise to ownership of branded merchandise.[61] The authors found that among never smokers, marketing receptivity was positively associated with susceptibility to smoking, positive expectances of smoking, and willingness to try a specific brand.

### Longitudinal Studies

The NCI review[31] identified 16 longitudinal studies of the relationship between various measures of exposure to cigarette marketing and adolescents' smoking or susceptibility to smoking. Nine studies were conducted in the United States, three in the United Kingdom, and two each in Australia and Spain. The NCI review found that a significant link between exposure to tobacco advertising and later smoking behavior was found in all but two studies,[62,63] after other variables, including social influences, were controlled for. In the latter two studies, "The link just missed statistical significance at the $p < .05$ level."[31,p.258] The overall conclusion of the NCI review was that "strong and consistent evidence from longitudinal studies indicates that exposure to cigarette advertising influences nonsmoking adolescents to initiate smoking and to move toward regular smoking."[31,p.280]

In the studies reviewed by NCI, exposure to tobacco advertising predicted smoking behavior as little as 4 months later and as long as 6 years later. For example, in analyses of a series of weighted surveys of thousands of adolescents in the U.S. states of Massachusetts and California, positive responses to tobacco advertisements predicted movement toward smoking between 3 and 6 years later.[64–67] In a study of 1,390 youth ages 12 and 13 in Northern England, awareness of cigarette brands predicted smoking 4 months later among girls, after controlling for parents' and friends' smoking.[68] In a Spanish sample of 2,356 youth ages 13 and 14, the more tobacco brands participants could identify from billboards around their school, the more likely they were to be regular smokers 18 months later, controlling for demographics and social influences.[69]

More recent studies confirm and extend these findings. For example, a study assessing the relationship between advertising exposure and smoking initiation in German youth ages 10–17 found that those who were in the highly exposed group were more likely than those in the low group to have initiated smoking at follow-up, controlling for covariates.[70] In addition, a longitudinal study by Pierce and colleagues[71] demonstrated that the U.S. Master Settlement Agreement, which limited some advertising practices that target youth, reduced but did not eliminate the proportion of youth who reported they had a favorite cigarette advertisement. Youth who had a favorite cigarette advertisement at baseline in 2003 were 50% more likely to report having smoked by the final follow-up in 2008. Furthermore, after the start of a campaign for a particular cigarette brand aimed at young women, the proportion of girls who reported a favorite cigarette advertisement (regardless of brand) increased by 10 percentage points.[71] Marketing to women is described in Box 7.2 below.

In 2011, the Cochrane Collaboration published the results of their systematic review to determine whether prior exposure to tobacco industry advertising and promotion is associated with future smoking initiation among adolescents.[72] These researchers found that 18 out of the 19 identified longitudinal studies showed a positive, consistent, and specific relationship between exposure to tobacco advertising and adolescent smoking. The review concluded that tobacco advertising and promotion increase the likelihood that adolescents will initiate smoking, based on the strength and specificity of the association,

evidence of a dose–response relationship, consistency of findings from numerous observational studies, timing of the exposure and smoking behaviors observed, and theoretical plausibility of the impact of advertising.[72]

In addition, Arora and colleagues[73] analyzed data from their 2-year longitudinal group-randomized trial in 32 schools in two cities in India (Delhi and Chennai). The study sample consisted of more than 2,700 nonsmoking Indian adolescents (ages 10–16) who were not susceptible to tobacco use. Arora and colleagues found that only 13% of students had never seen any tobacco advertisements. Exposure to tobacco advertisements at baseline was positively associated with progression towards tobacco use at 2-year follow-up in a dose-dependent manner; the association was significant among boys, but not among girls.

### Box 7.2: Marketing to Women

Marketing targeted to various population groups, including men, women, youth and young adults, and others, has long been strategically important to the tobacco industry.[87] As explained in *Women and Smoking: A Report of the Surgeon General,* "women have been extensively targeted in tobacco marketing, and tobacco companies have produced brands specifically for women, both in the United States and overseas."[166,p.527] In North America and Northern Europe, tobacco marketing was first targeted to women in the 1920s and 1930s and contributed to normalizing tobacco use among women.[167,168] Marketing to women is now widespread around the world, including in countries where women's tobacco use is rare.[169] Commonly used marketing themes include independence and autonomy, rebelliousness, glamour and fashion, romance and sex appeal, and health and weight control.[169,170]

Numerous reports and individual studies have raised concern about a potential rise in women's tobacco use in LMICs, where women's tobacco use rates are generally far lower than men's, making them an obvious target for multinational tobacco companies.[166,169,171–174] As Gilmore and colleagues have noted, "the tobacco industry's future depends on increasing tobacco use in low-income and middle-income countries, especially among women and young people, and, contrary to industry claims, tobacco marketing deliberately targets these groups."[175,p.1029] A key challenge going forward will be to avert a rise in smoking among women as current cultural and economic barriers to women's tobacco use fall, in the face of globalization, modernization, and improvements in the status of women.[176]

## Studies of Indirect Tobacco Marketing

Indirect marketing of tobacco products consists of a wide variety of activities, including sponsorship, loyalty programs, product sampling, promotional items or brand sharing, brand stretching, packaging, point-of-sale promotions, and product placement in entertainment media. These sections discuss evidence from the NCI review[3] and other studies.

The WHO FCTC defines tobacco advertising and promotion as "any form of commercial communication, recommendation or action with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly."[9,p.4] The WHO guidelines for creating and implementing comprehensive bans on tobacco advertising, promotion, and sponsorship under Article 13 of the WHO FCTC address these indirect marketing channels and others, including vending machines, price-reducing promotions (discussed in chapter 4), retailer incentive programs, packaging design

features (discussed in chapter 8), product design features (discussed in chapter 10), and cross-border advertising.[10]

The various forms of direct and indirect marketing communications are not intended to operate in isolation. As noted in NCI Monograph 19, "a fundamental theme of the work reviewed here is the great agility of tobacco companies in using a variety of communication channels, strategies, and rhetorical devices to continue to sell tobacco products, frame the public debate on the effects of tobacco use, and influence key stakeholders."[74,p.598] Individual marketing components are part of an integrated plan, so that the whole is greater than the sum of its parts. Research conducted in the United Kingdom demonstrates this cumulative effect; it has found that the more forms of marketing communication young people are aware of, the more likely they are to smoke or intend to smoke.[75,76]

### Sponsorship

Sponsorship by tobacco companies includes providing " 'any form of contribution', financial or otherwise, regardless of how or whether that contribution is acknowledged or publicized."[10,p.3] Tobacco company sponsorship of sporting events, entertainment events, festivals, cultural venues, and social causes enhances brand awareness, reinforces brand image, and improves sales and/or market share.[77]

NCI's 2008 review[78] of tobacco companies' public relations efforts identified three key research questions: (1) whether tobacco corporate image efforts are able to improve public perceptions of the companies' credibility, trustworthiness, social responsibility, or public attitudes toward the companies; (2) whether enhanced public perception increases tobacco product sales or reduces quitting among current smokers; and (3) whether corporate sponsorship and corporate advertising affect the perceptions of jurors and public or legislative support for tobacco control policies. The NCI review also noted the relative newness of corporate public relations efforts and indicated that academic research on this topic was quite limited.[78] Nevertheless, the review concluded that "corporate sponsorship of events and social causes represents a key public relations strategy for major tobacco companies," and that corporate image campaigns by tobacco companies "have reduced perceptions among adolescents and adults that tobacco companies are dishonest and culpable for adolescent smoking, and among adults, have increased perceptions of responsible marketing practices and favorable ratings for the individual companies."[78,p.204]

A number of studies have been conducted to assess the impact of tobacco industry sponsorship of sporting events, which are often of interest to youth, and have demonstrated a link between sporting event sponsorship and increased smoking among young people.[79–82] For example, a longitudinal study of schoolchildren's appreciation of televised sport in the United Kingdom found that preference for motor racing was a significant independent variable in progression to regular smoking.[79] In cross-sectional studies in India, Vaidya and colleagues[81,82] examined the effects of tobacco sponsorship of a televised cricket series where the cigarette brand logo was displayed prominently at the cricket ground, on players' outfits, and on billboards. All the adolescents were aware of tobacco sponsorship of cricket matches, but experimentation with tobacco was significantly higher among those who watched the matches. The perception that smoking improves performance at cricket was the most significant factor influencing experimentation with the sponsoring brand.

### Price Promotions to the Consumer and Retailer

Price promotions, including discounting and couponing, can counteract the ability of significant tax and price increases to reduce smoking and encourage cessation. Promotions, including payments to wholesalers and retailers, help build a pro-tobacco environment by ensuring prominent selling space and creating strong relationships with retailers. In 2013, the amount paid to retailers or wholesalers to reduce the price of cigarettes to consumers accounted for 85.4% (US$ 7.642 billion) of the total advertising and promotion budget of the major U.S. cigarette manufacturers.[83] Despite the importance of price promotions in determining consumer behavior, to date relatively few studies have examined the influence of these, including price discounting and couponing, on smoking attitudes and behavior.

Using regression analyses, MacFadyen and colleagues[75] studied young people's awareness of and involvement in all forms of tobacco marketing communications in the United Kingdom, and found that coupon loyalty offers were associated with being a smoker. In a study of 12- to 15-year-old Chinese students, Lam and colleagues[84] found that answering "yes" to a combined measure of participation in cigarette promotions or sponsored activities (including exchanging empty cigarette packs for tickets, free gifts, or discounted commodities) was significantly associated with ever smoking in the crude analysis. Slater and colleagues[4] analyzed data from a nationally representative sample of 8th, 10th, and 12th graders in the United States between 1999 and 2003 and found that cigarette promotions were associated with youth experimentation with cigarettes, leading to later uptake of regular smoking. Another U.S. study found that in 2011, about 1 in 4 adult smokers ages 18–34 had received direct mail from a tobacco company, and of those, nearly 70% reported having used a coupon to purchase cigarettes within the past 6 months; signing up on a brand website was the most commonly reported way to receive direct mail.[85] Additionally, tobacco companies often tailor or personalize the coupons included in direct mailings.[86–88] An analysis of data collected by the 2012 U.S. National Youth Tobacco Survey found that exposure to discount coupons among U.S. middle and high school students was associated with positive smoking-related beliefs, susceptibility to smoking, intention to purchase tobacco, and lack of confidence in ability to quit smoking.[89]

The Internet and social media are efficient means of disseminating price promotions. For example, Richardson and colleagues[90] found that 30% of all online tobacco and electronic cigarette (e-cigarette) advertising in the United States and Canada in 2011-2012 contained a price promotion such as a coupon or discount code. A study of U.S. middle and high school students found that 13% had obtained tobacco coupons in the past 30 days; 7.4% received coupons by digital communications (e-mail, Internet, social network, or text message)—a greater percentage than those who received coupons by mail (6.0%) or via the tobacco package (3.7%).[91] Researchers examining the prevalence of price promotions in the content of tobacco- or e-cigarette-related tweets found that one-third of all e-cigarette tweets contained a price promotion, typically a discount.[92]

### Sampling

The distribution of free samples of tobacco products, known as "sampling," is another form of sales promotion. Sampling teams often target venues that appeal to young people, such as bars, nightclubs, music concerts, shopping malls, and festivals, or use their own sponsored events for distribution.[93] Tobacco companies may segment their market to direct trial cigarette sampling at particular demographic groups—for example, young urban African Americans[87] and lesbian, gay, and bisexual communities.[94] There is also evidence that free e-cigarette samples are distributed at music festivals and other venues.[95] In the United States, free samples of cigarettes, hookah tobacco, cigars, and

nicotine-containing e-liquids are banned, and free samples of smokeless tobacco are restricted to qualified adults-only venues.[96,97]

Several studies use GYTS data to examine tobacco product sampling. One such study among Indian adolescents ages 13–15 showed that offers of free cigarette samples and branded promotional items were strongly associated with smoking.[98] Studies from Africa have yielded mixed evidence regarding the relationship between free sampling and smoking behavior in youth. Offers of free cigarettes in Malawi[50] were not found to be associated with current smoking behavior, and a study in Zambia[99] found that offers of free cigarettes were negatively associated with smoking. However, Maassen and colleagues' study[43] in Gambia found that the offer of a free cigarette by a company representative was the best predictor of smoking behavior among Gambian adolescents.

### Distribution of Promotional Items

Using a cigarette brand name, logo, trademark, or other distinctive feature (including color combinations) on a promotional item (including brand sharing and brand stretching) or to sell other non-tobacco products can create brand awareness and build brand imagery. Promotional items such as branded lighters, T-shirts, baseball caps, key chains, and badges may be distributed at the point of sale, at special events, or through competitions. Exposure to tobacco promotional items has been positively and significantly related to susceptibility to tobacco use across the globe, including in Cyprus,[100] the Czech Republic,[101] Saudi Arabia,[102] and the United States.[103,104] Pierce and colleagues[105] estimated that over a 10-year period (1988–1998), 7.9 million U.S. youth were induced to experiment with tobacco because of tobacco advertising and promotions. Other studies in the United States found that many minors received promotional items despite regulations in place at the time controlling their distribution.[106,107]

A number of cross-sectional studies have examined the influence of tobacco promotions in LMICs. Young boys in Zambia were more likely to have tried cigarette smoking if they owned an item branded with a cigarette logo.[108] Sinha[109] analyzed GYTS data from India and found that current 13- to 15-year-old users of gutka (a form of smokeless tobacco) were significantly more likely to own an item with a gutka brand name or symbol on it than youth who never used smokeless tobacco. Other studies conducted in LMICs and reporting on exposure found that 27% of Kenyan adolescents'(ages 12–17) reported ownership of objects with a cigarette brand logo[110]; and Muula and Mpabulungi[111] found that, among 13- to 15-year-olds, 24.0% in a Ugandan city and 18.2% in a Malawian city had an item with a cigarette brand logo.

Gilpin and colleagues[65] used a longitudinal study design to examine young people's receptivity to tobacco promotions as a predictor of established smoking in young adulthood. They found that possessing or being willing to use a tobacco promotional item increased the adjusted odds of being an established smoker 6 years later by a factor of 1.84. Further analysis found that young adult daily smokers showed stronger results at follow-up, with an adjusted odds ratio higher than 2.0 for possessing or willingness to use a tobacco promotional item. In a longitudinal study, Sargent and colleagues[112] examined receptivity to tobacco promotional items by measuring the number of promotional items owned by young smokers and their willingness to use the items. They found a dose–response relationship between the number of promotional items owned and the likelihood of experimental and regular smoking. In the United States, FDA regulation bans the distribution of non-tobacco promotional items with cigarette or smokeless brand names.[96,113]

## Point-of-Sale Displays

Display of tobacco products at the point of sale provides an opportunity to highlight the brand and the imagery on the packaging and to remind consumers of the availability of these products. In addition, point-of-sale displays of tobacco products reinforce perceptions that tobacco use is normative. As other channels for marketing and promotion decrease, the retail environment point of sale has increased in importance.[114]

Many studies have demonstrated the role of point-of-sale displays in influencing tobacco use. Wakefield and colleagues,[115] for example, used an experimental approach to assess the effect of displays on Australian youth by randomly assigning youth to three groups: One group was shown photographs of convenience stores with point-of-sale displays and advertising, a second group saw photographs with displays only, and a third group viewed photographs of stores with displays and advertising digitally removed. Youth who viewed the photographs with advertising and displays or viewed displays only thought it would be easier to purchase tobacco in these stores than did the group viewing the photographs with displays removed. The researchers also found that young people who viewed photographs with displays only showed greater brand recall than those who viewed photographs with advertising and displays removed.

Others have looked at associations between exposure or sensitivity to point-of-sale displays and tobacco use and related outcomes. In a study of New Zealand youths ages 14–15, Paynter and colleagues[116] measured exposure to displays based on self-reports of the frequency and types of stores visited and controlled for a variety of other factors. They found significant positive associations between frequency of store visits/frequency of noticing cigarettes with susceptibility to smoking, experimentation with smoking, and current smoking. Their study also found that the likelihood of being a current smoker increased with a greater frequency of store visits among youth of high socioeconomic status but not among those of low socioeconomic status. Wakefield and colleagues[115] found that the amount of point-of-sale advertising was predictive of youths' brand choice. Another study found that the more youth-oriented advertisements that were displayed outside shops, the more often youth tried to buy cigarettes.[117] An Australian study designed to test the effects of point-of-sale advertising showed that such advertising enhanced brand imagery.[118]

Wakefield and colleagues[119] and Carter and colleagues[120] both found that seeing point-of-sale displays increased the likelihood that smokers would make unplanned cigarette purchases. Wakefield and colleagues[119] also found that about one in three smokers thought that removing displays would make it easier for them to quit, and this belief was more prevalent among smokers who noticed displays at least sometimes compared to rarely or never. Germain and colleagues[121] in their analysis of longitudinal data on adult smokers in Victoria, Australia, concluded that smokers who were more "sensitive" to point-of-sale displays (based on frequency of noticing displays, impulse purchases, and brand choice decisions based on displays) were significantly less likely to have quit smoking over time than those who were less sensitive to displays.

Two longitudinal studies of tobacco point-of-sale advertising in the United States confirm the increasing importance of this form of advertising to the tobacco industry. One study in California showed an increase over 4 years in the mean number of total advertisements per store (22.7 to 24.9) and in the proportion of interior signs and displays with a sales promotion (28% to 32%).[122] A study in Massachusetts found a statistically significant relationship between a greater amount of cigarette advertising visible from outside retail outlets and illegal cigarette sales to minors.[123]

In addition, two longitudinal studies examined the effects of point-of-sale advertising on smoking. In a study of California youth ages 11–14 years, Henriksen and colleagues[124] used two measures of exposure to retail cigarette advertising—the frequency of visits to stores that contain the most advertising, and a combination of where and how often subjects shopped near school—and observed the quantity of advertisements in those stores. After adjusting for other risk factors, both measures of exposure predicted significant increases in the odds of smoking initiation among adolescents who had never smoked at baseline. The more store visits adolescents reported at baseline, the greater their chances of initiating smoking at follow-up. In the second longitudinal study, Weiss and colleagues[125] measured self-reported exposure to point-of-sale advertising and smoking on television among young adolescents and determined that exposure to either or both of these conditions was significantly related to ever smoking at follow-up.

Exposure to point-of-sale displays is associated with higher susceptibility to smoking among nonsmoking youth[126,127]and college students.[128] Iceland was the first country to adopt a point-of-sale display ban, effective in August 2001.[129] Since that time, a growing number of governments have adopted display bans and others are considering doing so.[129,130]

The relatively few studies that have examined the impact of display bans on tobacco use and related outcomes have yielded findings suggesting that display bans have at least some impact on tobacco-related outcomes. For example, two longitudinal studies, one based on International Tobacco Control Policy Evaluation (ITC) Project data for Thailand and Malaysia and another based on ITC data from Australia, Canada, the United Kingdom, and the United States, concluded that the display bans in Thailand, Australia, and Canada were effective in reducing exposure to tobacco marketing at the point of sale.[129,131] A pre–post implementation study by McNeill and colleagues[132] reported that removal of point-of-sale displays in Ireland resulted in a reduction in the proportion of youth who thought young people their age smoked. A study from Western Australia found that implementation of the state's display ban reduced spontaneous cigarette purchases among smokers by 30%.[133] Another found that partial implementation of England's policy banning displays in large shops beginning in April 2012 did not have an immediate impact on smoking prevalence or cigarette consumption, but did accelerate the decline in smoking prevalence over time.[134] Similarly, Quinn and colleagues[135] reported that a display ban in Ireland did not have a significant impact on cigarette sales in the first 12 months following its implementation. The limited evidence of an impact on tobacco use found in these studies is likely due to the short time period considered and the difficulty in distinguishing the effect of the display bans from other factors that influence tobacco use.

### Entertainment Media and Product Placement

Portrayal of tobacco use and tobacco brands in movies, television, video games, and other entertainment media is an important means by which the tobacco industry conveys images of tobacco to the public. Tobacco companies may pay promotional fees for tobacco use to be portrayed (known as product placement), which allows companies to achieve broadcast coverage of their brands, increase brand awareness, and at times, circumvent regulations on tobacco advertising.[136] Tobacco use in entertainment media may also be dictated by the producers' artistic, noncommercial, decision-making. Whatever the reason, the appearance of tobacco brands and tobacco product use in entertainment media may influence viewers, especially youth.

NCI[136] reviewed 19 published content analyses of portrayals of tobacco in movies (all conducted in HICs) and concluded that three-quarters or more of contemporary box office hits (most commonly, movies rated for adults) depicted tobacco use, typically use of cigarettes and cigars. In addition, one-third of the movies released in the 1990s showed identifiable tobacco brands. By 2007, however, less than 10% of movies showed identifiable brands, followed by a slight increase to about 12% in 2008.[7]

The NCI review found that depictions of cigarette smoking were pervasive in U.S. movies and concluded that "the total weight of evidence from cross-sectional, longitudinal, and experimental studies, combined with the high theoretical plausibility from the perspective of social influences, indicates a causal relationship between exposure to movie smoking depictions and youth smoking initiation."[136,p.412-413] This conclusion was confirmed by the 2012 U.S. Surgeon General's report: "There is a causal relationship between depictions of smoking in the movies and the initiation of smoking among young people."[7,p.602] The 2012 Surgeon General's report also characterized images of smoking in television and films as possibly "some of the more potent media-delivered smoking images seen by U.S. children and adolescents."[7,p.574] The power of these images is augmented by the release of many U.S. films on television, online, or on DVD, where they reach a far wider, even global audience. Thus, images of tobacco use in entertainment media "have the potential to expose adolescents around the world to role models who smoke."[7,p.574] In addition, a systematic literature review conducted in 2015 identified exposure to smoking in films as one of a number of factors associated with increased risk of youth smoking.[137]

Guidelines for implementation of Article 13 of the WHO FCTC recognize that the depiction of tobacco use in movies is a form of promotion of tobacco use. The WHO publication *Smoke-Free Movies: From Evidence to Action* summarizes the research base on the influence of film smoking as well as the measures that have been taken by some countries to control and reduce the depiction of smoking in movies. It also assists countries in understanding the basis for taking actions in this area, in line with the Article 13 guidelines.[138]

Although most of the research on the potential influence of depictions of tobacco use in entertainment media has been conducted in the United States, studies have also been produced in other countries, both HICs and LMICs, as discussed in the following paragraphs.

In a study conducted in Germany, researchers found that about three-quarters of the 398 popular movies released between 1994 and 2004 in German cinemas included portrayals of smoking.[139] This study also found that German adolescents (ages 10–17) with higher exposure to smoking in movies were significantly more likely to experiment with cigarettes and to be current smokers, after a variety of other factors were controlled for. The authors concluded that "the strength and consistency of the association between movies and youth smoking across countries, despite very substantive differences in culture and tobacco regulations, argues strongly for smoking in movies as a causal socializing agent for youth smoking in [the United States and Germany]."[139,p.7] In a follow-up longitudinal study of 2,711 never smokers from the original sample, greater exposure to depictions of smoking in movies was associated with trying smoking; after controlling for other factors, the effect was stronger among adolescents whose parents were not smokers themselves.[140] Conversely, a study conducted in Scotland did not find an association between seeing smoking in films and current smoking among young adults age 19 years.[141] However, a follow-up study documented an association between exposure to images of smoking in movies and smoking among Scottish youth ages 15–16 years, which was dose dependent.[142]

India is an important source of movies for the Indian subcontinent and other world regions. Researchers found that tobacco portrayals were prevalent in 76% of the 395 Indian films released between 1991 and 2002, and most of the incidents involved cigarette smoking.[143] Focus group research with Indian youth ages 16–18 years found that the values associated with smoking were "modern, fashionable, cool, arrogant, rebellious, [and] powerful,"[143,p.15] but Indian movies rarely portrayed the health harms of smoking.

A cross-sectional survey of 7th-, 9th-, and 12th-grade students in Alexandria, Egypt, found that higher levels of exposure/receptivity to Western entertainment media (movies, television shows, magazines, newspapers, and music) were positively associated with having smoked in the last 30 days among boys, and with ever having tried smoking among boys and girls.[144] This association was partially mediated by positive beliefs about smoking. Maassen and colleagues'[43] study of Gambian adolescents found no significant differences between smokers and nonsmokers—either in how often they saw actors smoking in the media or how often they saw cigarette brand names on television.

Thrasher and colleagues[145] conducted a longitudinal study of Mexican schoolchildren ages 11–14 and found that, at one-year follow-up, students in the two highest categories of exposure to incidents of smoking in movies were more than twice as likely to have smoked in the previous 30 days. The authors noted, however, that the risk factor of smoking onset a year later appeared weaker in Mexico than in countries with stronger tobacco marketing regulations.[145] The group's prior cross-sectional study of Mexican adolescents also documented an association between exposure to smoking in films and susceptibility to smoking, favorable attitudes toward smoking, and perceived prevalence of smoking among peers.[146] A later study of secondary school students from Argentina and Mexico found that movies rated for younger children had the highest number of scenes containing smoking watched by students (67% in Argentina; 54% in Mexico).[147]

### Marketing via the Internet, Social Media, and Other Emerging Communication Platforms

The Internet is a global forum in which tobacco products can be advertised and promoted, a venue for the sale of tobacco products, and a means by which consumers can share and contribute information on tobacco products (via text, music, videos, and photographs). As Freeman notes, "In recent years, the internet has changed dramatically from primarily an expert driven information source to an interactive participatory and consumer driven medium."[148,p.139] New media—the combination and convergence of computing and information technology, communications networks, and digitized media and information content—provide tobacco companies with "a continually evolving range of technologically innovative means" to promote tobacco use.[148,p.140] Access to the Internet and smartphone ownership vary widely around the world, but both are becoming increasingly available to the general public. In 2016, nearly half of the world's population (47%) had access to the Internet,[149] and about 75% of the world's population had access to a cell phone in 2012.[150] Internet advertising and promotion of tobacco were banned in 57% of reporting countries in 2014.[13] In the United States, online tobacco marketing is not prohibited but is subject to the provisions of the Family Smoking Prevention and Tobacco Control Act.[151]

Research in this topic area has often focused on youth and young adults, given the heightened vulnerability of this age group to tobacco marketing. Despite the relative newness of this research subject and the difficulty of examining a continually changing communication landscape, a literature base is developing. A review of the literature published in 2013 by Forsyth and colleagues[152] identified

only 20 research studies examining the effect of the Internet on teen and young adult tobacco use. An early content analysis of 318 randomly sampled websites featuring pro-tobacco content (for cigarettes, cigars, pipes, chew, or snuff) found that the presence of tobacco marketing was pervasive on the Web, and that the style and content of the sites—which featured celebrities, films and television shows, sex, e-commerce, hobbies, and recreation—would appeal to young people.[153] Another content analysis of pro-smoking websites determined whether the sites prevented access by minors, contained health warnings, mentioned brand names, made references to smoking fetishism, sold tobacco products, or also analyzed the demographics of people pictured in photographs on the site.[154] The authors located 30 smoking culture and lifestyle sites containing 1,689 photographs. These sites contained extensive and diverse pro-smoking content, which included brand imagery, cigarette packages, photographs of nude women smoking, and pairing of smoking with sexuality and alcohol use.

Elkin and colleagues[155] searched for and analyzed YouTube videos for non-Chinese cigarette brands and found 163 tobacco brand–related videos. Most (71.2%) of the videos had pro-tobacco content, and very few (3.7%) had anti-tobacco content. Three of the four most common themes of the videos were potentially of interest to youth: celebrities/movies, sports, and music.

A case study of a cigarette company's use of the Internet as an interactive platform ("open source marketing") to promote a particular cigarette brand demonstrated the fine line between the use of the Internet for consumer marketing research and for the actual marketing of its product. This case study demonstrated how the cigarette company interacted with thousands of consumers via the Web to design new cigarette flavors and packages, noting that advertising bans do not typically consider the role of the consumer in generating and sharing marketing materials.[156]

As Chu and colleagues have noted, "the growth of e-cigarettes occurred as social media and other Web 2.0 sites became an important platform for commercial advertising."[157,p.2] Many e-cigarette companies began their business online, and several maintain a strong Web presence for both product promotion and sales.[158–160] A content analysis of e-cigarette retail websites found that many contain themes that may appeal to young people, including images or claims of modernity, enhanced social status or social activity, romance, and use of e-cigarettes by celebrities.[158] Many ENDS manufacturers and their affiliate retailers also have social media accounts that promote their products and offer users the opportunity to interact with the company online.[161]

Smartphones, mobile phones that can perform some functions performed by computers, are growing in popularity.[150,162] These devices can be customized with the addition of applications (called "apps"), which are software programs designed to run on smartphones or other mobile devices. BinDhim and colleagues[163] analyzed the availability of pro-smoking apps from the world's two largest app stores, identifying 107 pro-smoking apps for sale from these venues. Most of these apps either simulated actual smoking behavior or contained information about where to purchase tobacco, information about brands, or related content. The authors note that the apps often included explicit brand images and have the potential to reach millions of users, including children and adolescents.

## Summary

Scholars in many countries and from many disciplines have investigated the relationship between tobacco marketing and tobacco use, particularly youth use of tobacco products. The extensive body of evidence on this topic includes econometric studies, population-level cross-sectional and longitudinal analyses, and others. Several authoritative reviews, including those conducted by NCI, the U.S. Surgeon General, and the Cochrane Collaboration, have concluded that advertising and promotion are causally linked to youth smoking initiation.[3,7,72] Studies conducted since these reviews confirm and extend these findings.

Research has also demonstrated the effectiveness of tobacco product marketing bans, and WHO has concluded that comprehensive bans on TAPS are a "best-buy" measure to reduce tobacco use. A new analysis conducted for this chapter also confirms that comprehensive bans on tobacco advertising have a significant negative effect on consumption, reducing tobacco consumption by 28.3% in LMICs and by 11.7% in the full sample of 66 countries (HICs and LMICs) analyzed.

The WHO FCTC obligates its Parties to implement and enforce a comprehensive ban on tobacco advertising, promotion, and sponsorship, or for those Parties that are not in a position to undertake a comprehensive ban owing to their constitutions or constitutional principles, to apply restrictions on tobacco advertising, promotion, and sponsorship that are as comprehensive as possible. As of 2014, a majority of countries, including HICs and LMICs, now ban at least some forms of tobacco marketing; bans on television and radio advertising are most common. More comprehensive bans benefit the public's health by limiting industry's demonstrated ability to adapt to and circumvent regulatory strategies and various types of marketing bans.

Recent studies have also looked at the impact of indirect tobacco marketing, which includes sponsorship, product sampling, promotional items and brand sharing, tobacco packaging, retail point-of-sale displays, and entertainment media and product placement. These forms of marketing also promote tobacco use, as recognized by the WHO FCTC, which defines tobacco advertising and promotion as "any form of commercial communication, recommendation or action with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly."[9,p.4] Research conducted in many countries has shown that the portrayal of tobacco use, including particular tobacco brands, in movies and other entertainment media normalizes tobacco use among youth. WHO has issued guidance to assist countries in countering this industry tactic.

The Internet is now a global venue for marketing and sale of tobacco products, accessible to more potential consumers every day. The Web's transition from a static forum to one that is interactive, participatory, and often consumer driven has dramatically changed the nature of Internet marketing. Researchers have documented that tobacco products are marketed on the Internet in ways that may attract youth; given the rapidity of change and the scope for reaching young people, this is an important area for future research.

Lastly, it is now recognized that the many forms of direct and indirect marketing communications do not operate in isolation; rather, it is the combination of marketing communications that influences the consumer. In short, as regards marketing communications, the whole is much greater than the sum of its parts.

## Research Needs

A large evidence base documents the causal association between tobacco industry advertising and smoking among young people. However, there are areas that warrant further research. Documentation and assessment of the impact of financial or "in-kind" contributions from the industry in exchange for sponsorship of events, media, and product placement have been limited compared to other areas of tobacco marketing, with the exception of sports sponsorship and product placement in movies. As certain segments of entertainment media become more popular and technologically advanced, such as video/virtual reality gaming, more extensive and creative documentation and study of the effects of sponsorship or product placement in these media are needed. Similarly, as new media technology emerges and gives rise to different marketing and advertising strategies, such as through the Internet and social media, research is needed to study the impact of these new types of marketing tools on tobacco use. These media tools have been heavily used for marketing products, such as ENDS, which are available to youth in many countries. Novel digital marketing and conventional marketing strategies may have synergistic effects on tobacco product consumption, particularly by youth—a subject about which further investigation is needed.

## Conclusions

1. Tobacco companies engage in a wide variety of marketing activities, ranging from traditional advertising, promotion, and sponsorship to emerging marketing techniques in the digital arena. These marketing activities have the potential to affect key populations, such as young people and women, particularly in low- and middle-income countries, who may be particularly susceptible to these efforts.
2. The weight of the evidence from multiple types of studies done by researchers from a variety of disciplines and using data from many countries indicates that a causal relationship exists between tobacco company marketing activities and tobacco use, including the uptake and continuation of tobacco use among young people.
3. In high-income countries, comprehensive policies to ban the marketing activities of tobacco companies are effective in reducing tobacco use, but partial marketing bans have little or no effect.
4. Comprehensive policies to ban the marketing activities of tobacco companies leads to larger reductions in tobacco use in low- and middle-income countries than in high-income countries.

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## Section 4
## Non-Price Determinants of Demand

# Chapter 8
# The Impact of Information on the Demand for Tobacco Products

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# The Impact of Information on the Demand for Tobacco Products

Information failures in the tobacco marketplace provide an economic rationale for governments to intervene in the tobacco market using a variety of measures. This chapter explores the impact of information on the demand for tobacco products, including:

- Consumers' limited awareness of the risks of tobacco use, and differences in awareness by country income group
- The role of tobacco industry disinformation practices in consumers' uptake and continued use of tobacco
- Information interventions—including anti-tobacco mass media campaigns, school-based tobacco education programs, health warning labels, and interventions focused on tobacco product packaging—and their impact on the demand for tobacco products.

Research shows that consumers, especially youth, do not appreciate the magnitude of the risks of tobacco use and tend not to personalize these risks, and that these information failures are generally greater in low- and middle-income countries than in high-income countries. For this reason, programmatic interventions and policies to raise awareness of the harms of tobacco use and the addictive properties of nicotine, and to counter tobacco industry marketing and disinformation efforts are necessary to help reduce tobacco use.

## Chapter Contents



## Figures and Tables

## Introduction

Information on the effects of tobacco use on health can decrease aggregate tobacco demand by discouraging nonusers from initiating tobacco use, encouraging current users to quit or cut down, and discouraging relapse among former smokers.[1] However, as this chapter will describe, evidence from both high-income countries (HICs) and low- and middle-income countries (LMICs) indicates that consumers' knowledge of the health risks of tobacco use is often poor or inadequate. Lack of information about the harms caused by tobacco use and the addictiveness of tobacco products can lead tobacco users to underestimate the health risks of tobacco use and overestimate their ability to quit. These information failures provide an economic rationale for governments to intervene in the tobacco market using a variety of measures—among these, the active dissemination of health information to consumers and the regulation of industry information sources (i.e., product packaging, advertising, and marketing practices). This chapter focuses on how individuals obtain and process information about tobacco products and their health effects, and how this information affects demand for tobacco products. Much of the data presented in this chapter are based on the experiences of HICs because considerably less data on the role of information in tobacco demand are available for LMICs. However, for most of the topics covered in this review, the research conducted in HICs is also largely applicable to LMICs.

### Health Risks Associated With Tobacco Use: Awareness in High-Income Countries

The evidence indicates that most cigarette smokers in HICs are informed at least at a superficial level about the major health consequences of smoking. For example, the International Tobacco Control Policy Evaluation (ITC) Project surveyed a representative sample of adult smokers in the United States between 2002 and 2011 and found high levels of awareness about some but not all health risks. They reported high levels of awareness that smoking causes lung cancer (94%), heart disease (88%), lung cancer in nonsmokers (84%), and stroke (77%), but far lower awareness that smoking causes impotence (40%) and that tobacco smoke contains the harmful constituents arsenic (57%) and cyanide (52%).[2] Similarly, in analyses of data from ITC surveys of smokers in the United States, Canada, Australia, and the United Kingdom of Great Britain and Northern Ireland, Siahpush and colleagues[3] found generally high levels of awareness that smoking causes lung cancer (>90%) and heart disease (>85%), but lower levels of awareness that smoking causes stroke (>70%); higher education and income were associated with substantially higher awareness of the health harms of smoking. However, awareness beyond a superficial level is often lacking. For example, a national survey conducted in the United States in 2001 found that although 94% of smokers considered themselves adequately informed about the health risks of smoking, a large proportion of respondents were unable to correctly answer questions about the health risks of smoking (39%), contents of cigarette smoke (53%), safety of nicotine (52%), low-tar cigarettes and filtered cigarettes (65%), additives in cigarettes (56%), and nicotine replacement products (56%).[4]

Other studies have documented that smokers often hold mistaken beliefs about the relative harms of cigarette brands with low machine-measured levels of tar and nicotine—so-called "light," "mild," or "low-tar" brands. As described in *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*, Smoking and Tobacco Control Monograph 13 by the National Cancer Institute (NCI) of the National Institutes of Health (an agency of the U.S. Department of Health and Human Services), these cigarettes do not have lower health risks and do not facilitate quitting, but many smokers believe they do.[5] This finding has been confirmed and extended to other countries over time. For example, ITC surveys of adult smokers in Australia, Canada, the United Kingdom, and the United States found that many smokers (40–70%, depending on the country) held at least one false

belief about the health effects of "light" cigarettes compared to regular cigarettes.[6] Despite bans on use of these misleading descriptors, misperceptions remain widespread among smokers in many countries.[7,8]

Virtually all smokers underestimate the severity and magnitude of the risks of smoking and display strong "optimistic bias" about the risks of smoking—that is, they tend to see their own personal health risk as being lower than that of other smokers.[9] For example, a U.S. study found that among smokers, the majority (81% of adults and 71% of youth) agreed that "most people who smoke for a few years become addicted and can't stop." Despite this, 60% of youth smokers and 48% of adult smokers surveyed agreed with the statement that "I could smoke for a few years and then quit if I wanted to."[10] Similarly, data from NCI's Health Information National Trends Survey, a nationally representative cross-sectional survey of U.S. adults, demonstrate that smokers underestimate their risk of lung cancer, relative to both other smokers and to nonsmokers, and have many other serious knowledge gaps.[11]

The information failures described above are compounded by the fact that nearly all tobacco use is initiated during adolescence. Young consumers are particularly likely to discount information about the risks of tobacco experimentation and use, in part because they fail to appreciate the highly addictive nature of tobacco products and thus do not expect to become long-term smokers.[12–15] For example, two U.S. surveys found that youth smokers generally believe they would have less difficulty quitting than other smokers and believe they are less addicted than the average smoker. Adult smokers, in contrast, tend to say they are not different from other smokers in their level of addiction or their ability to quit. Nonetheless, the researchers concluded that virtually all smokers are overly optimistic about their chances of cessation.[16]

### Health Risks Associated With Tobacco Use: Awareness in Low- and Middle-Income Countries

More than 80% of the world's smokers live in LMICs, where knowledge of the health harms of smoking and tobacco use is generally thought to be lower than in HICs.[17] The Global Adult Tobacco Survey (GATS), a component of the Global Tobacco Surveillance System that is primarily conducted in LMICs, measures a broad range of tobacco control indicators including beliefs about smoking as a cause of major diseases and conditions.[18] As shown in Table 8.1, knowledge that smoking causes lung cancer was generally high across the 22 GATS countries (73.0–98.6%), while knowledge that smoking causes heart attack (38.7–95.0%) and stroke (27.2–89.2%) was substantially lower. Knowledge that secondhand smoke (SHS) causes serious illness in nonsmokers varied between 64.3% and 96.3% across the 22 GATS countries. In addition, an analysis of data from the ITC Project and GATS documented major gaps in smokers' knowledge of the cardiovascular disease risks of smoking and in both smokers' and nonsmokers' knowledge of the cardiovascular disease risks of SHS exposure.[19]

Other studies provide more detailed information on knowledge of the health harms of smoking in individual LMICs or among different population groups within LMICs. For example, Cheng and colleagues[20] analyzed data from the 2010 GATS People's Republic of China survey to focus on the relationship between knowledge of health hazards and smoking status. Their study found that although most respondents knew that smoking causes lung cancer (53.7–84.7%), less than half knew that smoking causes heart attacks and stroke, and only a low proportion (3.6–21.2%) knew that low-tar cigarettes are not less harmful than other cigarettes. Additionally, a study conducted in Zambia and the Democratic Republic of the Congo found that pregnant women's knowledge of the harms of smoking and SHS exposure was extremely limited.[21] In both HICs and LMICs, information failures are more pronounced

## Table 8.1 Knowledge About the Harms of Smoking Among Adults Age 15 and Over in 22 Countries, 2008–2013

| Country (year) | Believes smoking causes lung cancer (%) | Believes smoking causes heart attack (%) | Believes smoking causes stroke (%) | Believes SHS causes serious illness (%) |
|---|---|---|---|---|
| **Region of the Americas** | | | | |
| Argentina (2012) | 98.6 | 91.0 | 73.6 | 92.6 |
| Brazil (2008) | 96.2 | 87.0 | 74.3 | 91.4 |
| Mexico (2009) | 96.7 | 79.7 | 60.4 | 95.6 |
| Panama (2013) | 97.0 | 83.5 | 73.5 | 87.5 |
| Uruguay (2009) | 96.8 | 92.0 | 76.5 | 93.8 |
| **European Region** | | | | |
| Greece (2013) | 96.3 | 91.2 | 76.6 | 84.9 |
| Poland (2009-2010) | 92.6 | 79.9 | 61.8 | 81.4 |
| Romania (2011) | 98.3 | 90.0 | 89.2 | 94.2 |
| Russian Federation (2009) | 91.2 | 71.0 | 67.3 | 81.9 |
| Turkey (2008) | 96.1 | 93.6 | 82.1 | 95.5 |
| Ukraine (2010) | 91.2 | 79.3 | 77.9 | 86.3 |
| **African Region** | | | | |
| Nigeria (2010) | 73.0 | 76.8 | 51.4 | 74.5 |
| **Eastern Mediterranean Region** | | | | |
| Egypt (2009) | 96.2 | 95.0 | 88.6 | 96.3 |
| Qatar (2013) | 96.4 | 93.7 | 79.5 | 95.1 |
| **South-East Asia Region** | | | | |
| Bangladesh (2009) | 91.5 | 85.9 | 81.6 | 93.4 |
| India (2009-2010) | 84.9 | 63.9 | 49.4 | 82.9 |
| Indonesia (2011) | 84.7 | 81.5 | 45.5 | 73.7 |
| Thailand (2009) | 97.5 | 75.7 | 79.6 | 94.9 |
| **Western Pacific Region** | | | | |
| China (2010) | 77.5 | 38.7 | 27.2 | 64.3 |
| Malaysia (2011) | 93.7 | 88.8 | 80.7 | 85.8 |
| Philippines (2009) | 92.8 | 78.9 | 73.3 | 91.6 |
| Viet Nam (2010) | 95.6 | 62.7 | 70.3 | 87.0 |

*Note*: SHS = secondhand smoke.
*Sources:* Chiosi et al. 2015[18] and Global Adult Tobacco Survey Fact Sheets and Reports, 2008–2013.[174]

among some populations (i.e., low-education, low-income), which contributes to persistent social inequalities in tobacco-related morbidity and mortality. To date, in the only study of the impact of banning "light" and "mild" descriptors in LMICs, Siahpush and colleagues[22] found that removal of "light" descriptors on cigarette packages in Thailand led to a decrease in the belief that "light" cigarettes are less harmful, particularly among individuals in lower income and education groups. However, the authors note that even after the descriptors' removal, the belief that "light" cigarettes are less harmful remained more widely held in Thailand than in some other countries.

### Additional ITC Project Survey Findings

Data from the ITC Project enable researchers to examine differences across countries of various income levels on measures of adult smokers' knowledge and beliefs. Table 8.2 presents a summary of ITC survey results showing percentages of respondents (adult smokers and former smokers) who did not know or believe the health impacts of smoking and SHS exposure for specific diseases. Countries vary considerably in the level of knowledge/belief about the harms of smoking and tobacco use, with respondents in HICs being more knowledgeable than those in LMICs in some areas but not others. The knowledge/belief that smoking causes lung cancer was the most consistently observed across all countries surveyed. The knowledge/belief that smoking causes heart disease and stroke was far less widely held. Even lower levels of knowledge/belief were observed about the health harms (lung cancer and heart attack/heart disease among nonsmokers) caused by SHS exposure.

## Tobacco Industry Efforts to Limit and Distort Public Knowledge

The peer-reviewed literature, internal tobacco industry documents, and findings of litigation have conclusively shown that the tobacco industry has for many decades engaged repeatedly and consistently in a pattern of withholding, denying, and distorting information so that the hazards of their products would not be known—or if known, minimized in the minds of consumers.[23–29] These practices have directly contributed to the information failures associated with consumers' knowledge of the risks of disease and addiction, and thus provide sufficient grounds for government action to enhance consumers' knowledge and awareness of the health harms of tobacco use and SHS exposure. Tobacco industry strategies to limit and distort public knowledge have included:

- Denying and distorting evidence (1) on the health harms of smoking and SHS exposure, (2) that cigarette smoking is addictive, and (3) that cigarettes are designed to maximize addiction
- Marketing cigarettes in ways designed to assuage consumers' fears about smoking and disease
- Falsely promoting filtered, "light," "low-tar," and "mild" cigarettes (i.e., with low machine-measured amounts of tar and nicotine) as less hazardous than other cigarettes
- Funding and publicizing research aimed at denying, distorting, and/or distracting the public from the health effects of smoking and SHS exposure
- Influencing media coverage of smoking and health so as to limit public knowledge of the health effects of smoking and SHS exposure.

**Table 8.2 Percentages of Current and Former Adult Smokers Who Did Not Know About or Believe Specific Risks of Smoking and Secondhand Smoke Exposure, 2008–2014**

| Country (year) | That smoking causes lung cancer in smokers (%) | That smoking causes heart disease (%) | That smoking causes stroke (%) | That SHS causes lung cancer in nonsmokers (%) | That SHS causes heart attack/heart disease in nonsmokers (%) |
|---|---|---|---|---|---|
| Australia (2013) | — | — | 15.1 | 24.9* | 59.6 |
| Bangladesh (2011-2012) | 4.7 | 18.4 | 11.8 | 13.4 | 21.7 |
| Brazil (2012-2013) | 6.5 | 7.0 | 16.0 | 20.4 | — |
| Canada (2013-2014) | — | — | 13.5 | 17.0* | 47.2 |
| China (2011-2012) | 12.4 | 35.2 | 62.8 | 21.3 | 43.0 |
| France (2012) | 1.1 | 3.1 | 11.5 | 9.1 | — |
| Germany (2011) | 1.1 | 4.3 | 7.4 | 21.9 | — |
| India (2010-2011) | 12.2 | 21.7 | 32.1 | 25.4 | 32.7 |
| Kenya (2012) | 11.2 | 31.1 | 50.6 | 32.5 | 47.7 |
| Malaysia (2013) | — | 9.6 | 18.4 | 16.2 | 18.8 |
| Mauritius (2011) | 6.2 | 13.9 | 22.7 | 11.9 | — |
| Mexico (2012) | 3.1 | 12.6 | 26.5 | 6.7 | 17.4 |
| Netherlands (2014) | 11.2 | 21.4 | 37.2 | 43.1 | 57.5 |
| New Zealand (2008-2009) | — | — | 17.4 | 22.0 | — |
| Republic of Korea (2010) | — | — | 43.6 | 19.5† | 43.9 |
| Thailand (2012) | — | 24.4 | 15.1 | 2.6 | 14.6 |
| United Kingdom (2013) | — | — | 21.6 | 22.2* | 54.4 |
| United States (2013-2014) | — | — | 23.5 | 26.5* | 52.5 |
| Uruguay (2014) | 3.9 | 10.6 | 33.8 | 18.7 | 28.3 |
| Zambia (2014) | 21.7 | 27.2 | 53.4 | 34.0 | 36.8 |

*Data are from 2008-2009.
†Data are from 2008.
*Note:* SHS = secondhand smoke.
*Sources:* Unpublished data from the ITC Project, 2008–2014.[175]

The World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC) recognizes that Parties to the WHO FCTC "need to be alert to any efforts by the tobacco industry to undermine or subvert tobacco control efforts and the need to be informed of activities of the tobacco industry that have a negative impact on tobacco control efforts."[30,p.1] Article 5.3 of the WHO FCTC requires that "in setting and implementing their public health policies with respect to tobacco control, Parties shall act to protect these policies from commercial and other vested interests of the tobacco industry in accordance with national law."[30,p.1] The WHO FCTC Conference of Parties has adopted guidelines for Article 5.3, with specific recommendations to be implemented without prejudice to the sovereign right of the Parties to determine and establish their tobacco control policies to the extent possible, in accordance with their national law.[30] Raising awareness about the addictive and harmful

nature of tobacco products and about tobacco industry interference with Parties' tobacco control policies is one of the key recommendations of the guidelines.

### Denying and Distorting Evidence on Health Effects

For many decades, the U.S. cigarette industry consistently refused to acknowledge the health effects of tobacco use, arguing that the links between smoking and disease were not proven, and sought to create doubt about scientific evidence of adverse health effects.[23,24] A very public example of the U.S. industry's strategy occurred at a 1994 Congressional hearing convened by the House Energy and Commerce Subcommittee on Health and the Environment, where executives of the seven major U.S. tobacco companies stated under oath that they did not believe nicotine was addictive and that the evidence linking cigarettes to diseases such as lung cancer was not conclusive.[31] In 2006, the trial judge in *United States of America v. Philip Morris USA, Inc.* ruled, and the U.S. Court of Appeals for the District of Columbia Circuit affirmed on appeal in 2009, that the major U.S. cigarette manufacturers had engaged in a decades-long effort to deliberately deceive the American public about the health hazards of smoking and SHS exposure (see Box 8.1 below).[26,p.852] This strategy was widespread in the tobacco industry. British American Tobacco (BAT), based in the United Kingdom, adopted a strategy to publicly deny claims about smoking's adverse health effects, which the company acknowledged in private, in order to discourage and delay legislative action by governments.[32] The evidence indicates that, despite their long-standing denials to the contrary, the major international tobacco companies have understood for many decades the addictive nature of nicotine.[33]

The tobacco industry has consistently raised spurious objections to the findings of individual scientists as well as major government reports linking smoking to disease. As Brandt notes, the industry's response to the landmark 1964 Surgeon General's report, *Smoking and Health: Report of the Advisory Committee of the Surgeon General of the Public Health Service*, was to "maintain the strategy it had adopted in 1953: insist that there is no proof that tobacco causes disease; disparage and attack all studies indicating such a relationship; support basic research on cancer largely unrelated to the hypothesis that smoking and cancer are linked; and support research on alternative theories of carcinogenesis."[28,p.230] For example, in 1971, the Surgeon General's report, *The Health Consequences of Smoking,* found that smoking during pregnancy increased stillbirths and neonatal deaths.[34] In response, the Tobacco Institute—the trade and lobbying association for the U.S. tobacco industry until it was dissolved in 1999—responded that the Surgeon General was "endeavoring to scare pregnant women."[26,p.306]

In 1998, the International Agency for Research on Cancer (IARC) published what was then the largest European epidemiological study on lung cancer and SHS exposure, which found an increased risk of lung cancer among nonsmoking spouses of smokers and among nonsmokers exposed in the workplace.[35] In response, as described by Ong and Glantz,[36] the tobacco industry launched a coordinated, well-funded, multifaceted effort to discredit the study, relying heavily on third parties so as not to reveal the extent of the tobacco industry's involvement. These authors showed that Philip Morris worked with its public relations firms and lawyers to develop what the company called a "sound science" program in the United States and Europe which sought to shape the standards of epidemiology; in this way, the company's efforts went "beyond 'creating doubt' and 'controversy' … to attempting to change the scientific standards of proof" in order to dispute the link between SHS and disease.[37,p.1753]

In 1997, the world's major tobacco companies created the International Committee on Smoking Issues to promote spurious "controversy" about smoking and disease.[38] The tobacco industry sought to impede the Australian National Health and Medical Research Council's review of the health effects of SHS by criticizing the science, attacking scientists working on the report, and through other means.[39]

### Box 8.1: Findings from *United States of America v. Philip Morris USA, Inc.*

In 1999, the U.S. Department of Justice (DOJ) initiated a lawsuit against the major U.S. cigarette manufacturers alleging, among other things, that the companies had conspired to deceive the American public about the health risks of smoking and secondhand smoke exposure in violation of the Racketeer Influenced and Corrupt Organizations Act. In 2006, U.S. District Judge Gladys Kessler ruled in favor of the DOJ, concluding that the major domestic cigarette manufacturers had conspired to deny, distort, and minimize the hazards of cigarette smoking to the public. The judge's findings of fact support the government's long-voiced claims that:

- The companies deceived the American public about
  - The health effects of smoking and secondhand smoke exposure
  - The lack of significant health benefit from smoking "low-tar," "light," "ultralight," "mild," and "natural" cigarettes
  - The addictiveness of smoking and nicotine.
- The companies endangered public health by
  - Intentionally designing cigarettes to ensure optimum nicotine delivery to create and sustain addiction
  - Marketing their lethal products to youth.[26,p.854-866]

Judge Kessler's opinion noted that this case:

> is about an industry, and in particular these Defendants, that survives, and profits, from selling a highly addictive product which causes diseases that lead to a staggering number of deaths per year, an immeasurable amount of human suffering and economic loss, and a profound burden on our national health care system. Defendants have known these facts for at least 50 years or more. Despite that knowledge, they have consistently, repeatedly, and with enormous skill and sophistication, denied these facts to the public, to the Government, and to the public health community. . . . In short, Defendants have marketed and sold their lethal products with zeal, with deception, with a single-minded focus on their financial success, and without regard for the human tragedy or social costs that success exacted.[26,p.28]

On appeal, the Court's decision was affirmed in relevant part, and in 2010, the U.S. Supreme Court denied all sides' petitions for further review.[26]

## Marketing Cigarettes to Assuage Consumers' Fears

As early as the 1930s and 1940s, evidence had begun to appear implicating smoking as a cause of lung cancer.[29] The U.S. tobacco industry responded to rising concerns about smoking's health effects with advertisements aimed at reassuring smokers, for example, by depicting physicians as smokers. As Brandt has noted, "from the early 1930s to the early 1950s…tobacco companies competed to portray their cigarettes as the most healthy while utilizing physicians to counteract any fears of serious health risks."[28,p.106] But by the early 1950s, in the face of new scientific findings and increased public attention

to studies linking smoking to cancer, industry references to "health claims" were seen as counterproductive and more likely to increase concerns than to allay them.[40]

As additional scientific evidence mounted in the 1950s and 1960s about the adverse health consequences of tobacco use, the industry responded with extensive marketing campaigns typically focused on three themes: satisfaction (freshness, mildness, and strength); anxiety reduction (filters, low-tar, and low nicotine); and desirable associations (associating smoking with people, places, activities, and ideas desired by the target group).[41] Indeed, as noted in NCI Monograph 19, *The Role of the Media in Promoting and Reducing Tobacco Use*, "The tobacco industry has mastered and dominated nearly all forms of communication media during the past 100 years."[41,p.100]

U.S. tobacco companies disclose information on domestic sales and advertising and promotional activities to the U.S. Federal Trade Commission, which has issued periodic reports for both cigarettes (since 1967) and smokeless tobacco (since 1987).[42] Between 1940 and 2005, the U.S. tobacco industry spent approximately US$ 250 billion on cigarette advertising and promotion, or about US$ 10 million per day on average.[41] In 2013 alone, the U.S. cigarette industry spent US$ 8.95 billion on cigarette advertising and promotion.[43] Estimates of global tobacco marketing expenditures are not available.

### Falsely Promoting "Light" and "Low-Tar" Cigarettes as Less Hazardous

In the United States and elsewhere, the tobacco industry falsely marketed "light" and "low-tar" cigarettes as less hazardous than regular cigarettes, implying that they deliver lower levels of tar and nicotine to the user. For decades, cigarette manufacturers produced cigarettes with low levels of machine-measured tar and nicotine, but smokers could obtain much higher levels of tar and nicotine by altering their puff patterns (compensation) and by blocking "ventilation holes" in the filter. This cigarette design was a conscious strategy; as noted in NCI Monograph 13, the "dichotomy of delivery between smokers and machines was the intended result of the engineering effort to design elasticity of delivery into ['low-tar'] cigarettes."[5,p.6] These cigarettes were marketed with terms such as "light" and "ultralight," and their advertising was intended to reassure smokers and to present these cigarettes as an alternative to quitting.[5,44] Additionally, the sensory impression of smoking "light" and "ultralight cigarettes"—that these brands are milder and less harsh to smoke—contributes to smokers' misconceptions about these products.[45,46] Studies from the United States suggest that these efforts were successful, and that some smokers switched who might have otherwise quit, thus continuing to harm their health.[47,48]

These strategies were replicated in many countries around the world, and research indicates that erroneous beliefs that "light" and "low-tar" cigarettes are less hazardous than conventional cigarettes are still common.[49] The deception inherent in marketing low machine-measured cigarettes is now widely recognized, and as described later in this chapter, the WHO FCTC obliges Parties to ban the use of misleading descriptors.

### Funding Research to Deny, Distort, and Distract the Public About Health Effects

Research has been crucial to improving scientific and public understanding of the health effects of tobacco use and SHS exposure, and thus was seen as a threat by the industry. Beginning in 1954, the U.S. tobacco industry provided substantial funding for research through the Council for Tobacco Research (CTR), and from 1988 onward through the Center for Indoor Air Research (CIAR). The CTR, previously known as the Tobacco Industry Research Committee, was founded with the stated purpose of

"providing financial support for research by independent scientists into tobacco use and health."[50] However, the vast majority of studies supported by the tobacco industry were focused on basic science research, rather than on understanding the effects of smoking on health.[51] Indeed, the actual goals of the CTR were to lend credibility to the idea that there remained a "scientific debate about the smoking-and-health controversy," to allow the tobacco industry to "create doubt about the health charge without actually denying it," and to bolster industry's public claim that it "remains committed to advancing scientific inquiry."[52,p.839] The CTR and the CIAR, dissolved in 1998 under the Master Settlement Agreement between the nations' major cigarette manufacturers and the attorneys general of 46 states,[53] were falsely represented to the public as operating independently of the tobacco industry; in fact, both were closely controlled by industry scientists and lawyers.[54] Since these organizations were closed, individual tobacco companies have sponsored research through other entities, although the ties to industry have often been downplayed or concealed.[54]

Scientific findings and public knowledge of the health harms of SHS exposure were of special concern to the industry because of the potential for smoking bans to broadly change social norms and reduce smoking rates. Using previously internal tobacco industry documents, Drope and Chapman[55] showed that the industry developed a large global network of scientists to disseminate the industry's message that SHS was an insignificant health risk. The industry relied on lawyers to identify and fund scientists sympathetic to industry's position, and trained and sent scientists to conferences (which were sometimes organized by the tobacco companies themselves), among other tactics.[55]

Muggli and colleagues[56] provide further insight into the broad-ranging activities of the tobacco industry's international scientific consultant program focused on protecting the industry from the international threat of smoking restrictions. In Germany, for example, the tobacco industry created the Verband der Cigarettenindustrie (VdC, or Association of Cigarette Industries of Germany), made up of German and Austrian tobacco companies and the German branches of three multinational firms (Philip Morris, R.J. Reynolds, and BAT), to advance their interests by funding pro-industry research. Links between scientists and the VdC were blurred, sources of funding were not cited, and the research produced under its guidance was heavily controlled. As with other industry efforts, the VdC has been geared toward the industry's goals such as playing down the harms of SHS exposure.[57,58]

In Latin America, Philip Morris and BAT put in place a network of scientific consultants coordinated by a Washington, D.C., law firm to deter potential future action on SHS; these consultants were to be perceived as independent scientists but would conduct and publish scientific studies on SHS that were favorable to industry.[59]

The tobacco industry also helped develop a scientific society, the International Society of the Built Environment, which published a journal, *Indoor and Built Environment*[60] to provide a forum for its funded research. The society and the journal's editorial board were dominated by individuals with undisclosed financial ties to the tobacco industry. More than 60% of the journal's papers related to SHS reached conclusions favorable to industry; of these, 90% included one or more authors with financial ties to the industry. [60]

As noted by WHO, "the history of tobacco industry involvement in research has shown that the results are often manipulated, suppressed or used incorrectly by non-scientists to suit the needs of the tobacco industry," and "the documented history of scientific misconduct has led a growing number of academic institutions to introduce a policy not to accept tobacco industry funding."[61,p.10]

### Influencing Media Coverage of Smoking and Health

In 1989, the U.S. Surgeon General noted that "media dependence on advertising revenues from the tobacco companies may discourage full and open discussion of the hazards of tobacco use. Reduced media attention may reduce the extent of public understanding of the health hazards."[62,p.502] Strong evidence indicates a negative association between magazine revenue from tobacco advertising and publication of tobacco-related content.[41] For example, Warner and colleagues[63] analyzed data from 99 magazines published over 25 years and concluded that magazines with substantial tobacco advertising revenue were less likely to publish negative information about smoking. Studies of women's magazines in Europe reached similar conclusions.[41]A study exploring the relationship between the tobacco companies and the African American press concluded that a "quid pro quo" existed between the two: In exchange for advertising dollars and other forms of support for the African American press, dating from the 1940s, the tobacco industry both expected and received support for the industry's positions on tobacco taxes, smoke-free policies, and other policies.[64]

## Information Interventions to Reduce Demand for Tobacco

A large body of evidence from HICs, as well as some studies from LMICs, demonstrates that providing information to adult consumers about the addictive and harmful nature of tobacco products can help reduce consumption of these products.[41,65] Governments may disseminate information about the health hazards of tobacco use in a variety of ways, including published reports, anti-tobacco mass media campaigns, school-based anti-tobacco education programs, and health warnings on tobacco packages. Warning people about the dangers of tobacco use through large pictorial warnings and hard-hitting anti-tobacco mass media campaigns are two of the most cost-effective measures for reducing tobacco use.[27]

The WHO FCTC, an international treaty with 180 Parties (179 countries and the European Union, as of November 25, 2015), legally binds Parties to implement measures that inform the public about the harms of tobacco. Article 10 obligates Parties to implement effective measures for public disclosure of information about the toxic contents of tobacco products and the emissions they produce. Article 11 obligates Parties to adopt and implement effective measures to ensure that tobacco packaging carry health warnings describing the harmful effects of tobacco use. Article 12 obligates Parties to adopt and implement effective measures including comprehensive education and public awareness programs. In addition, the WHO FCTC obligates Parties to prohibit misleading industry information practices through regulation of advertising, promotion, and product packaging. Parties are obligated to prohibit industry promotion of tobacco products that is false, misleading, or deceptive or likely to create an erroneous impression about the characteristics, health effects, hazards, or emissions of tobacco products, whether on packaging (Article 11) or via other mediums (Article 13).

## Information Shocks

In many HICs, "information shocks," such as new publications on the health consequences of tobacco or the introduction of prominent warning labels, have led to measurable and sustained reductions in the demand for tobacco. Of major historical significance are the information shocks caused by two publications that conclusively linked smoking to lung cancer—the 1962 Royal College of Physicians report in the United Kingdom[66] and the U.S. Surgeon General's report of 1964.[67] These reports helped lead to significant reductions in cigarette smoking, with initial declines of 4% to 9% and longer term cumulative declines of 15% to 30%.[1,68]

Information shocks have the greatest impact at a relatively early stage in a population's epidemic of tobacco-related disease, when public knowledge of the health risks of smoking is low.[69] In a number of LMICs, the level of knowledge and awareness about the harms of tobacco use is very low, and governments have not yet engaged in efforts to increase knowledge and awareness. These countries have the potential to experience sharp reductions in tobacco use. To date, a limited amount of research has been conducted on the impact of information shocks in LMICs. Research on this issue can be expected to increase in the future, thanks to the emergence of high-quality data on public knowledge, attitudes, and behaviors regarding tobacco use and government actions implementing the WHO FCTC.

## Anti-Tobacco Mass Media Campaigns

Anti-tobacco mass media campaigns involve the use of one or more forms of media (e.g., print, radio, billboards, television, social media) to inform the public about the health risks of tobacco, discourage tobacco use, promote anti-tobacco social norms, and provide resources for cessation assistance.[41] Campaigns may also attempt to reduce demand for tobacco indirectly by generating public support for various tobacco control policies, such as new tax initiatives or clean indoor air laws. Mass media campaigns can efficiently reach large populations of both smokers and nonsmokers repeatedly, over time, and at a relatively low cost per person.[41,70]

### Evidence From High-Income Countries

Extensive evidence from HICs documents that well-funded mass media campaigns, especially when implemented as part of a comprehensive tobacco control program, can lead to reduced tobacco use among both youth and adults.[41,71–76] NCI Monograph 19 reviewed the available evidence on such campaigns in a number of HICs published between 1970 and May 2007 and discussed anti-tobacco mass media interventions in detail, tracing their evolution and describing elements of effective campaigns and targeting/tailoring strategies.[41] This report concluded that mass media campaigns designed specifically to discourage tobacco use in adults can also change youth attitudes about tobacco use, curb smoking initiation, and encourage adult cessation, and that the effects of campaigns are greater when combined with school- and/or community-based programming.

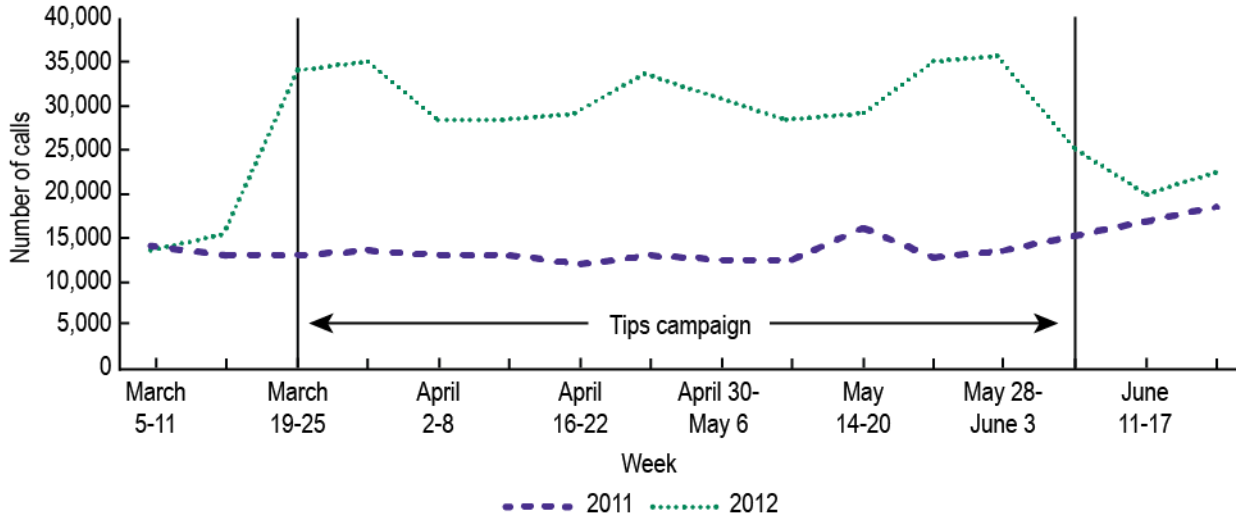
The 2012 report by the U.S. Surgeon General, *Preventing Tobacco Use Among Youth and Young Adults,* concluded that anti-tobacco media campaigns can prevent the initiation of tobacco use and reduce the prevalence of tobacco use among youth.[72] Since the publication of these key reports, additional evidence has accumulated to support the effectiveness of anti-tobacco media campaigns in high-income countries; selected studies are presented below.

A systematic review by Wakefield and colleagues[70] examined the effectiveness of mass media campaigns to improve health behaviors, including campaigns to prevent/reduce tobacco use. Their review cited the 121 studies on mass media campaigns examined by NCI (including 25 controlled field experiments on youth and 40 on adults, as well as 57 population-based state and national mass media campaigns) and the Cochrane review by Bala and colleagues[74] of 11 adult-focused studies of mass media campaigns with control groups or interrupted time series designs. Wakefield and colleagues asserted that there is "a substantial body of support for the conclusion that mass media campaigns can change population health behaviors"[70,p.1271] and that the evidence in support of anti-tobacco mass media campaigns is strong.

In another systematic review, Durkin and colleagues[71] studied the ability of mass media campaigns to promote smoking cessation among adult smokers. This review updated and synthesized findings from previous reviews[41,74] with 26 additional empirical studies. The authors concluded that the evidence in support of mass media campaigns to promote smoking cessation has strengthened over time, and such campaigns are an important investment as part of a comprehensive tobacco control program. These campaigns "educate about the harms of smoking, set the agenda for discussion, change smoking attitudes and beliefs, increase quitting intentions and quit attempts, and reduce adult smoking prevalence."[71,p.127]

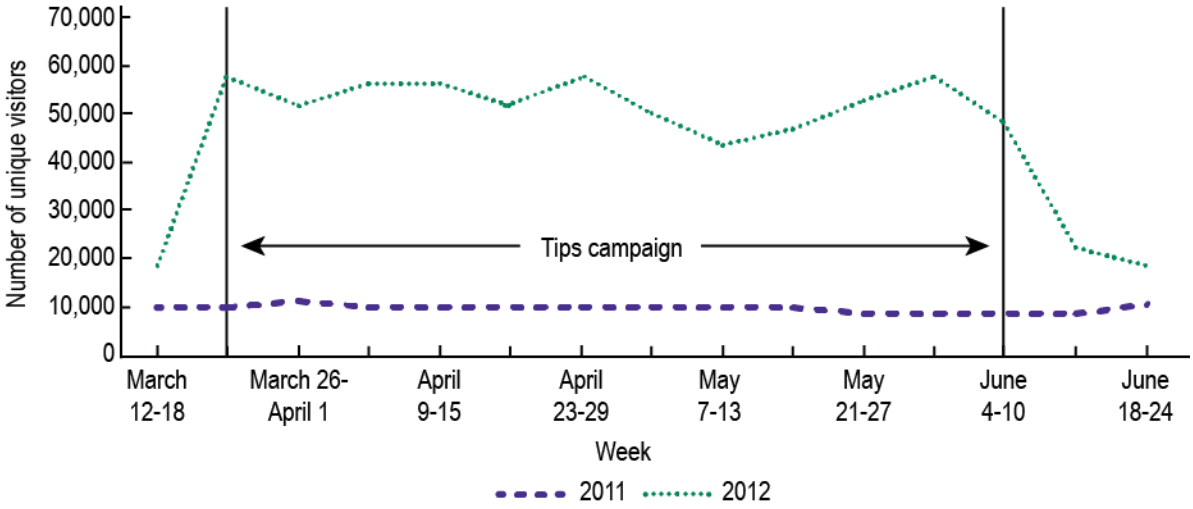
In 2012, the U.S. Centers for Disease Control and Prevention (CDC; an agency of the U.S. Department of Health and Human Services) launched "Tips From Former Smokers" (Tips), the first federally funded, national-level tobacco education mass media campaign in the United States. Tips aimed to increase public awareness of the health effects of smoking and exposure to SHS, encourage quitting, and motivate nonsmokers to talk with family and friends about the hazards of smoking. The campaign featured testimonials from former smokers who described in graphic and emotional terms the consequences of living with diseases caused by smoking. Campaign messages were presented through national and local cable television, local radio, online media, billboards, movie theaters, transit venues, and print media (see Figure 8.3 for examples of advertisements). Tips promoted a national quitline portal (1-800-QUIT-NOW) and a national smoking cessation website (http://www.smokefree.gov/), and the campaign was found to increase calls to the quitline portal and visitors to the smoking cessation website (Figures 8.1 and 8.2).[77] An analysis of the Tips campaign found that it succeeded in reducing smoking-attributable morbidity and mortality, and overall, was a highly cost-effective mass media intervention.[78]

**Figure 8.1 Number of Weekly Telephone Calls to the National Quitline Portal Around the Airing of the Centers for Disease Control and Prevention's Tips From Former Smokers Campaign**




*Notes:* The Tips campaign ran from March 19 to June 10, 2012. Data for May 30 to June 19, 2011, were imputed using straight-line regression.
*Source:* Centers for Disease Control and Prevention 2012.[77]

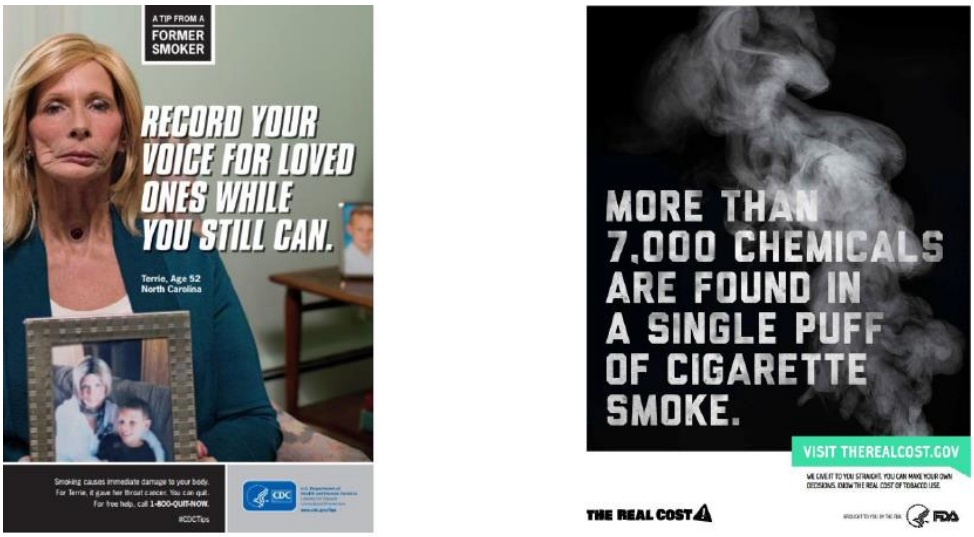
## Figure 8.2 Number of Weekly Unique Visitors to the National Cancer Institute's Smokefree.gov Around the Airing of the Centers for Disease Control and Prevention's Tips From Former Smokers Campaign




*Notes:* The Tips campaign ran from March 19 to June 10, 2012. Data for 2011 and 2012 were collected by Google Analytics.
*Source:* Centers for Disease Control and Prevention 2012.[77]

The U.S. Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, launched a national mass media campaign targeting youth prevention in February 2014.[79] Titled "The Real Cost," the campaign targets youth ages 12–17 at risk for cigarette smoking. Key messages, which are targeted specifically toward a high-risk teen audience, include: addiction leads to loss of control, cigarette smoke contains a toxic mix of chemicals, and every cigarette comes with a "cost" to health. Examples of advertisements from both the CDC Tips campaign and the FDA Real Cost campaign are shown in Figure 8.3.

## Figure 8.3 Advertisements From the Tips From Former Smokers Campaign (CDC) and the Real Cost Campaign (FDA)




*Sources:* Centers for Disease Control and Prevention 2015[176] and Food and Drug Administration 2014.[79]

## Evidence From Low- and Middle-Income Countries

In recent years, many LMICs have increased their implementation of anti-tobacco mass media campaigns, including campaigns that can reach rural and low-income areas and can operate via Internet and mobile technologies which are increasingly available in LMICs.[80] The emerging use of media campaigns in LMICs has been recognized as an important tobacco control intervention,[70,81] particularly in countries where bans or restrictions on tobacco advertising and promotion as obliged by the WHO FCTC are not yet in place or not effectively enforced. Although research on campaigns conducted in LMICs is limited, existing studies suggest that anti-tobacco media campaigns can be effective at preventing smoking and promoting cessation in LMICs, as described below.

In India, smokeless tobacco use is more prevalent than cigarette smoking and thus poses a significantly greater threat to population health than it does in other countries.[82,83] Murukutla and colleagues[81] examined the effects of the first national mass media campaign implemented by the Indian Government (in collaboration with the World Lung Foundation and other organizations) to raise awareness, increase knowledge, and improve perceptions of the health consequences of smokeless tobacco use. A 30-second public service announcement (PSA) depicting the illnesses and disfigurement resulting from surgery performed to treat cancers caused by smokeless tobacco use ran for 6 weeks in 2009 on state-owned national and regional television channels and on privately owned cable and satellite channels. A post-intervention evaluation of a nationally representative household survey of smokeless-only users, smokers-only, and dual users, who reported having watched television or listened to radio during the time of the campaign demonstrated high recall of the campaign advertisement (63% of smokeless-only users and 72% of dual users). More than 70% of those aware of the campaign reported that the PSA had made them "stop and think," and said that it was relevant to their lives and gave them new information. There was also a significant association between campaign awareness and campaign-relevant knowledge, attitudes, and behaviors among smokeless-only users. The authors concluded that the study supports the feasibility and efficacy of mass media social marketing campaigns targeted at rural populations and those of low socioeconomic status in India.

In another study conducted in India, Anantha and colleagues[84] examined the effectiveness of an anti-tobacco community education program in the Kolar District of Karnataka. The program components included distribution of tobacco information flyers, display of cards with graphic pictures of cancers, and screenings of films about tobacco use in the villages. This program was tested in one experimental area and compared to two control areas. Measures of prevalence, quitting, and initiation were taken at baseline and 2 years and 3 years later, using face-to-face surveys. Sample sizes varied across waves, but included 13,833 respondents from the experimental area, 18,509 from control area 1, and 9,437 from control area 2 across the three waves. This study found that the prevalence rate of tobacco use declined more in the experimental than in the control communities, and that a greater number of tobacco users quit in the experimental area compared with the control areas.

Other research from India has shown that various communication strategies for motivating tobacco users to quit can be effective, even among rural populations with high rates of illiteracy. For example, an intervention study conducted over a period of 10 years in three rural areas of India was well understood and well received by villagers. Various communication methods were used, including films, posters, folk-drama, radio programs, and newspaper articles. The method most preferred by the population was personal communication. Overall, the intervention led to tobacco cessation in 14% of the sample.[85]

In 2004, Malaysia implemented the Tak Nak ("Just say no") campaign—the first media campaign in the country designed to increase awareness of the health hazards of smoking. An evaluation of the campaign was conducted by Fong and colleagues[86] as part of the ITC Malaysia Survey. Waves 1 through 4 of this survey (conducted from 2005 through 2009) included face-to-face and telephone surveys of cohorts of about 2,000 adult smokers and 1,000 youth smokers and nonsmokers; waves 1 through 3 also surveyed 1,500 adult nonsmokers. The survey measured awareness of the campaign, self-reported effects of the campaign, current knowledge of tobacco's health risks, and effects of the campaign on discussion of tobacco-related health concerns in the respondent's household. The survey found that at least 93% of smokers had heard of the campaign at each wave. In wave 4 (2009), 61% and 53% of smokers said that the campaign had led to discussions about smoking and health with their family and friends, respectively. In addition, almost three-fourths of smokers indicated that the campaign made smoking less socially desirable, and nearly half (43%) of smokers and quitters indicated that the campaign made them more likely to quit or to stay quit.

An ITC Project evaluation of the Tak Nak campaign by Lee and colleagues[87] found that smokers who reported being most affected by the campaign were more likely to report stronger intentions to quit. Further analyses showed that the impact of the campaign was strongest among smokers who showed the most cognitive and affective reactions to the campaign, specifically those who thought more about the harms of smoking, perceived greater societal disapproval of smoking, and/or exhibited a higher level of fear arousal after the campaign. The authors concluded that their findings support the effectiveness of including both cognitive and affective components in health communication messages.

A mass media campaign to reduce the common Chinese practice of giving cigarettes as gifts was evaluated using ITC China Survey data, specifically focusing on the impact of this campaign on Chinese smokers' knowledge of smoking-related harms and attitudes toward gifting cigarettes.[88] Disagreeing that cigarettes are good gifts was more common in the four ITC cities where the anti-gifting television advertisement was presented (Beijing, Shenyang, Shanghai, Guangzhou) compared to the two cities where it was not (Yinchuan, Changsha).

In 2009, a mass media campaign was developed in Moscow, Russian Federation, with the aim of educating the public about the harms of tobacco.[89] The campaign, which ran on television, radio, newspapers, billboards, and posters in the Metro, bars, and restaurants, was adapted from the Australian "Sponge" PSA campaign already shown to be effective in HICs. A post-campaign evaluation survey found that the campaign accomplished its objectives of "making smokers think more about the health harms of smoking, creating concern about smoking, and increasing knowledge and encouraging discussion about the harms of smoking at home—all precursors to quitting."[89,p.440] The success of the campaign was then used as support for the smoke-free Moscow initiative by the Moscow Duma Health Committee.

In South Africa, Abedian[90] explored the effect of anti-smoking advertising, using data on real per capita domestic consumption of cigarettes from 1970 to 1993. He examined the decline in per capita consumption and assessed whether it could be explained by changes in price, income, and advertising, or by anti-smoking campaigns. Because this decline could not be explained by the first three factors alone, the author argued that anti-smoking publicity contributed to the decline.

In Mauritius, Azagba and colleagues[91] used longitudinal data from the ITC Mauritius Survey and found that the combination of a cigarette tax increase and an adapted version of the Australian "Sponge" campaign led to significant decrease in smoking prevalence and consumption among adults.

In Turkey, Tansel[92] used annual time series data on the number of cigarettes consumed per person age 15 and over between 1960 and 1988 to estimate the effects of: (1) health warnings after 1981, (2) a 1986 anti-smoking campaign by a national newspaper, and (3) a short-term anti-smoking campaign in 1988 (consisting mainly of displaying anti-smoking posters in public places) initiated by the Turkish Ministry of Health. The study found that the 1982 health warning and both the 1986 and 1988 anti-smoking campaigns had a significant negative effect on demand for cigarettes; the average decline was about 8% for the period 1982–1988. The author argues that public education "exerts its primary effect on the smoking behaviour of the less educated who are currently less well informed about the health consequences of smoking."[92,p.527]

Several studies from LMICs have evaluated anti-tobacco mass media campaigns aimed at increasing knowledge of the health effects of SHS exposure and increasing support for smoke-free laws. Thrasher and colleagues[93] conducted a pre–post cohort design study of a two-month social marketing campaign intended to support Mexico City's comprehensive smoke-free law. The campaign, which used ads on television, radio, and billboards and in print, was conducted from early September to mid-December 2008. It aimed to increase knowledge of the toxic constituents of SHS, support for and compliance with the new legislation, and awareness of the positive outcomes associated with smoke-free environments. The study found high recall of the campaign (69%), and that greater exposure to the campaign was associated with greater knowledge of the presence of toxic components (ammonia and arsenic) in SHS. The Mexico City campaign was also associated with increased support for and perceived benefits of the new law.

Two television campaigns that ran in São Paulo, Brazil, during the implementation of a smoke-free law in 2009 were evaluated to assess their effectiveness in changing attitudes and creating support for the law.[94] The first campaign featured a well-known physician providing information about the law; the second focused on a graphic and hard-hitting manner on the harms of SHS exposure. Compared with the first campaign, the second was rated as significantly more persuasive, personally relevant, and convincing, and smokers rated this campaign as significantly more likely to make them want to quit. These results are consistent with evidence from HICs that anti-tobacco media campaigns which evoke strong negative emotional responses are more effective than those that evoke low levels of negative emotion or positive emotions such as humor.[72,95-98]

Kosir and Gutierrez[99] reviewed more than 30 mass media campaigns on SHS conducted between 1998 and 2008 in countries around the world, including several LMICs (India, Mexico, the Philippines, Poland, Turkey, Uruguay, and Viet Nam). These campaigns included one or more of the following objectives: changing individual smoking behavior; building support for smoke-free environments; announcing an upcoming smoke-free policy and/or preparing the public for one; and/or encouraging compliance with existing smoke-free laws. Increasing knowledge of the health effects of SHS exposure, especially exposure of children, was an integral part of many campaigns. This review highlights many lessons learned regarding the process and content of the campaigns that are applicable to both HICs and LMICs. The authors' key observations include: (1) research and evaluation of many campaigns was limited, thanks largely to lack of funding, time, and knowledge of how to conduct research and evaluation activities, and (2) advertisements developed in one country can be effectively adapted to

other countries as long as the process includes adequate local target audience research, pretesting of draft materials, and appropriate adaptation based on the research findings.[99]

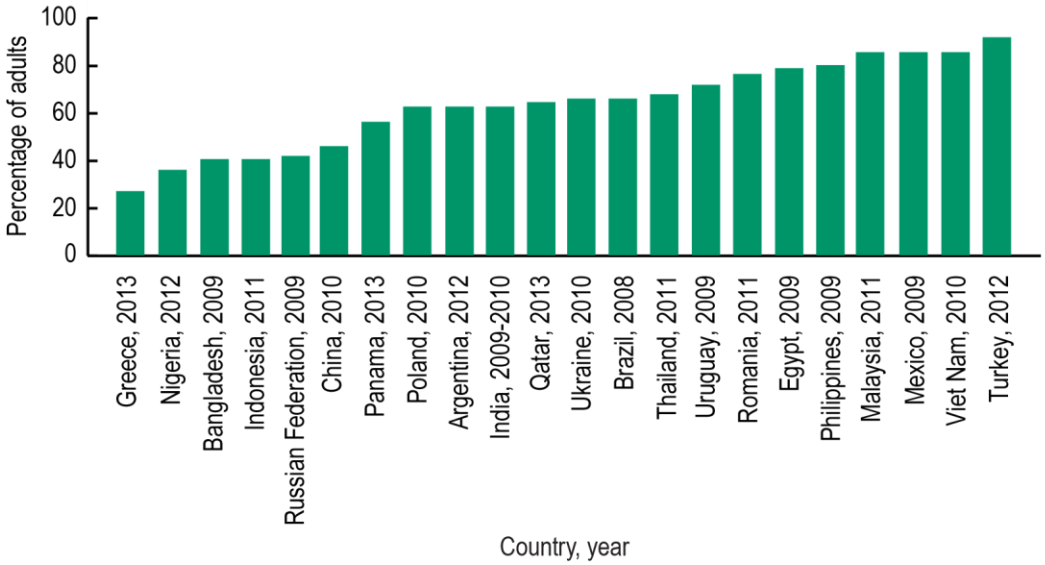
### Implementation of Anti-Tobacco Mass Media Campaigns

In their comprehensive review of the literature, Hammond and colleagues[100] identified key factors to consider when implementing mass media campaigns, including campaign reach and intensity and durability of campaign effects—that is, the extent to which effects last after a campaign ends. Research has demonstrated that withdrawal of anti-tobacco media campaigns is associated with a decline in beneficial effects, which indicates the utility of investing in longer, better-funded campaigns.[41,70,101,102] Television advertising, the most commonly employed medium for anti-tobacco mass media campaigns, is the most efficient method for reaching smokers in most countries.[40,103] Evidence from HICs suggests that online advertising may be a highly cost-effective channel for low-budget anti-tobacco media campaigns.[104]

High-quality anti-tobacco mass media campaigns can be expensive to produce and broadcast, and require both research and marketing expertise to increase the likelihood that they will be effective.[105] One successful strategy for LMICs has been to adapt existing evidence-based anti-tobacco mass media campaigns from other countries.[103,105] Adapting television campaigns can involve simply changing the end-frame to represent local sponsors (low-level adaptation) or reproducing the advertisement to better represent the target population (high-level adaptation).[105] For example, Australia's "Sponge" campaign graphically depicts the damage to the lungs each time a smoker inhales a cigarette by showing tar squeezed from a lung like a sponge. The advertisement has been adapted by 10 other countries, including China, the Russian Federation, Bangladesh, and India. Perl and colleagues[89] describe how the Sponge campaign was adapted for use in the Russian Federation. Cotter and colleagues[106] describe how the Sponge campaign was modernized. Similarly, an Australian advertisement that depicts fatty deposits being squeezed out of an artery ("Artery") has since been adapted by over 40 countries.

WHO reports that more than half of the world's population live in countries that have aired at least one national anti-tobacco mass media campaign (with all appropriate characteristics) on television and/or radio for at least 3 weeks in duration in the past 2 years.[17] People living in low-income countries are least likely to be exposed to anti-tobacco mass media; 65% of low-income countries have not run any national anti-tobacco media campaign in the past 2 years.[17] The effectiveness of anti-tobacco media campaigns can vary, based on advertisement content, the percentage of the target population that can access television or radio, the amount of play ads receive on television or radio, and other factors. As shown in Figure 8.4, the percentage of adults who noticed anti-smoking information on either television or radio varies greatly by country.

**Figure 8.4 Percentage of Adults Who Noticed Anti-Smoking Information on Television or Radio, 2008–2013**




*Source:* Eriksen et al. 2015.[177]

## School-Based Tobacco Education Programs

School settings are another venue in which information can be disseminated to raise awareness of the health effects of tobacco use. School-based education programs have considerable appeal because they represent an efficient means of reaching youth at the ages when most smoking begins.[72] The nature and content of effective school-based tobacco education curricula have been described in detail elsewhere.[72,107] The U.S. Surgeon General has stated that to be effective, school-based programs "should be comprehensive, interactive, start early, be sustained, incorporate an appropriate number of lessons, and be integrated into a community-wide approach."[72,p.792] Additionally, as described below, programs designed, conducted, or funded by the tobacco industry have been found to be ineffective or, in some cases, counter-productive.

### Evidence From High-Income Countries

Evidence regarding the effectiveness of school-based tobacco education programs is mixed but suggests that these programs have a role to play in preventing youth smoking. The 2012 Surgeon General's report stated that "the evidence is sufficient to conclude that school-based programs with evidence of effectiveness, containing specific components, can produce at least short-term effects and reduce the prevalence of tobacco use among school-aged youth."[72,p.812] School-based programs that are implemented as part of comprehensive tobacco control programs are more successful than school-based interventions alone.[72,108]

### Evidence From Low- and Middle-Income Countries

Few studies have evaluated school-based tobacco education programs conducted in LMICs. In many LMICs, there is little anti-tobacco information from other sources, so the marginal impact of information from school-based tobacco education programs may be greater than in HICs. However, despite recent

improvements in access to education, fewer youth in LMICs are in school compared with youth in HICs, which may reduce the potential efficacy of this strategy.

Project MYTRI (Mobilizing Youth for Tobacco-Related Initiatives), a partnership between researchers in the United States and India, was a group-randomized trial designed to assess a multicomponent intervention to prevent tobacco use (cigarettes, bidis, and smokeless tobacco) among Indian adolescents. The researchers assessed factors predictive of tobacco use among youth in urban India, developed the intervention program and measurement methods, assessed baseline and first-year follow-up data, and evaluated the final project outcome.[109,110] The intervention consisted of classroom curricula, school posters, and both a parental involvement and peer-led activism component. The findings showed that, compared with students in the control group, students in the intervention group were significantly less likely to increase their use of cigarettes or bidis over the 2-year study period, and were less likely to intend to use tobacco products in the future. Because of the robust research design and the number of adolescents involved, the project provides strong evidence that a multicomponent school-based program can be an effective tobacco control tool in LMICs.

Three different school smoking prevention approaches were tested in 36 public high schools in the Western Cape and KwaZulu-Natal, South Africa.[111] The 5,266 students attending these schools were randomly assigned to one of three programs: the school's usual tobacco education program (comparison), a harm minimization program developed and tested in Australia (KEEP LEFT), and a social skills/peer resistance program from the United States (Life Skills Training). No differences were found in past 30-day smoking among students in the three groups.

Several smaller scale studies have evaluated school-based tobacco education programs in Malawi,[112] the Russian Federation,[113] and Thailand.[114] Studies of the programs conducted with Thai and Russian adolescents showed positive effects, but the study among Malawian adolescents found no positive effects for the school-based program.

Overall, the limited evidence available from LMICs suggests that school-based tobacco education programs can improve students' knowledge, contribute to denormalizing tobacco use, and help prevent tobacco use in the short term. Given the generally lower levels of awareness of tobacco's health effects in LMICs, these programs may have a greater impact in these countries than in HICs, where health effects are generally better known. School-based tobacco education programs in LMICs represent an area for further research and study.

### Evidence on Tobacco Industry Programs

In the United States, tobacco companies have funded or conducted programs since the 1980s with the stated purpose of preventing smoking among youth. These efforts have included school-based smoking prevention programs as well as family involvement self-help booklets, mass media campaigns, and community-based youth smoking prevention activities.[115] Similar programs have been implemented in countries around the world.[116] In contrast to strategies known to be effective, these programs focus largely on parental and peer influences and decision-making and life skills, and ignore the influence of tobacco advertising and promotion on youth initiation, the importance of parents' promoting a nonsmoking norm for themselves and their children, the addictive nature of tobacco products, and the serious harm that tobacco use causes. These programs have also tended to present smoking as an "adult choice," thus minimizing the addictive nature of tobacco products and capturing the interest of

adolescents eager to enter the adult world. The U.S. Surgeon General, the courts, and research studies analyzing previously internal tobacco industry documents have generally concluded that the actual purpose of the industry programs is to discourage legislation, regulation, and programming to effectively reduce youth tobacco use; to improve the tobacco industry's public image; to generate partnerships with youth-serving organizations; and to limit the threat of litigation.[26,72,116]

## Health Warning Labels

Health warning labels constitute a potentially powerful information intervention[103,118–120] and are typically the most visible health information intervention presented to smokers. An individual who smokes a pack of 20 cigarettes a day is potentially exposed to the warning label 7,300 times a year, simply by taking a cigarette out of the pack to smoke. Second, the time and circumstances of the exposure are advantageous for stimulating change in behavior because they are proximal to the decision to use the product—that is, when buying a pack of cigarettes or when taking a cigarette out of the pack.

Not only do warnings convey information to smokers, but nonsmokers, including children and youth, also report high exposure to and awareness of health warnings on packages.[121] When smokers from representative national samples in Canada, the United States, the United Kingdom, and Australia were asked to list where they had seen anti-smoking information, their overall responses mentioned warning labels just slightly less often than television.[122]

In addition, compared to other information interventions such as mass media campaigns, health warning labels are a very low-cost intervention because the tobacco companies bear the costs of printing and distributing them. Thus, warning labels on tobacco packaging can be implemented at virtually no cost to governments.

Studies have assessed the ability of health warnings to reduce differences in knowledge and smoking behaviors between population subgroups, particularly between advantaged and disadvantaged groups within countries. In general, these studies indicate that pictorial warning messages have very wide reach, and can be a broadly effective tool in improving knowledge and reducing health disparities.[119] For example, a study comparing the impact of pictorial warning labels with text-only labels among U.S. adult smokers found that the pictorial warnings were more effective across diverse racial/ethnic and socioeconomic groups, concluding that "pictorial health warning labels may be one of the few tobacco control policies that have the potential to reduce communication inequalities across groups."[123,p.1] Similarly, a study of the perceived effectiveness of pictorial health warnings with different content among Mexican youth and adults found that youth and adults, smokers and nonsmokers, and adults of varying education levels rated pictorial health warnings in a generally consistent manner.[124]

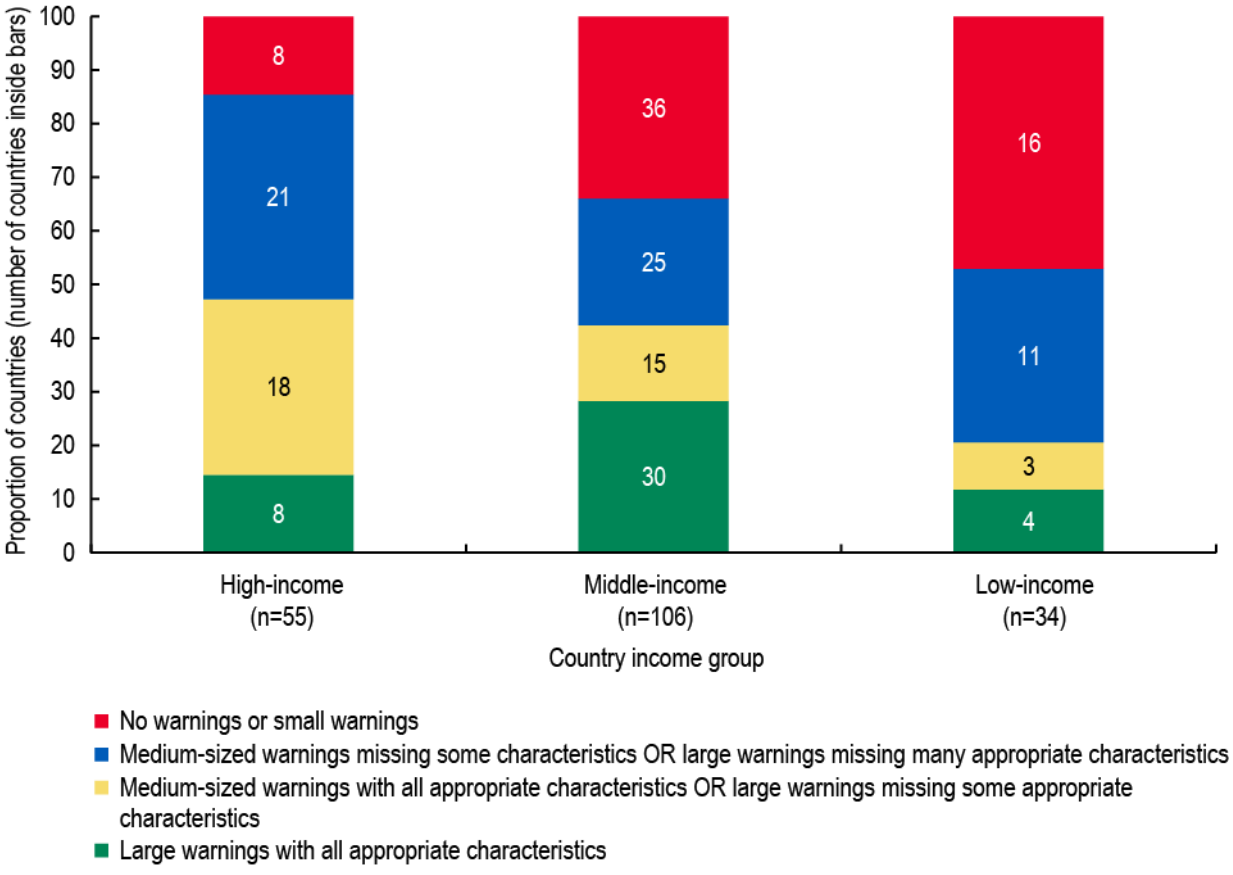
In the United States, cigarette warning messages have been required since 1966 as a result of the Federal Cigarette Labeling and Advertising Act of 1965.[62,p.482] By 1991, 77 countries required health warnings on cigarette packages, but many were considered weak.[125] Over time, various measures to increase the effectiveness of health warnings have been taken, including increasing their size, strengthening their texts, and requiring rotation of different messages. In 1985, Iceland became the first country to require the rotation of pictorial warnings, as opposed to the "text-only" messages that were standard at the time.[62] In 2000, Canada became the first country to mandate rotation of hard-hitting, full-color pictorial warnings which took up 50% of the principal surfaces (front and back) of the pack.[126] Today, a strong body of research demonstrates that pictorial warnings are more effective than text-only warnings.[127]

And, as Hammond has noted, "a wide variety of research has demonstrated the effectiveness of using pictures and imagery in health communications."[119,p.329]

Article 11 of the WHO FCTC requires prominent health warning labels on all tobacco packaging and obligates Parties to adopt strong packaging and labeling regulations requiring tobacco producers to print rotating health warning labels covering 50% or more of the principal surfaces, but no less than 30%, on all tobacco packages.[128] In 2008, the Conference of Parties adopted evidence- and best practice-based guidelines for implementing Article 11 which recommend that Parties consider using health warnings that cover more than 50% of the principal display areas of tobacco packs and aim to cover as much of the principal display area as possible.[129]

National labeling requirements vary considerably around the world, ranging from large pictorial warnings that take up most of the front and back of the pack to small text warnings on the side of the pack. More than 85% of countries mandate at least some labeling, but many have not yet implemented best-practice warning labels. Nearly 20% of the world's population living in 42 countries (about 1.4 billion people) was protected by strong pack warnings in 2014, an increase from 14% in 2012.[17] Low-income countries are the least likely to have implemented strong health warnings. About 30% of countries, including half of low-income countries, have either no warnings or only small warnings (Figure 8.5).

**Figure 8.5 Types of Health Warning Labels in Use Around the World, by Country Income Group, 2014**

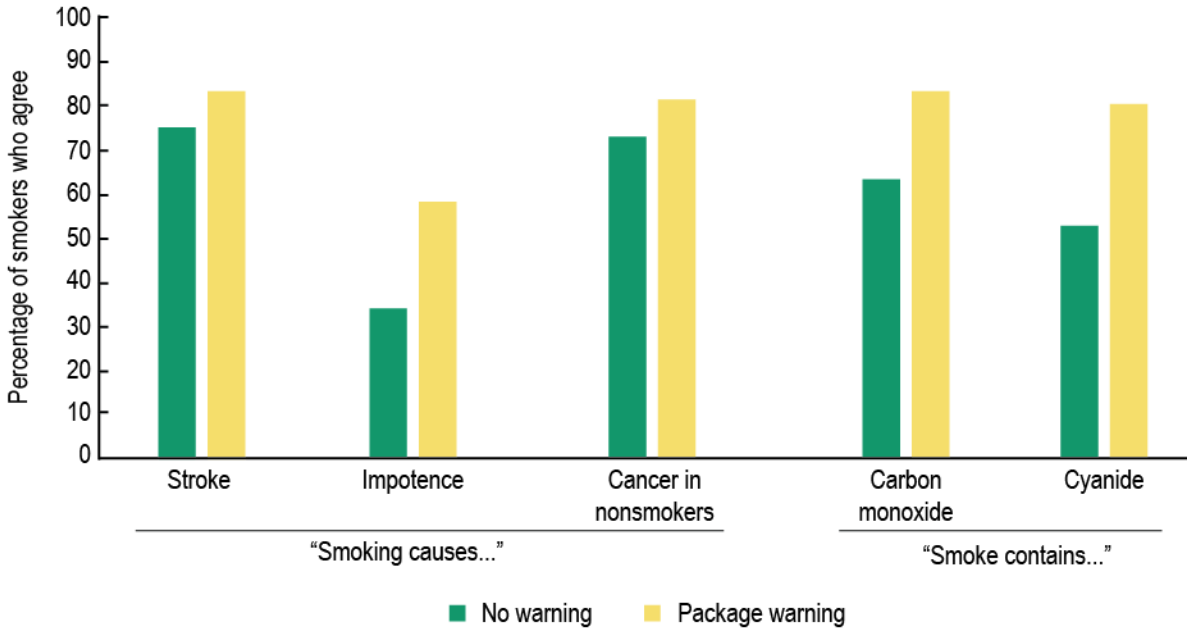



*Source:* World Health Organization 2015.[17]

## Impact of Health Warning Labels

Health warning messages on tobacco packages are now widespread, although they vary greatly in content, format, size, and whether they include graphics and other features.[103] People who live in countries where informative health warning labels are required are more knowledgeable about the harms of tobacco use than people in countries where health warning labels are not required.[72,103,130,131] As shown in Figure 8.6, knowledge about the harms of tobacco is greater in countries that implement tobacco warning labels.

### Figure 8.6 Knowledge About the Harms of Tobacco Use: Comparison of Countries With and Without Health Warning Labels on Particular Topics




*Sources:* World Health Organization 2011,[103] based on data from Hammond et al. 2006.[122]

## Evidence From High-Income Countries

In HICs, the introduction of strong health warning labels has successfully reduced consumption and prevalence of tobacco use among adult smokers. Following the 2001 introduction of large pictorial warning labels in Canada, smokers who had read, thought about, and discussed the labels were more likely to have quit, made a quit attempt, or reduced their smoking.[126] About 3 in 10 former smokers reported that the labels had motivated them to quit and more than one-fourth said that labels helped them remain abstinent.[132] In another Canadian study, about one-fifth of smokers reported reducing their consumption as a result of seeing the pack warning labels.[133]

The 2006 introduction of pictorial health warnings in Australia caused more than half of smokers to believe that they had an increased risk of dying from smoking-related illness, with 38% feeling motivated to quit.[134]

Health warning labels have been shown to increase positive moves toward cessation such as calling a quitline, particularly when quitline information is included as part of the warning message. For example, a link between such warning messages and increased calls to a quitline has been found in studies from

the Netherlands,[135] Australia,[136] and New Zealand.[137] Another study showed that smokers exposed to a pictorial warning had a higher likelihood of reducing smoking, calling a telephone quitline, and quitting than smokers exposed to the text-only warning.[138] In Singapore, quitline calls tripled when new pictorial labels were introduced.[139]

Other studies measuring behavioral outcomes have shown a link between improved warning labels and reduced tobacco use. An ITC survey of 616 randomly selected adult smokers showed that smokers who had read, thought about, and discussed the new labels were more likely to have quit 3 months later.[126] Two self-report surveys of youth, in Canada[140] and in Australia,[141] also showed a link between warning labels and decreased initiation, with between one-fifth and two-thirds of nonsmokers reporting that warning labels had helped prevent them from initiating smoking. Additional studies conducted in Canada, Australia, and the United Kingdom also found that warning labels have successfully discouraged youths, including the most vulnerable youths, from initiating smoking.[119] In the Singapore survey mentioned above, 28% of smokers surveyed smoked fewer cigarettes because of the warnings.[139] And in a study of 191 former smokers in Canada, 27% of former smokers reported that warning labels helped them remain abstinent from tobacco.[132]

Huang, Chaloupka, and Fong[142] conducted a difference-in-difference (quasi-experimental) analysis of the impact of pictorial warnings in Canada, using the United States as the control. Controlling for price, Huang and colleagues found that the introduction of pictorial warnings reduced smoking rates by 2.9% to 4.7%, a relative decrease of 12.1% to 19.6%. Their findings suggest that if the United States had adopted Canadian graphic warnings in 2012, the number of adult smokers in the United States would have decreased by 5.3 million to 8.6 million in 2013. Similarly, Azagba and Sharaf,[143] based on their analysis of data from the 1998–2008 Canadian National Population Health Survey, found that Canada's pictorial warnings reduced smoking prevalence and increased quit attempts among smokers.

As with all communications, in health or otherwise, the same communication tends to lose its effectiveness over time, a phenomenon known as *wear-out*. Thus, it can be expected that health warnings will need to be revised on a regular basis. Hitchman and colleagues[144] analyzed ITC Survey data in Canada and the United States from 2002 to 2011, examining trends for six indicators of cigarette health warning label effectiveness. The effectiveness of both countries' warnings declined over the 9-year period of study. The magnitude of wear-out was larger in Canada (likely due to the fact that the Canadian warnings were very new when the study began) than in the United States, but was evident even for the U.S. warnings, which had been in place for 17 years at the outset of the study. Wear-out of health warnings has also been documented in a study conducted by the ITC Project in Mauritius.[145]

### Evidence From Low- and Middle-Income Countries

While evidence of the effectiveness of large text and pictorial warnings in HICs is well established, evidence from LMICs has only recently begun to emerge. Tobacco warning labels are especially crucial for communicating health risks in LMICs, where there are fewer sources of information about tobacco's health risks, and well-funded public information campaigns on the harms of tobacco are likely to be rare.[146]

A report from the U.S. Centers for Disease Control and Prevention[147] used 2008–2010 data from the Global Adult Tobacco Survey conducted in 14 countries to examine the effects of cigarette package health warnings on interest in quitting among smokers 15 years of age or older. Most smokers noticed

the health warnings, and among those who did, the percentage who reported thinking about quitting because of the warning was 25% or more in all countries except Poland.[147]

The enhancement of warning labels in Thailand in 2006 from 30% text-only to 50% pictorial greatly increased their effectiveness. After implementation of these new warnings, the percentage of smokers stating that the labels made them think about the health risks "a lot" increased from 34% to 53%, and the percentage stating that the labels made them "a lot" more likely to quit increased from 31% to 44%. By comparison, the ITC Malaysia Survey, conducted at the same time, showed no such increases; their labels did not change during that time.[118,146]

Gravely and colleagues[148] conducted a pre–post evaluation of the impact of Uruguay's 2009-2010 enhancement in warnings, including an increase of warning size from 50% to 80%, finding that this enhancement led to significant increases in all six indicators of warning effectiveness among adult smokers. This study demonstrates that increasing warning size beyond 50% leads to greater increases in effectiveness.

In 2009, Mauritius became the first nation in the African Region to implement pictorial warnings—a set of eight rotating images that were, at the time, among the largest in the world (70% of the back of the pack in English and 60% of the front in French). Images included graphic depictions of mouth cancer, diseased lungs, open heart surgery, as well as images such as a "limp" lit cigarette. An evaluation of the new warnings conducted before and approximately 14 to 15 months after implementation provides compelling evidence for the effectiveness of pictorial warning labels across several indicators, compared with the former text-only labels. Significant increases in awareness of health effects corresponded to the topics addressed in the new warnings. Also noted were increases in noticing the labels (27%), reading or looking closely at the labels (18%), thinking about the health risks (20%), avoiding the labels (27%), forgoing a cigarette (8%), and likelihood of quitting (29%). After the new warning labels were implemented, there was a 32% increase in the number of smokers who said that labels were a reason to quit. While the pictorial warnings evoked emotional alarm and unpleasant feelings among most smokers, the labels were not considered unrealistic or too sensational. More than half of Mauritian smokers wanted more information on cigarette packages.[145]

Evidence from an evaluation of warning labels in three Latin American countries also confirms that health warning labels have the most impact when they are prominent (i.e., the front and back of the package) and include emotionally engaging imagery that illustrates negative bodily impacts and human suffering due to smoking. This evaluation also suggests that text-only warnings may be less effective with more socioeconomically disadvantaged smokers.[149] This study compared health warning labels in Uruguay (2008) (4 different abstract images on 50% front/50% back) with warning labels in Brazil (2009) (10 different images of diseased organs, human suffering, and abstract imagery on 100% of the back) and Mexico's text-only labels (50% of the back). Uruguay's warning labels using abstract imagery, had higher salience than either Brazilian or Mexican warning labels. People at higher levels of educational attainment in Mexico were more likely to read the text-only labels, whereas education was not associated with salience in Brazil or Uruguay. Brazil's strategy of depicting human suffering and gruesome health effects had greater cognitive and behavioral impacts than the abstract imagery used in Uruguay or Mexico's text-only format. These cognitive impacts were strongest among smokers with low educational attainment.[149]

An investigation of the impact of warning labels on quit intentions among Malaysian smokers suggests that Malaysian smokers' responses to warning labels are comparable to those of people in HICs (e.g., Australia, Canada).[150] Responses of 2,006 adult smokers surveyed in the ITC Malaysia study in 2005 showed that warning labels have a clear relationship with interest in quitting, specifically insofar as the warnings stimulated thoughts about quitting and then led the person to forgo cigarettes. Given that Malaysia had only small and non-prominent warnings on the side of the pack at the time of the study, the findings attest to the potential impact of enhancing warning labels to meet or exceed the guidelines for Article 11 to stimulate quitting.

Experimental research conducted in Mexico, China, and Malaysia has demonstrated that pictorial warnings are rated by smokers as more effective than text-only warnings. In an experimental auction study in Mexico, adult smokers (n=89) placed separate bids on two packs of cigarettes, one with a text-only warning label and the other with a warning label that included text and graphic images. The study showed that the pack with the graphic image had a mean attributed value which was 17% lower (3.21 pesos) than the pack with the text-only warning. This lower perceived value was relatively consistent across socioeconomic status, cigarettes per day, number of prior quit attempts, and levels of perceived risk of smoking. This lower perceived value suggests that pictorial warnings are likely to reduce cigarette demand, resulting in a significant reduction in tobacco consumption.[151]

In October 2008, China enhanced its warning labels from small warnings on the side of the pack to larger text warnings on 30% of the front and 30% of the back of the pack. An ITC experimental study conducted in 2009 among 1,169 adult smokers, adult nonsmokers, and youth in four cities (Beijing, Shanghai, Kunming, and Yinchuan) found that the newly enhanced text-only Chinese warnings were much lower in effectiveness than labels that included pictorial-plus-text warnings.[152] The old warnings (with text on the side of the pack) and newly enhanced Chinese text-only warnings—along with eight alternative warnings that were created on Chinese packs using pictorial-plus-text warnings from Canada; Singapore; China, Hong Kong Special Administrative Region (SAR); and the European Union—were ranked and rated by respondents on a number of dimensions, including perceived effectiveness in motivating smokers to quit and in convincing youth not to start smoking. The results were remarkably consistent across adult smokers, adult nonsmokers, and youth for all four cities, and for males and females. All four pictorial-plus-text warnings were rated and ranked highest on effectiveness in motivating smokers to quit and convincing youth not to start smoking. The text-only versions of the four pictorial warnings were rated in the middle. The actual newly enhanced Chinese text warnings (on 30% of the front and back) were rated at the bottom of the set of 10 warnings, just above the old Chinese text warnings that had appeared on the side of the pack.

Fathelrahman and colleagues[153] conducted an experimental study to evaluate the new pictorial warnings in Malaysia before their implementation among adult male smokers (n=140). A two-group randomized design was used to compare the impact of the new pictorial warnings against the original text-only warning on the side of the pack. Nine pictorial warning mock-up packs were prepared to resemble the new warning labels proposed by the Malaysian government for implementation in January 2009. The warning label images included graphic depictions of mouth and throat cancer, diseased lungs, and gangrene. Exposure to the pictorial warnings resulted in a significantly increased awareness of the risks of smoking, thinking about the harm of smoking, interest in quitting smoking, avoiding looking at or thinking about the pack warnings, and forgoing having a cigarette. Based on these experimental findings and the results of population-based studies in other LMICs, the new Malaysian pictorial warnings can be

expected to improve awareness of the harms of tobacco and stimulate emotional responses that will lead to quit attempts.

In 2008, China and Malaysia had U.S.-style warning labels—text-only and only on the side of the pack. In 2009, both countries changed their warning labels, China to the 30% text-only warnings described above, and Malaysia to pictorial warnings occupying 50% of the top of the front and back of the pack. These changes made it possible to examine the difference in impact from a common starting point. Using pre–post data from the ITC surveys in China and Malaysia, Elton-Marshall and colleagues[154] found that the size of the effect of Malaysia's larger pictorial warnings was significantly greater on all six indicators of warning effectiveness than the effect size of the change to text-only warnings in China. Elton-Marshall and colleagues[154] also computed the estimated impact of China's failure to implement graphic warnings by taking the difference in the effect sizes and multiplying by the number of smokers in China. The text-only revision in China led to an increase of 3.1% in the number of smokers who reported often noticing the warnings, but the pictorial revision in Malaysia led to an increase of 12.6%, for a net difference of 9.5%. Multiplying this by 300 million Chinese smokers led the researchers to estimate that 28.5 million Chinese smokers would have noticed the warnings if China had implemented pictorial warnings rather than text-only warnings. Using the same method, Elton-Marshall and colleagues[154] estimated that if China had implemented Malaysia-style pictorial warnings, 25.2 million more Chinese smokers would have read the warnings, 13.2 million more smokers would have reported that the warnings made them think about the health risks of smoking, 23.1 million more smokers would have reported that the warnings made them think about quitting, and 52.8 million more smokers would have reported that the warnings stopped them from smoking a cigarette at least once. These findings demonstrate the enormous potential impact of population-level interventions to raise awareness and inform consumers about the harms of smoking—an impact that is either realized or lost, depending on the strength of the intervention.

## Tobacco Packaging: Banning Misleading Descriptors and Requiring Plain Packaging

The cigarette package represents an important marketing vehicle, serving to transmit information about the desirable characteristics of the product and the brand to both current and potential consumers.[155] Packaging has become an increasingly prominent form of marketing in countries with comprehensive restrictions on traditional advertising channels.[100,156] Governments seeking to limit the industry's use of this information channel may employ policy measures to regulate the retail packaging and appearance of tobacco products, ranging from bans on misleading terms or descriptors, to legislatively mandated plain packaging (also known as standardized packaging) restrictions. As described in the guidelines for WHO FCTC Article 11, plain packaging refers to "measures to restrict or prohibit the use of logos, colours, brand images or promotional information on packaging other than brand names and product names displayed in a standard colour and font style."[129,p.8] Plain packages use a standard background color with the brand name printed in a mandated size, font, and position.[72]

Article 11 of the WHO FCTC requires the Parties to implement effective measures to ensure that tobacco packaging does not promote a tobacco product by false or deceptive means. Parties are also obligated to prevent packaging and labeling from misleading the public about the product's characteristics, health effects, or emissions, including the use of any term or element that "creates the false impression that a particular tobacco product is less harmful than others"[129] (e.g., "light," "low-tar," "mild"). As of 2014, 114 WHO Member States had banned misleading descriptive terms such as "light" and "mild" for manufactured cigarettes, and 94 countries prohibited them for smokeless products.[17]

In the United States, a provision of the Family Smoking Prevention and Tobacco Control Act (2009) bans use of the terms "light," "mild," or "low," or similar descriptors, without a marketing authorization from the FDA.[72] The court in *United States of America v. Philip Morris USA, Inc.* also prohibited the defendants and other covered persons and entities from using misleading descriptors such as "low-tar," "light," "mild," and "natural."[26,p.938;157]

Guidelines for implementation of Articles 11 and 13 of the WHO FCTC recommend that Parties consider adopting plain packaging. Guidelines for implementation of Article 11 state that plain packaging may "increase the noticeability and effectiveness of health warnings and messages, prevent the package from detracting attention from them, and address industry package design techniques that may suggest that some products are less harmful than others."[129,p.8] Guidelines for implementation of Article 13 acknowledge the advertising and promotional importance of packaging, noting the use of pack or product features to attract consumers, promote products, and establish brand identity (e.g., through use of colors, pictures, shapes, logos, etc., on packs or on individual cigarettes or other tobacco products). The Article 13 guidelines also recognize that "the effect of advertising or promotion on packaging can be eliminated by requiring plain packaging."[158,p.4]

## Plain Packaging Laws: The Example of Australia

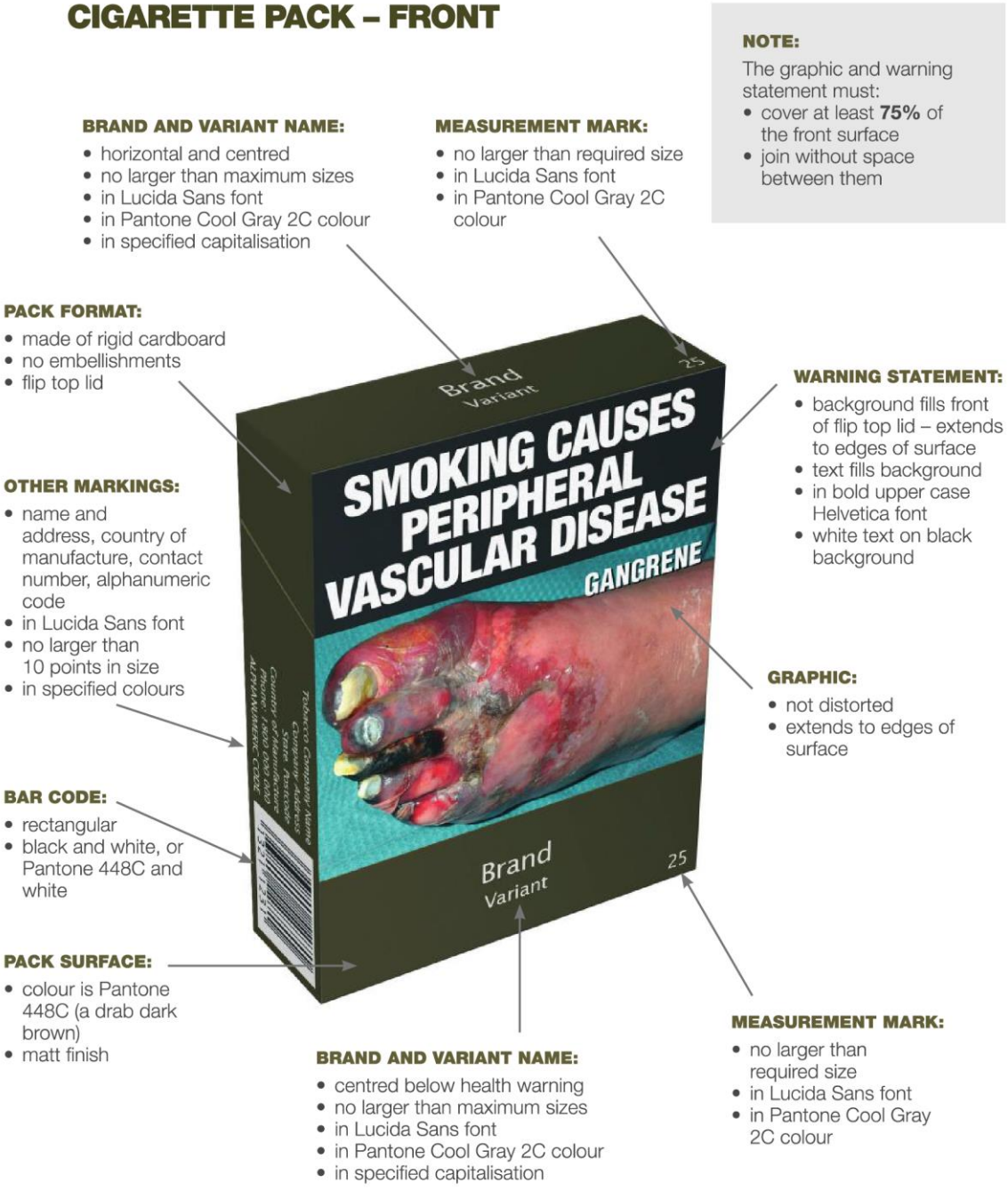
In December 2012, Australia became the first country in the world to implement plain packaging for all tobacco products. Under Australia's law,[159] the Tobacco Plain Packaging Act 2011 and Tobacco Plain Packaging Regulations 2011, all tobacco products must be sold in a standardized "drab dark brown" package, with the brand name and any variant name shown in standard font, style, and size on the front of the package (Figure 8.7). The appearance and color of the tobacco products were also standardized, and pictorial health warnings increased in size by, for example, requiring them to cover at least 75% of the front and 90% of the back of the cigarette packages.[160]

### *Evidence on the Effect of Australia's Plain Packaging Law*

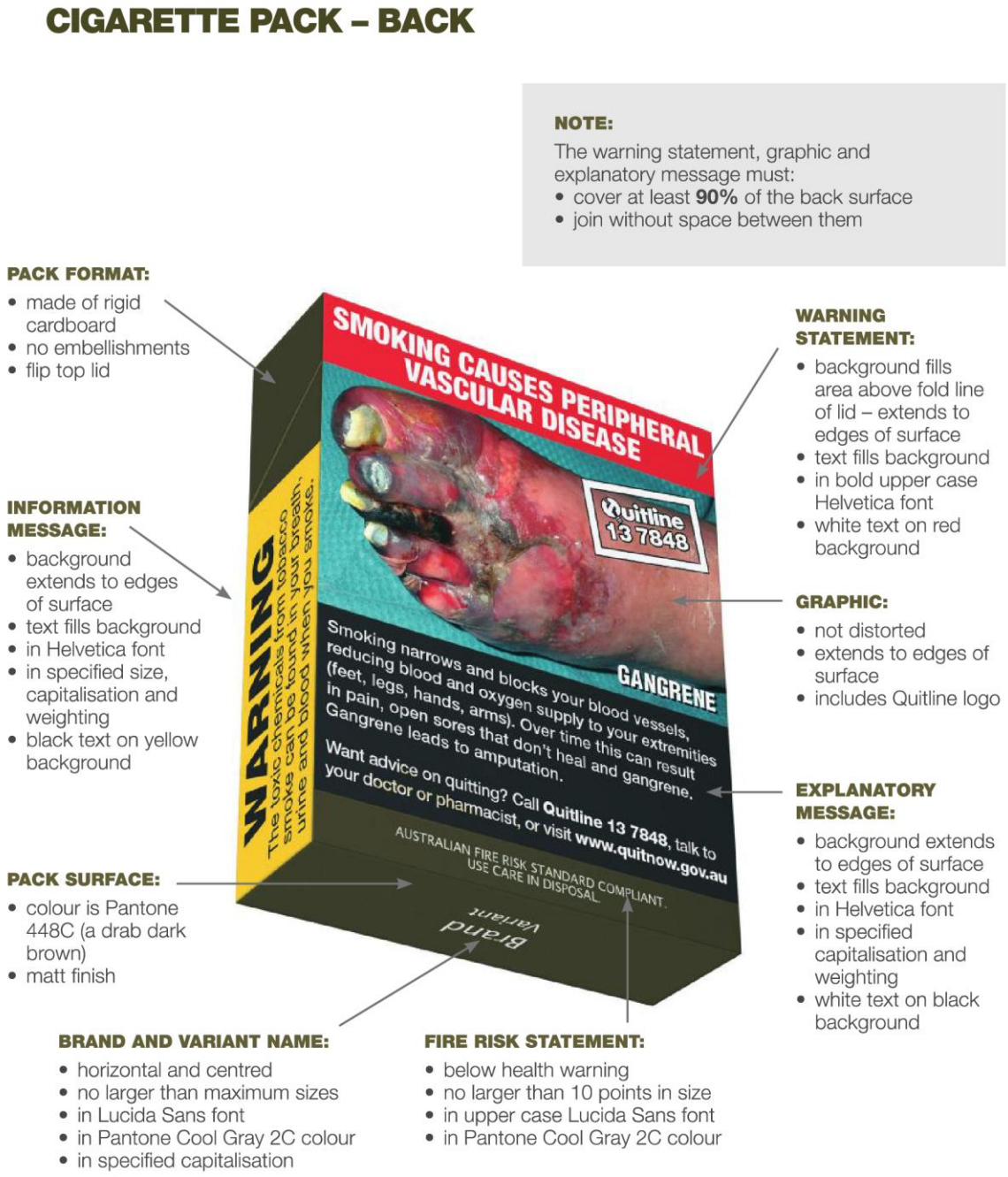
Studies have been conducted to assess the impact of Australia's plain packaging legislation since its introduction in 2012. For example, a study conducted during the roll-out phase of the legislation compared attitudes and intentions of smokers using the new cigarette packages (plain and with larger pictorial health warnings) to those of smokers still using the "fully branded" packages (with smaller warning messages).[161] Compared with those smoking cigarettes from "branded" packs, those smoking cigarettes from plain packs rated their cigarettes as lower in quality and less satisfying than 1 year ago, were more likely to think about quitting, and rated quitting as a higher priority.

Kmietowicz[162] conducted an interrupted time series analysis to examine the relationship between the implementation of plain packaging and the number of calls to the Australian national "stop smoking" helpline. The number of calls to the helpline increased 78% following the initial appearance of plain packaging, and this increase was sustained for at least 43 weeks. Dunlop and colleagues[163] found that 2–3 months after the introduction of plain packaging, there was a significant increase in the absolute proportion of smokers having strong cognitive (9.8% increase, $p=0.005$), emotional (8.6% increase, $p=0.01$), and avoidant (9.8% increase, $p=0.0005$) responses to on-pack health warnings.

## Figure 8.7 An Example of Australia's Plain Packaging, Showing Requirements for the Front and Back of the Cigarette Pack



## Figure 8.7 (continued)





*Source:* Australian Government 2014.[178]

Durkin and colleagues[164] examined the short-term changes in quitting-related cognitions and behaviors among a nationally representative sample of Australian adult smokers 1 year after the legislation (plain packaging with larger pictorial health warnings) went into effect. These authors found that implementation of the legislation was associated with increased intentions to quit, quit attempts, pack concealment, and prematurely "stubbing out" cigarettes among smokers.[164] In addition, a study using data from the ITC cohort of Australian smokers found that after implementation of plain packaging, smokers preferentially attended to and noticed the larger warnings, which also stimulated more thoughts about health risks.[165] The larger warnings also stimulated more avoidance behaviors than the previous warnings, but a small number of smokers appear to have learned to systematically avoid the warnings, thus lessening their impact.

These studies support the conclusion of earlier experimental research conducted to inform Australia and other countries considering implementing plain packaging. Moodie and colleagues,[166] in their systematic review to inform the possible United Kingdom tobacco control plan, found that there was strong evidence that plain packaging will reduce the attractiveness and appeal of tobacco products, increase the noticeability and effectiveness of health warnings, and reduce the use of techniques that may mislead consumers about the harmfulness of tobacco products. Similarly, Hammond[167] concluded that plain packaging increases the effectiveness of health warnings, reduces false health beliefs about cigarettes, and reduces brand appeal among younger smokers. A systematic review of the limited literature on the impact of plain packaging in LMICs and in low-income settings within HICs, found "early evidence that tobacco products in plain packaging have less appeal, increase the salience of health warnings and may reduce the initiation of smoking in LMICs."[168,p.8-9]

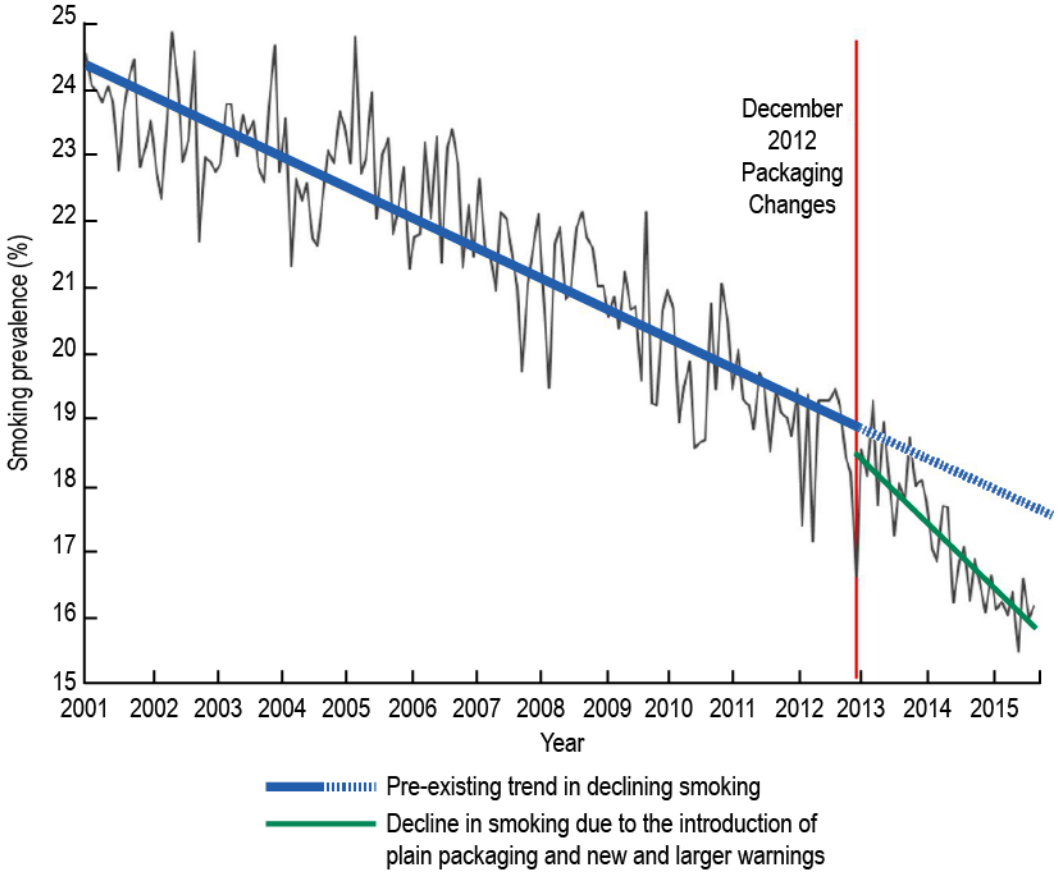
Australia's official post-implementation review of plain packaging is consistent with the earlier studies and experimental research, which recognizes that plain packaging has begun to achieve its objectives.[169] Specifically, an expert analysis conducted as part of Australia's review found that introduction of plain packaging together with introduction of larger pictorial health warnings and new warnings had reduced smoking prevalence in Australia beyond the pre-existing downward trend (Figure 8.8). The report concluded that there was a total decline in average prevalence before and after the 2012 packaging changes of 2.2 percentage points; and that "the [2012] packaging changes should be credited with about 0.55 percentage points (or about 25 percent) of that 2.2 percentage point."[169,p.35,170] According to the model, average smoking prevalence in the post-implementation period would have been 17.77%; instead, with the changes to packaging it was 17.21%. The report also indicates that the effect on smoking prevalence may be an underestimate, and that the effect is likely to grow over time.

### Implementation of Plain Packaging Policy Measures

Australia's experience is being closely observed by other countries. As of September 2016, France, Hungary, Ireland, New Zealand, and the United Kingdom have passed laws to implement plain packaging, and France and the United Kingdom have implemented the measures. Plain packaging is under formal consideration in Norway, Slovenia, Canada, Singapore, Belgium, and South Africa.[171]

Australia's introduction of plain packaging has been the subject of multiple World Trade Organization (WTO) disputes, as well as a dispute brought by Philip Morris Asia against Australia under the 1993 bilateral investment treaty between Australia and China, Hong Kong SAR.[172] The investment treaty challenge was resolved on jurisdictional grounds in Australia's favor in December 2015; as of July 2016, the WTO dispute was unresolved.[173]

**Figure 8.8 Overall Monthly Smoking Prevalence, Australia, January 2001–September 2015**




*Note:* The law took effect in December 2012.

*Source:* Australian Government 2016.[169,170]

## Summary

Information failures provide an economic rationale for governments to intervene to increase public knowledge about the health harms of tobacco products. Studies conducted in HICs find that although most smokers demonstrate awareness of the major health consequences of cigarette smoking, significant knowledge gaps remain, and smokers tend to underestimate the magnitude of the risks of smoking and tend not to personalize these risks. Adolescent smokers are especially likely to underestimate or discount the health risks. In general, knowledge of the health risks of tobacco products is thought to be less widespread in LMICs, where limited government resources and often weak tobacco control environments make informing the public a greater challenge than in HICs. The tobacco industry's decades-long global effort to deny and distort the scientific evidence on smoking and health has contributed to the public's limited and inadequate understanding and awareness of the health consequences of tobacco use and SHS exposure.

Measures that increase public awareness of the risks of tobacco use are important tobacco control strategies. Indeed, studies conducted in both HICs and LMICs show that various types of interventions aimed at increasing public knowledge help reduce tobacco consumption. The WHO FCTC requires Parties to the treaty to adopt a variety of evidence-based measures, including warning labels on tobacco

packages, and to prohibit misleading industry practices, such as the use of "light" and "low-tar" descriptors on packages. Many countries have implemented anti-tobacco mass media campaigns, and numerous scientific studies document that these campaigns can reduce smoking prevalence among both youth and adults. School-based tobacco education campaigns that are implemented as part of comprehensive tobacco control programs can help reduce tobacco use among youth; these may be especially useful in countries with low public knowledge about smoking and health. However, youth-focused campaigns conducted or funded by the tobacco industry have been shown to be ineffective at reducing youth's tobacco use or may subvert this goal. Indeed, research has shown that the actual purpose of these programs is to serve industry's interests at the cost of the public interest. Large pictorial health warning messages on tobacco products have now been implemented in many countries around the world and have been shown to inform smokers and help reduce tobacco use. Among other groups, pictorial health warnings have the ability to inform both youth and poorly literate adult populations. Their low cost makes them particularly attractive to governments with limited resources, e.g., LMICs.

In 2012, Australia pioneered the use of plain (standardized) packaging, which requires tobacco products to be sold in a standardized "drab dark brown" package, with the brand name and any variant name shown in a (small) standard font, style, and size. This requirement limits the value of the tobacco package as a marketing vehicle and increases the prominence of the health warning message carried on the package. Early studies of Australia's experience already show that the measure is contributing to a decline in tobacco use by reducing the appeal of tobacco products, reducing the potential for tobacco packaging to mislead consumers, and enhancing the effectiveness of pictorial health warnings. These effects are expected to become stronger over time. Despite concerted tobacco industry opposition, a few countries have passed laws to implement plain packaging, and several other countries have announced their intention to implement or are considering doing so.

## Research Needs

Research is needed to better understand public knowledge of the health hazards of tobacco use and SHS exposure, including knowledge of vulnerable subpopulations such as youth, the poor, and those with low or no literacy; these issues are especially important to study in LMICs, where the majority of the world's tobacco users now reside. Studies are needed to evaluate the impact of "information shocks" and of measures to increase public knowledge of the health effects of tobacco use as these are rolled out in LMICs. It will also be important to assess the ability of school-based health education efforts in LMICs, especially when incorporated into broader tobacco control efforts, to both increase knowledge of tobacco's hazards and to reduce tobacco use. To date, most studies of the public's knowledge have focused on cigarettes; given the diversity of smoked and smokeless products used around the world, and the entry of products such as Electronic Nicotine Delivery Systems to the market, research should also examine public knowledge of the health effects of these products.

Research is also needed to assess the impact of policies designed to increase public knowledge, implemented in response to the WHO FCTC, and to determine what additional policies are needed to expand and maintain public knowledge. As more countries adopt plain packaging, it will be important to assess the impact of this measure and how it is influenced by different approaches and implementation conditions. Finally, continued study of tobacco industry strategies to undermine public knowledge is also needed, especially in LMICs and among vulnerable populations in HICs.

## Conclusions

1. Imperfect understanding of the impact of cigarette smoking and other tobacco use on health, particularly in low- and middle-income countries, provides an economic rationale for interventions to disseminate information about the addictive and harmful nature of tobacco products.
2. Tobacco industry disinformation practices have directly contributed to the information failures associated with consumers' imperfect knowledge of the risks of disease and addiction.
3. Well-designed and -implemented anti-tobacco mass media campaigns are effective in improving understanding about the health consequences of tobacco use, building support for tobacco control policies, strengthening social norms against tobacco use, and reducing tobacco consumption among youth and adults.
4. School-based tobacco education programs, when implemented as part of comprehensive tobacco control programs, can improve knowledge, contribute to denormalizing tobacco use, and help prevent tobacco use. Emerging evidence suggests that school-based programs can be as or more effective in reducing tobacco use among young people in low- and middle-income countries, where knowledge of the hazards of tobacco use is lower compared with high-income countries.
5. Large pictorial health warning labels on tobacco packages are effective in increasing smokers' knowledge, stimulating their interest in quitting, and reducing smoking prevalence. These warnings may be an especially effective tool to inform children and youth and low literacy populations about the health consequences of smoking.
6. Plain (standardized) packaging (i.e., devoid of logos, stylized fonts, colors, designs or images, or any additional descriptive language) reduces the appeal of tobacco products, enhances the salience of health warnings, minimizes consumers' misunderstanding of the harms of tobacco, and has contributed to a decline in tobacco use in Australia, the first country to implement plain packaging.
7. The stock of information about the harms of tobacco use is subject to potential erosion over time (wear-out) and needs to be replenished and maintained.

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## Section 4
## Non-Price Determinants of Demand

# Chapter 9
# Smoking Cessation

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Smoking cessation can have an immediate impact on the economic and public health consequences of tobacco use. This chapter examines current evidence for cessation support and best practices and their implementation in countries around the world. Specifically, the chapter discusses the following topics:

- Health and economic benefits of cessation
- Current interventions for smoking cessation, including pharmacological and behavioral interventions, tobacco quitlines, Web- and mobile-based cessation services, and the integration of cessation treatments into health care systems
- Factors that affect demand for cessation support, including cost and accessibility of cessation support services and products, the price of tobacco products, and consumer awareness
- Effects of tobacco control measures, such as taxation, smoke-free policies, and information and mass media interventions, on cessation.

Evidence from high-income countries clearly demonstrates the effectiveness and cost-effectiveness of interventions to promote and support cessation. Less evidence is available on the effectiveness and cost-effectiveness of cessation interventions in low- and middle-income countries. Demand for cessation services in low- and middle income countries exists, but in many of these countries cessation services are of limited availability or accessibility, or are unaffordable for most of the population.

## Chapter Contents



## Figures and Tables

## Introduction

This chapter explores the potential health and economic impacts of smoking cessation, and reviews the cost-effectiveness of individual- and population-level smoking cessation interventions. The implications of the literature for increasing cessation rates, particularly in low- and middle-income countries (LMICs), are discussed. This chapter focuses exclusively on cessation of cigarette use because of the limited research on cessation of other tobacco products.

Although prevention of tobacco use is a critical component of global tobacco control efforts, the health and economic benefits of prevention will not be evident for several decades. Only large increases in population-level smoking cessation will significantly reduce the global burden of tobacco use in the near term.[1,2] In urging countries to ratify the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC), WHO's Director-General noted that persuading current smokers to quit "is the only way we can substantially reduce smoking-related deaths over the next 40 years."[3]

Widespread cessation of smoking in many high-income countries (HICs) has produced steady declines in smoking prevalence over the past four decades. In HICs, a significant proportion of smokers try to quit each year.[2,4] For example, nationally representative data from the United States show that in 2010, 69% of adult current smokers reported wanting to quit completely, and 52% had made a quit attempt lasting more than 24 hours within the past year.[5] The International Tobacco Control Policy Evaluation (ITC) Project determined that 36.1% of male smokers in Canada, 38.6% in Australia, and 24.0% in the United Kingdom of Great Britain and Northern Ireland made quit attempts during 2010.[6] Success rates, however, are modest—only a very small proportion of smokers quit successfully each year. In the United States, approximately 6% of smokers achieve long-term (>1 year) abstinence each year.[5] Moreover, smoking cessation in HICs has occurred disproportionately among those with more education, better health status, skilled jobs, and higher household incomes, effectively shifting the burden of tobacco-related disease to a subset of vulnerable populations with the fewest resources.[2,7–9]

Smoking cessation rates are typically lower in LMICs where, among other things, cessation services are less accessible than in HICs. Smokers in LMICs who used effective cessation services had similar or even higher quit rates compared to smokers in HICs.[10,11] In a study of 18 countries, former smokers make up an estimated 3%–18% of the population in LMICs, versus over 20% in most HICs.[12] In the People's Republic of China, only 22.2% of male smokers made a quit attempt during the last year, one of the lowest rates observed across the 19 LMICs participating in the ITC Project.[6] If current trends continue, an estimated one-third of Chinese men currently under the age of 20 can be expected to die prematurely from smoking.[13,14] These studies show the formidable challenges countries face when attempting to boost population quit rates, as well as the enormous opportunities that are within reach.

## Health Benefits of Smoking Cessation

Chapter 2 describes the serious negative health consequences of cigarette smoking. Among smokers, the rate of death from any cause is approximately three times that of people who have never smoked, and the average smoker loses at least one decade of life expectancy.[15] Smoking cessation on a population scale would produce substantial health gains and greatly reduce the global burden of tobacco-related illness and death. It has been estimated that reducing global adult smoking rates by one-third by 2025 would avert more than 200 million tobacco-related deaths during the rest of the century.[16]

Quitting smoking, at any age, confers substantial health benefits. The health benefits of cessation begin within minutes and continue to accrue as long as an individual remains abstinent.[17,18] Over the long term, former smokers can expect increased life expectancy and improved quality of life. Those who quit before age 40 avoid most of the excess risk of smoking-related morbidity and mortality, and their pattern of survival resembles that of individuals who have never smoked.[15,19–21]

Benefits of quitting include reduced risk of cardiovascular disease and death, improved lung function, reduced risk of lung infection, and reduced risk of lung and other cancers.[22–24] Quitting smoking can also improve the risk profile of other chronic diseases, such as diabetes and osteoporosis. Women who quit before or during pregnancy (especially early in pregnancy) can reduce the serious risks of smoking to their babies, including premature birth, certain birth defects, and sudden infant death syndrome.[17,25]

Evidence is accumulating to suggest that smoking cessation may also confer mental health benefits. Cross-sectional and longitudinal studies examining the relationship between smoking cessation and subjective well-being have found that successful quitters report higher levels of subjective well-being than continuing smokers.[26–29] In a systematic review of 26 longitudinal studies that measured changes in mental health status pre- and post-cessation, smoking cessation was consistently associated with reductions in depression, anxiety, and stress, and improved positive mood and quality of life compared with continued smoking.[30] In a retrospective analysis of suicide rates and state-level tobacco control policies, Gruzca and colleagues[31] found significant protective effects of cigarette excise taxes and smoke-free laws on the risk of suicide. They estimated that a 1 U.S. dollar (US$) increase in cigarette excise taxes in the United States would result in a 10.5% relative reduction in suicide risk, or roughly 4,000 fewer suicides per year in the United States.

## Economic Benefits of Smoking Cessation

The economic benefits of smoking cessation are characterized as costs to an individual, family, or economy that are eliminated or reduced because a smoker stops buying and smoking cigarettes. As described in detail in chapter 16, tobacco use is strongly linked to poverty; tobacco use and its negative health consequences are experienced disproportionately by people of low income and low educational attainment. The poor are much more likely than the rich to become ill and die prematurely from tobacco-related illnesses.[32,33] In HICs, this unequal burden of tobacco use is a major contributor to widening socioeconomic disparities in population-level health.[34]

In some low-income countries, the poorest households spend 10%–15% of their income on tobacco.[32] Similarly, in HICs, people with the fewest resources bear the highest cost burden. For example, in New York City, low-income smokers (<US$ 30,000/yr) spent nearly one-quarter (23.6%) of their annual household income on cigarettes, relative to more affluent smokers (>US$ 60,000/yr), who spent just 2.2% of their earnings on cigarettes.[35] These expenditures represent profound opportunity costs—that is, money that could be spent on household essentials such as food, shelter, or education, is instead spent on tobacco. For example, a study conducted in Bangladesh estimated that if all the nation's poor stopped using tobacco and redirected the expenditures to food, 10.5 million fewer Bangladeshis would suffer from malnutrition; if parents who used tobacco quit and redirected the expenditures to food, the number of Bangladeshi children who die from malnutrition each year would be halved.[36]

In addition to the cost of purchasing cigarettes, individuals and families also bear the cost of lost productivity—lost wages and contributions to household activities—as a result of illnesses and death

caused by smoking. Low-income smokers in both high- and low-income countries are often uninsured or underinsured and may have minimal access to formal health care. Thus, the direct costs of their illnesses caused by smoking fall almost entirely on the individual or family, representing significant expenses and opportunity costs.[37] In the United States, each smoker incurs an estimated additional US$ 1,623 in excess medical expenditures and US$ 1,760 in lost productivity annually.[38] Just as the poorest countries bear the largest burden of tobacco use, the poorest people in the poorest countries bear a disproportionate burden from smoking.[32] These groups stand to realize the greatest relative gains from smoking cessation.

The individual costs of tobacco use also translate to broad social costs.[39] Lost labor output due to illnesses and premature death caused by tobacco use decreases overall productivity. In countries with more comprehensive health care and insurance systems, the entire system shares the direct health care costs attributable to tobacco use, thus inflating health care costs for those enrolled in health care plans. Each of these costs is potentially avoidable if tobacco use is reduced or eliminated.[40]

Cessation has direct economic benefits at the population and individual levels. An analysis of smoking-attributable medical expenditures in the United States concluded that if smokers quit before experiencing any symptoms of smoking-related disease, approximately 70% of their excess medical care costs could be avoided.[41] According to figures from the U.S. Public Health Service, the cost per quality-adjusted life-year (QALY) saved by implementing its clinical practice guideline for cessation ranges from US$ 1,108 to US$ 4,542, compared with an annual cost of hypertension screening among 40-year-old men of US$ 23,335.[42,43] Solberg and colleagues[44] estimated that repeated annual tobacco use screening and brief intervention over the lifetime of smokers would result in 2.47 million QALYs saved, at a cost savings of US$ 500 per smoker receiving the service. Tobacco cessation support interventions are also cost-effective relative to other commonly used disease prevention interventions, such as Pap smears and medical treatments for hypercholesterolemia.[43] Maciosek and colleagues[45] evaluated the relative health impact and cost-effectiveness of 30 evidence-based clinical preventive services recommended by the Preventive Services Task Force (U.S.), and concluded that tobacco use screening and brief interventions ranked among the top 3 clinical preventive services, along with immunizing children and discussing aspirin use with adults at high risk of cardiovascular disease.

Return on investment calculations offer another lens through which to view the economic value of smoking cessation interventions. A compelling example comes from the experience of the U.S. state of Massachusetts. In 2006, Massachusetts began offering comprehensive tobacco cessation services for low-income adults as a covered benefit under the state's Medicaid insurance program. In the first 2.5 years, the smoking rate among Medicaid beneficiaries declined by 26%,[46] and there was a significant decrease in cardiovascular-related hospitalizations among benefit users.[47] Researchers estimated the return on investment of the cessation benefit by examining the cost of the program benefit relative to the reduction in cardiovascular hospitalizations and concluded that every dollar Massachusetts invested in cessation coverage yielded US$ 3.12 in savings for cardiovascular-related hospital admissions alone.[48] Similarly, Lightwood and Glantz[49] estimated that in the United States, a 10% relative reduction in smoking prevalence along with a 10% relative reduction in consumption per remaining smoker would result in health care expenditure savings of US$ 63 billion the following year. Smoking cessation support is particularly cost-effective for special populations, such as pregnant women and hospitalized patients, for whom successful tobacco abstinence reduces general medical costs in the short term and decreases the number of future hospitalizations and long-term health problems.[50–54]

Most of the evidence on the cost-effectiveness of smoking cessation support comes from research undertaken in HICs. The cost-effectiveness of smoking cessation support is also expected to increase in LMICs, given that the relative costs of smoking in LMICs are increasing.

## Current Interventions and Programs for Smoking Cessation

Tobacco dependence is a chronic, relapsing disorder, and cessation often requires repeated interventions and multiple quit attempts.[43] A significant proportion of smokers who quit do so on their own without formal cessation assistance.[55] However, nicotine is highly addictive, and many smokers find quitting extremely difficult.

Article 14 of the WHO FCTC requires Parties to adopt and implement effective measures to promote tobacco cessation and ensure adequate treatment for tobacco dependence.[56] The Article 14 guidelines recommend a number of specific actions that Parties should take to successfully design and implement a comprehensive national cessation strategy. Recommended actions include a combination of population-level and individual-level approaches to helping smokers quit.

- Population-level approaches include integration of tobacco use screening and brief intervention into health care systems; establishment of cessation services such as tobacco quitlines; and Web- and mobile phone–based cessation interventions.
- Individual-level approaches include provision of direct cessation support (e.g., pharmacological therapies, behavioral support) to individual smokers.

The evidence supporting population-level and individual-level interventions for smoking cessation is described in this section. Also included is a brief discussion of other tobacco control measures that can increase the impact of cessation treatment strategies when implemented in conjunction with them. These measures are described in greater detail elsewhere: taxation in chapter 5, comprehensive smoke-free policies in chapter 6, and anti-tobacco mass media campaigns and health warning labels in chapter 8.

Interventions for smoking cessation increase the probability of long-term, sustained abstinence among all smokers attempting to quit.[43] Table 9.1 summarizes effectiveness data for these smoking cessation interventions, including information from the latest Cochrane Reviews.

## Table 9.1 Effectiveness of Treatments for Tobacco Dependence After 6 to 12 Months

| Category | Type of intervention | Comparison | Risk ratio* (95% confidence interval) |
|---|---|---|---|
| Self-help | Self-help print materials | No intervention | 1.19 (1.04–1.37)[178] |
| | Internet (interactive/tailored website) | Usual care or written self-help | 1.48 (1.11–2.78)[179] |
| | Mobile device (mostly texting) | Usual care | 1.71 (1.47–1.99)[180] |
| Health professional interventions | Advice from physician | Brief advice vs. no advice | 1.66 (1.42–1.94)[181] |
| | | Intensive advice vs. no advice | 1.84 (1.60–2.13)[181] |
| | | Intensive vs. minimal advice | 1.37 (1.20–1.56)[181] |
| | Advice from nurse | Usual care | 1.29 (1.20–1.39)[182] |
| Counseling | Individual behavioral counseling | Minimal behavioral intervention | 1.39 (1.24–1.57)[183] |
| | Group behavior therapy | Self-help | 1.98 (1.60–2.46)[184] |
| | Telephone counseling, multiple sessions | Self-help or minimal intervention | 1.37 (1.26–1.50)[92] |
| Incentives | Reward- and deposit-based interventions | Usual care | 1.42 (1.19–1.69)[185] |
| Pharmacological therapies (nicotine replacement therapy) | Nicotine replacement therapy† | Placebo or non-NRT control | 1.60 (1.53–1.68)[57] |
| | Nicotine gum | Placebo or non-NRT control | 1.49 (1.40–1.60)[57] |
| | Nicotine patch | Placebo or non-NRT control | 1.64 (1.52–1.78)[57] |
| | Nicotine lozenge/oral tablets | Placebo or non-NRT control | 1.95 (1.61–2.36)[57] |
| | Nicotine inhaler | Placebo or non-NRT control | 1.90 (1.36–2.67)[57] |
| | Nicotine nasal spray | Placebo or non-NRT control | 2.02 (1.49–2.73)[57] |
| Pharmacological therapies (other) | Bupropion | Placebo or alternative therapeutic control | 1.82 (1.6–2.06)[66] |
| | Varenicline | Placebo or alternative therapeutic control | 2.88 (2.4–3.47)[66] |

*For all studies, risk ratios represent the risk of abstinence relative to control.
†Any type of nicotine replacement therapy including gum, patch, lozenge/oral tablets, inhaler, and nasal spray.
*Note:* NRT = nicotine replacement therapy.

## Pharmacological Therapies

This section examines the current economic and clinical evidence surrounding pharmacological therapies as cessation aids. Evidence-based pharmacological therapies for smoking cessation include nicotine replacement therapy (NRT)—such as the transdermal patch, gum, tablets, lozenges, inhalers, and nasal sprays—and non-nicotine pharmacological therapies, such as bupropion and varenicline. These medications may be used alone, or in certain combinations, to increase the likelihood of achieving smoking abstinence.[43]

### *Nicotine Replacement Therapy*

A large body of research, conducted mainly in HICs, provides strong evidence of the effectiveness of NRT, which uses controlled doses of nicotine to help patients manage symptoms of withdrawal. In clinical trials, abstinence rates at 6 to 12 months of treatment are typically 50%–70% higher compared to placebo.[57] When NRT is used in combination with behavioral support, abstinence rates are even higher compared with placebo or no treatment.[43] Although most studies have been conducted in HICs, it is reasonable to expect similar effectiveness in LMICs when these medicines are used as recommended. Outside of clinical trials, a large proportion of those who try NRT use less than the recommended doses and for shorter periods than recommended.[58,59] More research is needed to determine the effectiveness of NRT when used in a non-research setting and among lower income populations.

In most HICs, three forms of NRT—gum, lozenge, and transdermal patch—are widely available, often without a prescription. NRT is also available in tablet, inhaler, and nasal spray forms, but the availability of these products for over-the-counter (OTC) purchase, which reduces barriers to their use, varies by country. In 2014, 139 out of 195 countries and territories sold NRT, and 51 of the 53 countries where NRT was not available were LMICs.[60] LMICs were also more likely to require a prescription for NRT: 16 of the 17 countries requiring an NRT prescription were LMICs. NRT gum and transdermal patches appear on the 16th WHO Model List of Essential Medicines because of public health need, high-quality evidence of effectiveness and acceptable safety, and cost-effectiveness.[61] The selection of NRT as an essential medicine represents a key step toward access to quality, safe, effective, and affordable therapies to treat tobacco use and addiction in countries around the world.

Several studies have examined the cost-effectiveness of NRT. Ranson and colleagues[62] modeled the cost-effectiveness of NRT across low-, middle-, and high-income countries. Under conservative assumptions, this study found that worldwide, NRT would cost between US$ 358 and US$ 1,917 per disability-adjusted life-year (DALY) saved. The cost per DALY saved was lower in LMICs (US$ 280–$ 870) than in HICs (US$ 750–$ 7,206). Shroufi and colleagues,[63] in a systematic review of interventions for preventing cardiovascular disease in LMICs, also found that NRT was cost-effective, but to a lesser degree than population-based tobacco control interventions. Cornuz and colleagues[64] found that across six North American and European countries, NRT increased quit rates, and the incremental cost for NRT ranged from US$ 1,758 to US$ 5,759 per life-year saved for men and from US$ 2,657 to US$ 8,700 per life-year saved for women. In Australia, the cost per DALY saved was slightly higher: US$ 12,920 ($17,000 in Australian dollars).[65] Despite the variations in cost per life-year or life-year saved, the research consensus shows that NRT is generally cost-effective for men and women in low-, middle-, and high-income countries.

The cost of NRT varies worldwide and is often a barrier to its use. Nearly half of all HICs (24 of 55) cover all or part of the costs of NRT through public and private health insurance plans.[60] In contrast,

most LMICs do not help cover the cost of NRT, leaving the cost burden to individuals. Of the 86 LMICs offering NRT, 59 (69%) do not cover any of the cost of NRT.[60]

### *Non-Nicotine Pharmacological Therapies*

Two types of non-nicotine pharmacological therapies, bupropion and varenicline, have demonstrated efficacy for improving cessation outcomes. These therapies can aid smoking cessation by reducing the rewarding effects of nicotine and relieving symptoms of nicotine withdrawal. Clinical evidence provides strong support for the efficacy of both bupropion and varenicline in increasing smoking abstinence.[66,67] In clinical trials, varenicline increased the odds of successful long-term cessation between two- and threefold compared with unaided quit attempts.[66] Bupropion and varenicline have both been approved by the Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, for cessation treatment.

Economic analyses from HICs suggest that varenicline is a cost-effective option for cessation. A direct comparison among a cohort of U.S. smokers found that varenicline was far more cost-effective than NRT, bupropion, and unaided cessation.[68] In a review of 20 studies that examined the cost-effectiveness of smoking cessation treatment options in HICs, varenicline appeared to be the most cost-effective option. Faulkner[69] reviewed the cost-effectiveness evidence for varenicline and concluded that although the initial treatment cost typically exceeds that of other pharmacological therapies for smoking cessation, varenicline's superiority in promoting long-term abstinence makes it a cost-effective treatment in the long run. No data exist on the cost-effectiveness of either bupropion or varenicline for smoking cessation in LMICs.

The requirement for physician monitoring of patients taking bupropion and varenicline may make widespread use of these medications a challenge. Even if the clinical complexities of these medications are resolved, cost may also be a barrier, even in HICs, especially if these medications are not covered by national or private health insurance plans. Cost may also be a barrier in LMICs and for low-income individuals living in any country.

## Behavioral Interventions

Effective behavioral interventions for treatment of tobacco use range from broad-reach approaches, such as quitlines and brief advice, to more intensive multicomponent programs, such as intensive individual and group behavioral support. Behavioral counseling focuses on practical skills training (e.g., problem-solving, refusal skills) and providing social support within the treatment setting. Tailoring behavioral treatments to address unique cessation barriers associated with a variety of special populations, such as pregnant women and individuals with comorbid psychiatric disorders, has been found to improve the effectiveness of behavioral interventions among these subgroups.

### *Tobacco Use Screening and Brief Interventions*

The health care system is a key channel for delivering treatment to tobacco users.[43,70,71] Brief clinical interventions, delivered as part of routine health care, are an important evidence-based intervention for cessation. Brief interventions have been found effective across all populations in the United States, including adolescents, pregnant women, older smokers, smokers with medical comorbidities or mental illness, racial/ethnic minorities, people who are willing and unwilling to make a quit attempt soon, and

former smokers who are at risk of relapse.[43] Emerging evidence suggests that brief interventions might also be effective in LMICs with suitably developed systems of primary care.[10,72]

Brief interventions often follow the "5As" model:[43]

- *Ask* patients about tobacco use
- *Advise* tobacco users to quit
- *Assess* willingness to make a quit attempt
- *Assist* quitting efforts through counseling and/or pharmacological therapies
- *Arrange* follow-up contact.

Two models have emerged to ensure adequate delivery of smoking cessation advice in general practice settings. In the first model, allied health professionals provide the bulk of detailed assistance to patients in the practice, limiting the physician's role to motivating action and dealing with prescription medication. In countries where physicians play a small role in primary care, smoking cessation counseling could be provided by nurses, pharmacists, or other health care workers, if they are sufficiently trained and directed to offer such services. For example, brief smoking cessation counseling could be combined with other preventive health care services, such as tuberculosis prevention programs, that are provided by trained lay health workers. In LMICs, where many people have limited experience with receiving health information through printed materials and other means, the role of face-to-face contact with health workers is likely to remain critical in encouraging and supporting smoking cessation.

In the second model, clinicians encourage referral out of general practice settings to other programs (e.g., telephone quitline services). In this model, clinicians must still be trained and provided appropriate institutional incentives to ask about tobacco use and advise patients to quit. By referring patients to more intensive treatment programs, however, clinicians can transfer the bulk of assessment and assistance, the two most time-consuming tasks of the 5As framework, to others. This model is difficult to implement in settings in which telephone access is limited, but the extensive and increasing penetration of cellular phone service is making it possible to provide counseling support even in low-income countries and among low-income populations.

With few studies on the 5As in low-income countries[73] and on alternatives to the 5As approach,[74] more research is needed on the delivery of brief interventions for smoking cessation in the general practice setting in LMICs. As with other methods of treating tobacco dependence, the bulk of the evidence on the cost-effectiveness of brief interventions comes from HICs. A study of U.S. smokers showed that the cost-effectiveness ratio for brief physician advice with people quitting smoking ranged between US$ 705 and US$ 988 per year of life for men and between US$ 1,204 and US$ 2,058 per year of life for women.[75] Similarly, Cromwell and colleagues[42] showed that physician-led brief counseling in the United States resulted in incremental cost-effectiveness ratios of US$ 2,587 per life saved and US$ 1,915 per QALY saved. In an examination of the cost-effectiveness of brief counseling in the United Kingdom, Bauld and colleagues[76] found that pharmacy-led brief counseling resulted in a cost-effectiveness ratio of US$ 5,202 (2,600 British pounds) per QALY saved. Each of these studies clearly shows that even with modest gains in long-term abstinence, the cost-effectiveness of brief counseling from physicians or other health care providers falls well within accepted cost-effectiveness standards for preventive practices.

Brief interventions are significantly more likely to be delivered when tobacco assessment is part of the standard patient intake protocol and clinicians are expected or incentivized to provide such interventions or refer patients to available and affordable services. The use of health information systems such as electronic health records, computerized decision support systems, and electronic prescribing has been found to increase documentation of smoking status and referrals to cessation counseling in health care settings in HICs.[77] Financial incentives that reward clinicians for performance of cessation treatment activities have also been shown to improve treatment delivery within health care systems in HICs.[78–80] Across many health care settings, clinicians are frequently pressed for time and/or lack skills in cessation counseling.[81–85] These constraints are likely to be more serious in LMICs, where patient visits to clinics tend to be for acute illness or injury, rather than for routine and preventive care, and where physician time is more limited than in HICs.

### *Intensive Behavioral Interventions*

Multisession individual or group counseling interventions can have a measurable impact on cessation. There is a strong dose–response relationship between the intensity of tobacco dependence counseling and its effectiveness. Although brief counseling interventions (3 minutes or less) are effective, more intensive counseling (four or more sessions lasting more than 10 minutes) can more than double abstinence rates compared with no contact.[43] An example of intensive counseling, the Maudsley model in the United Kingdom, includes six weekly sessions of support with a behavioral specialist as well as pharmacological therapies and other configurations, such as ongoing drop-in groups that do not require an appointment.[86]

Cultural targeting of intensive counseling has been shown to improve outcomes among African American smokers.[87] The relative effectiveness of cultural targeting may translate across cultures. The counseling interventions identified in the 2008 guidelines from the U.S. Public Health Service[43] effectively improved quit rates in every population group in which they were evaluated. However, little research has been conducted on whether tailoring such treatment is culturally relevant in the context of most LMICs. Promoting cessation can be expected to be very different in contexts in which people have limited awareness of tobacco harms and few former smokers as role models, and such differences will likely affect treatment outcomes. Beyond the challenges of treatment design, the costs of behavioral interventions are not covered even in many HICs. In low-income countries, such services—generic or targeted—are rare.[88]

### *Tobacco Quitlines*

Tobacco quitlines provide telephone-based behavioral counseling and support to tobacco users who want to quit. Quitlines can reduce barriers to cessation treatment in that they are telephone based, and smokers can access them at a time and location that is convenient to them and usually at no cost. Quitline counseling protocols may be adapted for specific populations, or tailored for individual users. Evidence indicates that quitlines can expand the use of evidence-based cessation services in populations that historically have had the most limited access to and use of these treatments.[89–91]

A strong evidence base supports the efficacy of quitlines for smoking cessation. The 2013 Cochrane Review[92] found a 1.37 relative risk (RR) (95% confidence interval [CI] 1.26–1.50) for at least 6 months abstinence for people who received multiple sessions of callback counseling compared with people who tried to quit without counseling assistance. The 2008 update of the U.S. Public Health Service guideline found that the odds ratio (OR) for quitlines versus minimal or no counseling or self-help

was 1.6 (95% CI 1.4–1.8).[43] Quitlines have the greatest potential impact when they are part of a comprehensive tobacco control effort, reach large numbers of people, and bridge the clinical and public health approaches to smoking cessation.[43,92]

In 2014 approximately one-third of all countries offered national toll-free telephone quitlines staffed with live counselors.[71] HICs were far more likely than LMICs to have implemented a national toll-free quitline; in 2014, only 9% of low-income countries reported having a national toll-free quitline.[71] However, even in HICs, the actual proportion of smokers who use quitlines remains low, leaving substantial room for improving their promotion, use, and reach.

Services from tobacco quitlines are generally less expensive to provide than face-to-face services, but in many LMICs, the cost of calls may be a significant barrier. Operators of tobacco quitlines are predominantly governments and nongovernmental organizations.[39] Evidence from HICs provides strong support for the cost-effectiveness of quitlines.[89] The Community Preventive Services Task Force (U.S.) reviewed six studies on the cost-effectiveness of telephone counseling and found the median cost per QALY was US$ 2,012 (values ranged from US$ 439/QALY to US$ 2,627/QALY).[89] In a randomized trial of the American Cancer Society's telephone counseling services, McAlister and colleagues[93] estimated that the cost per successful quit (12-month abstinence) was approximately US$ 1,300. A cost-effectiveness analysis of the New Zealand national quitline estimated that the unit cost of securing and supporting a quit attempt for the full year in 2014-2015 was US$ 202.46, with an annual return on investment of US$ 63 per quit.[94] An analysis of Thailand's national quitline data estimated an average cost per quitter of US$ 253, and US$ 32 per life-year saved.[11]

### *Web- and Mobile-Based Cessation Services*

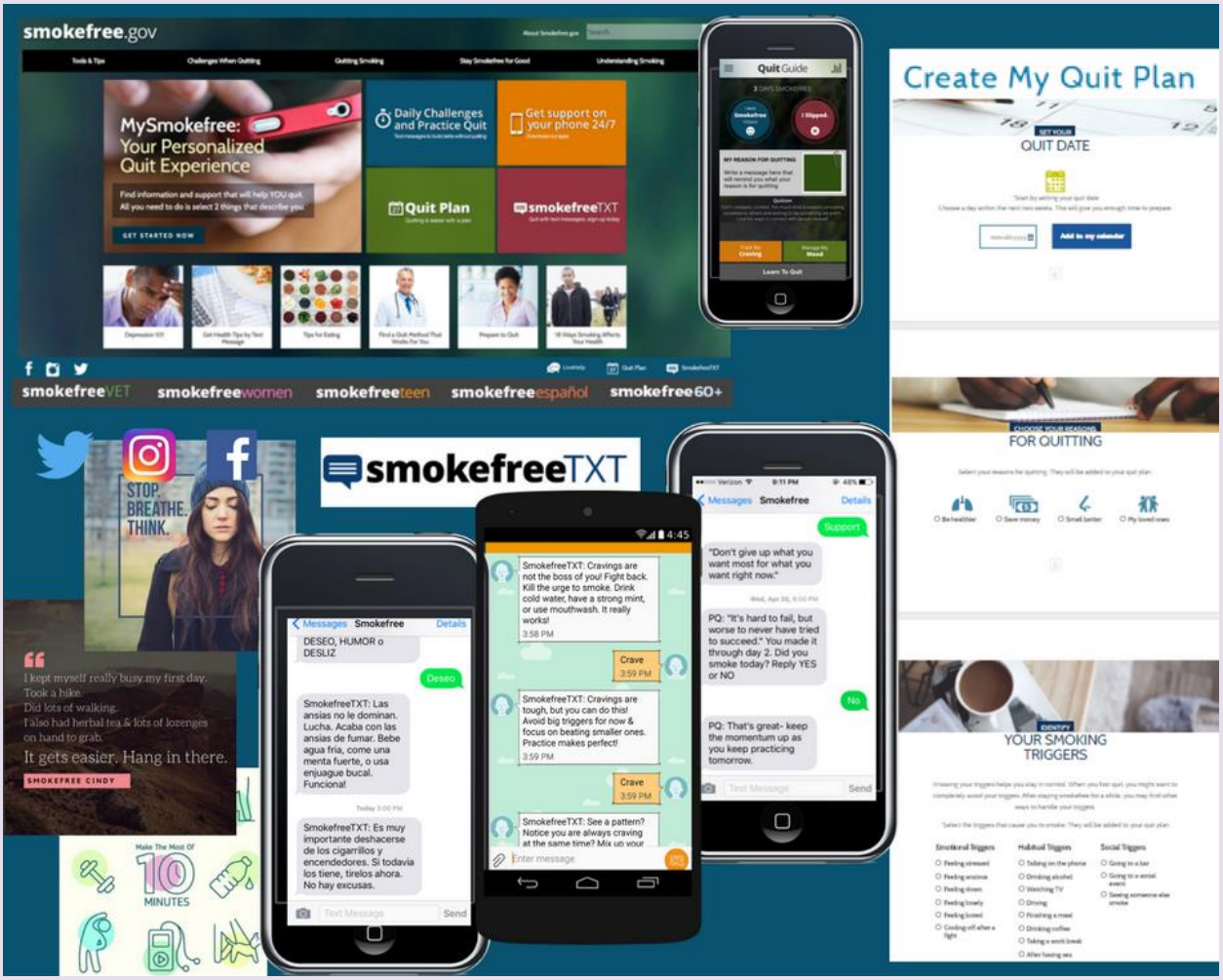
The emergence and diffusion of Web- and mobile-based technology has given rise to new and innovative approaches for promoting tobacco cessation, such as through cell phone text messaging and Internet-based behavioral support. These approaches have great potential to impact smoking prevalence, given their broad reach and accessibility.

Quitlines around the world are developing a range of smoking cessation counseling services for use via the Internet.[32] Many stand-alone Internet-based smoking cessation interventions are also emerging in countries such as Iceland, Ireland, and Panama.[70] Strong evidence from a meta-analysis of Web- and computer-based smoking cessation programs indicates that these services can significantly improve smoking cessation outcomes compared with no treatment.[95] Munoz and colleagues[96] studied Internet-based cessation programs in both Spanish and English among four groups. Each group in this randomized controlled trial received a static smoking cessation guide and increasing levels of counseling intensity. Seven-day abstinence rates were approximately 20% across all four groups, suggesting that even a low-intensity Internet-based cessation intervention can be significantly more effective than no treatment. In countries where populations have wide access to computers and the Internet, these strategies represent promising and cost-effective additions to broader national services for tobacco cessation. However, in countries where populations have limited computer access or slow Internet connections, such approaches may have limited utility.

Similarly, the penetration of mobile phone networks in many LMICs may facilitate cost-effective alternatives or adjuncts to traditional provider-based cessation interventions.[97] Text messages (Short Message Service) can be used to deliver health behavior change interventions, including smoking

cessation messages, across a variety of contexts.[98] With text messaging, messages can be tailored to individuals, delivered instantaneously, and accessed at any time. In addition, text messaging is appealing to populations such as young adults, who have not typically shown interest in calling quitlines.[99] Because of the novelty of text messaging services, few economic studies on them are available, but early results suggest that Web and mobile interventions hold promise as a cost-effective and scalable mode of delivery for smoking cessation.[100–102]

### Box 9.1: The National Cancer Institute's Smokefree.gov Initiative




*Source:* National Cancer Institute 2016.[186]

The Smokefree.gov Initiative (SFGI) developed by the National Cancer Institute (NCI) of the National Institutes of Health (NIH), an agency of the U.S. Department of Health and Human Services, provides Web- and mobile-based quit smoking resources to the public, including targeted resources for subpopulations with unique information needs and/or higher smoking rates. The SFGI offers a variety of websites, mobile applications, text messaging–based programs, and social media accounts to help teen and adult smokers quit.

The Smokefree.gov website (https://smokefree.gov) anchors the SFGI and provides smokers with evidence-based cessation advice and support, including information about effective quit methods and barriers to quitting. The website serves as an entry point for all SFGI resources, as well as NCI's telephone and online smoking cessation counseling services (https://smokefree.gov/tools-tips/speak-expert).

The Smokefree Women website (http://women.smokefree.gov) provides women of reproductive age with evidence-based smoking cessation information. This website was designed to address the concerns of women trying to quit smoking (e.g., weight management, diet and physical activity, pregnancy and parenting).

The Smokefree Teen website (http://teen.smokefree.gov) offers teens evidence-based cessation support and includes decisional values clarification, information on different tobacco products, and information for specific groups of teens.

The Smokefree Español website (https://espanol.smokefree.gov) provides evidence-based smoking cessation content that has been culturally adapted for Spanish-language smokers.

The Smokefree 60+ website (https://60plus.smokefree.gov) offers evidence-based cessation advice and support as well as information on smoking and health topics often important to older adults.

The Smokefree Veterans website (https://smokefree.gov/veterans) provides evidence-based smoking cessation information designed to assist military veterans in achieving their health goals.

SmokefreeTXT (https://smokefree.gov/Smokefree-Text-Messaging-Programs) offers text messaging–based smoking cessation support to smokers trying to quit. Smokers can choose from a variety of text messaging programs, depending on their particular cessation needs (e.g., adult smokers, pregnant women, Spanish speakers, military veterans, teens, etc.).

The SFGI supports two free smoking cessation smartphone apps (https://smokefree.gov/tools-tips/apps). QuitGuide for adults and quitSTART for teens are designed to help users prepare to quit smoking and build the skills needed to become and stay smoke-free. These tools offer personalized cessation support by allowing users to track their cravings and moods, tag specific locations and times of day that trigger tobacco use, request on-demand help, and monitor their progress towards smoke-free milestones.

## Studies Assessing the Utility of Electronic Nicotine Delivery Systems for Cessation

Electronic nicotine delivery systems (ENDS) are battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user. Since their appearance on the global market around 2007, ENDS have gained popularity, and anecdotal reports indicate that some ENDS users have quit smoking using these products.[103] However, the evidence regarding the effectiveness of ENDS as a cessation aid is scant and of low certainty, making it difficult to draw credible inferences as of this writing.

A single randomized trial[104] found that ENDS had low efficacy for quitting, similar to that observed in this study for the nicotine patch. Most observational studies of the relationship between ENDS use and smoking cessation/reduction, employing both cross-sectional and longitudinal designs, have found either no cessation benefit or a diminished cessation benefit associated with ENDS use.[105–113] Two studies have found a cessation benefit associated with ENDS under specific conditions related to frequency of use and type of ENDS product.[114,115] A review of tobacco smoking cessation interventions by the U.S. Preventive Services Task Force concluded that there is insufficient evidence to recommend ENDS as a cessation tool for adolescents or adults, including pregnant women.[116]

One meta-analysis of six studies, including two randomized controlled trials, two cross-sectional studies, and two longitudinal studies, concluded that ENDS use was associated with increased quitting and reduced cigarette consumption among continuing smokers.[117] In contrast, two meta-analyses—one including 15 cohort studies, 3 cross-sectional studies, and 2 clinical trials,[118] and the other examining the existing 8 observational longitudinal studies with the highest Grading of Recommendations Assessment, Development and Evaluation (GRADE) quality[119]—concluded that the use of ENDS reduces the chances of quitting smoking.

In conclusion, the evidence is insufficient to determine whether ENDS are an effective smoking cessation tool.

## Demand-Side Factors Related to Smoking Cessation Treatment

Despite the existence of efficacious treatments for smoking cessation, the public health benefit of these treatments has been limited. Relatively few smokers who attempt to quit utilize available smoking cessation resources such as behavioral treatments, pharmacological therapies, or tobacco quitlines. If consumer demand for evidence-based tobacco cessation products and services were to increase, many more people would attempt to quit and would succeed. Therefore, it is essential to increase the demand for evidence-based treatments as well as their use and reach, and to ensure that these treatments are affordable, accessible, and easy to use.

Demand for tobacco cessation products and services varies across countries; level of economic development appears to be a factor influencing demand.[120] Although data on the demand for cessation services in LMICs is quite limited, it is thought that the demand for such services is generally lower in LMICs than in HICs, because there is less public awareness of the health consequences of smoking; there are fewer former smokers to serve as role models, fewer limits on smoking in workplaces and public places, and weaker social norms against tobacco use; and tobacco products are often very affordable. In contrast, the cost of cessation treatment is high.[121] Limited existing demand for cessation treatment services in low-income countries represents a substantial barrier to widespread use of treatment. But interest may increase in these countries in the coming years as a result of continued capacity building and implementation of the WHO FCTC's Article 14 guidelines.

### Impact of Price on Demand for Smoking Cessation Treatment

Economic theory predicts that price of pharmacological therapies is an important determinant of their use, and empirical evidence from HICs indicates a strong inverse relationship between the use of pharmacological therapies for smoking cessation and their cost. The following sections discuss seminal papers that explore this relationship.

#### *Economic Studies*

In the first study on the economic determinants of NRT use, Tauras and Chaloupka[122] estimated the effects of price on the demand for product-specific NRT. This study is based on demand equations using pooled cross-sectional, time-series, scanner-based data from 50 major metropolitan markets in the United States between the second quarter of 1996 and the third quarter of 1999. Estimates from the demand equations implied that decreases in the price of NRT lead to substantial increases in per capita sales of NRT products. Own-price elasticity of demand measures the responsiveness of consumer demand for NRT products to changes in the price of the products. The average own-price elasticities

of demand for Nicoderm CQ® (transdermal patch) and Nicorette® (gum) were –2.33 and –2.46, respectively, suggesting that a 10% decrease in the real price increases demand by approximately 23% for Nicoderm CQ® and 24% for Nicorette®. These estimates are based on average elasticities across products within a brand. Therefore, the derived elasticity estimates in this study likely exceed the overall NRT price elasticity (in absolute value) because of substitutability between NRT products within and across brands.

In a follow-up study, Tauras and colleagues[123] used a longer data series (1996–2002) to examine the demand for NRT products by focusing on the interrelationship between them. The study found that product-specific own-price elasticities of demand ranged from –0.77 to –3.74 for Nicoderm CQ®, –2.56 to –4.65 for Nicorette®, and –1.82 to –1.97 for Nicoderm®. Tauras and colleagues also looked at the cross-price elasticity of demand for other NRT products, which is the percentage change in quantity of NRT demanded for a 1% change in the average price of all other NRT products. They found that the cross-price elasticity of demand for other NRT products ranged from 0.08 to 2.59. The authors concluded that a positive and significant relationship exists between the demand for any given NRT product and the average price of all other NRT products, implying that different NRT products can often be seen as substitutes for each other at an economic level.

### *Randomized Experimental Design Studies*

Several studies have used randomized designs to examine how employer and health insurer coverage of NRT influences NRT usage and related outcomes.

Hughes and colleagues[124] conducted a controlled experiment in which 106 smokers were randomly assigned to pay different prices for nicotine gum. The study concluded that smokers who pay less out of pocket are more likely to obtain the gum, use it for longer periods, and increase the number of units of gum they buy.

Schauffler and colleagues[125] assessed the impact of health insurance coverage of tobacco dependence treatments using a randomized controlled trial of smokers who were enrolled in health maintenance organizations in California. The study randomly assigned 1,204 smokers to either a control group, which received a self-help kit containing a video and pamphlet, or a treatment group, which received the self-help kit and fully covered benefits to obtain OTC NRTs and participate in a group behavioral cessation program with no cost sharing. The quit rates after one year were 18% for the treatment group and 13% for the control group, with an estimated adjusted OR of 1.6 (95% CI 1.1–2.4). Compared with the control group, the treatment group had significantly higher rates of quit attempts (OR 1.4; 95% CI 1.1–1.8) and use of NRT (OR 2.3; 95% CI 1.6–3.2).

### *Other Studies*

Several non-experimental design studies have examined the impact of employer and health insurer coverage on NRT usage and related outcomes. For example, Cox and McKenna[126] found that military personnel who were provided nicotine gum free of charge were significantly more likely to use the gum, use the gum for a longer period of time, and have more success in abstaining from smoking for one year than those who had to purchase nicotine gum at a local pharmacy. Johnson and colleagues[127] studied the effect of health insurance copayments for nicotine gum on the number of pieces of gum consumed, finding an inverse relationship between out-of-pocket cost and both the probability of using nicotine gum and the duration of gum use.

Curry and colleagues[128] examined the impact of health insurance cost-sharing plans on the use of behavioral modification therapies and NRTs. This study found that a higher proportion of enrollees utilized smoking cessation services when health insurance policies covered the full cost of using both behavioral modification therapies and NRTs. The rate of smoking cessation was higher among smokers whose coverage required a copayment than among smokers who were enrolled in a full-coverage insurance policy, which the authors speculate could reflect higher motivation to quit among those willing to pay for cessation services versus those who received them at no cost. Despite the slightly lower cessation rate when no copay was required, participation in the full-coverage insurance programs still resulted in a larger proportion of smokers who quit, because of increased use of cessation services.

In a study conducted in the United Kingdom, West and colleagues[129] investigated how making smoking cessation products available outside pharmacies and reimbursing consumers for them affected utilization of these products. The study found that reimbursing for pharmacological therapies for smoking cessation led to large increases in their use. Making bupropion and NRT products reimbursable increased the number of treatment weeks purchased by more than 80,000 per month per medicine. The proportion of smokers who used NRT and other pharmacological therapies to aid smoking cessation more than doubled after the United Kingdom changed its policy to reimburse for smoking cessation medicine.

These studies suggest that the costs of pharmacological therapies for smoking cessation are strong determinants of their use, and that lower out-of-pocket costs lead to significant increases in the use of these medicines.

## Other Demand-Side Factors

### *Taxes on Tobacco Products*

As discussed in detail in chapter 4, higher tobacco taxes and prices reduce tobacco use by motivating current users to quit, preventing young people from initiating tobacco use, and reducing the frequency and intensity of consumption among those who continue to use tobacco. People in LMICs respond more to tax increases than individuals in HICs. In general, price elasticity estimates for LMICs are at least as high and often higher than the estimates for HICs.[130]

Several econometric studies have examined the impact of higher cigarette prices on the demand for smoking cessation pharmacological therapies. In their assessment of the determinants of demand for NRT products in the United States, Tauras and Chaloupka[122] found a positive and significant relationship between the real price of cigarettes and the demand for NRT products. The average cross-price elasticities of demand, relating percentage change in demand to a 1% increase in the price of cigarettes, were 0.77 for Nicoderm CQ® and 0.76 for Nicorette®. Such positive and significant cross-price elasticities demonstrate that NRT products and cigarettes are economic substitutes in consumption and indicate that increases in the price of cigarettes will increase the use of NRT products. In a follow-up study, Tauras and colleagues[123] measured the economic interrelationship between cigarettes and NRT products in the United States. Their findings confirmed the positive impact of cigarette prices on demand for NRT. The estimated cross-price elasticity of product-specific NRT demand for cigarettes ranged from 0.34 to 1.48. These estimates imply a price-based relationship for demand for cigarettes versus NRT products, with a 10% increase in the price of cigarettes leading to a 3.4%–14.8% increase in use of NRT products.

Population-level data from the United States show that tax increases prompt smokers to seek help in quitting. On April 1, 2009, the U.S. federal cigarette excise tax increased from US$ 0.39 to US$ 1.01 per pack. In an analysis using pooled data from 16 state quitlines, Bush and colleagues[131] found that calls to the quitlines increased by 23.5% in the months leading up to and following the tax increase. Similarly, Brown and Karson[132] examined monthly call data to state quitlines over a 5-year period between 2005 and 2010, and concluded that a 10% increase in cigarette taxes is associated with an approximately 0.31% increase in the number of calls in the month before the tax takes effect and a 0.33% increase in calls in the month after the tax increase. Promoting quitline services via paid media or through special promotions (e.g., free NRT) in conjunction with tax increases can ensure that the opportunity to engage smokers in cessation efforts is fully leveraged, which can enhance the quitlines' cessation benefits.[133,134]

### *Comprehensive Smoke-Free Policies*

As discussed in detail in chapter 6, comprehensive smoke-free policies not only reduce exposure to secondhand smoke, they also lead to significant reductions in cigarette consumption, induce quit attempts among smokers, and increase the likelihood of successful cessation. The WHO FCTC requires Parties to the treaty to implement comprehensive smoke-free policies, and many have already done so.

Several studies have examined the relationship between the enactment of smoke-free laws and calls to quitlines. Cummings and colleagues[135] found a significant increase in calls to the New York State Smokers' Quitline following enactment of the state's comprehensive smoke-free law, a cigarette tax increase, and the distribution of free NRT patches. Quit rates varied according to the amount of NRT received. The highest quit rates (35%) occurred among those who received a 6-week supply of NRT, and the lowest rates (21%) occurred among those who received a 1-week supply.

Wilson and colleagues[136] investigated the impact of the smoke-free law enacted in New Zealand in December 2004 on calls to the national quitline. They found that quitline call rates more than doubled in the 6 months following introduction of the smoke-free law. In their analysis, the authors controlled for other potential influences on the volume of quitline calls, including quitline advertising expenditures, advertising expenditures associated with ongoing smoke-free media campaigns, and print media coverage of smoking-related issues in major New Zealand newspapers.

In another study, Chan and colleagues[137] examined the impact of smoke-free legislation in China, Hong Kong Special Administrative Region on calls to a quitline, finding strong evidence that the smoking ban increased utilization of the quitline. The impact was temporary, however, as the number of calls decreased within 6 months.

Allwright[138] found that in the run-up to Ireland's comprehensive smoke-free policy banning smoking in all enclosed workplaces, including restaurants and pubs, the number of calls to the quitlines increased substantially. This study noted preliminary figures suggesting that sales of NRT and requests to physicians for cessation help also increased.

Other studies have also found increased use of pharmacological therapies and clinical cessation services after smoking bans have been implemented. For example, a study by Galeone and colleagues[139] found that after Italy banned smoking in enclosed public places on January 10, 2005, the use of NRT products increased by 10.1% for January–September 2005 compared with the same period in 2004. Grassi and colleagues[140] found that Italy's indoor smoking ban improved the efficacy of smoking cessation treatments. The smoking ban reduced the odds of continued smoking by 52% at 12 months among those

who attended group counseling sessions for 6 weeks and were provided with 7 weeks of daily pharmacological therapy, and by 41% at 12 months among those who attended only the 6 weeks of group counseling. In the months following the introduction of smoke-free legislation in the United Kingdom in 2007, local National Health Service Stop Smoking Services in England saw an increase in demand of around 20%.[141]

### *Anti-Tobacco Mass Media Campaigns*

As discussed in detail in chapter 8, well-funded anti-tobacco mass media campaigns, especially when implemented as part of a comprehensive tobacco control program, can increase cessation rates and reduce tobacco use among adults and youth. Disseminating anti-tobacco information often has the greatest impact in LMICs, where baseline levels of consumer information (i.e., knowledge about the health risks of tobacco use, awareness of cessation treatments) are generally low. Anti-tobacco mass media campaigns can also increase the use of smoking cessation quitlines and smoking cessation treatments, and foster nonsmoking social norms.

In 2012, the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services, launched the first federally funded nationwide anti-smoking mass media campaign in the United States. The campaign, "Tips From Former Smokers" (Tips) (also discussed in chapter 8), was responsible for a 12% relative increase in population-level quit attempts, resulting in an estimated 100,000 smokers quitting permanently.[142] The 2012 campaign increased the number of calls to a national portal to state quitlines by 132%, for an estimated 207,519 additional calls, compared with the corresponding period in 2011. The campaign also increased the number of unique visitors to the NCI's smoking cessation website (http://www.smokefree.gov) by 428%, for an estimated 510,571 additional unique visitors, compared with the corresponding period in 2011.[143] With a campaign cost of roughly US$ 48 million, Tips spent approximately US$ 480 per quitter, US$ 2,819 per premature death averted, US$ 393 per life-year saved, and US$ 268 per QALY gained.[144] In a follow-up evaluation of the 2013 Tips campaign, McAfee and colleagues[145] found that increasing the dose of television ads in selected media markets, relative to the standard dose, further increased quit attempts among smokers, especially African Americans.

Farrelly and colleagues[146] examined the effect of anti-smoking television, radio, and print advertising on calls to the New York State Smokers' Quitline. This study found a positive and significant effect of anti-smoking advertising expenditures on call volumes to the quitline. Television advertising had the largest effect, but because of relatively high costs, television advertising was not the most cost-effective way to increase calls to the quitline. Evidence from simulations suggests that an increase of US$ 1,000 in television, radio, and print advertising can increase call volumes to quitlines by 0.1%, 5.7%, and 2.8%, respectively.

Owen[147] examined the effect of an anti-smoking advertising campaign on calls to England's Quitline. The study found that the advertising campaign conducted by England's Health Education Authority was extremely successful in generating calls; more than two-fifths of all calls to the quitline in 1 year were made during the 3-month advertising campaign. Approximately 60% of callers claimed advertising was the reason they were aware of the quitline.

Miller and colleagues[148] investigated the relationship between calls to the Australian Quitline service and the extent of advertising that was conducted as part of the first nationally coordinated mass media anti-smoking campaign. This study found that weekly call volume was strongly related to anti-smoking advertising. When the advertisement specifically promoted the quitline, call volumes increased even further. Nearly 1 in 25 adult smokers in Australia called the quitline during the first year of the national campaign. Of the cohort of smokers at baseline, 28% reported at a one-year follow-up that they had quit smoking; 5% reported that they had quit for the entire year.

Using data from Australia for June 1995–December 2006, Wakefield and colleagues[149] examined the effects of NRT advertising and tobacco control advertising on NRT sales. The study found that tobacco control advertising had a strong immediate effect on NRT sales. NRT advertising also had a similar positive effect on NRT sales, albeit with a 2-month delay.

### *Health Warning Labels*

As discussed in detail in chapter 8, large pictorial health warning labels are effective in increasing smokers' awareness of the health consequences of smoking, stimulating their interest in quitting, and reducing smoking prevalence. Article 11 of the WHO FCTC recommends using, on a rotating basis, pictorial warning messages that are large, clear, and visible, and cover 50% or more of the principal display areas of the package.[32] Smokers who perceive greater health risks from smoking are more likely to form intentions to quit and engage in cessation efforts.[71,150] Health warnings may also be an important tool for reducing disparities in smoking prevalence.[151]

Data from the Global Adult Tobacco Survey (GATS) collected in 14 countries between 2008 and 2010 showed that among smokers who noticed a package warning, the percentage who thought about quitting because of the warning was greater than 50% in six GATS countries (Bangladesh, Brazil, India, Thailand, Ukraine, and Viet Nam) and greater than 25% for men and women in all countries except one (Poland).[152] In the Canadian National Population Health Survey for 1998–2008, introduction of pictorial warning labels was shown to have a statistically significant effect on smoking prevalence and quit attempts, and significantly decreased the odds of being a smoker.[153]

Providing direct information about cessation services on tobacco packaging has been shown to raise awareness of cessation resources and increase consumer demand for them. In a number of countries, promoting tobacco quitlines on cigarette packages has resulted in increased call volume from smokers seeking help to quit.[154] In 2012, Australia introduced plain (standardized) packaging of tobacco, increased the size of the pictorial health warnings on the packages, and introduced new warnings. In a time series analysis controlling for the influence of other factors such as anti-tobacco advertising and price increases, Young and colleagues[155] found a 78% increase in the number of calls to the national cessation quitline, coinciding with the implementation of plain packaging.

### *Pharmaceutical Industry Marketing*

The demand for cessation assistance may be influenced by consumers' awareness of effective cessation methods and their perceived benefits.[156] Several studies have examined the impact of pharmaceutical industry advertising on the use of pharmacological therapies for smoking cessation. For example, Tauras and colleagues[123] examined the impact of NRT advertising on NRT sales. The study used pooled cross-sectional, time series, scanner-based data on prices and sales from 50 major metropolitan markets in the United States between the second quarter of 1996 and the third quarter of 1999 linked to market-level

measures of exposure to NRT advertising. Estimates from this study indicated that increased advertising of Nicoderm CQ® transdermal patches and Nicotrol® transdermal patches increased per capita sales of established Nicoderm CQ® and Nicotrol® products. However, increased advertising of Nicorette® polacrilex (gum) did not significantly increase sales of established Nicorette® products.

Avery and colleagues[157] examined how exposure to pharmaceutical magazine advertisements for smoking cessation products affected smoking cessation and use of cessation products. Using multiple waves of data from the Simmons National Consumer Survey in the United States between 1995 and 1999, the study concluded that exposure to more advertisements for smoking cessation products significantly increased the use of smoking cessation pharmacological therapies, the probability of making quit attempts, and the likelihood of successfully quitting. Moreover, the study found that advertisements for smoking cessation products also significantly increased "cold turkey" quit attempts, suggesting spillover effects of smoking cessation product advertisements to quitting without pharmacotherapy. The study also found that advertisements by the tobacco industry reduced smoking cessation, whereas smoking-related news articles increased cessation.

## Supply-Side or Regulatory Factors

Pharmacological therapies for smoking cessation are subject to country-specific pharmaceutical laws and regulations that influence consumers' access to these products in a variety of ways. Pharmacological therapies for smoking cessation must undergo approval before they can be sold to consumers, which may raise barriers to market entry. In addition, unlike tobacco products, which are typically available for general sale in a wide variety of venues, many countries place restrictions on the types of venues in which medications for smoking cessation can be sold. Cigarettes can be sold by the pack, carton, or (in many countries) even as single stick; in contrast, NRT products are generally sold in 1-, 2-, or more-week supplies, requiring a greater out-of-pocket expense than cigarettes.[58] Where prescriptions are required for cessation medications, they represent another potential barrier to use.[158,159] In addition, many governments prevent manufacturers of medications, including smoking cessation medications, from advertising directly to consumers,[159] leading to decreased consumer awareness about these products. Finally, the health warning labels included with NRT products in most countries are long and often confusing to users.

In contrast, tobacco products are generally subject to far less regulation. As Novotny and colleagues[159] have argued, if pharmaceutical safety standards were applied to tobacco products, these would have to be completely removed from the market, or strictly regulated, because they are so harmful to users.

### Impact of Supply (Availability) on Demand for Cessation Treatment

Studies from HICs show that deregulating pharmacological therapies for smoking cessation—that is, making sales of such products OTC—increases the demand for these products. Shiffman and colleagues[160] estimated that the use of OTC NRT products increased by 152% compared with previous NRT prescription sales, and that between 114,000 and 304,000 12-month incremental quits resulted from 1 year of OTC availability, compared with an expected 40,000 successful quits with prescription-only NRT. Using data from the California Tobacco Surveys of 1992, 1996, and 1999, Pierce and Gilpin[161] found that NRT use among quitters increased by 50.5% between 1992 and 1999; the authors argued that much of the increase could be attributed to the OTC availability of NRT products. Similarly, Reed and colleagues'[162] analysis of the 1996 California Tobacco Survey concluded that making NRT products available OTC resulted in an immediate increase in quit attempts and smoking abstinence with

the use of nicotine patches and gums. Hyland and colleagues[163] used data from a prospective cohort of 1,639 adult smokers surveyed in 1993 and resurveyed in 2001 as part of NCI's Community Intervention Trial for Smoking Cessation; they found that use of NRT increased by approximately 60% after these products became available OTC.

A few econometric studies have examined how OTC availability of NRT affects cigarette demand. Using scanner-based sales data for the United States from 1994 to 2002, Chaloupka and Tauras[164] found that OTC availability of NRT products had a negative and statistically significant effect on the demand for cigarettes. The estimated elasticity of cigarette demand with respect to NRT sales was –0.059, implying that a doubling of NRT use will decrease the demand for cigarettes by approximately 6%. This elasticity is substantially larger than that estimated by Hu and colleagues[165] in the only previous econometric analysis of the impact of NRT availability and use on demand for cigarettes.

## Adoption and Implementation of Cessation Interventions: Challenges and Opportunities

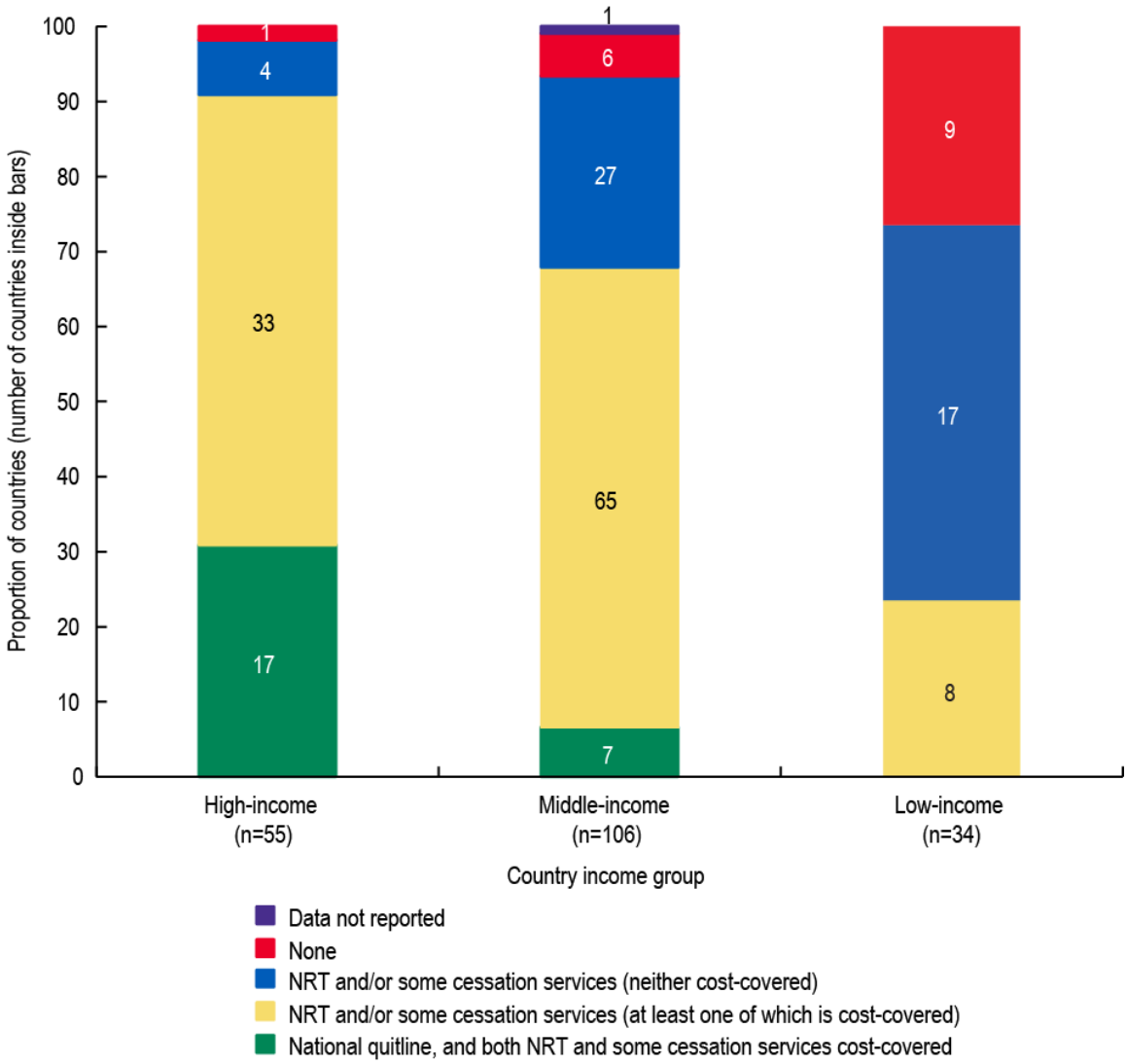
The provision of cessation services is strongly associated with country income status. Figure 9.1 presents an overview of the coverage of the cost of cessation treatment stratified by level of economic development. Only 24 (12%) of 195 countries—all HICs or middle-income countries—provide comprehensive, cost-covered tobacco cessation services.[71] Many more countries cover the costs of some forms of cessation services. Low-income countries have the lowest rates of service provision: only 23% of low-income countries cover the cost of NRT or other cessation services, and only 9% support a toll-free quitline.[71]

Even when the cost of treatment is covered, restrictions in the form of copayments, annual limits, prior authorization requirements, duration limits on treatment, and lack of coverage for combined treatments often limit the extent to which people use such coverage.[166] In the United States, the Patient Protection and Affordable Care Act of 2010 has increased access to cost-covered treatment by requiring most health insurance plans to cover tobacco cessation services with no patient cost-sharing (i.e., copay)[167]; however, the scope of covered services can vary greatly by type of insurance, insurance provider, and state.

### Involvement of the Health Care System

Health care systems can be frontline channels for delivering cessation treatment.[43] Countries can reduce barriers to the delivery of cessation treatment by integrating brief tobacco interventions (i.e., brief advice) into primary care settings and other clinical settings, which has the potential to reach large numbers of smokers efficiently and at a relatively low cost.[168] WHO recommends that all countries provide at least brief cessation advice in primary health care settings, counseling through quitlines, and access to low-cost pharmacological therapies.[32] Additionally, WHO has provided guidelines for the management of tobacco use in pregnancy.[168]

## Figure 9.1 Smoking Cessation Treatment: Cost Coverage, by Country Income Group, 2015




*Notes:* NRT = nicotine replacement therapy. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* World Health Organization 2015.[71]

### Tobacco Quitlines and Web- and Mobile-Based Cessation Services

As noted previously, quitlines have significant potential to expand access to cessation services. In addition, evidence is accumulating that Web and mobile technologies (e.g., Internet-based counseling, text messaging programs) can be effectively leveraged to promote cessation as part of a national health strategy.[40] However, quitlines and other digital health technologies vary widely in their sophistication, reach, and level of services provided. Setting minimum standards for quitlines, such as access to counselors and protocols for training telephone counselors,[169] would help ensure appropriate implementation. Despite the dramatically increased penetration of cell phones and cell phone technologies in many LMICs, access to telephones and the potential cost of cell phone calls remain barriers. The comparatively low cost of text messages and their high penetration coupled with ease of service delivery could make mobile message cessation services a viable alternative for reaching underserved populations.

### Expanding Capacity

Diverse health care providers can help promote and provide tobacco cessation services. For example, the nursing profession is a large potential resource for cessation support.[170] Health professionals can also be important role models and opinion leaders in promoting cessation[171]; however, in many LMICs, tobacco use by health professionals is high, which can undermine their effectiveness as treatment providers.[172]

Creating economies of scale and reducing the unit costs of interventions may be possible if services such as quitlines can be coordinated at larger regional and national levels and if awareness and demand for these services increase. Considerable discussion has been devoted to strategically promoting tobacco dependence treatment in the context of other policy initiatives, including conducting media campaigns, restricting smoking in indoor environments, adopting pictorial warning labels, and increasing taxation.[32]

### A Human Rights Approach to Treatment

Meier has proposed a human rights approach to cessation treatment, noting that "an individual's right to health is recognized as a fundamental international human right."[173,p.16] He further notes that "the right to health has been interpreted to include, at a minimum, basic provisions of health care necessary to save lives," and argues that this should encompass the right to tobacco dependence treatment.[173,p.20-21] Typically, tobacco users become nicotine dependent long before adulthood and find that they cannot quit.[174,175] Increased excise taxes tend to go to general revenue rather than to tobacco control initiatives, and cessation services tend to be greatly underfunded. Despite the positive impact that increased price has on overall quitting, individuals who continue to smoke, especially those in LMICs, face a mounting economic burden but little or no access to treatment.[32] As previously mentioned, none of the 24 countries (out of a total of 195 countries) that provide comprehensive, cost-covered tobacco cessation services are low-income countries.[71]

### Cultural Competence and Sensitivity

Cultural awareness and sensitivity are critical to the effective implementation and dissemination of tobacco dependence treatment. For example, some cultures (e.g., some Native American tribes) have strong traditions of using tobacco for ceremonial purposes. In other cultures, tobacco is offered on social occasions and is an accepted part of hospitality. Cessation interventions must recognize and address common misconceptions, such as the belief that the shock of withdrawal is harmful to the body (India) or that certain brands of cigarettes are suitable for the body (Indonesia).[176] Quitting tobacco use may be considerably more challenging in countries where there are relatively few former smokers to serve as role models, where even physicians have high rates of smoking and minimal awareness or concern about tobacco harms, and where health care systems are minimal or rudimentary.

## Summary

Tobacco dependence is a chronic, relapsing disorder that often requires repeated interventions and multiple attempts to quit. Most smokers will make many attempts to quit over a lifetime, and governments can support these efforts by making cessation resources readily available to all smokers who need them.

Research from HICs clearly demonstrates the effectiveness and cost-effectiveness of interventions to promote and support cessation, including the use of pharmacological and behavioral treatments, promotion of cessation by health care professionals, and integration of cessation treatments into health

care systems. Less evidence exists surrounding the adoption and implementation of cessation interventions in lower income countries. Policy interventions, such as tax increases, health warning labels, and smoke-free laws, can also stimulate interest in quitting and demand for treatment. Coordinating promotion of cessation programs and services with implementation of population-level policy interventions can increase the penetration and impact of such programs and services. Emerging low-cost technologies (i.e., mobile phones) and systems-level interventions (e.g., using electronic health record technology to aid in the identification of tobacco users, prompt clinicians to intervene, and guide intervention via evidence-based treatment algorithms) can facilitate successful implementation of cessation treatment worldwide.

Article 14 of the WHO FCTC obliges Parties to promote the cessation of tobacco use and adequate treatment for tobacco dependence. The implementation rate of Article 14 is strongly associated with country income status. Low-income countries have the lowest rates of service provision, but implementation of cessation services is often incomplete even in high-income countries.[71] Cost is a substantial barrier to the use of pharmacological therapies and other cessation services, particularly in LMICs, but also in HICs. Overall, the demand for smoking cessation treatment services is likely to be lower in LMICs than in HICs because of a lower awareness of the health consequences of smoking in LMICs, as well as fewer former smokers as role models, fewer limits on and weaker social norms against smoking, and the higher price of cessation treatment relative to tobacco products.

## Research Needs

Most research on the efficacy and cost-effectiveness of cessation interventions has been conducted in high-income countries and has focused on cigarettes—by far the most common tobacco product used in these countries. This discussion of research needs generally focuses on cigarettes, although other tobacco products (e.g., bidis, smokeless tobacco, waterpipe tobacco) account for a significant proportion of tobacco consumption in certain regions of the world, and deserve attention in their own right. Research is needed to evaluate adoption and implementation of interventions to reduce tobacco consumption and promote cessation in LMICs, where uptake of cessation interventions is lower. Economic analyses are needed to help LMICs determine the cost and effectiveness of offering various forms of cessation treatment and prioritize more cost-effective options. Implementation research is needed to determine how LMICs might use existing infrastructure to achieve the best possible reach as quickly as possible, at the lowest cost possible. Studies are needed, for example, on strategies for providing low-cost pharmacological therapies for smoking cessation in LMICs, perhaps through bulk purchases at the country or regional level or by making pharmacological therapies freely available. In addition, research is needed to help LMICs develop cessation strategies and treatment guidelines that are culturally sensitive and to increase demand for treatment among smokers. Research initiatives, such as the NIH's International Tobacco and Health Research and Capacity Building Program, can help build research capacity by supporting international research collaborations between investigators in the United States and scientists/institutions that are pursuing research on tobacco control and prevention in LMICs.[177]

## Conclusions

1. Rates of tobacco cessation among current tobacco users will need to increase in order to significantly reduce the health consequences of tobacco use worldwide, in both the short and mid term.
2. Tobacco control policies, such as increased taxation, anti-smoking media campaigns, and comprehensive smoke-free policies, increase the demand for tobacco dependence treatment and the rates of subsequent cessation.
3. Research from high-income countries demonstrates that a number of effective and cost-effective tobacco dependence treatments can increase the likelihood of successful cessation. Relatively little evidence is available on the effectiveness and cost-effectiveness of tobacco dependence treatments in low- and middle-income countries and on the transferability of effective interventions from high-income countries to low- and middle-income countries.
4. Demand for cessation support exists in low- and middle-income countries, but in most of these countries, cessation services and products are often of limited availability or accessibility, or are unaffordable for most of the population.

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## Section 5
## Policy and Other Influences on the Supply of Tobacco Products

# Chapter 10
# Tobacco Growing and Tobacco Product Manufacturing

# Chapter 10
# Tobacco Growing and Tobacco Product Manufacturing

Tobacco-growing practices and policies influence the supply of tobacco and can have important implications for tobacco use and tobacco control. In many countries, tobacco is a part of the farm and/or manufacturing sector. This chapter examines current issues related to tobacco growing and manufacturing, including the following topics:

- Economic and policy aspects of tobacco growing
- Crop substitution and diversification programs, particularly in low- and middle-income countries
- Tobacco product manufacturing
- The potential for tobacco product regulation to reduce tobacco use.

Policies encouraging crop diversification or substitution may be useful as part of a comprehensive strategy to reduce tobacco use. Research has demonstrated that alternative crops can be at least as profitable as tobacco, but many of these alternatives require investments in infrastructure, and tend to be highly specific to a country or region. The design and manufacturing of tobacco products have changed substantially over time, both as a result of efforts to allay consumers' concerns about health harms, and to reduce costs to manufacturers. However, these changes generally occurred in the absence of regulation and were sometimes harmful to public health. An important goal of tobacco product regulation is to ensure that future changes to tobacco products benefit public health. The evidence base for regulating tobacco products in the context of a rapidly evolving marketplace continues to grow, and tobacco product regulation is now recognized as an important component of a comprehensive approach to tobacco control.

## Chapter Contents



## Figures and Tables

## Introduction

Practices and policies affecting the production of raw tobacco and the manufacture of cigarettes and other tobacco products can have an important effect on the characteristics and patterns of tobacco product use. Trends in the economics and market structure of tobacco growing and tobacco product manufacturing can also impact tobacco control efforts. However, tobacco control policies targeting the supply side of the market are less widely used than those targeting the demand side. Thus, less is known about the impact of these policies on tobacco use. In addition, the increasing role of low- and middle-income countries (LMICs) in global tobacco growing and tobacco product manufacturing has raised new challenges for tobacco control policy.

One of the main obstacles to the adoption of measures to reduce tobacco use has been government concern that these measures could cause agricultural and manufacturing job losses as well as decreased tax revenues and export earnings. These concerns have been fueled by claims from tobacco industry–affiliated organizations such as the International Tobacco Growers' Association that tobacco control policies threaten the livelihoods of tobacco farmers, that tobacco-farming practices are sustainable and not harmful to the environment, and that tobacco is the only cash crop able to provide sufficient income, especially to small-scale farmers in key regions.[1–6] In contrast, a growing body of scientific evidence shows that concerns about the detrimental macroeconomic effects of tobacco control policies on tobacco-producing countries are largely unfounded when data and evidence on the actual economics of tobacco and tobacco control are examined (chapter 15).

The first part of this two-part chapter discusses the role of tobacco farming, and the second part covers the related subject of tobacco product regulation. The tobacco farming portion of this chapter addresses the main arguments and the most commonly held concerns about the impact of tobacco control measures on tobacco-growing activities and farmers' livelihoods. Drawing on the practical lessons emerging from selected country case studies, this section offers guidance for evaluating current opportunities to assist tobacco farmers in LMICs in shifting to other crops through crop diversification and crop substitution programs. The related subjects of exporting and importing both leaf tobacco and manufactured tobacco are discussed in detail in chapter 13, and tobacco-related employment in chapter 15.

The second part of this chapter describes tobacco product regulation. An example of these regulatory policies is a ban on one or more tobacco products; several countries have banned sales of some types of smokeless tobacco products, and one country (Bhutan) has banned the sale of all tobacco products.[7] Most existing tobacco product regulation has focused on policies that change the design of tobacco products in an effort to limit toxicity or other harmful aspects of the products. Countries around the world are in the very early stages of product regulation.

The section on tobacco product regulation briefly describes the variety of conventional and emerging tobacco products and their key design features and discusses the evolution of these products and their economic implications. Several approaches to tobacco product regulation are described, along with the limited evidence on the impact of these approaches. Some dimensions of policies targeting tobacco product manufacturing and distribution are covered elsewhere in this monograph, including tobacco product marketing (chapter 7), cigarette packaging/labeling (chapter 8), and youth access to tobacco products (chapter 11).

## The Global Context of Tobacco Growing

Tobacco farming takes place on approximately 4.2 million hectares (10.5 million acres) of land in 124 countries around the world, with LMICs accounting for about 92% of world production.[8] More than 80% of the world's tobacco is produced in only 10 countries (Table 10.1), with upper middle- and lower middle-income countries responsible for most production, whether measured by volume or share of area. The People's Republic of China, India, and Brazil account for almost two-thirds of total tobacco production. China is the world's largest producer, growing more than 40% of the world's tobacco. The United States was the second-largest producer until 1998, but its share has dropped from 10.2% in 1998 to 4.7% in 2013. Brazil became the world's second-largest producer in 2000.[8] India is the third-largest producer, with an 11.2% share of world production. The other top producing countries each contribute between 1.2% and 3.5% of world production. The European Union (EU), if treated as a single entity, would be the sixth-largest tobacco producer.[8] Of the World Health Organization (WHO) Regions, the Western Pacific Region has the largest share (45.4%) of the total world volume of tobacco production, largely accounted for by China (Table 10.2). (Note that data about the quantities of tobacco leaf are expressed in tonnes, a unit of mass equal to 1,000 kg or 2,204.6 pounds.)

### Table 10.1 World's Top Tobacco-Growing Countries, 2013

| Country | Production 2013 (tonnes) | Share of total world volume (%) | Area harvested (hectares) | Share of total world area (%) |
|---|---|---|---|---|
| China | 3,148,547 | 42.4 | 1,526,910 | 36.0 |
| Brazil | 850,673 | 11.4 | 405,253 | 9.6 |
| India | 830,000 | 11.2 | 490,000 | 11.6 |
| United States | 345,837 | 4.7 | 136,068 | 3.2 |
| Indonesia | 260,200 | 3.5 | 270,200 | 6.4 |
| Zimbabwe | 150,000 | 2.0 | 115,000 | 2.7 |
| Malawi | 132,849 | 1.8 | 120,172 | 2.8 |
| Argentina | 115,334 | 1.6 | 59,238 | 1.4 |
| Pakistan | 108,307 | 1.5 | 49,775 | 1.2 |
| Turkey | 90,000 | 1.2 | 136,233 | 3.2 |
| Other tobacco-growing countries | 1,401,488 | 18.9 | 928,394 | 21.9 |

*Source*: FAOSTAT 2013.[8]

## Table 10.2 Tobacco Leaf Production, by WHO Region and Country Income Group, 2013

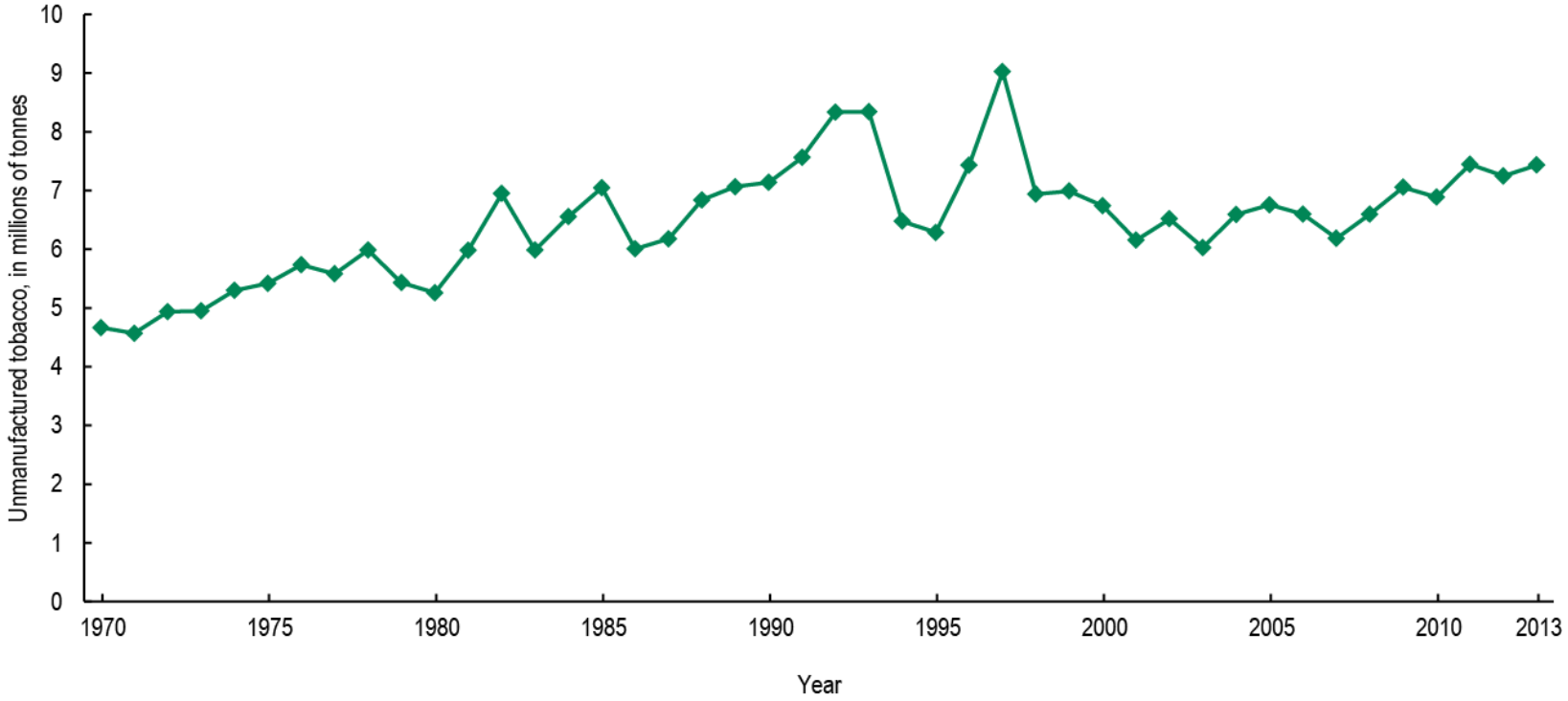
| Region/country income group | Production 2013 (tonnes) | Share of total world volume (%) | 2013 area harvested (hectares) | Share of total world area (%) |
|---|---|---|---|---|
| Western Pacific | 3,372,466 | 45.4 | 1,635,336 | 38.6 |
| Americas | 1,502,865 | 20.2 | 689,639 | 16.3 |
| South-East Asia | 1,364,470 | 18.4 | 914,918 | 21.6 |
| African | 628,506 | 8.5 | 619,117 | 14.6 |
| European | 375,554 | 5.1 | 277,712 | 6.6 |
| Eastern Mediterranean | 189,373 | 2.5 | 100,521 | 2.4 |
| High-income | 617,678 | 8.3 | 249,959 | 5.9 |
| Upper middle-income | 4,542,903 | 61.1 | 2,310,342 | 54.5 |
| Lower middle-income | 1,560,776 | 21.0 | 1,044,121 | 24.6 |
| Low-income | 711,878 | 9.6 | 632,821 | 14.9 |

*Notes:* WHO = World Health Organization. Country income group classification based on World Bank Analytical Classifications for 2013.
*Source*: FAOSTAT 2013.[8]

The two major features of tobacco leaf production in recent decades are the halt in the upward trend in tobacco growing of the 1970s through the 1990s, and the shift of tobacco farming from high-income countries (HICs) to LMICs. Global production of tobacco leaf increased from 4.6 million tonnes in 1970 to a peak of over 9 million tonnes in 1996-1997[8] (Figure 10.1). After that, leaf production declined steadily until it reached 6 million tonnes in 2003, and then stabilized around 6.5 million tonnes between 2004 and 2008 before increasing slightly in more recent years. No single factor explains this pattern, and some variation over time may be expected based on a variety of factors, such as weather, tobacco product demand, manufacturing technology, and changes in production locations.

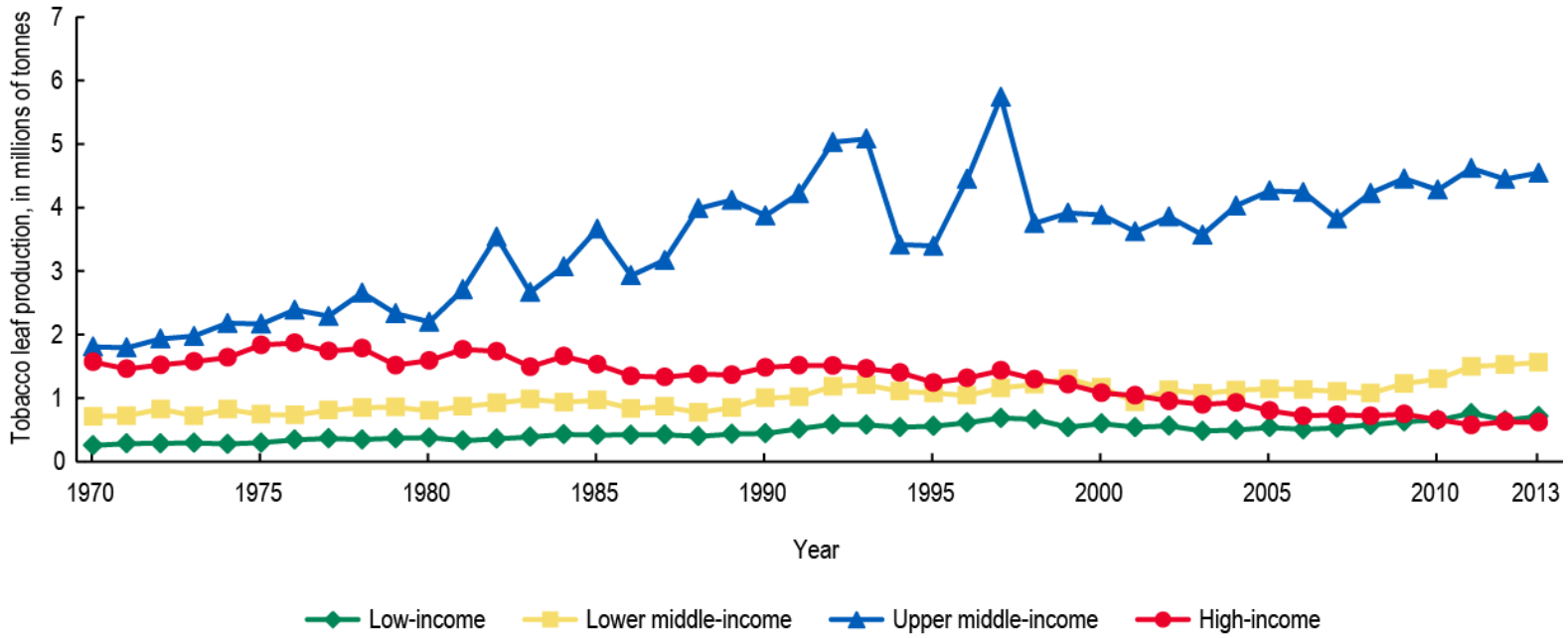
The growth in tobacco leaf production took place entirely in LMICs, with the largest growth seen in upper middle-income countries (Figure 10.2). From 1970 to 2013, tobacco leaf production in LMICs increased from 2.8 million tonnes to 6.8 million tonnes. In contrast, in HICs, production of tobacco leaf fell during the same period from about 1.5 million tonnes to 0.6 million tonnes.[8] Over the first decade of the 21st century, the greatest percentage increases in tobacco leaf production were seen in Mozambique, Zambia, Mali, Ghana, and Cambodia—all LMICs without a large pre-existing tobacco-growing sector.[8,9] As shown in Figure 10.3, overall growth in tobacco leaf production was greatest in the Western Pacific Region, primarily driven by China.[8]

## Figure 10.1 Global Tobacco Leaf Production, 1970–2013



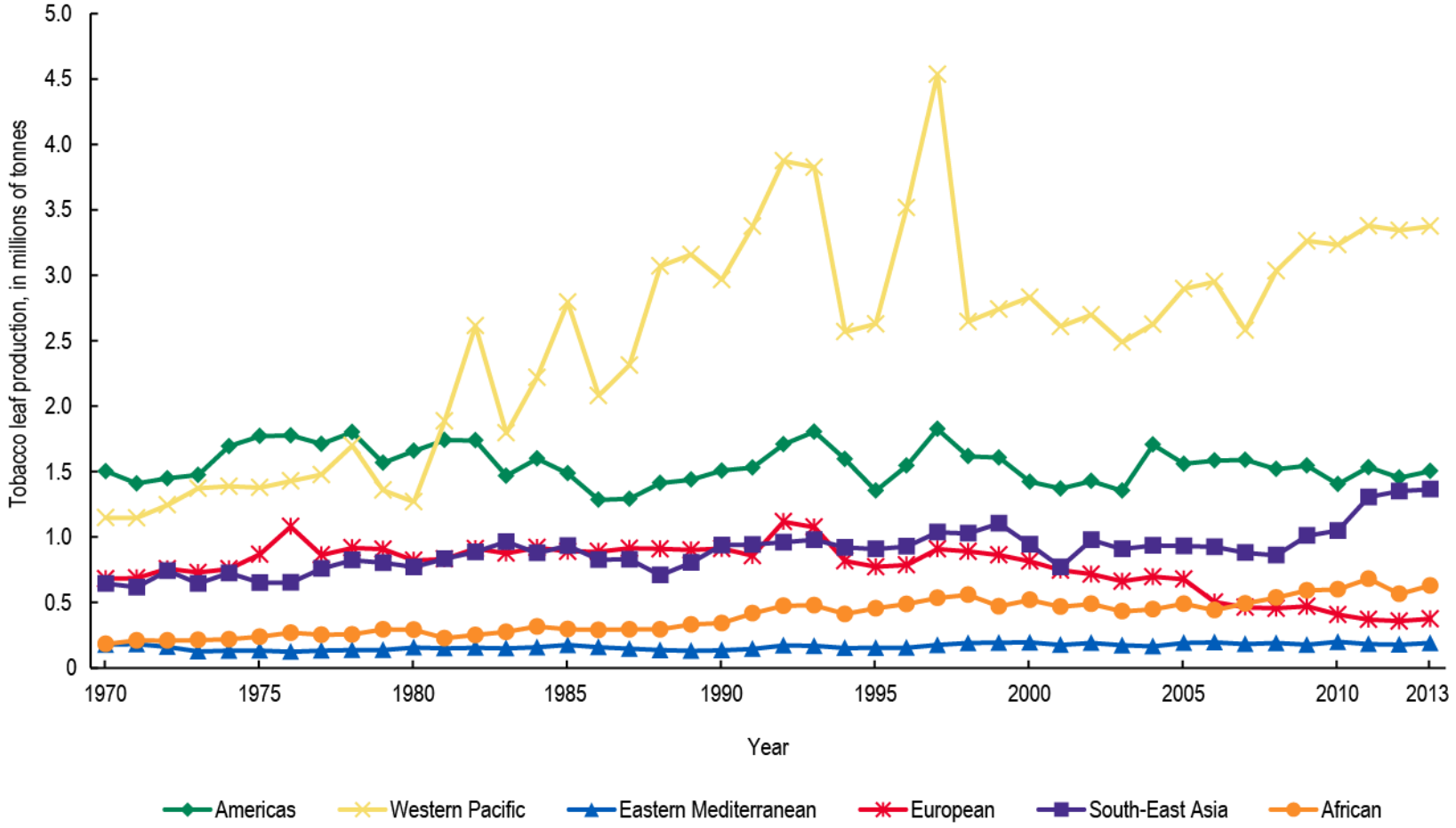

*Source:* FAOSTAT 1970–2013.[8]

## Figure 10.2 Global Tobacco Leaf Production, by Country Income Group, 1970–2013




*Note:* Country income group classification based on World Bank Analytical Classifications for 2013.
*Source:* FAOSTAT 1970–2013.[8]

## Figure 10.3 Global Tobacco Leaf Production, by WHO Region, 1970–2013




*Source:* FAOSTAT 1970–2013.[8]

Several factors help explain the increasing participation of LMICs in world tobacco production. First, production costs in LMICs are lower than in HICs, in part because of the generally less stringent regulatory environments in LMICs. Agricultural policies supporting tobacco production in many HICs have been weakened or ended, resulting in a considerable decline in the farm-level profitability of tobacco crops in these countries. For example, recent policies have resulted in a reduction in the number of tobacco farmers in the United States. Second, tobacco use in HICs has declined, while in LMICs demand for both cigarette manufacturing and exports has increased, catalyzing increased tobacco production. Third, since the late 1980s, as part of a broader trend toward globalization, multinational tobacco companies (MTCs) have established a growing presence in LMICs, and have encouraged the expansion of tobacco growing in order to supply new processing plants.[10] Fourth, in many LMICs tobacco may be perceived as a relatively profitable cash crop, particularly when compared with traditional food crops.[11] For example, tobacco growing may be perceived as associated with indirect benefits, including loans, technical support, or other forms of support from governments or the tobacco industry, along with well-developed marketing systems, which help make tobacco an attractive crop for small farmers in LMICs, and hamper efforts to encourage farmers to switch from tobacco to alternative crops.[12,13]

## Tobacco Farming

Tobacco is a labor-intensive crop that provides work and income to millions of people in the major tobacco-producing countries. However, estimating the number of people working in tobacco growing and the extent of their dependence on this employment is challenging, and data to support such estimates are limited. The differing interests and goals of the organizations estimating employment figures may influence how they select and interpret data. Tobacco industry–sponsored analyses, for example, may tend to overestimate the number of tobacco-related jobs—for example, by not distinguishing between part-time, seasonal workers, and full-time workers.[14] Tobacco-related employment is further addressed in chapter 15.

Most tobacco-growing operations are small family farms, averaging less than 1 hectare in many LMICs, where family members are an integral part of the labor force.[12] Although tobacco farmers often grow other crops either for their own consumption or for sale, the livelihood of many tobacco farmers depends on tobacco crops. In Malawi, tobacco is the main source of cash income for many rural households; in the major tobacco-producing regions, previous estimates have shown that sales of tobacco provided the bulk of rural household cash income, ranging from 65% in Lilongwe to 89% in Kasungu and 95% in Dowa. In these regions, cash income from other crops was minimal.[15] Prior to 2000, Zimbabwe's tobacco production was dominated by large-scale (greater than 1,000 hectares) commercial farms[16]; since the land reform program was undertaken in 2000, this is no longer the case[17] (see also chapter 13).

Tobacco farming is associated with detrimental effects on the environment and on the health of farm workers. Substantial evidence points to the harmful effects of tobacco farming as practiced, including a range of occupational health risks resulting from green tobacco sickness and exposure to pesticides[18–21] as well as the use of child labor associated with the intensive family involvement in tobacco growing.[22] Tobacco farming also entails farmer indebtedness.[23] Environmental harms include soil depletion and deforestation.[24]

## Farm Gate Prices

The price of tobacco leaf is a key factor in global trends driving tobacco farming and the leaf market. Producer prices—also called farm gate prices, or the price, in local currency, at which the farmer sells tobacco leaf—are determined by two major factors: international market conditions and regional and local market-related systems such as the power relationship between growers and leaf traders. Differences in farm systems and governmental price support policies, and power asymmetries between farmers and the tobacco industry all powerfully influence farm gate prices.[12] In addition, farm gate prices vary significantly over time and between countries, making country-to-country comparisons a difficult task.

Prices paid to tobacco producers in the top five major producing countries decreased between the beginning of the 1990s and the beginning of the 2000s, with the notable exceptions of China and India. Since 2002, however, farm gate prices have been rising in the top producing countries except the United States. The average price paid to growers in the United States, however, has been significantly higher than prices paid to producers in Brazil, India, and China. In India, for example, tobacco growers received 6.4 times less income per tonne than those in the United States, on average, between 1991 and 2006.[8] Despite the difficulty of comparing such data for different countries, the prices received by tobacco growers in LMICs are generally much lower than those received by tobacco growers in HICs.[8]

The low prices received by tobacco growers in LMICs has been one of the major factors inducing MTCs to invest in these countries, which has boosted tobacco growing in countries like Brazil and Malawi.[25] In HICs where the average payment to growers is higher, including Italy and the United States, production has declined.[8] Cured tobacco leaf can be stored over time under appropriate conditions,[26] allowing multinational tobacco product manufacturers to choose where and when to purchase tobacco leaf to obtain a desired price and quality. This flexibility drives the market to seek out lower tobacco leaf prices.

## The Global Tobacco Leaf Marketing Chain

There are important differences in how tobacco-farming activities and the sale of tobacco leaf are organized around the world. In most LMICs, tobacco is grown on small family farms that are linked to tobacco companies through contracts.[24] In other countries, including the United States, tobacco is grown on large commercial farms and sold at auctions. The nature of the linkages between growers and tobacco companies and the characteristics of tobacco-farming systems across countries have important implications for the role of government policies in protecting farmers' livelihoods and supporting a transition to alternative crops and livelihoods.

### Box 10.1: Integrated Production Systems: A Framework for Controlling Farmers

In countries where tobacco is sold through private contracts rather than at auction, small farmers usually participate in an integrated production system, which involves contractual obligations between the small farmers and tobacco-processing or retailing firms. In agreeing to these contracts, small farmers commit to provide all the tobacco leaf they produce to the contracting firm and to follow the technical guidance and price classification scheme set by the firm.[29]

Under such agreements, the firm is responsible for providing the farmers with seeds, selling them the main agricultural inputs like fertilizers and authorized pesticides and insecticides, giving technical advice through the firm's supervisory and instructional teams, controlling loans and mediating between tobacco growers and approved banks, providing transport from the fields to the tobacco warehouses and processing plants, and buying the entire crop from the farmers. The contracting farmers are then bound to volume, quality, and production costs defined by the firm.

Through establishing these agreements, and in order to reach the competitive standards required by the international markets, the tobacco firms control both the tobacco varieties produced at the local level and the quality and costs of production. The tobacco companies also determine which technologies the tobacco growers will adopt, and the companies are assured of exclusive rights in supplying them.

While farmers may receive seeds and materials, technical assistance, and a contracted price for their product, the arrangement restricts farmers' ability to grow other crops or sell their tobacco to other buyers, even if the farmer owns the land. The tobacco industry has defended integrated production systems by claiming they improve the quality of the product and provide better and more predictable incomes for farmers.[134,135] However, the integrated system offered to farmers by the tobacco companies has become a strong mechanism to increase farmers' dependence on tobacco, especially considering the lack of structured markets for alternative food crops. For example, studies in Bangladesh and Brazil found that tobacco companies aggressively promoted farming contracts, offering cash credit and fertilizer to farmers at the start of the season; if the tobacco harvest did not meet expectations, farmers were encouraged to take on additional debt with further cash advances, keeping them tied to ongoing tobacco production.[136,137]

Thus, the leading tobacco companies usually operate like a monopsony (a market where there is only one purchaser), promoting the same system of farming and paying the same prices for the crop. In the long run, this system gives leaf buyers and tobacco product manufacturers much greater control over the leaf market and, importantly, the ability to control prices.[138,139]

The tobacco industry's global expansion has dramatically increased the participation of LMICs in tobacco-growing activities. However, the geographical reach of these economic activities does not correspond to the distribution of the gains from participating in the global tobacco industry. Although tobacco growing and manufacturing are increasingly concentrated in LMICs and encompass thousands of small farmers, the higher value phases of the tobacco value chain—associated with research and development, marketing, or international trade—are increasingly concentrated in a few highly profitable tobacco companies largely based in HICs.[25] This gap between the global scale of tobacco companies and the local scale of farmers has resulted in an asymmetrical governance structure, in which the competition conditions faced by large corporations in the international market set the conditions for the roles carried out by farmers in LMICs.

Because many LMICs are involved in tobacco growing but the number of manufacturers is limited (five tobacco companies account for almost 90% of the cigarette market),[27] it is difficult for the tobacco-growing countries to compete in the global market unless they keep production costs low and quality high and have good trade networks. Most tobacco-exporting countries depend heavily on a small number of external customers associated with MTCs, including the two major leaf dealers and five major cigarette manufacturers.[25] For LMICs that are major tobacco growers, access to global tobacco production networks is increasingly based on both their lower costs of production and their functional integration with the leading MTCs. In this sense, these local producers remain tied to specific activities within particular links of the tobacco value chain—for example, tobacco growing—that are characterized by low barriers to entry and declining incomes.

For the leading MTCs, the ability to govern the global tobacco value chain rests on intangible competences like research and development, branding, and marketing that are characterized by high barriers to entry and high financial returns.[25] Thus, although global tobacco farming occupies an essential place in the tobacco value chain, the approximately 19.1 billion U.S. dollars (US$) accounted for by farming in 2013[8] represents only a small share of the global tobacco market. In comparison, the 2013 global tobacco product market was valued at US$ 783 billion.[28]

The large multinational leaf-buying companies and their subsidiaries are another important component in the global leaf market. The leaf market is dominated by two corporations—Universal Corporation and Alliance One.[25] The leaf-trading companies select tobacco to purchase and then process, store, and ship tobacco leaf to buyers (tobacco product manufacturers) around the world. While large cigarette manufacturers may purchase tobacco directly from farmers, they also rely heavily on the leaf-trading companies to obtain raw tobacco.[25] In some countries leaf buyers are making increased use of contract farming (or integrated production systems; see Box 10.1), allowing them to gain more control over labor arrangements, yields, prices, and quality. For example, in Malawi in the 2012-2013 growing season, contract farming accounted for 80% of the total volume of trade in tobacco leaf.[29] Another study found that the global leaf companies have significant political influence on Malawi's economic and trade policies through roles on government advisory groups and committees.[30]

Tobacco farmers in LMICs are highly dependent on a production and purchasing system that is dominated by a few large MTCs. The farmers have too little influence to demand changes in the system, including higher leaf prices or new contract terms. Table 10.3 summarizes the links in the global tobacco value chain, the roles of the participants in this chain—tobacco growers, major leaf dealers, and cigarette companies—and the dynamics of income distribution within each link.

In summary, global expansion of the tobacco industry during the past few decades has led to sharp increases in tobacco leaf production and increased participation of LMICs in tobacco farming. Although tobacco-growing activities are increasingly concentrated in LMICs and encompass thousands of small farmers, there has been little correspondence between the geographical reach of these economic activities and the distribution of economic gains resulting from participating in the global tobacco industry.

### Table 10.3 The Global Tobacco Value Chain: Major Participants and Trends

| Links/activities in the chain | Main participants | Major trends |
|---|---|---|
| Tobacco growing | Millions of tobacco farmers, particularly in LMICs | ▪ Intense competition based on lower production costs and compliance with quality standards<br>▪ Higher volumes associated with declining revenues |
| Tobacco leaf processing and exporting | Major leaf dealers:<br>▪ Universal Corporation<br>▪ Alliance One | ▪ Increasing consolidation (mergers and acquisitions) and overseas expansion<br>▪ High revenues associated with economies of scale on processing and trading, and higher productivity levels |
| Cigarette manufacturing and retailing | Largest MTCs:<br>▪ Phillip Morris<br>▪ British American Tobacco<br>▪ Japan Tobacco International<br>▪ Imperial Brands | ▪ Increasing consolidation (mergers and acquisitions) and overseas expansion<br>▪ High revenues associated with intangibles (research and development, brand names, and marketing) |

*Notes:* LMICs = low- and middle-income countries. MTCs = multinational tobacco companies.
*Source:* Vargas 2004.[140] Reprinted with permission.

## Price Supports and Other Support/Subsidy Programs

Many tobacco-growing countries provide some form of support or subsidies for tobacco growers, along with other agricultural subsidies. Governments use these subsidies to manage the supply and price of agricultural commodities and to support agricultural activity. The extent of government intervention in tobacco production varies considerably across countries. In some countries, government exerts a pervasive influence by means of subsidy concessions, trade barriers, legal restrictions, and export taxes. In other countries, the impact of governmental intervention on tobacco growing and trade is minimal. Given the diversity and complexity of the mechanisms of support employed by different countries, assessing the actual impact of these subsidies on global production and trade of tobacco is extremely difficult.

In the past, governments in many HICs relied on the use of traditional tobacco price support programs, which were based on a combination of marketing quotas and loans. These programs were widely used to support tobacco farmers by keeping tobacco prices stable and higher than they would be otherwise. The U.S. program, created in the 1930s in the wake of the Great Depression, mainly supported income by stabilizing the price of tobacco received by farmers. Tobacco growers participating in the price support program were subject to marketing quotas, which acted as a supply control mechanism and indirectly increased market prices.[31] In the EU, the Common Market Organisation for raw tobacco consisted of a premium system, a system of production limitation (a national threshold and quota system) and production orientation, measures to convert production from tobacco to other crops through the Community Tobacco Fund, and trading arrangements.[32] However, as described below, in recent years, HICs have been gradually phasing out production support for tobacco growers.

## United States

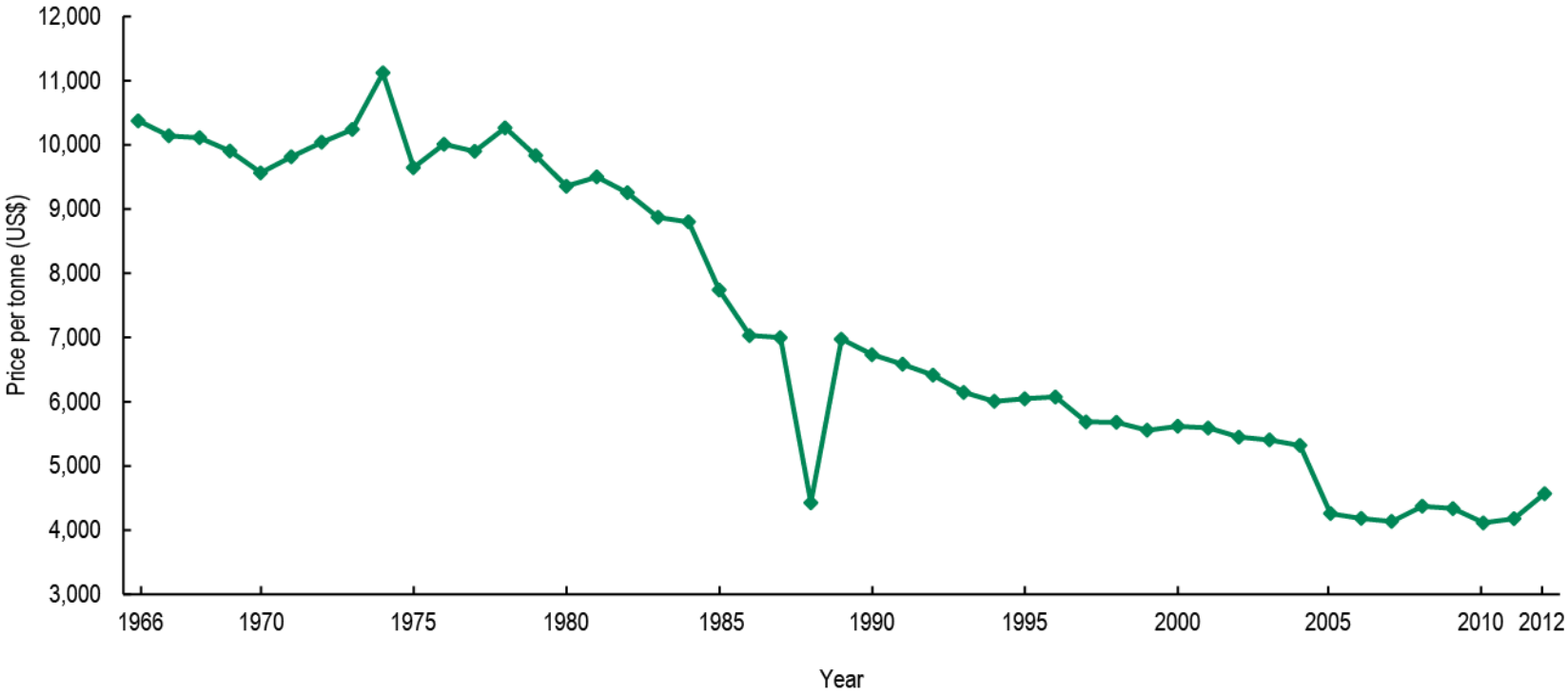
In the United States during the 1990s, in an atmosphere of increasing regulation and litigation directed at the tobacco industry, attention was focused on the decades-old system of federal support for tobacco growing. When the Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, proposed new regulations on cigarettes in 1996, President Clinton highlighted the potential negative impact on tobacco farmers, and concerns about the fate of tobacco farmers influenced tobacco control policy discussions.[33] The Fair and Equitable Tobacco Reform Act of 2004 eliminated the tobacco marketing quota and price support programs and, through its Tobacco Transition Payment Program, commonly referred to as the "Tobacco Program Buy-out," provided about US$ 10 billion in payments to quota owners over the next 10 years, financed by an assessment on tobacco product manufacturers and importers.[34] The Buy-out was launched in part to benefit the economic interests of tobacco farmers, who faced declining demand for their crops in the face of shrinking global tobacco markets and relatively high prices.[35] When the quota system ended, no constraints remained on who could grow tobacco or how much they could grow. As a result, prices dropped substantially because they were determined solely by supply and demand, as shown in Figure 10.4. Although this price drop had a minimal impact on U.S. cigarette prices (approximately 0.5%), it ultimately led to the replacement of a large number of small family-held tobacco farms with a smaller number of large corporate farms.[36,37] Additionally, an offshoot of the 1998 Master Settlement Agreement (MSA) between the major cigarette manufacturers and state governments created the National Tobacco Growers' Settlement Trust Fund to offset the impact of the MSA's tobacco control measures on farmers; this trust fund provided payments of US$ 5.15 billion over 12 years to farmers/quota holders in 14 states.[38]

Payments from both the Buy-out and MSA funds ended in 2014. The U.S. Department of Agriculture (USDA) continues to administer subsidized crop insurance for tobacco (though this has come under challenge), but the agency has discontinued all extension program expenditures on education and management related to tobacco; the USDA was also prohibited from spending research funds on the production, processing, or marketing of tobacco, and from promoting the export of tobacco or tobacco products.[31] The Tobacco Buy-out was an important milestone leading to political support for broad tobacco control measures,[36] including eventually the 2009 Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act). The Buy-out also led some farmers to leave tobacco production. However, the Buy-out required a large commitment of funds, through government-mandated fees on manufacturers and importers as well as the legal settlement with leading cigarette companies; the impact of the program's end in 2014 remains to be seen.

## Europe

Although the EU produces a small portion of the world's tobacco (less than 3%), and imports twice as much raw tobacco as it grows, the EU has historically subsidized tobacco growing.[39] In 2013, 207,272 tonnes of tobacco leaves were produced in 14 EU Member States: Belgium, Bulgaria, Croatia, Cyprus, France, Germany, Greece, Hungary, Italy, Poland, Portugal, Romania, Slovakia, and Spain. The leading European producers were Italy, Bulgaria, Spain, Poland, Greece, and Croatia (listed in order from most to least production); together these countries accounted for 83% of EU production in 2013.[8]

## Figure 10.4 Inflation-Adjusted Tobacco Leaf Prices in the United States, 1966–2012




*Note:* Tobacco leaf prices adjusted for inflation using 2012 U.S. dollars.
*Sources:* U.S. Department of Agriculture, Economic Research Service 1966–1990,[141] FAOSTAT 1991–2012,[8] and U.S. Department of Labor 2014.[142]

The market for raw tobacco in Europe was previously regulated under a Common Market Organisation created in 1992.[40] This system provided payments to farmers (a premium) per kilogram of tobacco, depending on the tobacco variety and other conditions, and established production limits through country-specific thresholds and production quotas. The regulation also established a Community Tobacco Fund which supported research and provided assistance related to crop substitution and alternative livelihoods.[32]

Over the years, concerns were raised about the EU system of support for tobacco growing, and the need for reform was increasingly recognized. A 1997 EU report acknowledged the apparent contradiction between EU policies to reduce tobacco consumption while at the same time supporting raw tobacco production. This report cautioned that abolishing support altogether would impact the livelihoods of an estimated 200,000 workers and threaten tobacco growers who depended on production premiums for most (over 80%) of their income.[41] It was also argued that the premium system failed to provide incentives for improving the quality of the tobacco grown, resulting in a surplus of poor quality tobacco, which was in turn exported at low prices to Eastern Europe and Africa.[42]

Starting in 2004, as part of broader reforms of the EU Common Agricultural Policy (CAP), the premium system was phased out over several years. Production quotas were abolished and financial aid was "decoupled" from production, which meant that aid was no longer tied to the amount of tobacco produced. Thus, farmers were freed to grow other crops in place of tobacco. The CAP also had the effect of removing from the market lower quality tobacco varieties which may have been grown primarily to benefit from the earlier production-based subsidy.[43] Since 2010, the EU has not granted any specific subsidies for raw tobacco production, but it continues to provide general agricultural aid through direct payments and rural development programs.[39] As a result, raw tobacco production has declined.[44]

### Low- and Middle-Income Countries

Many LMICs continue to apply price support systems for tobacco growing. For example, starting in 1940, the Turkish government set a minimum purchase price for each grade of tobacco leaf purchased by Tekel, the government's tobacco-producing monopoly. Farmers were free to sell their tobacco leaf on the open market, but most contracted with Tekel to sell at the established price. In 2000, the government replaced its price support program with "direct income support" for farmers, providing a subsidy based on the size of the farm.[45]

In many LMICs, however, governments are less focused on guaranteeing minimum prices to tobacco farmers and more concerned with providing and improving infrastructure facilities that expand tobacco-farming activities (e.g., roads and irrigation, loans, and tax incentives). For example, in the Philippines, 15% of tobacco tax revenues for specific types of tobacco are returned to tobacco-growing provinces and are used to support a variety of activities, including efforts to improve tobacco farming and infrastructure development.[46] As another example, Argentina has provided subsidies and technical assistance to tobacco growers since 1972 through the "Fondo Especial del Tabaco" (FET, or Special Tobacco Fund), which is financed through a 7% tax on the sale of cigarette packs.[47–49] In addition, for several decades the World Bank provided loans to tobacco farmers as part of its economic development efforts in LMICs; in 1991, the World Bank changed its policy and no longer supports tobacco projects or provides aid for tobacco production.[50]

## Crop Substitution and Diversification Programs

Crop substitution and tobacco farming diversification programs are unlikely, by themselves, to result in reductions in tobacco use, but there is consensus that efforts to help small farmers switch from tobacco to alternative crops can be a useful part of sustainable local economic development programs and can help overcome barriers to adopting and implementing strong tobacco control policies.[11,51]

Substantial barriers hamper the adoption of broader diversification programs and alternative livelihoods for small family farmers in tobacco-producing regions, particularly in LMICs. Three major challenges are:

- **Profitability:** In many LMICs, tobacco remains a highly attractive and profitable cash crop for small family farmers, particularly when compared with other cash crops and traditional food crops.
- **Economic dependence:** In some LMICs, local economies, regional governments, and individual farmers are highly dependent on income from tobacco-growing activities, a dependence that is also fostered by existing tobacco industry distribution and purchasing networks.
- **Support from governments and tobacco companies:** In some LMICs, local and central governments provide significant support and subsidies for tobacco growing and processing.

The net return on tobacco compared with alternative crops is a key issue for any crop substitution program aimed at supporting small family farmers to change from tobacco to other crops. Many tobacco-growing farms, even small family farms, are already quite diversified, and farmers may derive substantial earnings from relatively small areas devoted to tobacco cultivation because of its profitability.[6] Most other crops are for sustenance purposes, and farmers only sell occasional surpluses. Although the profitability of tobacco farming has fallen in recent years, tobacco remains a highly attractive crop to small family farmers, providing a higher net income yield per unit of land than conventional food crops like corn or black beans.

Transition to the existing alternative cash crops is impeded by lack of resources, an inability to create new market niches for most traditional food crops, and other constraints associated with transport and storage infrastructure. In countries with weak supply chains for agricultural commodities, farmers may have limited opportunities for pursuing alternative crops. The tobacco industry has invested in infrastructure for tobacco grower contracts and leaf purchasing, but similar systems may be lacking for other crops.

Some profitable alternative crops may require specialized expertise or infrastructure. For example, a 2001 analysis of Zimbabwe found that the most profitable crops are both skill-intensive and expensive to grow.[16] This is especially true with respect to roses and supermarket vegetables like baby corn, baby carrots, and mangetout peas, which can be very profitable but also require a high level of skill and expense to grow. In addition to field costs, value chain development for these enterprises requires large capital investments in processing and packing facilities, special irrigation equipment, and other infrastructure, including greenhouses and insulated trucks for roses and appropriate accreditation for vegetables. These products also must meet exacting growing standards and must be delivered in fresh condition according to tight schedules.

The following sections examine crop substitution and diversification opportunities and experiences in selected countries. Diversification opportunities vary greatly between countries and regions depending on factors like local growing conditions, market infrastructure, and availability of land per capita. The purpose of these case studies is not to provide comprehensive guidance for developing alternative crops, but to describe some practical issues and lessons from past experience that can help in evaluating current opportunities. A few well-documented case studies are presented here, followed by some general observations about the future of crop substitution and diversification and possible lessons for other countries in promoting crop substitutes and other economic alternatives to tobacco. However, as the following case studies demonstrate, experience with crop substitution and diversification can be highly dependent on context, and caution is warranted in generalizing the findings of these case studies to other countries.

### Indonesia

This section draws heavily on Keyser and Juita's 2005[52] supply-side analysis from Central Java, which was summarized in a case study report by Keyser in 2007.[53] This work examined how financial costs and returns for tobacco compare with costs and returns for a range of crops that could either complement or substitute for tobacco.

While Indonesia's farm economy is diverse overall, tobacco is a dominant crop in some locations.[53] Approximately 270,300 hectares were planted in tobacco in 2012, a year in which tobacco contributed around US$ 159.6 million in gross export earnings to Indonesia.[8] In addition to Central Java, tobacco is also an important crop in East Java, Lombok, and North Sumatra.[53]

Two main types of tobacco are produced in Central Java: a sun-cured Virginia tobacco grown mostly in upland areas where the climate is mild, and a type of tobacco grown mainly in the hot, tropical lowlands. More than 98% of Virginia tobacco is used domestically to manufacture kretek cigarettes, for which tobacco is blended with cloves and other aromatic ingredients. Local consumers are the largest market for Indonesian kretek cigarettes. In contrast, 98% of lowland tobacco is exported; it is mainly sold on a pre-negotiated basis and used in the manufacture of cigars.[53]

Most farms in Central Java are extremely small (0.25 to 0.5 hectares).[53] Achieving the maximum income from such a small parcel is a challenge for farmers. Therefore, no matter how attractive the rates of return are from an alternative investment, a high-income crop is still needed as part of the rotation. Tobacco in Central Java is only one part of a complex rotation of different crops. A typical practice in upland areas growing Virginia tobacco is to follow tobacco almost immediately with corn, soybeans, or some other relay crop that grows well before the start of the heavy rains, followed by a second rotation of mixed intercrops like garlic, green beans, cabbage, or onions. Traditionally, in many densely populated areas tobacco has served as the essential high-income crop, and any successful diversification strategy will need to ensure at least as much income to farmers over the long run.[53]

Data from the 2005 Keyser and Juita study[52] suggest that alternative crops offer a potential for net profits and rates of return that are similar to or better than those for tobacco. Staples like rice, corn, and ground nuts are important for food security but provide only a third as much income as tobacco. Thus, higher value commodities would be needed to replace income from tobacco. The results for chilli, potatoes, and nilam are particularly encouraging. In terms of total costs, the data also show that tobacco

is relatively expensive to grow, both in terms of cash and labor. Compared with other enterprises, only chilli requires more cash before sale than Virginia-kretek tobacco.[52]

The fact that other crops can be more profitable than tobacco, however, does not mean that these alternatives are necessarily better choices. The data show that high-value alternatives are also expensive to grow and sometimes more costly to grow than tobacco.[52] Newer crops can also be difficult to market since the same type of trading networks do not exist. Total market demand for each alternative is also much smaller compared with tobacco, so that no one enterprise could be expected to substitute completely. For this reason, farmers may decide to scale back on tobacco over time as efforts to reduce smoking take effect.

From these data, the Keyser and Juita[52] report concluded that agricultural planners would do well to focus on developing the specialized support services and private trading networks smallholders need to succeed with new enterprises. Especially in the case of perennial crops with a long maturity period, any shift from tobacco can be difficult and risky in terms of high establishment costs and limited access to long-term credit. From the farmer's perspective, substitute crops may appear to have less certain cost structures and markets compared with tobacco. Considerable efforts are therefore required to develop new, economically competitive markets and support services.

### Malawi

Malawi has one of the most heavily tobacco-dependent economies in the world and has relied on tobacco export earnings for most of the past century.[54] One report stated that tobacco crops account for about 60% of Malawi's total export earnings, 23% of its tax base, and 13% of gross domestic product.[13] Malawi has surpassed the United States as the world's largest exporter of burley tobacco,[55] and in 2013, the country was the sixth-largest tobacco leaf exporter.[8] This case study is based on a 2003 report by Jaffee[13] and also draws on Mataya and Tsonga,[56] the Food and Agriculture Organization of the United Nations,[15] and Keyser and Lungu.[53]

Because tobacco is so important to its economy, Malawi is regarded as one of the countries most vulnerable to the threat of shrinking tobacco markets. From 315,000 to 330,000 small farms grow tobacco on plots ranging in size from 0.1 to 0.3 hectares. Small-scale producers account for 70% of Malawi's total tobacco output, and one in five Malawian households derive a substantial share of their cash income directly from tobacco.[13]

Until the late 1970s, tobacco production in Malawi was restricted to an elite group of large-scale growers who owned or leased estate land. These farmers could sell their tobacco directly to international buyers at officially recognized auctions. Smallholder farmers, on the other hand, were only allowed to grow a limited number of tobacco varieties and were mostly required to sell to government agencies at prices below prevailing market levels. During the 1980s, the situation began to change when medium-scale entrepreneurs were allowed to lease land and establish "estates" (typically 10–20 hectares) on which to grow burley or flue-cured tobacco and to sell their tobacco directly through auction rather than a government agency. The situation eased further in 1993 with the introduction of tobacco sales quotas to groups of smallholder farmers who were organized into "clubs" and allowed to sell through a program of intermediate buyers who were meant to facilitate the logistics of bringing the smallholder crop into the auction.[13] Smallholder farmers responded quickly to these policy reforms: The number involved in tobacco cultivation increased from 200,000 in 1996 to more than 300,000 in the early 2000s.

Over 90% of tobacco grown in Malawi is burley, which is typically air cured and so does not require use of charcoal or other materials for curing.[53]

During the early 2000s, the profits of the burley estates smallholders seemed in jeopardy. Many estates simply ceased burley tobacco production because their labor force had abandoned them or their farm tenants and/or estate managers had sold their tobacco to intermediate buyers or others. Although no definitive data are available, Jaffee[13] estimates that 40–50% of estates that had been producing tobacco in the early 1990s gave up production or scaled back their operations. Marketing was also an important constraint in that smallholder growers still had only indirect access to auctions, which are much more profitable to farmers than going through an intermediate buyer.[53]

From a policy and business environment perspective, a number of other factors contributed to the diminishing profitability of tobacco,[13] including exchange rate movements; rising costs associated with transport, handling, and auctioning; and a variety of institutional fees charged by state and industry bodies.[13,57,58]

Studies have gone beyond simple financial calculations and looked at underlying economic efficiency. Malawi is very efficient in the production of many agricultural commodities, including paprika, tobacco, groundnuts, and soybeans, because the country is protected from competition from imports as a result of its landlocked geography and correspondingly high transportation costs. Producing crops to be sold domestically was found to be more efficient than producing crops for export. For example, Malawi has no comparative advantage in the production of maize for export, but can grow the crop efficiently as an import substitute. At the same time, most crops in the smallholder sector provide extremely poor financial profits. For example, only 8 of 20 different enterprises were found to return more than US$ 65 per hectare with average management, and just 5 activities provide more than US$ 327 per hectare. These results were attributed, in part, to high input costs following market liberalization.[53]

The income-earning potential of crops is especially important for smallholders because of the limited size of their plots, typically less than 1 hectare. Thus, in order to replace tobacco, any alternative crop must be highly profitable as well as being suited to the same growing conditions. For example, macadamia nuts can be very profitable but are probably not an option for smallholders because the crop needs to be grown over a large area.[56]

### Kenya

Tobacco production in Kenya has increased dramatically since 1980. During the 1980s, economic conditions and government policies encouraged many farmers to shift to tobacco. Public investment in agricultural research and market supports was cut during this decade, and at the same time, prices for other crops dropped in response to deregulation and international competition. Farmers were also drawn into tobacco production by crop inputs and technical assistance from tobacco companies and by promises of a ready market. In 2011, an estimated 55,132 farmers were producing tobacco,[59] harvesting 22,604 hectares to produce 14,000 tonnes of unmanufactured tobacco.[8]

Studies have shown that tobacco farmers in Kenya actually do worse than other farmers, netting US$ 198 less in income and spending an annual average of US$ 35 more of their income on health care per year compared to farmers growing other crops.[60] Thus, research efforts have been made to support agricultural diversification and develop alternatives to tobacco growing. One particularly successful research program, experimenting with bamboo cultivation as a substitute for tobacco, began in 2005 at

the South Eastern Kenya University with support from the Canadian International Development Research Centre. Bamboo is a highly versatile material that can be used worldwide in the manufacture of products such as furniture, mats, baskets, scaffolding, building material, paper, bioenergy products, and musical instruments.[61] Feasibility studies in Kenya revealed that the market potential for handicrafts and furniture is enormous.[62] Evidence from local urban areas indicates a demand for tables, stools, beds, shelves, stands, sofa sets, and beach chairs that could be made with bamboo; bamboo has also been used in the housing sector as flooring tiles, wall reinforcements, and ceiling and interior decorations.[63]

A 2006–2009 trial further tested the feasibility of bamboo as an alternative to tobacco and the development of a sustainable value chain market for bamboo products within four districts of the South Nyanza Region, where tobacco farming is prominent. Trainings and capacity building were conducted with 240 smallholder farmers, and a number of challenges were identified. The first was the 3- to 4-year lag time between initial input and harvest. Intercrops, such as kale and beans, were introduced to allow the farmer to maintain cash flow while waiting for the bamboo to mature. One of the obstacles for most farms attempting to leave the tobacco industry was the initial large investment in curing barns. Tobacco kilns could be repurposed to create market-ready dried bamboo poles that can be used to make construction scaffolding and bamboo furniture, which increases the base value by 100% and 200%, respectively. The net return value for bamboo crops was over 300% higher than that for tobacco crops. Another challenge was a 1986 ban on bamboo harvesting from government forests, which meant that little local bamboo was entering the market. The Kenyan government lifted this ban in 2013, eliminating the barrier to getting local bamboo to the market.[59] Study sites have reported that bamboo is being used locally for construction, fencing, furniture, and handicrafts.[62]

The program has proven to be sustainable, with over half of farmers who participated in the study continuing to allocate a portion of their crops to bamboo production, and 73.8% abandoning tobacco farming completely.[59] More than 75% have reported that their household livelihoods have improved.[62] By organizing farmers into cooperatives, in addition to offering inputs, training, and marketing support, the study was able to achieve a high level of buy-in from the farming community.[59]

### Brazil

In sharp contrast to Malawi, Brazil's economy is already extremely diverse, and tobacco accounts for less than 1.5% of total merchandise exports. Still, as of 2012, Brazil was the world's second-largest tobacco grower, with a total tobacco production of 810,550 tonnes. Brazil also was first in tobacco exports: 77% of its 2012 total production was exported, earning about US$ 3.2 billion in gross foreign revenues.[8] This case study draws extensively on a description by Vargas and Campos[64] of three attempts to introduce alternative agricultural crops in the main tobacco-growing areas in southern Brazil.

Almost 90% of the land used for tobacco farming in Brazil lies in three states, Rio Grande do Sul, Santa Catarina, and Paraná, in the southern part of the country, an area that produces 93% of Brazil's total tobacco crop. Most of the remaining production comes from northern states that mainly supply dark tobacco used for cigars. According to the Brazilian Tobacco Growers Association (AFUBRA), more than 600 localities and some 170,000 to 190,000 growers, mainly small landowners, are involved in growing tobacco in the south.[64] For these families, tobacco is the primary source of cash income. About 80% of total production in the south is flue-cured Virginia tobacco, and the rest is air-cured burley.[15]

Individual landholdings where tobacco is grown average 16.8 hectares, with 2.6 hectares planted to tobacco, 9.4 hectares to other crops, and the remainder being in pasture or non-agricultural use. About a quarter of the family farms in southern tobacco-growing areas rent land or have sharecropping arrangements with landowners, which require the farmers either to grow tobacco or to leave the farms.[15] Plot sizes of 2.6 hectares for tobacco, although small by Brazilian standards compared with other crops, contrast sharply with Malawi and Indonesia, where tobacco plots are rarely larger than 0.3 hectares.[13,15]

Vargas and Campos[64] identified three main barriers to the adoption of alternative livelihoods in Brazil's tobacco-producing regions: the integrated production system, which keeps farmers financially dependent on tobacco companies; local and state governments that support and subsidize tobacco growing and processing; and the high financial returns from tobacco, particularly compared with traditional food crops.

Vargas and Campos[64] compared the profitability of Virginia flue-cured and burley tobacco with corn and beans (see Table 10.4), and found that tobacco is far more profitable and expensive to grow compared with staple commodities, as measured in gross and net terms and by the daily returns to labor. These data indicate that the search for viable alternatives to tobacco will require considering high-value commodities rather than basic foods.

### Table 10.4 Costs and Returns for Selected Crops in Brazil, 1999/2000

| Category | Virginia flue-cured tobacco | Burley tobacco | Corn | Beans |
|---|---|---|---|---|
| **Costs** | | | | |
| Variable | 1,738.08 | 1,343.93 | 335.06 | 247.60 |
| Fixed | 170.82 | 170.82 | 56.54 | 56.58 |
| Total | 1,909.09 | 1,518.75 | 391.60 | 304.18 |
| **Profits** | | | | |
| Gross margin | 2,370.42 | 1,879.36 | 396.00 | 264.00 |
| Net profit | 454.57 | 360.91 | 1.51 | -42.11 |
| **Labor** | | | | |
| Total days worked | 149 | 134 | 22 | 26 |
| Return per day | 3.05 | 2.69 | 0.07 | –1.62 |

*Note:* Costs and returns shown in US$ per hectare.
*Source:* Vargas and Campos 2005.[64]

The challenge of crop diversification cannot be discussed in isolation from the current costs and benefits of tobacco, and diversification will require concerted efforts by the private sector, government, individual farmers, and farmer associations to succeed. Development of new value chains with support systems that are similar to (or better than) those available for tobacco is a major challenge for Brazil and other countries. Vargas and Campos[64] offer examples of diversification initiatives from which several lessons may be drawn.

Local initiatives have attempted to introduce organic food crops as alternatives to tobacco. For example, beginning in the late 1980s the search for an alternative model led to the establishment of various "agro-ecological" endeavors based on the principles of organic farming in Santa Cruz do Sul, a municipality in the Rio Pardo Valley. These efforts eventually gave rise to a regional cooperative of ecologically based family farmers known as ECOVALE. Farm products—including a wide variety of horticultural crops, erva-mate (Brazilian tea), peaches, oranges, beans, and corn—are sold in fairs and to regional and local supermarkets and restaurants. Vargas and Campos[64] cite data from the Center of Assistance for Small Farmers which show that an average household earns an annual income of US$ 1,560 from agro-ecological crops, compared with only US$ 938 to US$ 1,182 from tobacco, based on an average 2.6-hectare plot.

The financial returns that are reported for agro-ecological enterprises, however, are very uncertain, and the estimates do not show how these enterprises compare with respect to variable costs, labor requirements, investment needs, returns to capital, and other matters of importance to farmers. Moreover, Vargas and Campos[64] report that more than 330 families are involved in agro-ecological products in the Rio Pardo Valley, which is a very small number compared with the number of tobacco growers. For widespread farmer participation, market linkages clearly need to be extended beyond local fairs and restaurants and will therefore involve completely different cost and price structures than the ones encountered so far. Horticulture production and marketing is one of the most demanding areas of agriculture and requires specialized infrastructure. Whether programs similar to ECOVALE can be built up to this level is the real challenge for developing an alternative crop as a competitive substitute for tobacco. Other initiatives have yielded similar lessons, including the need for diverse distribution networks, coordination, and government support.

### Canada

The experience of HICs yields additional insights into the issue of crop substitution. These countries are in a much stronger position than LMICs to promote alternative enterprises, both in terms of the ability to afford farmer quota buy-outs and greater opportunities for farm and non-farm diversification. Canada's 1990s diversification experience helps illustrate these points as well as a number of similarities in terms of the challenges of competitive value chain development.[65]

In the mid-1990s, Canada ranked as the world's sixth-largest producer of flue-cured tobacco and among the world's top 20 producers of tobacco overall. About 90% of the tobacco grown in Canada was produced in a highly concentrated area in southwestern Ontario near the north shore of Lake Erie. Historically, tobacco companies in Canada have encouraged and helped farmers to begin growing tobacco, and tobacco has made a major contribution to the local economies of four Ontario counties.[65]

Although the government of Canada has a history of supporting tobacco farming dating back to the early 1900s, Canada in the 1980s and 1990s took some of the most aggressive steps in the world to reduce tobacco production. Between 1987 and 1993, federal and provincial governments paid more than 50 million Canadian dollars (CA$) to farmers who stopped growing tobacco. A further CA$ 13 million was spent on projects seeking alternative crops.[65]

Canada's Tobacco Diversification Plan, announced in 1987, consisted of two components, the Tobacco Transition Adjustment Initiative (commonly known as Redux) and the Alternative Enterprise Initiative, which provided financial incentives for farmers to cease tobacco production. The Diversification Plan

had a substantial impact. By 1990, about one-third of tobacco growers across Canada had left tobacco production. Of the Ontario farmers who ceased growing tobacco, half said they would have done so regardless, and one-third said the program prompted them to discontinue. However, many eligible farmers did not take advantage of the program because they felt they were better off financially continuing to grow tobacco. Of the farmers who did leave, about 40% were still involved in tobacco growing afterward, typically as employees of other farmers.[65]

In addition to the financial incentive to stop growing tobacco, the Alternative Enterprise Initiative provided financial support for the development and marketing of non-tobacco crops. This effort was not immediately successful, as some farmers were reluctant to leave tobacco, a high-income crop, for a riskier, low-income activity, and some funded ventures failed. Despite these difficulties, "since the early 1980s many Canadian farmers who once grew tobacco have produced alternative crops, including ginseng, baby carrots, rhubarb, Spanish onions, zucchini, coriander, garlic, melons, early and sweet potatoes, buckwheat, and hay."[65,p.166] Cunningham concludes that while government programs have contributed to diversification, the biggest factor has been the free market. As the demand for Canadian tobacco fell in the 1980s, farmers realized they could make more money by growing something else, either instead of or in addition to tobacco. By the late 1980s, tobacco farming had stabilized and the number of farmers exiting tobacco dwindled.

### The Future of Crop Substitution and Diversification

For countries planning substitution and diversification programs, these and other case studies offer valuable examples and highlight the types of issues and challenges that may be encountered. These case histories show that alternative crops can substitute for some of the income earned from tobacco, but that programs designed to promote diversification simply for the sake of promoting diversification are likely to face significant challenges. Alternatives must be competitive and well managed; if they have not developed of their own accord, factors other than the dominance of tobacco may be at work.

The Canadian experience is very different from what most LMICs can expect. While donor funding for programs like tobacco buy-outs may be possible, Canadian farmers benefited from many favorable economic conditions that most LMICs cannot offer. The same principles of being subject to market forces and the risk of diversification for the sake of diversification still hold true, but the development of new enterprises will likely be more complicated and slow in LMICs without a large consumer base for alternative products and other opportunities for non-farm employment.

Approaches to crop diversification and substitution vary considerably across countries. In general, a consensus is growing that alternatives to tobacco farming do exist, but they tend to be highly country- or region-specific. To facilitate these diversification and substitution efforts, the Conference of the Parties to the WHO Framework Convention on Tobacco Control (WHO FCTC), at its third meeting, established a Working Group on economically sustainable alternatives to tobacco growing. The Working Group's policy options and recommendations were adopted by the Conference of the Parties at its sixth session in October 2014[51] (see Box 10.2).

### Box 10.2: Working Group Report: Policy Options and Recommendations on Economically Sustainable Alternatives to Tobacco Growing (in Relation to Articles 17 and 18)

This report was intended to assist Parties to the WHO FCTC in complying with Article 17 (Provision of support for economically viable alternatives to tobacco production) and Article 18 (Protection of the environment and the health of persons). The report identified six guiding principles:

1. Livelihoods diversification should be the concept guiding implementation of economically sustainable alternatives to tobacco growing.
2. Tobacco growers and workers should be engaged in policy development concerning Articles 17 and 18 in line with Article 5.3 of the WHO FCTC [Protection of public health policies with respect to tobacco control from commercial and other vested interests of the tobacco industry] and its guidelines.
3. Policies and programs to promote economically sustainable alternative livelihoods should be based on best practices and linked to sustainable development programmes.
4. The promotion of economically sustainable alternative livelihoods should be carried out within a holistic framework that encompasses all aspects of the livelihoods of tobacco growers and workers (including the health, economic, social, environmental, and food security aspects).
5. Policies promoting economically sustainable alternative livelihoods should be protected from commercial and other vested interests of the tobacco industry, including leaf companies, in accordance with Article 5.3 of the WHO FCTC and its guidelines.
6. Partnership and collaboration should be pursued in the implementation of these policy options and recommendations, including in the provision of technical and/or financial assistance.[51]

A common perception is that tobacco is the most profitable crop a farmer can grow. As described in the case histories above, at least in some countries other crops have the potential to rival or surpass tobacco in terms of gross and net profits, returns to cash, and returns to family labor. In Kenya, initial trials have shown that bamboo can be a successful commodity, offering a diversity of uses and higher profits. In Indonesia, potato, chilli, nilam, and oranges were all found to return higher profits than tobacco, depending on farm management. Similarly, in Zimbabwe, analysis shows that paprika, coffee, and specialty horticulture crops offer greater profits than tobacco, and in Malawi, tomato, paprika, rice, confectionery groundnuts, and coffee all provide higher incomes for smallholder farmers, depending on market arrangements.

Policy incentives that encourage tobacco growers to use their incomes to invest in other farm activities are well worth considering. In this way, tobacco itself could help fuel the process of diversification.

Hu and colleagues[66] conclude that tobacco growing provides lower returns than alternative crops such as grains, oilseeds, beans, and fruit. However, they also observe that local governments use various incentives to promote tobacco growing because of its importance to their tax revenues, and the quotas mandated by local governments do not allow farmers to determine which crops they will grow.

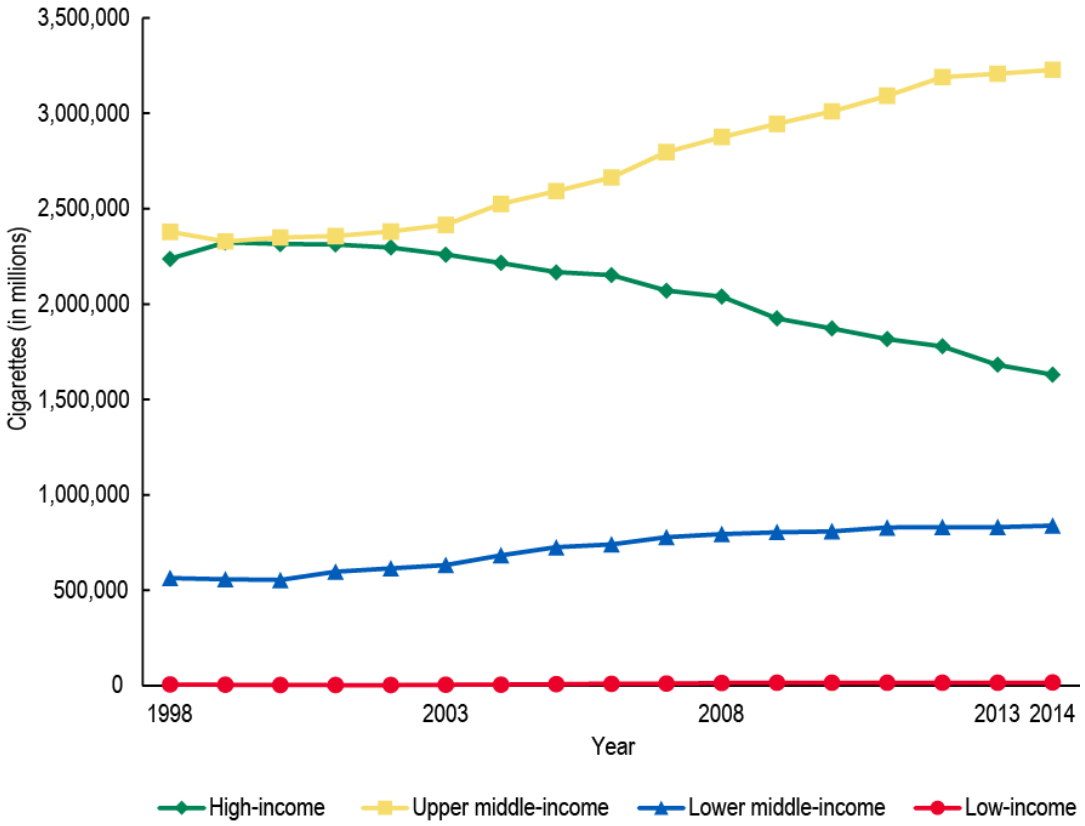
The markets for most high-value products that could to some extent make up for a loss of tobacco revenue are much smaller and more difficult to penetrate. The challenge of developing new supply chains for alternative products may appear daunting, but this does not mean that new products cannot, or will not, emerge over time to replace tobacco. As the markets for tobacco begin to shrink, other commodities could become relatively more attractive and gradually emerge alongside tobacco.

## The Evolving Tobacco Industry

A wide variety of tobacco products are available and consumed globally as a result of economic, cultural, historic, and other forces. As described in chapter 2, these products can be grouped into two broad categories: smoked products such as cigarettes, cigars, bidis, kreteks, roll-your-own tobacco, and waterpipe tobacco; and smokeless products such as chewing tobacco, moist snuff, and dry snuff products. New products such as electronic nicotine delivery systems (ENDS)—battery-powered devices designed to heat a liquid, which typically contains nicotine, into an aerosol for inhalation by the user—have received increasing attention internationally. All tobacco products carry health risks for the user, but the risks vary due to differences in product characteristics and consumer usage patterns.

Cigarettes remain the dominant tobacco product worldwide. From 1970 to 2004, world production of cigarettes increased by 57%, but most of this increase occurred in the 1970s.[67] Figure 10.5 depicts global cigarette production during the years 1998 to 2014.[68] Cigarette production has steadily declined in HICs since the early 2000s, but has increased in lower middle-income and especially in upper middle-income countries. In 2014, 71% of world cigarettes were produced in LMICs.[68] This shift from HICs to LMICs can be explained by several factors: (1) the largest proportion of smokers (77%) now live in LMICs[69]; (2) many locations in LMICs can produce cigarettes at a lower cost than in HICs; and (3) historically, tobacco control measures have been nonexistent or weakly enforced in many LMICs, which encouraged large tobacco manufacturers to relocate factories to these countries.

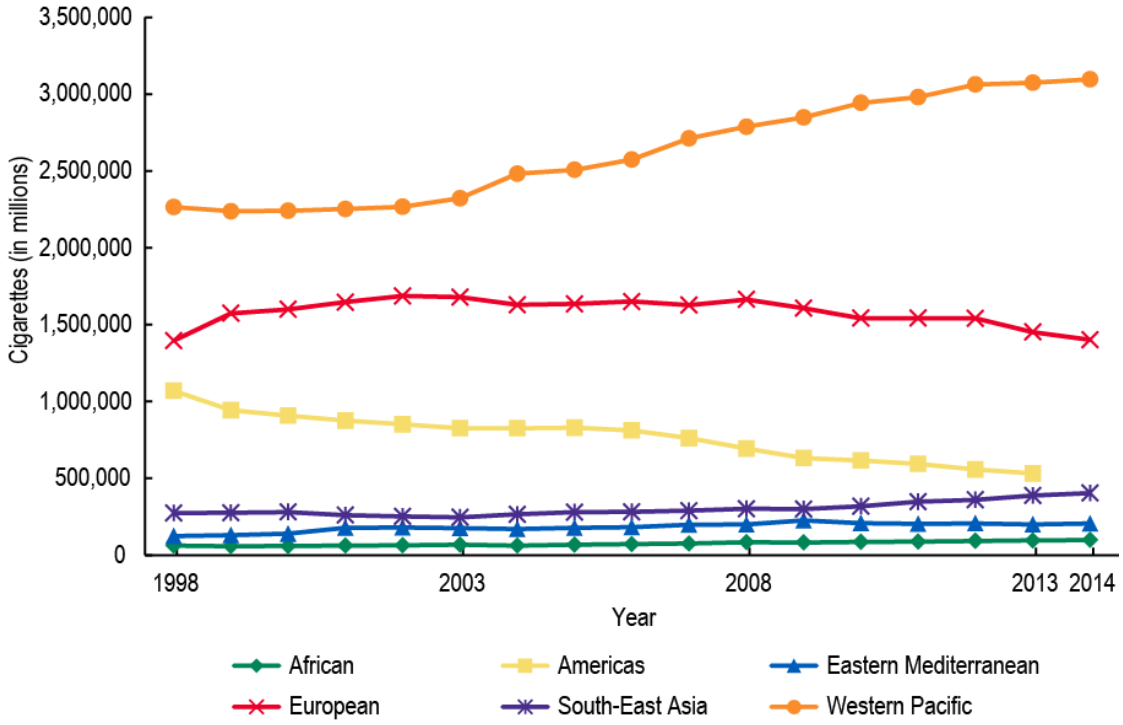
**Figure 10.5 Cigarette Production, by Country Income Group, 1998–2014**




*Notes:* Data from a total of 74 countries are shown. Only one country is included in the low-income group (Kenya). Country income group classification based on World Bank Analytical Classifications for 2014.
*Source:* Euromonitor International 1998–2014.[68]

The WHO Region that produces more cigarettes by far than other regions is the Western Pacific, which includes China and other large producers such as Japan, the Republic of Korea, and the Philippines[68] (Figure 10.6). The largest share is produced by China, which is the largest cigarette-producing and -consuming country in the world. The African Region produces large quantities of raw tobacco,[8] but manufactures few cigarettes. The Eastern Mediterranean Region also has a very small share of global cigarette production. The South-East Asia Region, which includes Indonesia and India, produces fewer cigarettes as a region than the Western Pacific, European, and Americas Regions.[68] India, a major tobacco grower, is not a large manufacturer of cigarettes, but it produces very large quantities of bidis (small hand-rolled cigarettes wrapped in a tendu leaf).[70] Cigarette production in Indonesia is mostly limited to clove cigarettes, called kreteks.[71,72]

### Figure 10.6 Cigarette Production, by WHO Region, 1998–2014




*Notes:* Data from a total of 74 countries are shown.
*Source:* Euromonitor International 1998–2014.[68]

## Evolution of Manufactured Cigarettes and Other Tobacco Products

The evolution of the tobacco industry has been marked by significant changes in product design and manufacturing. Changes in the product itself and how it is produced and marketed have, at various times, had a dramatic impact on patterns of tobacco consumption. This section briefly reviews some key product design changes that have occurred over the past century, focusing primarily on the U.S. tobacco industry.

Before the mid-19th century, most tobacco was consumed in the form of chewing tobacco, plug tobacco, pipe tobacco, snuff, and cigars. Early cigarette manufacturing was a highly labor-intensive activity, given that cigarettes were rolled by hand. Much of the tobacco used in early American and British cigarettes was relatively expensive, imported Turkish tobacco or comparable domestically grown

heavy, dark varieties which produced strong-tasting cigarettes. Given the labor-intensive nature of production and the use of costly imported tobacco, cigarettes were expensive relative to other tobacco products; the expense, combined with their strong taste, contributed to their low share of the overall tobacco product market.[73]

The first design innovation that led to increased cigarette consumption was a change in the blend of tobacco used in cigarette production. U.S. manufacturers began to shift from strong imported tobacco to lighter varieties grown domestically—initially bright leaf tobacco and eventually burley tobacco. The new taste had wider appeal and led to a significant increase in cigarette consumption in the United States during and after the Civil War.[74]

The next and most significant manufacturing innovation was the shift from hand-rolling to mechanized cigarette production. In 1876, Allen and Ginter, the leading U.S. cigarette manufacturer of the time, offered a substantial cash prize for the invention of a cigarette-rolling machine,[72] and James Bonsack patented the first such machine in 1881. In contrast to the highly skilled hand-rollers, who could produce 3,000 cigarettes per day, Bonsack's machine could produce 12,000 cigarettes per hour and also produced highly standardized products at greatly reduced cost.[75]

W. Duke, Sons & Co., led by James Buchanan "Buck" Duke, was the first U.S. cigarette company to fully take advantage of the new machine. Through an exclusive deal with Bonsack, Duke aggressively expanded production capacity for manufactured cigarettes and heavily marketed their products. Duke became the American Tobacco Company (ATC) and by 1890 had a near-monopoly on the U.S. cigarette market, with a market share of approximately 90%.[74] Over the next two decades, the company used its position to take over additional competitors and expand into international markets. The company dominated the market so completely that in 1911 the U.S. Supreme Court ordered the monopoly to be broken up.[76]

The U.S. Supreme Court divided ATC into 16 different firms—including a new American Tobacco Company, R.J. Reynolds Tobacco Company (RJR), Liggett & Myers Tobacco Company (L&M), and P. Lorillard Company (PLC). ATC was divested of its foreign holdings, notably Imperial Tobacco Company (IT) and British American Tobacco Company (BAT). Following the breakup, the new ATC, L&M, and PLC together controlled 90% of the U.S. cigarette market; IT would come to monopolize cigarette markets in the United Kingdom of Great Britain and Northern Ireland, and BAT would do the same in various British colonies and elsewhere.[74] The structure of the U.S. market, however, would change in subsequent decades as the leading U.S. manufacturers competed with each other and introduced product changes and new marketing strategies.

RJR pursued a novel integrated advertising, pricing, and design strategy centered around its Camel brand. Although a minor player following the breakup of the monopoly, RJR became the dominant firm in the U.S. cigarette market by the end of World War I.[75]

Camel cigarettes contained a blend of relatively mild, flue-cured bright tobacco and sweetened burley tobacco (unique to Camel at the time), with a small amount of Turkish tobacco; eventually, Maryland tobacco was added to the blend to give it a slower burn.[77] The milder smoke it produced was appealing, particularly to those taking up smoking at the time. Camel's product design was featured in its marketing efforts, with the exotic blend noted on the pack and the camel imagery drawing attention to

the Turkish tobacco it contained, but Camel cigarettes were also priced well below imported brands or other domestically produced brands containing Turkish tobacco.[75,78]

By 1918, Camels accounted for more than one-third of the U.S. cigarette market.[79] ATC focused on its Lucky Strike brand, emphasizing the "toasted" tobacco it contained, and L&M changed the tobacco in its Chesterfield brand to a blend similar to Camel's.[75,78] By the mid-1920s, the three firms had more than 80% of the U.S. market, with the market share of each almost entirely accounted for by their leading brand.[79] By this time, the combination of the changes in product design, aggressive marketing campaigns, and pricing strategies (including distribution of free cigarettes to soldiers during World War I) had completely changed U.S. tobacco product markets, with cigarettes going from a small share of the market early in the 20th century to becoming by far the most widely consumed tobacco product.

The cigarette and the U.S. cigarette industry continued to evolve over the next few decades. Changes in product design were gradual and intended to improve the mildness of the smoke in an effort to appeal to a wider range of potential consumers while allaying concerns about health (e.g., the "not a cough in a carload" tag line used in PLC's advertising for its Old Gold brand). The industry changed in more significant ways as well. A price war broke out in the 1930s that cost RJR its leadership position and allowed Philip Morris (PM) and Brown & Williamson (B&W) to gain toeholds in the market.[74]

The next significant innovation—development and mass marketing of filter-tipped cigarettes—came in the 1950s in an apparent response to mounting evidence about the adverse health consequences of smoking. Filter-tipped cigarettes had been around for many years, but in 1950 accounted for less than 1% of cigarette sales. Given the growing health concerns, however, cigarette companies experimented with new filter designs, including cellulose acetate, charcoal, and asbestos-based filters, and marketed brands using these filters as delivering less tar and nicotine to smokers. B&W was the first to adopt and market the cellulose acetate filter in its Viceroy brand, with its ads stating that "filtered cigarette smoke is better for your health."[74,p.87] Others quickly followed, including RJR with its Winston brand, and PM with a filter-tipped version of its Marlboro brand. Filter-tipped cigarettes accounted for more than a quarter of the market by 1956[74] and more than half of the market by 1960,[80] despite the finding of a U.S. congressional committee in 1958 that "cigarette manufacturers have deceived the American public through their advertising of filter-tip cigarettes . . . , [through] phrases implying health protection, when actually most filter cigarettes produce as much or more nicotine and tar as cigarettes without filters."[81,p.24-25] Though designed to allay smokers' health concerns, filtered cigarettes were almost certainly less costly to produce than non-filtered cigarettes because they contained less tobacco (because the length of the cigarette including the filter was the same as for non-filtered cigarettes).[74]

Scientific evidence on the health consequences of smoking continued to accumulate, however, and in January 1964 the first U.S. Surgeon General's report on the health consequences of smoking was released, summarizing this evidence. The report concluded that cigarette smoking caused lung cancer in men, and contributed to emphysema, chronic bronchitis, and cancers of the mouth, throat, respiratory tract, and larynx, and noted that smokers had higher death rates from cardiovascular disease and liver cirrhosis.[82] The Surgeon General's report was a landmark event, which eventually led to a variety of public and private efforts to discourage cigarette smoking and other tobacco use.[83]

At the same time, the release of the 1964 Surgeon General's report spurred a new wave of changes in cigarette design and accompanying marketing efforts intended to alleviate consumers' concerns about the health consequences of smoking, this time focused on the tar and nicotine content of cigarettes. Reductions in machine-measured tar and nicotine content were achieved by making cigarettes using reconstituted tobacco sheet (a combination of tobacco stems and dust that in the past had been discarded), expanded tobacco, more porous cigarette paper, and increased filter ventilation.[84,85] Again, these design changes not only helped alleviate consumers' concerns about the health consequences of smoking, but almost certainly lowered production costs. After dropping a bit following the release of the 1964 report, per capita cigarette consumption in the United States rose, albeit unevenly, for several more years before peaking in 1973.[86]

## Tobacco Product Regulation

### Introduction

As the previous section has described, the evolution of cigarette and other tobacco products in the United States has been characterized by changes intended to appeal to more consumers, to respond to consumers' concerns about the adverse health consequences of tobacco use, and/or to make cigarettes less expensive to produce for the manufacturer. This evolution occurred at least in part because of the lack of regulatory control over tobacco products in the United States before 2009, as well as limited understanding by both policymakers and the public of the long-term health consequences of changes in tobacco product design. Similar trends were seen in other countries with high cigarette use during the twentieth century, including Canada and the United Kingdom.[87,88]

This section describes tobacco product regulation, beginning with a discussion of the inherent challenges, and moving on to a review of several approaches to product regulation and the impact or potential impact of each. This section focuses on moves to restrict availability of at least some tobacco products or to regulate various aspects of product design. Given that these types of regulations are quite new, limited evidence is available on the actual impact of these efforts. Other product regulations, including bans on using descriptors like "light," "mild," and "low-tar," and mandated warning labels for tobacco products, are discussed in chapter 8.

Tobacco product regulation has two primary goals: to reduce the harm that results from continued tobacco use and to reduce the prevalence and consumption of tobacco products. As discussed in the 2010 Surgeon General's report,[89] these two goals can at times compete with one another. For example, allowing the sale and marketing of a potential reduced-risk product might reduce the harms that would accrue to continuing users, but at the same time it might cause a decline in the number of users who stop smoking or lead more users to begin smoking than would have occurred had the product been kept off the market. Without effective regulation, such negative consequences pose a greater threat and may go undetected. The historical case of "light" and "low-tar" cigarettes provides a powerful example of the damage that can occur in the absence of appropriate regulatory oversight (see Box 10.3).

### Box 10.3: The "Light" Cigarette Story

During the 1960s and 1970s, tobacco companies increasingly marketed new cigarette brands with lower machine-measured levels of tar and nicotine as low-tar or "light." Filtered, low-tar cigarettes came to dominate U.S. cigarette markets, accounting for 86.4% of the market as of 2010,[144] in large part due to the perception that they were less harmful than other cigarettes. This perception was not only driven by tobacco company marketing campaigns for their filtered and low-tar brands, but was also influenced by early statements and actions of the U.S. Public Health Service and those of the U.S. Federal Trade Commission (FTC).[89] For example, the U.S. Public Health Service recommended "the progressive reduction of the 'tar' and nicotine content of cigarette smoke" in 1966.[82,p.2] Indeed, average machine-measured tar and nicotine levels in cigarettes fell dramatically in the 1960s and 1970s. Sales-weighted measures of tar, for example, fell from 38 milligrams per cigarette in 1954 to 12 milligrams in 1993.[85] This led some scientists to conclude that if smokers switched to brands with reduced (machine-measured) levels of tar and nicotine, their risk of disease would decline, providing that they did not compensate by increasing cigarette consumption. Additionally, the FTC decided to allow companies to make statements in their marketing about the tar and nicotine content of their cigarettes when such statements were based on standardized machine measurements.[145,146]

Decades passed, however, before it became clear that the significant reductions in machine-measured tar and nicotine had not been followed by significant reductions in the death and disease caused by smoking. Over time, it was understood that this was largely the result of cigarette design features and changes in design that offset any potential benefits resulting from the apparent reductions in machine-measured tar and nicotine delivery. Of particular importance were the ventilation holes in cigarette filters. When "smoked" by machine, these holes allowed smoke to escape, reducing machine-measured tar and nicotine. However, smokers learned to cover these holes with their fingers, often without realizing it, resulting in considerably higher actual tar and nicotine intake than the machine measures.[85] Other research demonstrated that ventilated cigarettes delivered more free nicotine, adding to the addictiveness of the product, and producing a milder smoke that led smokers to inhale more deeply.[91,147,148] For example, Monographs 7[149] and 13[150] published by the National Cancer Institute of the National Institutes of Health, an agency of the U.S. Department of Health and Human Services, describe the problems with the machine measurement of tar and nicotine, and Monograph 13 concluded that changes in cigarette design during the latter half of the 20th century did not result in improvements in public health. In 2006, U.S. District Judge Gladys Kessler ruled, as the United States had argued, that the country's major cigarette companies had engaged in fraud and deception for more than half a century; one of the seven specific areas of fraud identified was that the companies falsely marketed and promoted light/low-tar cigarettes as less hazardous than full-flavor cigarettes.[113]

In 2008, the FTC stopped allowing companies to make marketing statements about the tar and nicotine yields of their brands based on the so-called "FTC Method," stating: "the Commission believes the statements of tar and nicotine yields as measured by this test method are confusing at best, and are likely to mislead consumers who believe they will get proportionately less tar and nicotine from lower-rated cigarettes than from higher-rated brands".[151,p.74503]

As the history of "light" cigarettes shows, effective tobacco product regulation is complicated by the design of the product, by how consumers use the product, and by how consumers perceive the product. Consumers may be unaware of the modifications that are continually being made to cigarettes but which respond to changing tastes and health concerns. Design changes can include changes in tobacco blends, additives, engineering, length, circumference, filters, paper, and much more, creating challenges for regulators. Regulatory authority provides governments with tools to respond to market changes that have

implications for health. Components of a tobacco regulatory program may include standardized testing of all products; requiring manufacturers to disclose product information; surveillance of patterns of product use, health effects, and knowledge; and classification of products by their constituents, design, or other characteristics.[90,91]

### Regulatory Challenges Facing Governments

Governments face at least three challenges in implementing effective product regulation: diversity of tobacco products in global tobacco markets, including variability in the same product/brand within and across countries; diversity of the tobacco industry and the political power wielded by the industry in some countries; and lack of regulatory capacity.

The evolving tobacco product market and the diversity of products used around the world pose challenges for a common regulatory approach. For example, the emergence of ENDS has created new challenges for regulatory efforts. These products are relatively new, only appearing in the marketplace over the past decade.[92] Regulating the ENDS market will be a challenge because these products represent a very diverse set of devices, with hundreds of brands and thousands of liquid nicotine solution flavors available on the U.S. and global markets.[93] The non-standard aspects of the devices (e.g., different sized batteries with different heat generation capacity, different heating elements with varying abilities to transfer the heat to the liquid) and the varied composition of the liquid (e.g., solvent used, nicotine content, flavorings) present unique challenges for product regulation. All aspects of product use—including the type of device, type of liquid used in the device, and user behavior—can interact to create different exposure conditions which make it difficult to determine the individual and public health impact of product use. In 2016, the U.S. Food and Drug Administration finalized a rule extending its authority to all tobacco products, including e-cigarettes, cigars, waterpipe tobacco, and pipe tobacco, among others.[94]

Tobacco product regulation is also challenging where tobacco products are not standardized because they are produced in local "cottage industries." For example, it has been estimated that, by volume, 91.3% (588 billion tonnes) of smokeless tobacco products worldwide (644.3 billion tonnes) are sold in traditional cottage industry markets.[7] These products, widely used in countries like India and Bangladesh, are assembled by local vendors and often customized to the customer's preference. Thus, the ingredients and other characteristics of the product, including levels of nicotine and toxic constituents, can vary widely from one sample to another. Indeed, forms of smokeless tobacco that are produced using non-standardized methods may pose the greatest risk to health because of the high levels of toxicants they contain. A wide variety of products and methods of manufacturing and distribution within a country make it more difficult to set up a regulatory regime. Difficulties are encountered especially in countries where products are manufactured and distributed in informal settings that are less amenable to a conventional regulatory system of product registration, inspection, and enforcement.[7]

Regulation of tobacco products also differs in important ways from regulation of other consumer products. The inherently harmful and addictive nature of the product and the fact that most users start in adolescence set tobacco apart from other products. The differences between regulating tobacco and regulating other products are illustrated when conducting a cost–benefit analysis for tobacco products (see Box 10.4).

### Box 10.4: Analyzing the Costs and Benefits of Regulating an Addictive Substance

Cost–benefit analysis has been routinely used to assess new federal policies and regulations in the United States and elsewhere since the 1960s. Like other U.S. federal agencies, the FDA is required to conduct such an economic impact analysis for any "significant" new regulation.

The FDA conducted a cost–benefit analysis for its proposed and final rule requiring pictorial warning labels on cigarette packages; the final rule was successfully challenged in court by several tobacco companies and never went into effect.

The methodology the agency used in this analysis has generated substantial controversy and criticism.[152–155] Critics argued that conventional assumptions about rational behavior used in economic analyses can result in distorted estimates of benefits and costs when applied to an addictive product. The most controversial aspect of the analysis is the use of the concept of "lost consumer surplus" (the loss of smoking-related "pleasure" for those who reduce their consumption or quit smoking entirely because of a new regulation) as part of the cost of imposing a new regulation. While lost consumer surplus may be a meaningful concept in some circumstances, critics state that its application is problematic for an addictive product like tobacco.[154,155] Research on smoking behavior has shown that most smokers would like to quit and many try to do so each year. In addition, the proportion of smokers who regret ever having started smoking is extremely high (~75–90%).[156,157] Moreover, the use of lost consumer surplus assumes that smokers are fully informed, rational consumers—that is, they understand all the costs and benefits of their actions. However, most smokers begin smoking and develop their addiction before age 18; research indicates that adolescent smokers tend to underestimate the risks of their behavior and the potential for long-term addiction.[158] There is currently no consensus among experts regarding the appropriate quantification of lost consumer surplus when analyzing regulations affecting addictive products.

The government of the United Kingdom considered lost consumer surplus in its assessment of the impact of a plain (standardized) packaging law, but the government review concluded that there was insufficient evidence to include a monetary estimate of lost consumer surplus in the economic analysis.[159,160] The challenge of assessing lost consumer surplus will be greater in countries that are in earlier stages of the tobacco epidemic, where consumers are less informed about the health risks of smoking and may have even greater exposure to tobacco product promotions and advertising.[161]

A number of steps have been taken or are under way to strengthen the capacity of tobacco product regulators and facilitate effective implementation of Articles 9 and 10 of the WHO FCTC (Article 9: Regulation of contents of tobacco products; Article 10: Regulation of tobacco product disclosures). These steps include formation of the WHO's Study Group on Tobacco Product Regulation (TobReg), creation of the WHO Tobacco Laboratory Network, establishment of the WHO Global Tobacco Regulators Forum, WHO's efforts to establish new cigarette testing standards, and the WHO FCTC Conference of the Parties Working Group to develop guidelines for Articles 9 and 10 of the treaty.[95] These efforts are ongoing, responding to new developments in the tobacco product market and patterns of use, and continually informed by experiences of countries that have been early adopters of tobacco product regulations. The following sections outline a selection of regulatory approaches that have been implemented in some form and describe the experience of these countries to date.

### *Bans on the Sale of Tobacco Products*

Perhaps the most direct form of tobacco product regulation is a complete ban on the sale of these products, based on the harms they cause. As of 2015, only the country of Bhutan has banned the sale of all tobacco products. Data from a 2009 International Tobacco Control Policy Evaluation (ITC) Project survey conducted in Bhutan indicate that prevalence of tobacco use in the country is 11.1% despite the comprehensive ban.[96] More recent data from the 2014 the WHO STEPwise approach to Surveillance (STEPS) survey indicate even higher rates of tobacco use, with 4% of adults ages 15 through 75 reporting tobacco smoking and 48% reporting smokeless tobacco use.[97] Data from the Global Youth Tobacco Survey indicate that youth tobacco use prevalence was 30.3% in 2013.[98]

Some governments ban selected classes of products. The sale of several types of smokeless tobacco is banned in all EU countries except Sweden.[98] Smokeless tobacco products have also been partially or completely banned in New Zealand; Australia; Turkey; Israel; Thailand; Singapore; China, Hong Kong Special Administrative Region; India; and the United Arab Emirates.[7]

In India, new rules introduced in 2011 under the Food Safety and Standards Regulations prohibit any harmful ingredient, including nicotine and tobacco, from being added to food. The Indian Supreme Court had previously ruled in 2004 that gutka, a commonly used smokeless tobacco product, was a "food product."[7] Thus, the 2011 rules authorized state food commissioners to ban gutka products. In March 2012, Madhya Pradesh became the first state to implement the ban on gutka by invoking the new regulation.[99–101] As of October 2013, all of India's states and union territories except Meghalaya and Lakshadweep had banned the sale of gutka.[102] While some states and union territories have been relatively successful in enforcing the ban on gutka, industry is circumventing these bans by selling gutka's components, pan masala and tobacco, in separate pouches.[103] A 2014 study conducted by the WHO India Country Office and the Johns Hopkins Bloomberg School of Public Health found that the state-level gutka bans have reduced use of the product.[104] Although bans on selected tobacco products may, if enforced, impact the use of a particular class of products, little evidence is available to assess whether they lead to reductions in overall tobacco use.

In the United States, the 2009 Family Smoking and Tobacco Control Act requires that new tobacco products—that is, those not on the market as of February 15, 2007—must undergo pre-market review. FDA can deny a marketing authorization on the basis of public health concerns.[105]

### *Mandating Reductions in Tobacco Product Constituents*

One of the most widely implemented forms of product regulation globally is the mandated reduction of tobacco product constituents and emissions, most often tar and nicotine, but in some cases carbon monoxide (CO) and other toxicants as well. The United Kingdom was among the first to adopt this approach, with its "low-tar program" to reduce machine-measured tar and nicotine yields, which was implemented in the early 1970s and expanded in 1981 to include CO. In 1980, the British government and the tobacco industry agreed to set targets for tar yields, beginning in 1983 with a sales-weighted average yield of 15 mg of tar per cigarette.[106] A similar agreement in Australia called for reductions in tar and nicotine delivery, setting initial upper limits of 18 mg of tar and 1.6 mg of nicotine per cigarette. Over time, an upper limit for CO was added, and the limits for each were gradually lowered.[107] In addition, the European Communities set upper limits on tar yields, starting at 15 mg in 1992 and falling to 12 mg by the end of 1997[108]; the EU subsequently strengthened and expanded the limits, reducing the maximum tar yield to 10 mg, and adding limits on CO (maximum of 10 mg per cigarette) and nicotine

(maximum of 1 mg per cigarette) by the beginning of 2004.[98] Similar approaches have been used in many other countries.

Although such mandates have led to reductions in machine-measured average tar, nicotine, and CO yields in the countries that have adopted them, similar reductions have occurred in countries without such mandates.[109] This is not surprising given that lower tar and nicotine cigarettes were extensively marketed in many countries, and consumers switched to these brands believing that they were less dangerous. Moreover, given the inadequacies of machine measurement of yields, it is not clear that even lower mandated yields would have had a positive impact on public health (see Box 10.3).

An alternative approach has been proposed that would regulate the specific constituents of tobacco smoke or smokeless tobacco products, including carcinogens such as tobacco-specific nitrosamines and polycyclic aromatic hydrocarbons. For example, the International Agency for Research on Cancer and WHO working group proposed a regulatory strategy, which was approved by WHO TobReg, with two aims: to reduce the levels of specific toxicants in products allowed on the market, and to prevent the introduction of new products/brands with higher levels of toxicants than those already on the market.[110] TobReg notes that the existing science does not allow a definitive conclusion that mandatory upper limits of certain toxicants will result in meaningful changes in consumer exposure to toxicants, or reduce the incidence of cancer or any other tobacco-related disease. Therefore, TobReg has recommended prohibiting the use of the results of proposed testing in marketing or other communication with consumers, including product labeling, so as to avoid misleading the public.[110]

A key first step toward implementing such regulations is a more complete understanding of the constituents and emissions of tobacco products, as called for in Article 10 of the WHO FCTC. Countries are beginning to mandate that tobacco companies disclose this information. For example, Canada requires tobacco product manufacturers to report all research activity related to toxicity, health impact, ingredients, taste and flavor, modifications, marketing, and the way consumers use the product for each brand every year.[111] The United States (via the 2009 Tobacco Control Act) now requires cigarette manufacturers and importers to report the ingredients and additives used in their products, as well as the levels of certain harmful or potentially harmful constituents in tobacco or tobacco smoke, to the FDA.[112]

### *Reducing the Addictiveness or Appeal of Tobacco Products*

Another type of regulation that has been widely discussed worldwide would (1) require reductions in the addictiveness of tobacco products, to be achieved by regulating nicotine content or limiting the use of additives that enhance the release of free (unprotonated) nicotine, or (2) reduce product appeal, for example, by banning flavor additives.

Changes in the design of cigarettes over time have enhanced their ability to quickly and effectively deliver nicotine. Internal tobacco company documents make clear that this was the intent of these design changes. In her findings in the U.S. Department of Justice's litigation against the U.S. cigarette companies, U.S. District Judge Gladys Kessler concluded that "defendants have designed their cigarettes to precisely control nicotine delivery levels and to provide doses of nicotine sufficient to create and sustain addiction."[113,p.515] The fact that cigarettes have been designed to maximize their effectiveness as nicotine delivery devices implies that design changes to reduce this effectiveness are feasible. Mandating progressive reductions in nicotine content in cigarettes to non-addicting levels has been

proposed as a strategy for reducing the potential for future addiction.[113] This strategy remains the subject of continued research.[109,114–116]

Some countries have begun to implement regulations aimed at reducing the appeal of tobacco products. For example, in the United States, the Tobacco Control Act bans cigarettes that have a characterizing flavor of the tobacco product or tobacco smoke (with the exception of tobacco and menthol flavors), although the use of these flavors in products other than cigarettes continues to be allowed (as of August 2016). The rationale for the ban is that cigarettes with characterizing flavors, such as fruit or chocolate, are especially attractive to youth and are widely considered to be "starter" products for new tobacco users.[117]

In Canada, a 2010 amendment to the federal Tobacco Act prohibited flavored cigarettes, cigarillos, and blunt wraps (menthol exempted). The law was enacted in response to the increased marketing of cigarillos with chocolate, peach, cherry, strawberry, vanilla, and mint flavors sold in colorful packaging.[118,119] However, the ban does not apply to all product categories, such as full-size cigars or smokeless tobacco products, and recent data suggest that flavored products are still widely used among Canadian youth.[120] A 2012 regulation from Brazil's regulatory agency Agência Nacional de Vigilância Sanitária (ANVISA; National Health Surveillance Agency) bans the use of all flavor and aroma additives (defined as any additive that can intensify or modify the flavor or aroma of the product) in any tobacco product,[121] but implementation of the regulation has been slowed by ongoing legal challenges from the tobacco industry.[122] The EU's revised Tobacco Products Directive,[123] adopted in April 2014, provides a number of new measures updating the 2001 Directive, including a ban on additives that give a characterizing flavor when used in cigarettes and roll-your-own tobacco. Other tobacco products such as cigars, cigarillos, and smokeless tobacco are exempted, but provisions allow for expanding the ban to these categories in the future.[124]

### *Limiting Brand Proliferation*

Researchers have found that proliferation of cigarette brands—an increase in the number of brands available in a given product market—has led to increases in overall cigarette consumption. Simonich,[125] for example, estimated that a 10% increase in the number of brands in the United States resulted in a 4% increase in consumption. Brand proliferation can expand the market for tobacco products because it allows for greater market segmentation, such as by geographic region, demographic characteristics, consumer behavior, and by personality traits, values, attitudes, interests, and lifestyles (i.e., psychographic segmentation), which in turn allows for appeal to a larger number of potential customers.[126]

Analyses of previously internal tobacco industry documents, product designs, and marketing campaigns show that tobacco companies have effectively segmented the tobacco product markets along each of these dimensions, developing brands that appeal to specific segments. Philip Morris USA's Virginia Slims brand, for example, has long been marketed to women, using messages focused on fashion, independence, emancipation, thinness, and as a contrast to "men's cigarettes."[127] Specific brands have also been designed and marketed to appeal to other demographic groups, including youth, racial and ethnic populations, and gay men.[128–132]

Governments have adopted various policies that have the potential to limit brand proliferation. For example, as described in chapter 8, 114 WHO Member States have banned misleading descriptive terms such as "light" and "mild" for manufactured cigarettes,[133] and this practice may reduce the variety within a given brand family. Restricting the use of flavors can also reduce the variety of products available within a given brand family. Brazil's product regulation scheme, which requires manufacturers and distributors to pay an annual registration fee for each brand, raises the costs of brand proliferation to tobacco companies, but these costs would likely need to be substantial in order to significantly reduce brand proliferation. Uruguay has taken the most direct approach to limiting brand proliferation by allowing companies to sell only one variety of a given cigarette brand, a component of its product regulation scheme that was challenged by Philip Morris International (PMI) as a potential violation of the bilateral investment treaty between Uruguay and Switzerland, where PMI is based. On July 8, 2016, an international arbitration tribunal ruled against PMI and upheld Uruguay's limitations on the number of variants of cigarette brands (as well as the country's requirement that pictorial warning labels cover 80% of the front and back of cigarette packages).[134]

## Summary

Tobacco is grown in 124 countries, but by far the largest proportion of tobacco (92% in 2013) is grown in LMICs; more than 40% of the world's tobacco is produced in China alone. Tobacco farming accounts for only a small share (<3%) of the global tobacco market. Tobacco growing, a very labor-intensive process, is believed to provide income to millions of families in the major tobacco-producing countries, although reliable estimates of the number of people involved are difficult to obtain.

Tobacco growing and manufacturing are increasingly concentrated in LMICs, but the higher value phases of the tobacco value chain increasingly take place in a small number of highly profitable MTCs, largely based in HICs. Additionally, the global tobacco leaf market is dominated by large multinational tobacco product manufacturers and leaf traders. Recent trends in the organization of the tobacco leaf production and marketing chain, including use of integrated production systems, have expanded these multinational corporations' control over price and other factors while making farmers increasingly dependent.

The manner and extent of government intervention in tobacco growing vary considerably from country to country. Historically, in HICs, particularly in the United States and the EU, efforts to support tobacco growing mainly relied on tobacco price supports. In LMICs, where tobacco can be an important source of foreign exchange and tax revenue, support programs are less focused on guaranteeing minimum prices to tobacco farmers and more concerned with restricting imports and improving infrastructure facilities that support expansion of tobacco-farming activities.

The global trend toward reducing or eliminating tobacco subsidies and price supports in HICs has significantly affected international production and trade patterns. Specifically, production has dropped in HICs that have phased out price supports, such as the United States, Canada, and traditional producing members of the EU like Greece and Italy. At the same time, tobacco production has increased in China, Brazil, Argentina, and in the three main producing countries of Africa—Malawi, Zimbabwe, and Zambia. In response to the declining production of good quality leaves in HICs, some of the main producers in LMICs have improved the quality of leaf they grow and have received increased farm gate prices.

There is a consensus that helping small farmers switch from tobacco to alternative crops can be a useful part of sustainable local economic development programs and can help overcome barriers to adopting and implementing strong tobacco control policies. Implementing successful crop substitution and diversification programs and supporting farmers' transition to alternative livelihoods require an understanding of the characteristics of tobacco-farming systems in producing countries and of the linkages between growers and tobacco companies. Tobacco is an expensive crop to grow, but so too are most high-value alternative crops. Research has shown that there are viable alternatives to tobacco farming, but these tend to be specific to individual countries and regions. Building new, and hopefully better, support systems for other crops is a clear challenge for diversification programs. It will take time for these systems to emerge, and any successful transition from tobacco will likely be a gradual process.

Tobacco product manufacturing is another key component in the tobacco supply chain and a major determinant of the impact of tobacco on public health. Since the mid-19th century, cigarettes have undergone significant changes in design. Modern cigarettes have been extensively engineered to include the use of additives and design features to deliver nicotine as efficiently as possible. These product changes have contributed to increased tobacco use and have created market power for the innovating firms. Some product design changes have been made in response to the public's increasing awareness of the health consequences of tobacco use, while others have been made to appeal to more consumers or to reduce manufacturers' costs. Product innovations likely contributed to attracting new users and may also have led some smokers, who would otherwise have quit, to continue to smoke. During the first decade of the 2000s, new products have emerged in the United States and elsewhere, including ENDS.

In the past, the evolution of cigarettes and other tobacco products in the United States and elsewhere has occurred in the absence of regulatory authority; as a result, these changes have sometimes harmed public health. A key goal of tobacco product regulation is to ensure that future changes in tobacco products benefit public health. Effective interventions for tobacco product regulation face many challenges, given the variety of tobacco products, the diversity of the tobacco industry, and the difficulties in assessing the health impact of the constituents and emissions of tobacco products. These challenges are likely to be greater in LMICs, where technical capacity is more limited and resources scarce. Given these challenges, the sharing of research and other information across countries, as well as the scientific and technical cooperation called for in Articles 21 and 22 (Article 21: Reporting and exchange of information; Article 22: Cooperation in the scientific, technical, and legal fields and provision of related expertise) of the WHO FCTC will be particularly important in advancing tobacco product regulation. The optimal policy response in a rapidly evolving market of tobacco products remains an area for further study.

Despite these challenges, it is clear from past experience with changes in tobacco product design that tobacco product regulation is a necessary component of a comprehensive tobacco control strategy. To date, however, few countries have adopted wide-ranging product regulations, although many have adopted policies that narrowly regulate some aspects of tobacco product design or availability. Product regulation can be expected to advance in the coming years as Parties to the WHO FCTC further develop and implement guidelines on Articles 9 (Regulation of the contents of tobacco products), 10 (Regulation of tobacco product disclosures), and further implement Article 11 (Packaging and labelling of tobacco products).

## Research Needs

Tobacco growing, product manufacturing, and tobacco product regulation are the focus of a number of ongoing research needs. These three subjects have received limited research to date compared with other aspects of tobacco control, and increased research attention to these areas is important, especially in LMICs. Research on the economics of tobacco growing, including issues such as the profitability of tobacco farming and the structure of the leaf-buying industry and value chains, is needed in order to understand the impact of tobacco production on countries. Research is also needed on the potential adverse effects of tobacco growing on the health of farmworkers, the environment, and farmers' livelihoods, and on potential alternatives to tobacco growing in various contexts. The development of a general analytic framework aimed at providing guidelines for implementing crop diversification and substitution programs in LMICs is an important research priority.

The diversity of tobacco products in use around the world, as well as the introduction of new products such as ENDS, poses challenges for product regulation. A greater understanding of the characteristics of new and emerging products, including their addictive potential and their harmful constituents, would inform regulatory efforts. It is essential to document and learn from the experience of countries such as Brazil, Canada, the United States, the United Kingdom, and others as they put in place new regulations for tobacco products. Research evaluating comprehensive product regulation strategies, including their impact on patterns of tobacco use and health outcomes, would inform the evolution, adoption, and implementation of future regulatory actions.

## Conclusions

1. In 2013, ten countries accounted for most of the world's tobacco leaf production (80%); China alone produced more than 40% of the world's tobacco leaf. Tobacco is increasingly grown in low- and middle-income countries, and many of these countries export a large proportion of the world's tobacco leaf.
2. In the past, governments have sought to control price and quantity in the tobacco leaf market through quotas and pricing restrictions and to provide technical assistance to tobacco growers, along with other agricultural producers. Although most high-income countries have reduced or eliminated subsidies for tobacco growing, many low- and middle-income countries still provide support for the tobacco-growing sector.
3. The vast majority of workers in the tobacco production chain are tobacco farmers doing highly labor-intensive work on small family farms, which are increasingly located in low- and middle-income countries. In contrast, cigarette manufacturing—the higher value phase of the chain—is highly mechanized and dominated by a few large multinational corporations largely based in high-income countries.
4. Tobacco growing is relatively profitable, but farming of other crops has the potential to be as or more profitable than tobacco growing. Alternatives to tobacco growing tend to be highly specific to a country or region. Policies that encourage crop diversification or substitution are useful as part of a comprehensive tobacco control strategy, but alone they will have little impact on tobacco use.
5. Changes in product design—often made in response to consumer concerns about the adverse health consequences of tobacco as well as to reduce costs to the manufacturer—have likely contributed to increased tobacco use.

6. Product regulation is a rapidly developing component of a comprehensive tobacco control strategy. Regulation of tobacco products is a highly technical area, which poses many challenges for regulators, including challenges relating to the diversity of products, the ability of the tobacco industry to respond quickly to changing market conditions, and the need for sufficient capacity for testing and enforcing regulatory measures; addressing these issues is likely to be particularly challenging for low- and middle-income countries.

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## Section 5
## Policy and Other Influences on the Supply of Tobacco Products

# Chapter 11
# Policies Limiting Youth Access to Tobacco Products

# Chapter 11
# Policies Limiting Youth Access to Tobacco Products

This chapter examines policy interventions designed to limit youth access to tobacco products and reviews issues related to the global implementation, enforcement, and impact of these policies. Key areas of discussion include:

- Sources of tobacco products among youth and measures of levels of youth access to tobacco and their variation by world region and World Bank country income group
- Types of youth access policies and their intended impacts
- Research on the implementation and enforcement of youth access policies and the impact of these policies on youth access to tobacco and youth smoking
- Limitations of youth access policies—in particular, how the necessary infrastructure and resources for implementing and enforcing such policies may pose challenges, particularly for low- and middle-income countries, and how the tobacco industry's involvement with these interventions can undermine broader tobacco control efforts.

In high-income countries, youth access policies, when consistently enforced, can reduce commercial access to tobacco products among youth. Evidence from high-income countries suggests that strongly enforced youth access policies that successfully disrupt the commercial supply of tobacco products to minors can reduce youth tobacco use, although the magnitude of this effect is relatively small. The limited evidence on the impact of youth access policies implemented in low- and middle-income countries suggests that they can be effective in reducing youth tobacco use in these settings, although the amount of reduction is unclear.

## Chapter Contents



## Tables

## Introduction

This chapter discusses policies put in place around the world to limit the ability of youth to access tobacco products. Topics covered include the types of youth access policies, the economic rationale for these policies, the sources from which youth obtain tobacco products, the prevalence and comprehensiveness of youth access policies adopted around the world, and the empirical evidence on the impact of these policies in both high-income countries (HICs) and low- and middle-income countries (LMICs). The chapter concludes with a discussion of the costs of implementing youth access policies and the role these interventions can play in broader tobacco control efforts.

## Types of Youth Access Policies and Their Intended Impact

Access to tobacco products is an important environmental risk factor for tobacco use among youth. Youth access policies are intended to reduce opportunities for minors to obtain tobacco products from commercial sources, with the goals of preventing youth from beginning to smoke, decreasing cigarette consumption, changing social norms with respect to smoking, and decreasing young people's overall smoking prevalence. To limit youth access to tobacco, governments attempt to regulate the sale and distribution of tobacco products to youth by establishing a minimum age of legal access to tobacco products, banning self-service displays and sale of single cigarettes, prohibiting the distribution of free tobacco samples to youth, and by other means. Jurisdictions may also attempt to reduce young people's demand for tobacco products by penalizing youth consumers who purchase, use, or possess tobacco products (PUP laws). Penalties for youth who violate PUP laws may include civil fines, loss of driver's license, and/or diversion to tobacco prevention/educational programs.

Article 16 of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC) obligates Parties to adopt and implement effective measures to prohibit the sale of tobacco products to and by minors.[1] Article 16 also obligates Parties to adopt and implement effective measures, including penalties, to ensure that sellers and distributors comply with these laws. The WHO FCTC youth access provisions are summarized in Box 11.1, along with a number of other policy measures not specified in Article 16 of the WHO FCTC.

The definition of a *minor* varies by country and can also vary within a country. By the end of 2007, most countries defined a minor as a person under the age of 18; age limits ranged from a high of 21 to a low of 14.[2] The term *minor* is defined as younger than 18 years of age in most U.S. states, and younger than 19 years of age in most Canadian provinces.

In 2013, the Institute of Medicine (IOM) (U.S.), at the request of the Food and Drug Administration (FDA), an agency of the U.S. Department of Health and Human Services, convened an expert committee for the purpose of determining the public health impact of raising the minimum age of legal access to tobacco products in the United States. The committee concluded that increasing the minimum age of legal access to tobacco products to age 21 would likely prevent or delay initiation of tobacco use by adolescents and young adults, particularly those between the ages of 15 and 17 years old. It further concluded that if the minimum age of legal access to tobacco products was raised to 21 nationwide, the result would be a substantial reduction in smoking prevalence—a projected 12% decrease—and avert 223,000 premature deaths and 4.2 million years of potential life lost for those born between 2000 and 2019.[3]

As a result of the IOM report, momentum has grown in the United States for raising the minimum age of legal access to tobacco products to 21 years, primarily because it is recognized that almost all tobacco product initiation occurs before age 26, and raising the minimum age of legal access would limit the ability of youth (<18) to obtain tobacco products from their older friends and siblings ages 18–21, who are frequent social sources of tobacco.[3,4] On January 1, 2016, Hawaii became the first U.S. state to raise the minimum age of legal access to 21, followed by California on June 9, 2016.[5]

### Box 11.1: Policy Measures to Prevent Youth Access to Tobacco Products

WHO FCTC Article 16 requires that all Parties implement policy measures to prohibit sales of tobacco products to minors. These measures may include:

- Requiring all tobacco retailers to post signs prohibiting access by minors at the point of sale and request age identification from purchasers if age is in doubt
- Banning direct access to tobacco products (e.g., self-service displays)
- Ensuring that tobacco vending machines are not accessible to minors
- Prohibiting the manufacture and sale of tobacco products in the form of sweets, snacks, toys, or other objects that may appeal to youth
- Prohibiting the distribution of free tobacco products to youth and the general public
- Banning the sale of single cigarettes or small cigarette packs, which are more affordable for youth.[1]

Other policy measures, not specified in Article 16 of the WHO FCTC, include:

- Requiring face-to-face sales of tobacco products and preventing sales via mail, telephone, and Internet
- Requiring tobacco retailers to hold licenses to sell tobacco products*
- Limiting the number, density, or location of tobacco retail outlets within a community
- Banning the sale of tobacco products in educational facilities
- Banning cigarette vending machines
- Requiring locking devices on vending machines
- Penalizing youth who purchase, use, or possess tobacco products.

*WHO FCTC also suggests the licensing of tobacco product distributors, but this is intended to address illicit trade.

## Economic Rationale for Youth Access Policies

The information failures in the market for tobacco products are particularly pronounced during the ages at which most tobacco use begins, providing an economic rationale for governments to intervene by limiting the supply of tobacco products to youth. Almost all tobacco use is initiated and established in adolescence, a developmental period characterized by high levels of impulsivity, risk-taking, and immature cognitive control mechanisms.[6] Relative to adults, young consumers lack the capacity to make fully informed, appropriately forward-looking decisions about the risks of tobacco experimentation and use. They underestimate the future costs of smoking due to imperfect information about the health consequences of tobacco use and the potential for addiction. Data from the Global Youth Tobacco Survey (GYTS)—a school-based survey focusing on the use of, attitudes toward, and access to tobacco products among students ages 13–15 across the WHO Member States—reveal that a sizeable proportion

of youth worldwide lack basic education about the health hazards of tobacco use.[7] Even when youth are informed about the harms of smoking, their propensity to be present- rather than future-oriented leads them to discount future smoking-related health costs.[8] Moreover, many young people fail to appreciate the highly addictive nature of tobacco products and their own risk of becoming addicted. Emerging scientific evidence suggests that the adolescent brain has a heightened sensitivity to the addictive properties of nicotine.[9,10] Most young people view smoking as a temporary activity that can be stopped at any time. Yet, of every three young smokers in the United States, only one will quit, and one of those remaining smokers will eventually die from tobacco-related causes.[10]

Restricting youth access to tobacco is intended to reduce youth smoking directly. Increasing the amount of effort and potential legal costs associated with obtaining and using tobacco products is expected to increase the full costs of smoking for youth.[11] Youth access policies could also impact youth smoking indirectly, by creating and reinforcing perceptions that tobacco products are difficult to obtain and consume, and fostering social norms that discourage adults from furnishing tobacco to underage youth.[12,13]

## Sources of Tobacco Products for Youth

Young people acquire tobacco products in a variety of ways and from both commercial and social (noncommercial) sources. Commercial sources include retail establishments (e.g., convenience stores, gas stations, restaurants, supermarkets); vending machines; street vendors; door-to-door sales; mail-order, Internet, and telephone sales; and via the distribution of free cigarettes to youth. Social sources involve the interpersonal exchange of tobacco, either for free, for money, or in the anticipation of future reciprocation.[14] Social transactions may involve youth "bumming" or sharing cigarettes with friends or legal-age siblings, sneaking cigarettes from parents or other family members, or giving somebody else money to purchase cigarettes for them.

Both commercial and social sources play an important role in youth access to tobacco products.[14–17] Their relative importance varies by the amount and frequency of tobacco used and the young person's age, gender, and race/ethnicity.[18,19] For example, based on studies conducted in the United States, youth who are more established smokers, older, male, and white are more likely than their counterparts to obtain tobacco products from commercial sources.

According to nationally representative data from the Youth Risk Behavior Surveillance System developed by the Centers for Disease Control and Prevention (CDC), an agency of the U.S. Department of Health and Human Services,[20] 14% of young smokers (grades 9–12) in the United States rely on commercial sources of cigarettes (i.e., buy them directly from a gas station or store). Data from the GYTS[21] gives an indication of the extent to which young smokers around the world rely on commercial sources of cigarettes. Tables 11.1 and 11.2 show the importance of commercial sources for the six WHO Regions and the World Bank's four country income groups, respectively. In the European Region, 56.5% of young smokers turn to commercial sources for their cigarettes, as do more than 45% of those in the Americas, Western Pacific, and South-East Asia Regions. In contrast, young smokers in the African and Eastern Mediterranean Regions rely heavily on social sources of cigarettes; only about one-third of young smokers in these regions buy cigarettes from commercial sources (stores, shops, and street vendors). Young smokers in low-income countries are the least likely to obtain cigarettes from commercial sources compared with youth in other country income groups.

### Table 11.1 Percentage of Youth Smokers, Ages 13 to 15 Years, Who Buy Cigarettes From Commercial Sources, by WHO Region, 1999–2011

| WHO Region | Number of countries in region | Number of countries reporting | Percentage who usually buy cigarettes in a store |
|---|---|---|---|
| African | 46 | 36 | 30.0 |
| Americas | 35 | 32 | 45.1 |
| Eastern Mediterranean | 22 | 18 | 39.2 |
| European | 53 | 31 | 56.5 |
| South-East Asia | 11 | 11 | 47.2 |
| Western Pacific | 27 | 22 | 51.8 |
| Total | 194 | 150 | 46.4 |

*Notes:* The data presented here are based on nationally representative Global Youth Tobacco Survey (GYTS) data when available. When national data were not available, data from the capital or largest city were used as a proxy for the country data, based on a previously described methodology.[123] The regional data summations seen here are weighted based on country-level population data for youth ages 13–15 in 2007.[124]
*Source:* Global Youth Tobacco Survey 1999–2011.[21]

### Table 11.2 Percentage of Youth Smokers, Ages 13 to 15 Years, Who Buy Cigarettes From Commercial Sources, by Country Income Group, 1999–2011

| World Bank country income group | Number of countries in group | Number of countries reporting | Percentage who usually buy cigarettes in a store |
|---|---|---|---|
| Low-income | 36 | 28 | 36.9 |
| Lower middle-income | 52 | 47 | 45.6 |
| Upper middle-income | 56 | 49 | 51.6 |
| High-income | 50 | 23 | 37.9 |
| Total | 194 | 150 | 46.4 |

*Notes:* Four countries/administrative regions that were in previous analyses were not included here because they do not have an income category. The data presented here are based on nationally representative Global Youth Tobacco Survey data when available. When national data were not available, data from the capital or largest city were used as a proxy for the country data, based on a previously described methodology.[123] The income and regional data summations shown here are weighted based on country-level population data for youth ages 13–15 in 2007[23] and World Bank Analytical Classifications for 2011.
*Source:* Global Youth Tobacco Survey 1999–2011.[21]

Youth access policies primarily address commercial sources of tobacco; commercial and social sources are interrelated, however. When youth access restrictions are successful in reducing the commercial availability of cigarettes, young people may increasingly rely on social sources of tobacco.[22–24] In the United States, documented reductions in illegal tobacco sales to youth have been accompanied by a shift in youth cigarette acquisition from commercial to social sources.[24] The opportunity to substitute social for commercial sources decreases the effectiveness of youth access interventions,[25,26] but studies also show that youth who purchase tobacco from commercial sources are the primary suppliers of tobacco to other youth.[27–29] Thus, interventions that effectively restrict youth access to commercial sources can also decrease the social exchange of tobacco by disrupting the supply chain and reducing the total supply of tobacco available to youth.[10,27,30]

## Country Adoption of Youth Access Legal Measures

There is considerable global variation in the prevalence and comprehensiveness of youth access policies. Table 11.3 shows the number of WHO Member States that have adopted the eight most common youth access legal mesures as of 2014. The average adoption rate of the Article 16 treaty provisions ranks among the highest of all the WHO FCTC Articles.[31]

Prohibiting sales of tobacco products to minors and prohibiting the distribution of free cigarettes to minors are the youth access legal measures that have been most often adopted by WHO Member States; they are most common in the Western Pacific, South-East Asia, and European Regions. Vending machine bans and restricting direct access to tobacco products are the least commonly adopted policies. Youth access legal measures are least common in the African Region. In terms of country income group, youth access policies are generally most prevalent in HICs and upper middle-income countries (Table 11.4).

A growing number of countries have enacted laws to regulate youth access to nicotine-containing liquids and/or electronic nicotine delivery systems (ENDS), which are battery-powered devices designed to heat a liquid, typically containing nicotine, into an aerosol for inhalation by the user. Countries banning their sale to minors include Canada, Costa Rica, Ecuador, Fiji, Honduras, Italy, Malta, Republic of Korea, Spain, Togo, and Viet Nam.[32] Additionally, a number of countries ban the sale and marketing of ENDS and all types of liquids to all persons, including Panama,[33,34] Singapore,[35] Thailand,[36] and Uruguay.[37] Since 2009, the FDA has enforced the U.S. federal minimum age for sales to minors (age 18) for cigarettes, roll-your-own tobacco, and smokeless tobacco products. In 2016, the FDA finalized a rule extending its authority to all tobacco products; the rule has a number of provisions aimed at restricting youth access to newly deemed products such as ENDS, waterpipe tobacco, pipe tobacco, cigars, and cigarillos, including a prohibition on the sale of "covered" products to persons under the age of 18 years (either in person or online).[38]

## The Impact of Youth Access Policies on Youth Smoking Behavior

### Sales-to-Minors Policies and Youth Smoking

Early community-level studies from the United States found that strongly enforced sales-to-minors policies can reduce youth smoking. For example, Jason and colleagues[39] reported that after two years of active enforcement of sales-to-minors laws and laws prohibiting minors' possession of tobacco, smoking prevalence in Woodridge, Illinois, dropped by 50% among middle school students. Similarly, DiFranza and colleagues[40] found that enforcement of sales-to-minors laws as part of a comprehensive smoking cessation program in Leominster, Massachusetts, resulted in a 44% decline in smoking among middle school youth.

## Table 11.3 Adoption of Youth Access Legal Measures, by WHO Region, 2014

| | Sales to minors banned (n=141) | | Sales by minors banned (n=139) | | Age verification for sales required (n=141) | | Direct access to cigarettes banned (n=141) | | Vending machines banned (n=138) | | Free cigarette distribution to the public banned (n=140) | | Free cigarette distribution to minors banned (n=139) | | Single cigarette sales banned (n=140) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WHO Region** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** |
| African (24 countries) | 17 | (71) | 18 | (75) | 9 | (38) | 6 | (25) | 8 | (36)† | 15 | (63) | 16 | (67) | 8 | (33) |
| Americas (22 countries) | 19 | (86) | 18 | (82) | 15 | (68) | 12 | (55) | 13 | (59) | 15 | (68) | 18 | (82) | 14 | (64) |
| Eastern Mediterranean (16 countries) | 15 | (94) | 12 | (80)* | 7 | (44) | 11 | (69) | 10 | (67)* | 14 | (88) | 14 | (88) | 10 | (67)* |
| European (48 countries) | 47 | (98) | 35 | (73) | 41 | (85) | 31 | (65) | 32 | (67) | 44 | (92) | 45 | (96)* | 42 | (88) |
| South-East Asia (7 countries) | 7 | (100) | 5 | (83)* | 3 | (43) | 4 | (57) | 7 | (100) | 7 | (100) | 7 | (100) | 5 | (71) |
| Western Pacific (24 countries) | 22 | (92) | 16 | (67) | 15 | (63) | 14 | (58) | 16 | (37) | 21 | (91)* | 21 | (91)* | 17 | (71) |
| Total (141 countries) | 127 | (90) | 104 | (75) | 90 | (64) | 78 | (55) | 86 | (62) | 116 | (83) | 121 | (87) | 96 | (69) |

*Data are missing from one country. That country was excluded from the denominator.
†Data are missing from two countries. Those countries were excluded from the denominator.
*Notes:* This analysis only includes WHO Member States that provided information on youth access laws. A total of 141 countries provided some data on adoption of youth access policies; the number of countries that provided data is noted under each region. Twenty-seven Member States did not provide any data on adoption of these policies, but a few countries were missing data for some policies, as indicated in the table. WHO = World Health Organization.
*Source:* World Health Organization 2016.[31]

## Table 11.4 Adoption of Youth Access Legal Measures, by Country Income Group, 2014

| World Bank country income group | Sales to minors banned (n=141) | | Sales by minors banned (n=139) | | Age verification for sales required (n=141) | | Direct access to cigarettes banned (n=141) | | Vending machines banned (n=138) | | Free cigarette distribution to the public banned (n=140) | | Free cigarette distribution to minors banned (n=139) | | Single cigarette sales banned (n=140) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | n | (%) | n | (%) | n | (%) | n | (%) | n | (%) | n | (%) | n | (%) | n | (%) |
| Low-income (13 countries) | 9 | (69) | 8 | (67)* | 4 | (31) | 4 | (31) | 5 | (42)* | 8 | (62) | 9 | (69) | 6 | (46) |
| Lower middle-income (32 countries) | 28 | (88) | 26 | (81) | 13 | (41) | 14 | (44) | 18 | (56) | 25 | (78) | 26 | (81) | 19 | (59) |
| Upper middle-income (46 countries) | 42 | (91) | 37 | (80) | 30 | (65) | 28 | (61) | 37 | (80)* | 38 | (83)* | 39 | (85)* | 31 | (67) |
| High-income (50 countries) | 48 | (96) | 33 | (67)* | 43 | (86) | 32 | (64) | 26 | (53)* | 45 | (90) | 47 | (96)* | 40 | (82)* |
| Total (141 countries) | 127 | (90) | 104 | (75) | 90 | (64) | 78 | (55) | 86 | (61) | 116 | (82) | 121 | (86) | 96 | (68) |

*Data are missing from one country. That country was excluded from the denominator.

*Notes:* This analysis only includes WHO Member States that provided information on youth access laws. A total of 141 countries provided some data on adoption of youth access policies; the number of countries that provided data is noted under each income group. Country income group classification based on World Bank Analytical Classifications for 2014. Twenty-seven Member States did not provide any data on adoption of youth access policies, and data were missing for additional Member States only for certain policies, as noted in the table.

*Source:* World Health Organization 2016.[31]

Larger multi-community intervention studies, however, have reached varying conclusions about the effectiveness of these policies. For example, in a six-community controlled trial in metropolitan Boston, Rigotti and colleagues[41] did not find that vendors' compliance rates had any effect on the perceived access to commercial sources of cigarettes by youth or on youth smoking, even when compliance levels were relatively high. In contrast, in an analysis of data from 12 communities in Erie County, New York, between 1992 and 1996, Cummings and colleagues[42] found that youth smoking during the past 30 days increased by 18% in communities that were unable to achieve an 80% retailer compliance rate by 1995, but did not change in communities with rates of 80% and above. Similarly, among youth ages 12 to 17 in the Central Coast of New South Wales, Australia, Tutt and colleagues[43] found that self-reported monthly smoking declined 34% as the retailer compliance rate increased from 69.1% in 1993 to 100% in 1999. However, when expanded to include all of New South Wales, the data showed a marginal increase in the rate of monthly smoking among this age group from 1993 to 1996.

In one of the most scientifically rigorous studies of youth access interventions, Forster and colleagues[44] conducted a randomized controlled study of seven pairs of small communities in Minnesota. The communities used different enforcement strategies as part of a broader community intervention. Between 1993 and 1996, daily, weekly, and monthly smoking increased at a lower rate among 8th- and 10th-grade youth who lived in high-compliance communities (94.9% average compliance rate) than among their counterparts who lived in control communities (87.5% average compliance rate). A net difference of –4.9% was observed in the prevalence of daily smoking between the intervention and control communities. Due to the small difference in the compliance rate, the authors suggested that the decline in the social acceptability of youth smoking, linked to the community mobilization, might have had a greater impact on the youth smoking rate than the reduced youth access to tobacco.

More recently, Jason and colleagues[45] measured the commercial availability of cigarettes in 24 Illinois towns and found that youth living in towns with higher levels of illegal sales to youth also had a higher prevalence of current smoking than youth who lived in towns with lower illegal sales rates. In contrast, Conley Thomson and colleagues[46] tested the impact of youth access policies and enforcement practices in a prospective cohort study of youth living in 295 Massachusetts towns. They found no association between community-level youth access restrictions and adolescents' rate of smoking initiation or progression to established smoking over two years. However, the authors acknowledge that the compliance rates in their study may have been below the threshold necessary to sufficiently limit retail access to tobacco, and they conclude that shutting off the supply of tobacco to minors may require unrealistically high levels of retailer compliance.

Of the few studies that have used national data to study the impact of youth access restrictions on youth smoking behavior, results have been mixed. Most of these studies have used cross-sectional survey designs to determine if exposure to youth access laws affects the likelihood that youth will use tobacco. For example, Lewit and colleagues[47] conducted a multivariate analysis using 1990 and 1992 data on 9th-grade students from 22 U.S. communities. Controlling for other tobacco control policies, cigarette prices, and demographic factors, the authors found that youth access policies were significantly associated with a reduction in tobacco use and the intention to smoke in this age group. In contrast, Chaloupka and Grossman[11] conducted a multivariate analysis of data on 8th-, 10th-, and 12th-grade students from 1992 to 1994 and found little impact of sales-to-minors policies on youth smoking. These authors attributed their findings to weak enforcement of youth access policies and retailers' poor compliance with the law. Such studies highlight the critical need for retailer compliance and strong

enforcement of these laws in order to produce a reduction in youth access to tobacco and, potentially, youth smoking.

Other research suggests that youth access laws can influence youth smoking, but that their impact is small relative to other tobacco control policies—significant tax and price increases in particular. For example, a study by Ross and Chaloupka[48] found that youth access laws were associated with reduced smoking among high school students, but that other tobacco control policies have a larger impact on reducing smoking prevalence and cigarette consumption among youth. Similarly, Powell and colleagues[49] found that although youth access policies reduced the prevalence of smoking among youth both directly and indirectly (by influencing peers), higher cigarette prices had a much larger effect on youth smoking prevalence. In another study examining the effect of cigarette prices on youth smoking in 38 countries participating in the GYTS, Nikaj and Chaloupka[50] attempted to quantify the potential impact of other tobacco control variables, including local-level heterogeneity in youth access to commercial cigarettes. They found that reduced access of minors to commercial cigarettes was associated with lower smoking prevalence and consumption across all country income levels. However, the estimated impact of price on smoking prevalence and consumption was far greater.

Some evidence suggests that youth access laws may prevent smoking uptake and transitions along a smoking trajectory. Botello-Harbaum and colleagues[51] examined state-level youth access and smoke-free laws, controlling for sociodemographic characteristics and cigarette price, and found that these policies decreased the odds that young people will experiment with cigarettes or become daily smokers. Ross and colleagues[52] found that retailer compliance with youth access laws significantly reduced progression to higher uptake stages, with the greatest impact observed among those who were in the later stages of smoking uptake (i.e., more addicted). This finding suggests that social sources of cigarettes are more important in the earlier stages of smoking uptake and that adolescents who are closer to completing their smoking uptake are more affected by retailers' compliance with youth access laws. Widome and colleagues[53] found that a greater proportion of youth become heavy smokers in communities where more adolescent smokers relied exclusively on commercial sources. Tworek and colleagues[54] found that stronger youth access laws were associated with less continuation of smoking among high school regular smokers. DiFranza and colleagues[55] examined the association between merchant compliance with youth access laws and youth smoking, while controlling for other tobacco control policies, and found that for every 1% increase in merchant compliance, the odds of daily smoking by youth were reduced by 2%.

In 2005, a systematic review of interventions to reduce minors' access to commercial sources of tobacco products was conducted by the Cochrane Tobacco Addiction Group.[56] This review concluded that active enforcement of youth access laws could reduce illegal sales to youth, but found little evidence that these interventions reduced the prevalence of adolescent smoking or perceived ease of access to tobacco products.

Also in 2005, the Community Preventive Services Task Force (U.S.)[57] conducted a systematic review of interventions to reduce minors' access to commercial sources of tobacco products. This review concluded that such interventions can effectively reduce youth tobacco use and commercial access to tobacco products when they are coordinated with community mobilization efforts and additional policy tools, such as stronger local laws directed at retailers, active enforcement of retailer sales laws, and retailer education with reinforcement.

In the most comprehensive systematic review of the literature to date, DiFranza[35] evaluated over 400 academic documents as well as local, state, and federal government reports, and concluded that enforcement programs that effectively disrupt the commercial supply of tobacco to minors reduce the number of youth who use tobacco. DiFranza argued that prior systematic reviews of the effectiveness of youth access interventions to prevent the sale of tobacco to minors failed to distinguish between interventions that successfully disrupted the commercial distribution of tobacco to underage youth and those that did not, resulting in erroneous conclusions about the effectiveness of these policies.

Few studies have examined the impact of youth access policies in countries other than the United States. Nelson[58] compared the impact of sales-to-minors laws in 24 HICs and 42 LMICs and found that regulations banning sales to minors did not affect prevalence of smoking in the past 30 days or ever smoking among youth in HICs, but were associated with reduced prevalence of past 30-day smoking among boys in LMICs. A study by Kostova and colleagues[59] measured retailer compliance based on youth reports of being denied tobacco sales because of age. They analyzed data from 17 LMICs that conducted the GYTS survey multiple times between 1999 and 2006 and found that high compliance with sales-to-minors laws, defined by the proportion of youth turned away by vendors because of their age, was associated with reduced youth smoking prevalence but had little impact on the intensity of smoking. The study also compared findings for different policy interventions, concluding that although youth access policies can effectively reduce the prevalence of smoking in LMICs, tax and price increases would be more effective.

### Other Policies With Potential to Decrease Youth Access and Youth Smoking

Other policies with the potential to reduce youth access include PUP (penalizing youth who purchase, use, or possess tobacco products) laws, bans on self-service displays, restrictions on vending machines and single cigarette sales, and regulation of the number, density, or location of tobacco retail outlets within a community. The available evidence for evaluating the effects of these policy tools on youth tobacco experimentation and consumption is limited, but the existing research suggests that certain approaches (e.g., retailer licensing) hold particular promise.

#### *Supply-Side Policies*

Most supply-side policy research has focused on sales-to-minors laws; few studies have evaluated the impact of other supply-side youth access policy approaches on youth smoking behavior. The display or sale of tobacco products in a manner that makes them easily accessible to the general public without the assistance of the retailer (i.e., vending machines, in-store self-service displays) can increase the ease with which youth obtain tobacco, either by theft or illegal purchase. Restricting or banning such self-service access to tobacco products can reduce commercial access to tobacco products for underage youth.[56] In the United States, the sale of tobacco products through vending machines is prohibited except in adult-only facilities; self-service displays are prohibited for cigarettes and smokeless tobacco, except in adult-only facilities.[38,60] Studies conducted in the United States show that limiting self-service access to tobacco products can effectively reduce the commercial availability of tobacco products to youth. Wildey and colleagues[61] found that illegal cigarette sales to underage youth in San Diego, California, dropped from 31% to 13% when stores eliminated self-service access to tobacco. Bidell and colleagues[62] compared illegal sales rates for stores with and without self-service access in three California communities; the illegal sales rate in stores requiring clerk assistance to purchase tobacco products was significantly lower than the rate in stores with self-service displays (3.4% vs. 32.1%).

A few U.S. studies have examined access to cigarettes from vending machines and concluded that laws requiring lockout devices or total bans on vending machines are the only effective policies that can reduce youth access to cigarettes from this source.[63,64] A study conducted in Germany found that the number of cigarette vending machines decreased in anticipation of a law that required electronic locking devices on the machines. However, lockout devices did not have a significant impact on cigarette acquisition by underage smokers, who increasingly obtained cigarettes through friends or purchased them from kiosks.[65] The evidence is mixed regarding the impact of self-service access on youth smoking prevalence. In a study examining the association between tobacco control policies and smoking prevalence among adolescents in 29 European countries, the legality of cigarette vending machines was associated with regular smoking (i.e., weekly or daily), among adolescent males.[66] In another study of the association between smoking onset and vending machine bans in the United States using data from the National Longitudinal Study of Adolescent Health, Kandel and colleagues[67] found that the presence of a state-level vending machine ban was protective against youth smoking uptake. On the other hand, a study examining the impact of retail marketing practices on smoking prevalence found that the presence of self-service displays in the local retail environment was not associated with increased odds of smoking uptake in a large cohort of U.S. youth.[68]

The availability of tobacco retail outlets near homes and schools may influence youth tobacco use by making cigarettes easier for youth to obtain. Nearby tobacco retail outlets may also influence tobacco use in other ways—for example, by exposing youth to tobacco marketing and influencing social norms. Tobacco retailer licensing laws can be used to restrict and control the location and density of tobacco retailers. Epidemiologic studies[69–80] have found that greater density of tobacco retail outlets near schools and homes has been associated with increased susceptibility to smoking, experimental smoking, current smoking, and smoking frequency by youth. These findings suggest that it may be possible to reduce youth access to tobacco products by restricting the number of retailers with a license to sell tobacco. Leatherdale and Strath[81] also found that youth smokers who attended schools in neighborhoods with a higher density of tobacco outlets were more likely to buy their own cigarettes and less likely to get cigarettes from others. The IOM has recommended that, if feasible, U.S. states should restructure retail tobacco sales and restrict the number of tobacco retail outlets so as to discourage tobacco use, including tobacco use by youth.[82] Despite its potential, few communities have utilized this policy tool, so the evidence base is not yet well developed.

### *Demand-Side Policies*

A number of scientifically rigorous studies conducted in the United States have demonstrated the ability of PUP laws to impact youth smoking in the short term. In one of the earliest studies of PUP laws, Livingood and colleagues[83] found that the rates of tobacco use were lowest in Florida counties with high PUP law enforcement, after controlling for demographic factors. Tauras and colleagues[84] found that the presence of state-level PUP laws reduced smoking prevalence but not smoking intensity among youth and young adults. Cawley and colleagues[85] found that state-level PUP laws reduced smoking initiation among girls but not among boys.

Tworek[86] reported that although local possession ordinances could lower smoking rates among youth, state-level PUP laws did not have a similar impact. In contrast, Pokorny and colleagues[87] found an inverse association between enforcement of PUP laws and current smoking among youth; a prospective randomized trial of 24 Illinois communities demonstrated that towns with higher levels of PUP law enforcement had significantly smaller increases in rates of adolescent smoking over time, compared with

towns with weaker PUP law enforcement. In a related analysis using data from the same prospective trial, Jason and colleagues[88] also found smaller increases in the proportion of youth who were heavy smokers (>20 cigarettes per day) in communities with higher levels of PUP law enforcement. In another study, Jason and colleagues[45] examined the effect of PUP law enforcement on observed and perceived tobacco use in 24 towns. Youth living in towns with higher levels of PUP law enforcement perceived lower rates of tobacco use among their peers and observed fewer instances of underage tobacco use at school and in their community. This finding suggests that enforcement of PUP laws can strengthen nonsmoking social norms among youth.

Despite demonstrated short-term effects, the total weight of the evidence thus far does not suggest a long-term impact of PUP laws on youth smoking or on subsequent rates of smoking when youth become young adults.[89] However, small sample sizes, non-randomized designs, and lack of long-term follow-up limit the conclusions that can be drawn from published studies in this area.[90]

## Costs of Youth Access Interventions

The infrastructure, systems, and resources required to implement and enforce youth access policies can present a challenge for LMICs and even HICs.[91] Some researchers have argued that these policies divert resources from more effective tobacco control strategies and should be abandoned altogether.[26,92] However, studies suggest that modest, earmarked increases in the tobacco tax or retailer licensing fees, coupled with fines collected from noncompliant retailers, may be sufficient to cover the costs of implementing youth access policies.[93,94] To date, only a few studies have assessed the costs or cost-effectiveness of these policies.

DiFranza and colleagues[93] calculated that in the United States, a well-designed and implemented youth access program consisting of quarterly inspections of all tobacco retailers would cost an average of 50 U.S. dollars (US$) per outlet per year if the enforcement was implemented at the community level, US$ 150 at the state level, or US$ 350 at the federal level. The total estimated cost for implementation at the federal level was US$ 190 million per year. The higher costs at the state and federal levels reflect contractual requirements, greater distances from enforcement agencies, and special requirements for prosecuting violations under state and federal laws. Using relatively optimistic estimates of the impact of a well-implemented youth access program on youth smoking, the study estimated that enforcing sales-to-minors laws in the United States would save 1 year of life for a price of US$ 44 to US$ 3,100. Similarly, Tutt[95] found that youth access interventions were relatively cost-effective, estimating that a youth access program implemented in the Central Coast of New South Wales, Australia, prevented a young person from smoking for a price of US$ 65 to US$ 130, which was one-fifth to one-tenth the cost of a course of nicotine replacement therapy to help an adult quit smoking.

## Implementation, Enforcement, and Compliance With Youth Access Policies

Sufficient resources are required to implement and enforce youth access policies at levels high enough to adequately constrain youth access to commercial sources of tobacco. Theoretically, governments can effectively restrict retail sales of tobacco to youth through active enforcement, whereby retailers' compliance with the law is tested and consequences for noncompliance are administered. However, evidence from countries that have adopted sales-to-minors laws suggests that retailer compliance with these laws is generally quite low, and interventions to boost compliance rates have been met with mixed success.[56]

Tables 11.5 and 11.6 summarize GYTS[21] data on minors' access to commercial sources of cigarettes worldwide and give the percentages of 13- to 15-year-old youth (i.e., minors in most jurisdictions) who reported that they usually obtained cigarettes from stores and were not refused purchase because of their age. Overall, whether based on WHO Region (Table 11.5) or World Bank country income group (Table 11.6), the data show that young smokers report being able to purchase cigarettes with little difficulty.[1]

### Table 11.5 Percentage of Youth Smokers, Ages 13 to 15 Years, Who Were Allowed to Buy Cigarettes Despite Being Underage, by WHO Region, 1999–2011

| WHO Region | Number of countries in region | Number of countries reporting | Percentage of underage youth not refused cigarette sales |
|---|---|---|---|
| African | 46 | 10 | 69.9 |
| Americas | 35 | 21 | 75.9 |
| Eastern Mediterranean | 22 | 9 | 85.6 |
| European | 53 | 28 | 75.1 |
| South-East Asia | 11 | 5 | 57.0 |
| Western Pacific | 27 | 14 | 87.0 |
| Total | 194 | 87 | 72.7 |

*Notes:* The data presented here are based on nationally representative Global Youth Tobacco Survey data when available. When national data were not available, data from the capital or largest city were used as a proxy for the country data, based on a previously described methodology.[123] The regional data summations seen here are weighted based on country-level population data for youth ages 13–15 in 2007.[124] WHO = World Health Organization.
*Source:* Global Youth Tobacco Survey 1999–2011.[21]

As shown in Table 11.5, 87.0% of youth in the Western Pacific Region successfully obtained cigarettes from commercial sources. In other WHO Regions, between 57.0% and 85.6% of youth were not refused sale of cigarettes. The available data do not show a pattern based on country income group (Table 11.6).

### Table 11.6 Percentage of Youth Smokers, Ages 13 to 15 Years, Who Were Allowed to Buy Cigarettes Despite Being Underage, by Country Income Group, 1999–2011

| World Bank country income group | Number of countries in group | Number of countries reporting | Percentage of underage youth not refused cigarette sales |
|---|---|---|---|
| Low-income | 36 | 15 | 80.8 |
| Lower middle-income | 52 | 6 | 60.2 |
| Upper middle-income | 56 | 31 | 84.8 |
| High-income | 50 | 34 | 61.5 |
| Total | 194 | 87 | 72.7 |

*Notes:* The data presented here are based on nationally representative Global Youth Tobacco Survey data when available. When national data were not available, data from the capital or largest city were used as a proxy for the country data, based on a previously described methodology.[123] The income and regional data summations shown here are weighted based on country-level population data for youth ages 13–15 in 2007[124] and World Bank Analytical Classifications for 2011.
*Source:* Global Youth Tobacco Survey 1999–2011.[21]

### Implementation in High-Income Countries

The majority of studies of retailer compliance with youth access policies are from HICs; evidence from these studies suggests that compliance varies greatly across countries and world regions, as shown by the discussion of implementation-related studies from HICs in North America, Europe, and Australasia.

In all 50 U.S. states, it is unlawful for tobacco retailers to sell tobacco products to minors. The Synar Amendment, named for its sponsor, Congressman Mike Synar of Oklahoma, and adopted in 1992, requires states, territories, and the District of Columbia to enact and enforce laws prohibiting the sale or distribution of tobacco products to individuals under age 18 years.[96] U.S. states must achieve at least 80% merchant compliance or face the loss of some federal funding. States measure their compliance by conducting annual, random, unannounced inspections of tobacco retail outlets. In 2012, Synar compliance checks found that 90.9% of U.S. retailers complied with youth access laws, a substantial improvement from the baseline of 59.9% in 1997.[97] Under a separate and complementary mechanism for enforcement oversight, required by the Family Smoking Prevention and Tobacco Control Act,[60] FDA contracts with states to conduct compliance check inspections of retailers and take enforcement action when appropriate.

A large body of evidence confirms that commercial sales of cigarettes to youth in the United States have decreased since implementation of the Synar Amendment. In 1995, 38.7% of middle- and high-school students under the age of 18 reported that they usually obtained their cigarettes by purchasing them from a store or gas station.[98] As of 2011, this figure had dropped to 14.0%.[20] The perceived availability of cigarettes has also declined considerably; the proportion of youth who report that cigarettes would be "fairly or very easy to get" has declined by 26% among 8th graders and by 16% among 10th graders over the past 15 years.[99]

Despite significant progress in reducing illegal sales to youth, it appears that a substantial proportion of young people are still able to obtain tobacco products. In 2012, 51% of 8th-grade students and 73% of 10th-grade students (i.e., mostly those between ages 13 and 16) reported that cigarettes would be "fairly or very easy to get" if they tried.[99] Of the 8th- and 10th-grade students who reported trying to buy tobacco products at retail outlets, 26% and 30%, respectively, reported being asked for proof of age, and only 20% and 26%, respectively, reported being refused sale.[2,99] The apparent discrepancy between high retailer compliance rates, as measured by Synar compliance checks, and the commercial availability of tobacco products, as self-reported by youth, suggests that reported retailer compliance rates may significantly underestimate the true rate of sales to minors. It is also possible that even under conditions of high retailer compliance, opportunities for underage youth to successfully purchase tobacco may be influenced by a small number of noncompliant retailers within a community who regularly sell to youth.[100]

Some research from the United States suggests that retailer compliance with youth access policies may differ according to individual- and neighborhood-level demographic characteristics. Asumda and Jordan[101] conducted a geographic information system analysis of the distribution of tobacco sales to underage youth across the state of Florida. They found that in Miami, underage tobacco sales to youth decoys were significantly more concentrated in Hispanic majority neighborhoods, implying a less restricted retail environment, in which youth living in these neighborhoods are not fully protected by existing sales-to-minors laws. Another study examined compliance checks in California between 1999 and 2003 and found that a higher percentage of illegal sales were made to black and Asian underage decoys than to whites.[102]

Research from other HICs shows a similar pattern: Retailer compliance improves following the adoption of sales-to-minors laws, but youth continue to report ready availability of cigarettes from commercial or social sources. For example, Finland banned tobacco sales to youth in 1995; Rimpelä and Rainio[103] evaluated the effect of the legislation on tobacco acquisition by minors, and found that the ban resulted in large and permanent decreases in underage purchases of tobacco from commercial sources. Between 1995 and 2003, the proportion of daily smoking by youth purchasing tobacco from commercial sources dropped from 90% to 67% among 14-year-olds and from 94% to 62% among 16-year-olds. However, during the same time period, a shift in youth acquisition of tobacco from commercial sources to social sources was observed, and the percentage of Finnish youth who reported that buying tobacco products from commercial sources was very or fairly easy remained rather high (72%). Two studies in England found that communities reporting 100% retailer compliance (assessed using youth under the age of 13 for compliance inspections) did not effectively prevent youth from purchasing tobacco from commercial sources: 95% of underage smokers living in these communities purchased tobacco from stores at least once per week, and 55% reported daily purchases.[104,105] In a study from New Zealand, self-reported purchases from commercial sources declined among 14- and 15-year-olds following the introduction of comprehensive enforcement initiatives, but these reductions were accompanied by increases in acquisitions from friends, family, and other social sources.[106]

### Implementation in Low- and Middle-Income Countries

The widespread presence of informal distribution channels, weak norms against youth tobacco use, and high rates of smoking prevalence in many LMICs make it challenging and costly to significantly limit youth access to tobacco products. The limited available data from LMICs show that young people in these countries are far more able to purchase tobacco products from commercial sources than youth in HICs. For example, 79% of retailers surveyed in Mexico City violated youth access laws by selling cigarettes to minors in 1997. Youth who were older or female were more likely to be able to purchase cigarettes than younger or male youth. Age-of-sale warning signs were displayed in only 12% of stores surveyed in Mexico City, and the presence of these signs was not associated with lower rates of sales to youth. Of the 561 retailers surveyed, only 4 (0.007%) asked young people their age, and only 1 (0.002%) asked for proof of age.[107] The Mexico City survey was repeated in 2002 and found very little improvement; 73% of 577 retailers surveyed sold cigarettes to youth, 15 (2.6%) asked youth their age, and 8 (1.4%) asked for proof of age.[108] Comparing results across the U.S.–Mexico border, the Centers for Disease Control and Prevention (U.S.)[109] found that illegal sales to youth were much higher in Ciudad Juarez, Mexico (98.1%) than in El Paso, Texas (18.0%) or Las Cruces, New Mexico (6.1%).

Zulkifli and Rogayah[110] conducted a study in Malaysia in which six youths (ages 15 to 17) visited 117 stores and attempted to purchase cigarettes. This study found that 97.4% of purchase attempts were successful. None of the retail clerks asked the youth to produce identification, and only four stores displayed notices (supplied by tobacco companies) stating that selling cigarettes to youth is illegal. Jirojwong[111] found that nearly one-third of 70 tobacco retailers in two provincial cities in Thailand did not know that the minimum age to purchase tobacco products was 18, and more than half of these retailers sold cigarettes to people younger than 18 despite the existence of this legal age limit for almost 10 years prior to the study.

## Youth Smoking Prevention Programs and the Tobacco Industry

Tobacco companies have been active proponents of "industry-friendly" youth access laws designed to pre-empt movement toward stricter regulatory and legislative controls.[112,113] The tobacco industry has also supported efforts that make it more difficult for retailers to be held accountable for noncompliance with youth access laws. For example, the industry has argued for the inclusion of words such as "knowingly" or "intentionally" in laws prohibiting the sale of tobacco to minors, which could render such laws unenforceable.[114] In addition, the industry has sought to include restrictions on how, how often, and by whom enforcement or compliance testing can be conducted. For example, the industry has opposed employing teenagers in compliance testing and has argued for a requirement that only very young teenagers (who are less likely to be sold tobacco than older teenagers) can serve as buyers in compliance testing.[114]

Tobacco companies have also developed and implemented their own programs to address young people's access to tobacco products. In the United States these have included the "We Card" initiative, "It's the Law," and "Action Against Access."[26,115,116] In Malaysia, British American Tobacco (BAT), Philip Morris, and the former R.J. Reynolds Malaysia—in collaboration with cigarette retailers—conducted the "No Sale to Under 18" campaign in 1998[117]; similar campaigns have been conducted in Mexico, Brazil, and other countries.[118] The limited research available on the impact of industry-sponsored youth access programs on youth smoking rates or illegal purchases does not provide evidence of an effect.[116,119,120] In her final opinion in *United States of America v. Philip Morris USA, Inc.*, U.S. District Judge Gladys Kessler found that "youth smoking prevention programs are not designed to effectively prevent youth smoking"[121,p.667] and noted that "there is no evidence that any Defendant [tobacco company] has evaluated whether tobacco outlets participating in the We Card Program were actually not selling tobacco to young people or whether the program reduced the overall adolescent smoking prevalence rate."[121,p.669]

Analyses of internal tobacco industry documents strongly suggest that the goals of these programs are to improve the tobacco company's public image, to reduce regulation and enforcement of existing youth access laws, and to legitimize industry lobbying efforts.[26,112,116,121] Industry programs are often accompanied by considerable public relations expenditures to enhance the industry's public image.[112,120] Companies track the number of "media hits," awareness among adults, and the effect of these programs on corporate images.

In the United States, the industry has also used its youth access programs to recruit a network of retailers as an early warning system to detect and defeat local tobacco control ordinances.[120] Tobacco industry documents show that the industry's teen smoking prevention programs have also provided an opportunity for the industry to study teenage attitudes toward smoking. The data collected as part of a "youth smoking prevention" effort contain information that tobacco marketers would need to sell their products to young people.[120]

Additionally, the industry has used the investment in its youth access programs as an argument against other tobacco control efforts and to forge alliances with government and nongovernmental organizations.[120] For example, the "No Sale to Under 18" campaign in Malaysia was conducted by three tobacco companies in collaboration with cigarette retailers, with the endorsement of the country's Minister of Domestic Trade and Consumer Affairs. This endorsement helped the industry influence the government's tobacco control efforts.[117] In 2000, Philip Morris and BAT responded to the Lebanese Minister of Health's concern about smoking among youth by proposing a joint government–industry

effort to prevent youth smoking, including the encouragement of minimum-age-of-sale legislation and the launch of retail access prevention programs. At the same time, however, the tobacco companies stressed the importance of "defending brand communication and advertising freedoms" and supported an assessment of the potential economic impact of a ban on tobacco advertising that had been adopted in Lebanon the previous year.[122,p.22]

Implementation of these programs in various countries has been selective, often driven by the strength of the market and the willingness of competitors to collaborate. For example, Philip Morris in Latin America rejected a U.S. program that discontinued the distribution of free cigarette samples because such a move was perceived as "extremely damaging unless [BAT] went along, which is highly unlikely."[112,p.63] Youth access programs sponsored by the tobacco industry can be particularly damaging when their endorsement by government officials legitimizes the programs as official anti-smoking messages. Philip Morris seized this opportunity in Latin America, where it developed a model for legislation on the minimum age for cigarette purchases to be promoted throughout the region.[112]

## Summary

Youth access policies are intended to limit the commercial supply of tobacco products to youth, with the goals of preventing or delaying initiation of tobacco use by youth and reducing underage consumption, changing social norms about smoking, and decreasing overall smoking prevalence. A variety of policy measures are available to regulate the sale and distribution of tobacco products to youth. These measures are economically justified on the grounds that failures in the market for tobacco products are particularly pronounced during the ages at which most tobacco use begins. Youth access policies are most common in high-income and upper middle-income countries. When consistently enforced, these policies can effectively reduce commercial access to tobacco products among underage youth. However, sufficient resources are needed to implement and enforce these policies well enough to effectively limit the commercial supply of tobacco to youth.

Evidence from HICs about the effectiveness of youth access policies in reducing youth smoking is mixed. Strongly enforced youth access policies that successfully disrupt the commercial distribution of tobacco products to underage youth appear to reduce youth tobacco use, although the magnitude of this effect is relatively small. More research is needed to evaluate the impact of youth access policies in LMICs; emerging evidence suggests these policies can be effective in reducing youth smoking in LMICs although the amount of reduction is unclear. The evidence indicates that youth access policies are likely to have a greater marginal impact in countries with relatively weak overall tobacco control policies and programs. Moreover, the absence of youth access laws sends mixed messages about the harm posed by the use of tobacco and the importance of other youth tobacco prevention efforts. Efforts to limit youth access to tobacco products, although of limited influence as stand-alone measures, are an important component of a comprehensive strategy to reduce tobacco use.

## Research Needs

Most of the evidence on the efficacy and cost-effectiveness of youth access policies reflects the experiences of HICs. More evidence is needed to evaluate the adoption, implementation, and impact of various youth access interventions in LMICs. Specific research needs in LMICs include continued monitoring of tobacco sales to minors and ongoing evaluation of enforcement and compliance measures in countries with existing youth access policies. In both HICs and LMICs, research could further inform

other policy approaches for limiting youth access to tobacco, including bans on self-service displays, and regulation of the number, density and location of tobacco retail outlets within communities. As noted previously, a growing number of U.S. states and localities are raising the minimum age of legal access to tobacco products to 21 years; research to understand their experiences will help inform the evidence base for youth access policies going forward in the United States and elsewhere.

## Conclusions

1. Information failures in the market for tobacco products are particularly pronounced during the ages at which most tobacco use begins, providing an economic rationale for interventions to limit youth access to tobacco products.
2. Youth access policies, when consistently enforced, can reduce commercial access to tobacco products among underage youth. Sufficient resources are needed to implement and enforce these policies well enough to effectively limit youth access to commercial sources of tobacco.
3. Evidence from high-income countries indicates that strongly enforced youth access policies that successfully disrupt the commercial supply of tobacco products to underage youth can reduce youth tobacco use, although the magnitude of this effect is relatively small.
4. Emerging research suggests that youth access policies can also be effective in reducing youth tobacco use in low- and middle-income countries, although the amount of reduction is unclear.

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## Section 5
## Policy and Other Influences on the Supply of Tobacco Products

# Chapter 12
# Tobacco Manufacturing Privatization and Foreign Direct Investment and Their Impact on Public Health

# Chapter 12
# Tobacco Manufacturing Privatization and Foreign Direct Investment and Their Impact on Public Health

The inflow of foreign direct investment (FDI) and the privatization of state-owned tobacco enterprises have increased for two reasons: (1) the rising globalization of industry in general and (2) the trend toward fewer government-owned business monopolies. This chapter examines the forces that drive FDI and privatization and their impact on global tobacco control efforts and public health. Specifically, this chapter discusses:

- The broad rationale for foreign stakeholders to invest in the tobacco industry, including globalization trends, FDI policies, and economic factors—particularly in low- and middle-income countries, where tobacco may attract the largest amount of such investment
- The economic and political issues surrounding the privatization of state-owned cigarette manufacturing industries
- The current global ownership status of tobacco industries, by World Health Organization Region
- Public health concerns that arise from FDI and privatization trends, including the multinational tobacco companies' motivation to expand markets, the economic and political leverage that influences tobacco control policies, and the impact of increased production differentiation and pricing.

Country-specific cigarette consumption trends show that FDI and privatization of tobacco enterprises are not inherently bad for tobacco control. When the privatization of state-owned cigarette manufacturing industries occurs transparently and without obligations to manufacturers, privatization removes the conflicts of interest from governments that own their tobacco industries. Unfortunately, these conditions have not been the norm.

Countries that implement strong and comprehensive tobacco control policies following privatization have been effective in reducing tobacco use. In contrast, tobacco use has increased in countries without these policies. These results, in conjunction with the economic and social trends that surround FDI and privatization, underscore the importance of both public health policy and appropriate regulatory frameworks in the ongoing evolution of global ownership and investment trends in the tobacco industry.

## Chapter Contents



## Figures and Tables

> Cross-border mergers and acquisitions are a part of economic life in a liberalizing and globaliz[ing] world. But accepting a more open market in the interest of growth and development does not mean relaxing the requirements of public vigilance. On the contrary, a freer market—and particularly the emerging market for enterprises—calls for greater vigilance as well as stronger and better governance.
>
> —Kofi Annan, Former Secretary-General of the United Nations[1]

## Introduction

Increasing globalization—the integration of markets across borders and regions of the globe—is a reality of today's world. Globalization influences the way the world does business for all goods and services, including tobacco.[2] This chapter explores two key characteristics of globalization and their impact on the tobacco industry: (1) the growth of foreign direct investment (FDI) and (2) privatization. Another key impact of globalization—reduced trade barriers between countries—is discussed in chapter 13.

During the past century the global tobacco industry, like many consumer product industries, consisted of a large number of individual companies. In many countries, tobacco manufacturing companies were owned and operated by the state. In the last four decades a range of factors have combined to encourage consolidation and privatization of tobacco companies, a trend that can be seen in many other industries.[3] During the 1990s, the forces of privatization in the tobacco industry accelerated, and by 2005 multinational tobacco companies (MTCs) had taken over many state-owned cigarette manufacturing companies in high-income countries (HICs) and low- and middle-income countries (LMICs). At the same time, MTCs also acquired many private local tobacco companies or cigarette manufacturing facilities. Although state-owned industries and niche producers still exist, today the global cigarette market is dominated by four major multinational firms—Philip Morris International (PMI) (including Altria in the United States), British American Tobacco (BAT), Japan Tobacco International (JTI), and Imperial Brands PLC—and one state-run firm, China National Tobacco Corporation (CNTC). Individual shares of the global cigarette market in 2014 range from 4.7% for Imperial to 16.9% for PMI/Altria and 44.2% for CNTC,[4] largely accounted for by the People's Republic of China's domestic market.

As an addictive and lethal product, tobacco differs greatly from other business products, and the impact of privatization of the tobacco industry is complex. General assumptions about the benefits of privatization to countries do not apply when an industry's growth and efficiency harm public health. Broad trends toward privatization of the tobacco industry clearly affect public health.

Many LMICs, fueled by FDI, privatized their state-owned enterprises as part of programs to address severe macroeconomic problems, transform economies, and promote efficiency and economic growth. FDIs can provide greater access to resources and markets, transfer technology and skills, and generate employment in host countries. Privatization can free national governments from the conflict of interest inherent in both owning a state tobacco industry and attempting to protect public health from the ravages of tobacco use. By removing these conflicts of interest, privatization could pave the way for policy-based interventions—such as smoke-free laws and higher taxes—that must ultimately be implemented by governments.

In addition to these benefits, privatization and FDI pose risks. The potential benefits of privatization may be diminished by concessions that governments accept in privatization agreements, such as tax and other incentives to tobacco companies. Acquisitions of private or state-owned tobacco industries often take place in countries with limited tobacco control infrastructure and weak regulatory controls, so that MTCs' activities in LMICs receive inadequate oversight. For example, legal requirements for corporate governance may be weaker in LMICs or countries undergoing economic or political changes. A weak regulatory environment enables MTCs to engage in aggressive and sophisticated marketing, which could enable them to enhance distribution channels and increase their total sales. At the political and policy level, macroeconomic concerns may dominate decision-making and eclipse concerns about public health.[5–7]

In many countries, tobacco production and sales are passing into the hands of MTCs that have the size and power to aggressively market tobacco to women, youth, and other vulnerable groups. Privatization leads to dramatic increases in production, marketing, and price competition. In most cases, consumption of cigarettes increases after privatization.[6] After privatization, tobacco industry growth may result in lobbying against excise taxes, limits on advertising, limits on smoking in public places, and other tobacco control policies.[5,6] For example, case studies from the Commonwealth of Independent States (an association of former Soviet republics) during the 1990s show the rapid pace of privatization in a time of economic transition and increased industry influence.[6,8,9]

This chapter examines the process of globalization, including the policy and market ramifications of FDI in general and of FDI in the cigarette manufacturing sector in particular; the economic and policy issues behind the privatization and globalization of tobacco and their impact on global public health; and the economic and political arguments for and against the privatization of state-owned cigarette-manufacturing industries. The chapter concentrates on FDI in cigarette industries because this is the tobacco product class so far most affected by FDI and for which data are widely available. It examines trends in the consumption of cigarettes in countries with different cigarette manufacturing industry ownership status and in countries where prevalence rates may be influenced by FDI. The chapter focuses on key public health concerns surrounding FDIs in tobacco in LMICs, including cigarette consumption and tobacco control policies.

## Foreign Direct Investment: An Overview

According to the Organisation for Economic Co-operation and Development:

> [FDI] reflects the objective of obtaining a lasting interest by a resident entity in one economy ("direct investor") in an entity resident in an economy other than that of the investor ("direct investment enterprise"). The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise, as well as a significant degree of influence on the management of the enterprise. Direct investment involves both the initial transaction between two entities and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated.[10,p.7-8]

This economic definition is refined in most of the 3,000 international investment agreements (IIAs) countries have adopted to protect and promote foreign investment.[11] IIAs come in several forms, predominantly bilateral investment treaties (BITs) and investment chapters within free trade agreements (FTAs). Most IIAs use a broad, asset-based definition of FDI, which, in addition to the enterprise itself,

may cover intellectual property rights, contracts, and licenses or authorizations.[12] For example, the Korea–United States FTA covers "every asset that an investor owns or controls, directly or indirectly, that has the characteristics of an investment, including such characteristics as the commitment of capital or other resources, the expectation of gain or profit, or the assumption of risk."[13,p.11-23]

Most FDI transactions balance two types of stakeholder interests: (1) the needs of the investor for growth and (2) the needs of the recipient for capital. In an increasingly global economy, many firms expand into new countries to lower costs of production and raw materials, penetrate new markets, and leverage capital. Many smaller private firms have difficulty competing against the economies of scale brought by larger firms, and governments often view their state-owned enterprises as assets that can be turned into capital, particularly in the difficult budgetary environment of many LMICs. Above all, the interests of both types of stakeholders (investors seeking growth and recipients seeking capital) have increasingly converged in recent years due to increasing liberalization of the environment for trade and investment worldwide.

Trends toward more liberalized trade and investment date back to the middle of the 20th century, part of the process of reconstruction, especially in Europe, after the Second World War. The General Agreement on Tariffs and Trade,[14] precursor to the World Trade Organization (WTO),[15] took effect in 1948. Trade liberalization has gained much greater momentum in recent decades.[16] For example, the Multilateral Agreement on Investment, a broad framework for liberalizing investment across countries within the Organisation for Economic Co-operation and Development, took shape in the mid-1990s.[17] Although this framework was never fully implemented, it served as a model for subsequent bilateral and multilateral agreements, which in turn set the stage for growth in both FDI and privatization efforts. Since the 1980s, established economies have implemented policies to increase trade and financial flows, such as increasing the volume and variety of cross-border transactions in goods and services, allowing free international capital flows, diffusing technologies widely and rapidly, and promoting FDI to other countries.

To promote FDI, most HICs expanded a network of BITs and provided insurance to reduce the risks associated with investments in LMICs. LMICs joined this expansion especially during the 1990s by liberalizing their national FDI laws and implementing supplementary trade and privatization policies to promote FDI to their countries. By 2014, a total of 3,236 international investment arrangements existed, including BITs (2,902) and other IIAs (334).[18] Global tobacco companies have begun to finance state-to-state disputes at the WTO and directly challenge tobacco control measures through investor–state dispute settlement (ISDS).[19] The section "Trends in International Investment Law" in this chapter provides a closer look at the legal framework for tobacco FDI and litigation.

By 2012, total FDI generated 1.4 trillion U.S. dollars (US$) in revenues, and for the first time ever, FDI in LMICs accounted for a larger share of total FDI revenues than FDI in HICs (LMICs = 52% of total FDI revenues).[20] According to several studies, the most likely explanations of the propensity of a country, especially an LMIC, to attract FDIs are the size of host country markets and host country market factors such as gross domestic product (GDP), GDP per capita, and GDP growth.[21–26] Figure 12.1 presents more details about host country determinants of FDI.

## Figure 12.1 Host Country Determinants of Foreign Direct Investment

**Host Country Determinants**

I. Policy Framework for FDI
   a. Economic, political, and social stability
   b. Rules regarding entry and operations
   c. Standards of treatment of foreign affiliates
   d. Policies on the functioning and structure of markets (especially competition and merger and acquisition policies)
   e. International agreements on FDI
   f. Privatization policy
   g. Trade policy (tariffs and nontariff barriers) and the coherence of FDI and trade policies
   h. Tax policy

II. Economic Determinants

III. Business Facilitation
   a. Investment promotion (including image-building and investment-generating activities and investment facilitation services)
   b. Investment incentives
   c. Hassle costs (e.g., costs related to corruption and administrative efficiency)
   d. Social amenities (e.g., bilingual schools, quality of life)
   e. After-investment services

**Type of FDI-Classified Principal Economic Determinants by Motives of Transnational Corporations in Host Countries**

| Type of FDI-Classified Principal Economic Determinants | Motives of Transnational Corporations in Host Countries |
|---|---|
| a. Market-Seeking | ▪ Market size and per capita income<br>▪ Market growth<br>▪ Access to regional and global markets<br>▪ Country-specific consumer preferences<br>▪ Structure of markets |
| b. Resource Asset-Seeking | ▪ Raw materials<br>▪ Low-cost unskilled labor<br>▪ Skilled labor<br>▪ Technological, innovatory, and other created assets (e.g., brand names), including those embodied in individuals, firms, and clusters<br>▪ Physical infrastructure (e.g., ports, roads, power, telecommunication) |
| c. Efficiency-Seeking | ▪ Cost of resources and assets listed under Resource Asset-Seeking, adjusted for productivity for labor resources<br>▪ Other input costs (e.g., transport and communication costs to, from, and within a host economy and costs of other intermediate products)<br>▪ Membership of a regional integration agreement conducive to the establishment of regional corporate networks |

*Note*: FDI = foreign direct investment.
*Sources:* United Nations Conference on Trade and Development 1998[184] and 2000.[1]

The inflow of FDI in LMICs is based predominantly on accessing natural resources and national or regional markets.[27] Other studies have found that FDI is driven by several other market determinants—skilled and cheap labor, existing infrastructure and raw materials, regional integration, trade and investment agreements and policies (ranging from tariff reduction among members to policy harmonization), and political and macroeconomic stabilities.[28–30]

Trade policy also greatly influences FDI. The export orientation of a host country (e.g., how aggressively the host country promotes exports, particularly manufactured products, in order to develop economically) and its openness to trade correlate positively with the inflow of FDI, and both are considered traditional determinants of FDI.[31,32] For example, Singh and Jun[32] found that export orientation was the strongest determinant of a country's ability to attract FDIs in the 1970s.

A 2014 study by Baker and colleagues[33] focuses specifically on foreign investment by the tobacco industry. These authors classify tobacco companies—along with alcohol and ultra-processed foods—as "transnational risk commodity corporations" (TRCCs):

> Trade liberalization allows TRCCs to rapidly move investments, technologies, production capacity, raw materials and final products across borders and thereby drive risk commodity consumption transnationally. . . . Although trade remains important, foreign direct investment (FDI) is the most significant strategy used by TRCCs to penetrate new markets and grow transnationally. . . . Subsequently, FDI-inflows are positively correlated with risk commodity consumption rates.[33,p.4]

Baker and colleagues[33] infer that tobacco companies use FDI to exploit market access opportunities created by trade liberalization by ramping up volume, reducing costs of manufacturing and distribution, and then engaging in aggressive marketing and price competition—all of which drives consumption of tobacco as it does the consumption of other "risk commodities." All of this occurs as the tobacco industry pivots from HIC markets, where tobacco consumption is dropping, to LMICs.[34–38] Studies have found that, as tobacco companies invest in production closer to their new markets, they are simultaneously using FDI to strengthen access to leading sources of tobacco leaf such as Brazil and the United States.[33,39,40] These findings parallel those of Gilmore and colleagues,[6] which focused on privatization that was independent of trade liberalization.

Many countries have enhanced their FDI policies across sectors (e.g., by adding financial incentives) to attract investments from foreign multinational companies.[28] LMICs commonly use fiscal incentives to encourage investment, including temporary tax holidays, reduced or zero import taxes for capital from foreign investors, strategic imported raw materials, easy access to other markets in their region, and other such measures as market preferences, infrastructure, and sometimes even monopoly rights.[28] For example, an Armenian Development Agency brochure cites favorable legislation, government commitment, no limits on foreign ownership, and access to neighboring markets as selling points for foreign investors.[41]

As noted above, Gilmore and colleagues[6] confirm that fiscal incentives (tax holidays and reduced excise taxes) are often part of governments' privatization agreements with tobacco companies. Some may argue, however, that committing to such explicit terms of privatization violates Article 5.3 of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC), which obligates Parties to the Convention to protect their tobacco control policies. The Article 5.3 guidelines say this explicitly: "Parties should not grant incentives, privileges or benefits to the tobacco industry to establish or run their businesses."[42,p.8]

The investment motives of MTCs are generally similar to those of multinational companies in other sectors. Possible motives include reduced production costs, economies of scale, local production in target markets, potential growth in new markets, and potential development of a regional export base.

As industry analyst reports and research on tobacco industry documents show, MTCs recognize that the markets for their products are declining in most HICs, but see opportunities in the new and emerging markets populated by the vast majority of the world's cigarette smokers.[4,43–45] MTCs may see special potential for market growth in some LMICs, particularly those in which the following conditions exist: young people make up a large share of the total population; smoking prevalence is very low among women; per capita income is rising[46]; the purchasing power of women is increasing because more

women are joining the labor force; and other regional markets can be accessed easily.[43,47] Additionally, the improved status of women is often accompanied by a rise in smoking among women, which they may perceive to be associated with independence.[48]

In the 1990s, many countries, particularly in Central and Eastern Europe, had either weak or no tobacco control policies in place, and such policies were not part of the political agendas of many governments. For example, countries such as Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, where state monopolies did not advertise, had very limited or no marketing controls on tobacco.[49] This weak tobacco control led to an attractive and profitable climate for the private acquisition of state-owned cigarette manufacturing industries in many LMICs in Central and Eastern Europe. As a result, MTCs were able to penetrate new and emerging markets without the constraints of tobacco control measures and gained access to new smokers, especially youth[49] and women.[50]

As will be discussed later in this chapter, these investments have exponentially increased production rates, cigarette consumption, and smoking rates among youth—especially in the Russian Federation, Latvia, and Lithuania.[49] Furthermore, some LMICs offer cheap, high-quality tobacco leaf and relatively high-quality cigarette production facilities—as in Moldova's tobacco industry when BAT wanted to purchase it.[51] In contrast, when BAT purchased Tekel, the state-owned tobacco industry in Turkey, in 2007, three of its six production sites were mothballed.[52]

## Privatization of State-Owned Enterprises: An Overview

Privatization, defined as a transfer from public to private ownership, is a way of welcoming FDI and broadening the scope of FDI by opening up new sectors to foreign investment.[7] Privatization of state-owned enterprises is a special case of FDI because it involves the purchase of industries that are owned by governments. Therefore, unlike other types of FDI, the privatization of state-owned enterprises generates revenue for governments. Early examples of privatization date back to the 1960s, but major efforts to privatize state-owned enterprises began in the 1980s. The move toward privatization then spread to many countries where most attempts to improve the performance of state-owned industry had failed. Between 1980 and 1991, approximately 6,800 medium- and large-scale enterprises were privatized worldwide.[53] The second (and biggest) wave of privatization took place in Eastern Europe and Central Asia during the early 1990s. With the collapse of the Soviet Union and a broad transition toward market economies among newly independent states, 60,000 medium- and large-scale state-owned enterprises were privatized.[54,55] By the early 1990s, 33%–50% of all foreign and domestic investments in Eastern Europe and Latin America was put into privatization programs.[56] The biggest wave of privatization in LMICs occurred between 1990 and 2008. During this time, more than 129 LMICs carried out more than 10,050 privatization transactions. The inflow of FDI played a significant role in these transactions.[57]

Approximately 73% of these transactions occurred in two regions that included countries with economies in transition: the East and Central Asian part of the European Region (6,048 transactions) and the Latin American and Caribbean part of the Region of the Americas (1,315 transactions).[57] Historically, countries had established state-owned enterprises in many sectors of the economy in order to cultivate industries in areas seen as vital for development, increase government revenues, control prices (in some cases), compensate for insufficient private investment, control the economy, promote self-reliance, and protect national security.[58] When operating conditions deteriorated over the years, many state-owned enterprises put an increasing burden on state budgets, thus slowing economic growth.

Many factors have undermined the profitability and viability of state-owned enterprises, including the abuse of political power by politicians, overstaffing, excessive wages and employee benefits, the absence of hard budget constraints and the ability of governments to subsidize loss-making enterprises, low autonomy and inappropriate incentives for managers, inefficient and unproductive operating conditions, outdated technology, corruption, and poor-quality products that were protected by import restrictions in some countries.[59,60]

In addition to political considerations and the opportunity for national governments to realize large short-term capital gains, several macroeconomic determinants have played a major role in privatization programs, including emerging capital markets, the desire to attract FDIs, the need to reduce the burden of state-owned enterprises on national budgets, deteriorating fiscal conditions, and the acceleration of economic development. When the Soviet Union collapsed in 1991, many of the newly independent states were in financial crisis and did not have strong credit ratings in international financial markets to attract FDI. Mass privatization served as a way to create and improve these national credit ratings.[61] Countries in economic transition as well as those with established economies have sought privatization to help with financial crises.

Political processes and pressure from international lending agencies are also major components behind the global privatization trend that affect the level, pace, and revenue generation of privatization programs. Privatization has accelerated as a result of the political process that transforms countries from socialist to market economies, but economists and public health experts have criticized fast-track privatization as part of FDIs and globalization. For example, Stiglitz[62] contends that globalization has not been pushed carefully or fairly and that poorly designed, pro-globalization policies tend to be costly, increase instability, make countries more vulnerable to external shocks, and increase poverty and social conflict. Privatization is meant to generate revenues, at least in the short term. However, some claim that, as compared to HICs,[63] the results of privatization are not always as positive in LMICs, especially those with transitional economies, due to factors such as a weaker political process[62,64] or the fiscal pressure created by international lending agencies such as the International Monetary Fund[65,66] and the World Bank.[61,62]

## Foreign Direct Investment and Privatization in the Tobacco Sector

State-owned tobacco enterprises were swept up in the global privatization whirlwind during the 1990s. Privatization was occurring even in market economies with long traditions of state involvement and ownership in the tobacco industry.

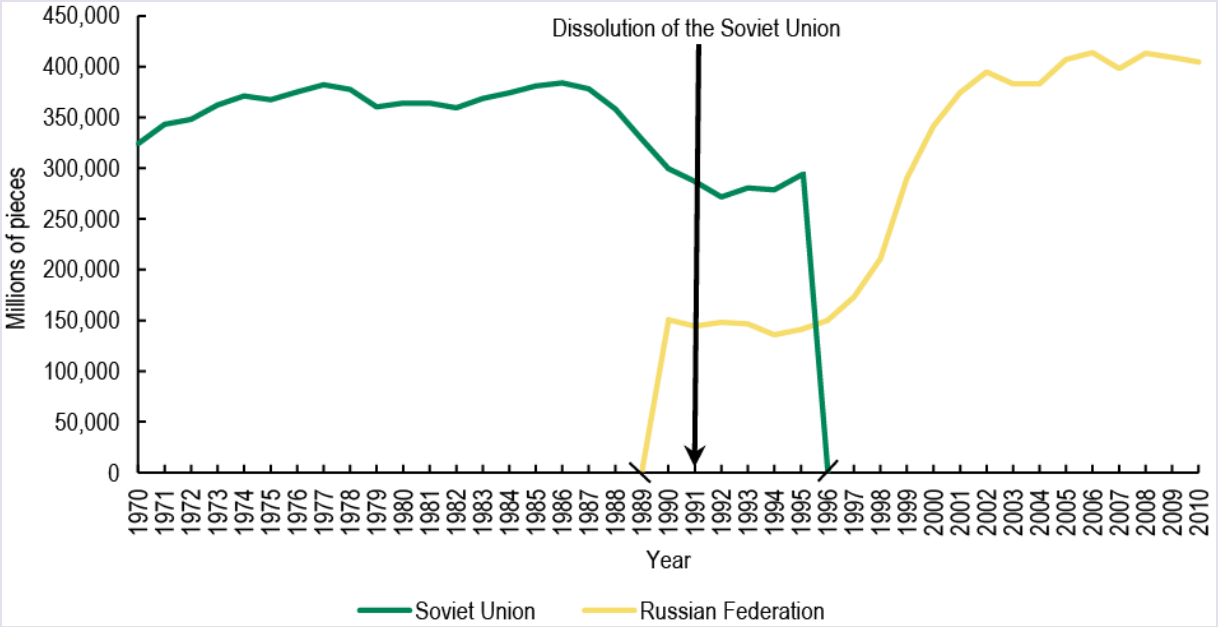
FDI in tobacco occurred in many countries by way of both purchases of state-owned tobacco enterprises and additional investments in firms by foreign and local private companies. In some countries, the proceeds from privatization of state-owned cigarette-manufacturing enterprises or FDIs in countries' tobacco sectors appear to be among the largest FDIs these countries have received. For example, World Bank data[57] between 1988 and 2008 show that Morocco generated US$ 11 billion in revenue from the privatization of state-owned enterprises. Of this revenue, 18.3% was generated by the privatization of its state-owned cigarette-manufacturing industry alone; FDI in tobacco was the third-largest investment the Moroccan government had received in its history. In addition, between 1992 and 2000, MTCs had invested at least US$ 2.7 billion in 10 tobacco-producing countries in economic transition from the former Soviet Union, making up a substantial proportion of total FDI in these countries[67] (see Box 12.1). Similarly, among the largest investments in Tanzania are the FDIs in its tobacco sector.[68,69]

## Box 12.1: Case Study: The Russian Federation

As early as the 1960s, the Soviet Union was among the major global producers of cigarettes, contributing about 10% of global production until a few years before its dissolution in 1991.[67] The sharp decline in cigarette production began in 1987 and was attributed not only to the breakup of the Soviet Union itself, but also to obsolete manufacturing equipment and shortages of raw materials.[67] Soon after the dissolution of the Soviet Union, MTCs began targeting the markets of the resulting newly independent republics, particularly the Russian Federation, the largest market and population center. The figure below shows trends in cigarette production from the 1970s until 2010, first for the Soviet Union and then for the Russian Federation.

Fueled by foreign investments from MTCs, cigarette production in the Russian Federation began to increase steadily in the late 1980s, experienced an exponential increase between 1998 and 2001, and then stabilized, with a slight decrease in 2003-2004 as the market became oversupplied. After this temporary decrease, production increased.[70] Over this timeframe, the Russian Federation became not only self-sufficient in cigarette production but, in 2003-2004, a net exporter of cigarettes, unlike the earlier Soviet Union, which experienced large deficits in the balance of trade in cigarettes dating back to 1970. This transition underscored the focus of foreign investment on producing cigarettes locally instead of importing them.[71] In 2007, the Russian Federation—then the third-ranked global producer of cigarettes—manufactured about 398 billion pieces, or about 7% of the 5,909 billion cigarettes produced globally.[72]

### Total Cigarette Production in the Soviet Union/Russian Federation, 1970–2010




*Note:* The Soviet Union dissolved in 1991.
*Sources*: Soviet Union data are from U.S. Department of Agriculture Foreign Agricultural Service 1960–1995.[71] Russian Federation data are from ERC Group 2011.[148]

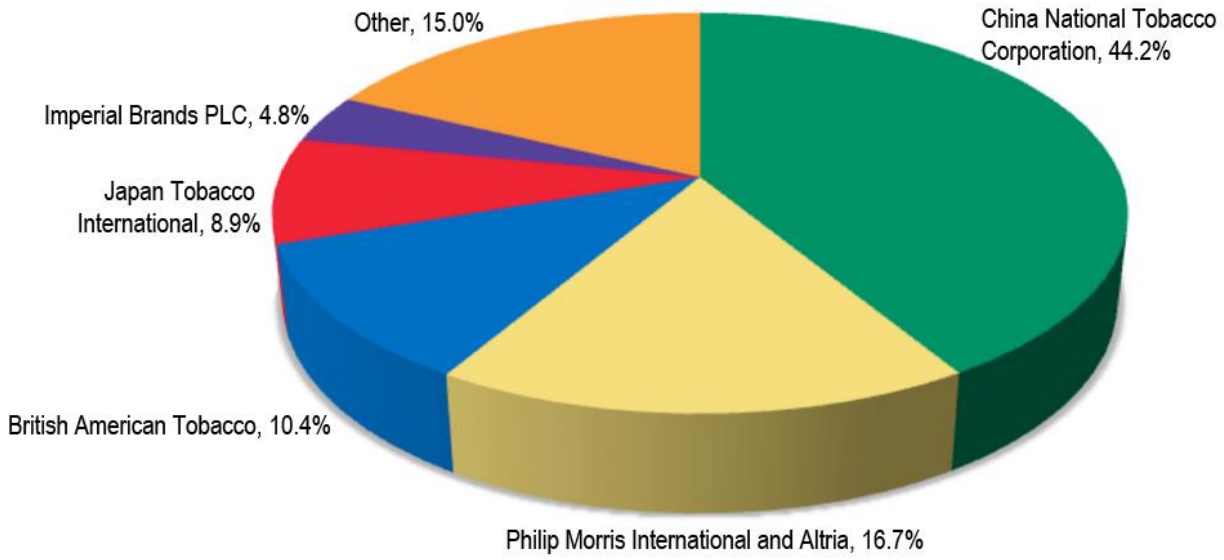
## Evolution and Consolidation in the Tobacco Industry

The tobacco industry has evolved to become a highly consolidated industry dominated by a few large entities. Before investing directly in LMICs, MTCs generally established business relations with the domestic LMIC producers via licensing, management and marketing contracts, and franchising (see Box 12.2). Over time, and within the context of economic forces surrounding globalization and privatization, such relationships evolved toward increased FDI in both private- and state-owned tobacco enterprises.

The types and extent of FDIs in the tobacco industry vary by country. Forms of FDI include (1) joint ventures between MTCs and local private tobacco industry or, for state-owned tobacco enterprises, between MTCs and the government, (2) direct establishment of tobacco industries in host countries, (3) lease of state-owned tobacco enterprises by MTCs for a limited time, and (4) mergers between national private industries and MTCs. Mergers and acquisitions are part of FDI, but unlike privatization, governments do not generally earn revenue from these transactions.

Figure 12.2 shows the global market share distribution in the cigarette industry in 2014, which highlights the amount of consolidation that has occurred. With 44.2% of the global market share, the state-owned China National Tobacco Corporation is by far the largest firm. Four MTCs jointly command 40.8% of the global cigarette market—PMI/Altria, BAT, JTI, and Imperial.[4]

### Figure 12.2 Global Cigarette Market Share Distribution, 2014




*Note*: Philip Morris International includes Philip Morris USA.
*Source*: Euromonitor International 2016.[4]

International trade liberalization played an important role in extending the reach of MTCs. Multilateral agreements reached during the Uruguay Round of trade negotiations in 1994 were the first to include liberalization of trade in unmanufactured tobacco. These agreements significantly lowered tariff and non-tariff barriers to trading tobacco and enabled greater penetration of the world tobacco market by large MTCs. The multinational tobacco industry has also enhanced market penetration through aggressive direct investment in LMICs' economies, such as through owning or leasing production plants

in countries. Thus, MTC investment in LMICs increased as cigarette production and consumption rates in HICs continued to decline.[37,73]

The privatization process has evolved to the point that most countries now have MTCs producing their tobacco products. MTCs have now begun to consolidate or move production facilities within a region to take advantage of bilateral and regional trade agreements that remove import tariffs.[74] For example, in 2013 BAT closed its production facility in Uganda and moved to Kenya, but continued to provide cigarettes to Uganda via export.[75,76] Similarly, BAT has consolidated its production for West Africa in Nigeria,[77] and PMI has done the same with a production hub in the Philippines that supplies other countries in the region.[78]

### Foreign Direct Investments for Cigarette Manufacturing in High-Income Countries

The available evidence indicates that established economies generally experience three types of FDI for tobacco industries: (1) privatization of state-owned cigarette-manufacturing industries, (2) acquisitions of local private cigarette-manufacturing industries, and (3) mergers of MTCs. While not a comprehensive review of FDI in HICs, this section provides some examples of these trends.

HICs have overwhelmingly joined the globalization trend by privatizing their traditionally state-run cigarette monopolies—for example, France in 1995,[79] Portugal in 1996,[79,80] Spain in 1998,[6,79] Austria in 1997,[79] Italy in 2003,[6,79] and the Republic of Korea in 2002.[6,81,82]

At the same time, mergers and acquisitions among MTCs in established economies have contributed to consolidation of the tobacco industry. For example, Japan Tobacco Incorporated became JTI when it purchased the RJR international cigarette unit in 1999 for US$ 7.8 billion, the largest overseas acquisition made by a Japanese company at the time.[83] JTI later acquired Gallaher PLC also, giving it a greater presence in Europe and notably the Russian Federation, where it became a market leader.[84]

Imperial gained entry to the sub-Saharan African market by acquiring a 75% interest in Tobaccor SA from the French group Bollore SA in 2001, which had a dominant market share in eight countries in French-speaking West and Central Africa and Madagascar.[85] In 2002, Imperial purchased 90% of Reemtsma, the largest MTC in Germany, for US$ 4.6 billion, securing strong access to former socialist economies.[86] Imperial gained a significant stake in the U.S. cigarette market in 2007, when it acquired Commonwealth Brands, at the time the fourth-largest U.S. cigarette company, for US$ 1.9 billion.[87] More recently, Imperial expanded its presence in the United States when it spent US$ 7.1 billion to acquire Winston, Salem, Kool, and other brands made available during the merger of RJR and Lorillard Tobacco Company.[87]

Altadis was created by a merger between France's Seita and Spain's Tabacalera, shortly after each was privatized from national monopolies.[88] Altadis also gained access to markets in sub-Saharan Africa and North Africa by purchasing the Morocco tobacco monopoly, which had a strong presence in the region.[5] Altadis was subsequently acquired by Imperial in 2008.[87] The current iteration of BAT resulted from a merger with Rothmans International in 1999, which was a combination of the second- and fourth-largest MTCs, respectively.[79] Through this merger, BAT increased its presence in the market of the United Kingdom of Great Britain and Northern Ireland and helped Rothmans International penetrate the Japanese market.[81,89]

Similarly, U.S. tobacco markets have become increasingly concentrated since 2000. For example, Altria, the parent company of Philip Morris USA and PMI, spun off PMI in order to decrease exposure of the international business to U.S. tobacco litigation.[79] More recently, RJR, long the second-largest tobacco company in the United States, acquired Lorillard Tobacco Company for US$ 27.4 billion in 2014.[90] Leading cigarette companies have acquired leading smokeless tobacco companies—specifically, Altria's acquisition of U.S. Smokeless Tobacco Company (2009)[91] and RJR's acquisition of Conwood (2006).[92] RJR's mergers with Brown & Williamson (2004) and Lorillard (2015) further consolidated the U.S. cigarette market.[92]

### Foreign Direct Investments and Privatization in Low- and Middle-Income Countries

The ownership status of tobacco-manufacturing industries and the types of FDIs involved vary across LMICs. Tobacco industries were traditionally under government ownership in a majority of countries in the Eastern and Central Asian sections of the European Region, as well as in the Western Pacific Region (except the Pacific Islands) and the Eastern Mediterranean Region. Conversely, tobacco industries were generally under private ownership throughout established economies in North America and some European countries and in African, Latin American, and South Asian countries.[93] However, as globalization expanded in the 1980s and 1990s, many state-owned tobacco industries changed hands to private producers, mainly MTCs. In general, MTCs purchased state-owned tobacco-manufacturing industries, but in some cases MTCs formed joint ventures whereby state-owned manufacturers produced tobacco brands for MTCs (e.g., in Egypt,[94] Viet Nam,[95] China[96]). Additionally, in some countries, MTCs purchased major local private producers (e.g., Indonesia in 2005[79]).

Foreign ownership of state-owned tobacco monopolies has generally occurred in a series of steps.[47,49,97] First, MTCs seek to increase imports of their brands by establishing a licensing arrangement whereby the state firm produces or sells international brands (e.g., in Egypt and countries of the former Soviet Union[5]). This may lead to the establishment of joint manufacturing ventures that involve the purchase of a portion of the state-owned company by an MTC, which may then invest in modernization and technology (e.g., in Ukraine[79,98]). MTCs may also promote privatization of the state industry and then seek to acquire the state company. If these steps fail, contraband sales may be used to gain a foothold in the market by stimulating local demand and arguing for the need to create a joint venture or to move toward privatization, which would allow smuggled goods to be replaced with those manufactured locally.[6,73]

The first wave of FDI in cigarette factories took place in the early 1980s when MTCs acquired local private cigarette factories in almost all Latin American countries. The second wave occurred in the 1990s with the privatization of state-owned cigarette factories after the dissolution of the Soviet Union. Some socialist countries in Asia also joined the privatization process and formed joint ventures with MTCs (e.g., in Cambodia,[99] Lao People's Democratic Republic,[100] Viet Nam[5]). By the end of the 1990s, many countries received some form of direct investment for their state-owned cigarette-manufacturing industries, and almost all state-owned cigarette-manufacturing industries were privatized in market economy countries and countries of the former Soviet Union. In the South-East Asia and Western Pacific Regions, MTCs acquired part or whole shares of local privatized cigarette-manufacturing industries (e.g., joint venture in Malaysia in 1999[81]) or invested directly in these countries (e.g., Indonesia in 2005[79]). After the year 2000, the privatization process slowed. The latest examples of privatization or FDI in LMICs occurred in Morocco and Serbia (2003),[6] Romania (2004),[6] Georgia (2005),[6] Turkey (2008),[6] and Bulgaria (2011).[101]

In the Western Pacific Region, the ownership status of the tobacco-manufacturing sector is mixed. This region includes major cigarette-producing countries such as China, Japan, Malaysia, Philippines, Viet Nam, and the Republic of Korea. The tobacco industry is under private ownership in Indonesia, Malaysia, Philippines, and the Republic of Korea and is under full state ownership in Cambodia, China, Lao People's Democratic Republic, and Viet Nam. However, Cambodia (in 1987),[99] Lao People's Democratic Republic (in 2001),[100] and Viet Nam (in 2001)[5] formed joint ventures whereby their brands are produced by foreign producers that lease state-owned manufacturing facilities. After gaining independence, some Pacific Island countries (Fiji in 1955, the Solomon Islands in 1967, and Samoa in 1978)[102] started to privately produce cigarettes as a result of FDI from MTCs or local investors.

The ownership status of the tobacco-manufacturing sector in the South-East Asia Region is also mixed. Initially, cigarette production was under private ownership in Bangladesh, India, and Pakistan during British colonial rule of these countries. After gaining independence, the Pakistan Tobacco Company was established in 1949 and the Bangladesh tobacco company in 1971, and MTCs continued their production in these countries. Sri Lanka's only cigarette producer, Ceylon Tobacco, is a subsidiary of BAT. Tobacco production was under government ownership in Nepal until the 1980s and was then privatized to local producers. In Indonesia, tobacco production has historically been under the ownership of local private entities and MTCs. In 2005, PMI purchased the largest private kretek manufacturer and the third-largest cigarette-producing company in Indonesia. In Thailand, the tobacco industry is under full state ownership.[79]

In the Eastern Mediterranean Region, Algeria,[103] Iran,[104] Lebanon,[5] Libya,[103] Tunisia,[103] and Yemen[105] have full or partial government ownership of tobacco production. Egypt has partial ownership in its only tobacco-producing company (Eastern Tobacco), which by bilateral agreement produces brands of MTCs.[103] Morocco is the largest cigarette-producing country in the region and, through a joint venture in 2003, is the only country in the region to have privatized its tobacco-manufacturing company.[106] The Persian Gulf countries Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia do not have any cigarette manufacturing facilities.

The European Region—especially countries in Eastern Europe and Central Asia—experienced massive privatization of their cigarette-producing industries starting in the early 1990s (Table 12.1). In 1991 Hungary and the Russian Federation were the first countries to privatize their tobacco enterprises,[6] and they were followed by the Czech Republic,[6] Slovak Republic,[6] Slovenia,[6] and Ukraine in 1992[6]; Lithuania in 1993[6]; Kazakhstan,[6] Poland,[107] and Uzbekistan in 1994[6]; Armenia in 1995[6]; Kyrgyzstan in 1998[6]; and Azerbaijan in 1999.[6] During the next decade, Serbia (2003)[6] and Romania (2004)[6] privatized their cigarette-manufacturing companies into MTCs. Cigarette production is still under full government ownership in only a few countries: Belarus, Bosnia, and Moldova.

Based on available data from a few countries in the African Region, private cigarette production often began before countries had gained their independence from European colonial powers. For example, BAT started private production in Ghana in 1952, before it gained independence in 1957.[108] Similarly, Kenya became independent in 1952, but private production started in 1908; in 1954, a joint venture was formed with MTCs.[76] Since the 1980s, MTCs have invested directly in African countries including Cameroon in 1986,[109] Ethiopia in 1999,[110] Tanzania in 1995,[6] Nigeria in 2000,[111] and Mozambique in 2006.[112]

## Table 12.1 Foreign Direct Investments for the Tobacco-Manufacturing Industry in Eastern Europe and Central Asia

| Country | Year | Type of investment | Market structure |
|---|---|---|---|
| Albania | 1995 | Privatization: purchased by workers and former owners[6] | — |
| Armenia | 1995 | Voucher privatization[6] | — |
| | 1997 | Joint venture: Grand Tobacco of Canada and two local companies[149] | — |
| Azerbaijan | 1997–1999 | Privatization: European Tobacco joint venture[6,149] | Oligopoly |
| Bulgaria | 2011 | Privatization of state-owned company Bulgartabac[79] | Oligopoly |
| Croatia | 1999 | Privatization: employee buyout[6] | Oligopoly |
| Czech Republic | 1992 | Privatization: PMI acquires majority of shares in state-owned Tabak AS[6,79] | Oligopoly |
| Georgia | 1998 | Privatization: no MTC investment[6,149] | Oligopoly |
| | 2001 | BAT establishes a licensed production operation[149] | Oligopoly |
| Hungary | 1992 | Privatizations: PMI acquires Eger Tobacco Factory and BAT acquires Pesci Dohanygyar[6,149] | Oligopoly |
| Kazakhstan | 1993–1994 | Privatization: PMI acquires state-owned Almaty Tobacco Company[6,79,149] | Oligopoly |
| | 1997 | Joint venture: Reemstma and Gallaher establish new factory[149] | Oligopoly |
| Kyrgyzstan | 1998 | Privatization: Joint venture between government and Reemtsma, which is later purchased by Imperial[6,149] | — |
| Latvia | 1992 | Joint venture between Danish company House of Prince and Latvian government[6,149] | Oligopoly |
| | 2001 | Privatization: House of Prince acquires full ownership (later purchased by BAT)[185] | Oligopoly |
| Lithuania | 1992 | Privatization: PMI acquires state-owned company[6] | Oligopoly |
| Macedonia | 1999 | Privatization: state-owned Tutunski Kombinat Skopje purchased by Reemtsma, which is later sold to Imperial[5,186] | Oligopoly |
| Morocco | 2003 | Privatization: Altadis (later purchased by Imperial) buys majority stake in state-owned company[5,6] | Oligopoly |
| Poland | 1995 | Privatization: BAT acquires majority shares of state-owned Przedsiebiorstwo Wyrobów Tytoniowych w Augustowie SA[107] | Oligopoly |
| | 1996 | Privatizations: PMI acquires state-owned Zaklady Przemyslu Tytoniowego Kraków[187]; Reemtsma (later sold to Imperial) acquires partial stake in state-owned WWT Poznan[188] | Oligopoly |
| Romania | 1993 | JTI & PMI establishes operations in Romania[189,190] | Oligopoly |
| | 1996 | BAT establishes operations in Romania[191] | Oligopoly |
| | 2004 | Privatization of Societatea Nationala Tutunul Romanesc SA[6] | Oligopoly |
| Russian Federation | 1992–1993 | Privatizations: RJR (later bought by JTI), PMI, BAT, & Gallaher enter the Russian Federation market through joint ventures and acquisition of formerly state-owned manufacturing plants[6,8,79,192] | Oligopoly |
| Slovak Republic | 1992 | Privatization: Reemtsma (later sold to Imperial) purchases state-owned company[6] | Oligopoly |
| Slovenia | 1991–1992 | Privatization: Reemtsma & Seita (later purchased by Imperial) acquires majority shares of state-owned Tobacna Ljubljana[6,193] | Oligopoly |

### Table 12.1 continued

| Country | Year | Type of investment | Market structure |
|---|---|---|---|
| Turkey | 1992 | Joint venture and other FDI: PMI joint venture with Sabanci Holding (a private local company); RJ Reynolds (later JTI) purchases tobacco plants[160,194] | Oligopoly |
| | 2008 | Privatization: BAT acquires state-owned Tekel[6,79] | Oligopoly |
| Ukraine | 1992–1994 | Privatization, and other FDI: PMI, Reemtsma (Imperial), BAT, RJR (JTI) acquire state- and privately owned factories[6,79,149] | Oligopoly |
| Uzbekistan | 1994 | Privatization: BAT joint venture with Uzbekistan's state-owned tobacco monopoly[6,149] | Monopoly |

*Notes:* BAT = British American Tobacco. PMI = Philip Morris International. RJR = R.J. Reynolds International. JTI = Japan Tobacco International. MTC = multinational tobacco company. Market structure is based on the market share of the leading cigarette companies in the specific country. A market was defined as a monopoly if only one cigarette producer had the vast percentage of the market. If there were a few relatively large cigarette producers, the market was defined as an oligopoly.
*Source:* Euromonitor International 2016.[4]

Investment patterns and tobacco use behavior diverge across countries. In Ghana the government took over partial ownership of the Pioneer Tobacco Company, but BAT maintained a stake and provided management to the company. For many years, BAT had a near-monopoly on tobacco production, apart from a venture by Rothmans International. In December 2006, the company closed and relocated to Nigeria. Cigarette consumption was at its peak in Ghana in 1970 but then fell and remained relatively low, likely due to early production shortages, increased prices, and a tobacco advertising ban.[108] This contrasts with Madagascar, where tobacco use remains at 49%, higher than other African countries, despite increasing tobacco control measures.[113] In 2001, Imperial bought Tobaccor Group from France and became a near-monopoly in the country and gained easier access to markets in eastern and southern Africa.[113]

In most countries in the Latin American and Caribbean areas of the Americas Region, cigarette production is dominated by BAT (with over 50% market share) and PMI (with about 40% market share).[4] During the period of mass privatization of state-owned enterprises in the 1980s and 1990s, MTCs moved in and formed either joint ventures with existing local private industries or invested directly in the countries. The only significant exceptions were the locally owned companies Cia Industrial de Tabacos SA and Cia Industrial de Tabacos Monte Paz, which have nearly 90% market shares in Bolivia[114] and Uruguay,[115] respectively.

## Countries With Significant Government Ownership

In 2014, cigarette production was still under the sole or significant state ownership of government in a number of countries (Table 12.2). Seven of these countries—Algeria, China, Egypt, Iran, Iraq, Japan, and Thailand—are among the 50 largest consumer markets.[116] Despite government ownership, in a number of these countries (Cambodia,[117] Cuba,[118] Egypt,[119] Lao People's Democratic Republic,[100] and Viet Nam[95]) MTCs operate as joint ventures where the state-owned cigarette manufacturers produce MTCs' cigarette brands.

### Table 12.2 Countries With State-Owned Tobacco Monopolies or Significant State Ownership in Tobacco Enterprises, by WHO Region, 2014

| WHO Region | Country |
|---|---|
| African | None |
| Americas | Bolivia and Cuba |
| Eastern Mediterranean | Algeria,[a] Egypt,[b] Iran,[a] Iraq, Jordan,[c] Lebanon,[c] Libya, Syria,[c] Tunisia,[c] and Yemen |
| European | Belarus, Bosnia-Herzegovina,[a] Moldova,[a] and Tajikistan[d] |
| South-East Asia | Thailand and Myanmar |
| Western Pacific | Cambodia,[b] China, the Democratic People's Republic of Korea,[e] Japan,[f] Lao People's Democratic Republic (leased), and Viet Nam[b] |

[a]The state-owned tobacco enterprise is on the pending privatization list of these countries.
[b]Foreign brands are produced by the state-owned tobacco enterprises.
[c]The tobacco industry may have become public.
[d]Information was not available to determine whether the tobacco industry is privatized.
[e]The Republic of Korea (South Korea) may invest in the tobacco industry in the Democratic People's Republic of Korea (North Korea); however, reports indicate that MTCs may be involved.
[f]The Japanese Ministry of Finance holds a 50% share of this company.
*Sources:* Data were compiled from various sources by the authors, including literature, Internet searches, government websites (Belarus, Moldova, Tajikistan, Algeria, Iran, Iraq, Jordan, Lebanon, Libya, Syria), company websites (Japan Tobacco International, State Tobacco Monopoly Administration in China [STMA], Tobacco Monopoly in Thailand, Libya, Tunisia, Syria, Moldova, Belarus), personal communication with Ministry of Finance officials (e.g., Bulgaria, Moldova, Cambodia, China, Lao People's Democratic Republic, Myanmar, Thailand, Viet Nam, Yemen) and with Ministry of Health officials and researchers (Belarus, Bosnia-Herzegovina, Tajikistan, Japan, and Tunisia).

#### Box 12.2: China: A Licensing Approach to Foreign Brands

China is by far the world's largest manufacturer of cigarettes, producing more than 2.4 trillion pieces in 2012, or about 41% of worldwide production.[4] Cigarette production is controlled by China's State Tobacco Monopoly Administration (STMA). MTCs still have very limited access to the Chinese market. The Chinese government forbids international tobacco companies from directly establishing factories in the country, and foreign brands usually are produced locally under license. For example, the brand Memphis (Gallaher/JTI) has been produced locally by Shanghai Tobacco since 2003; West (Imperial) has been produced by the Hongta Group since 2004; and Marlboro (PMI) has been produced since 2008 through a licensing deal signed in December 2005. To date, foreign brands have captured less than 1% of the licit local market.[81] MTCs may face resistance from consumers as well. A 2005 Morgan Stanley report found that Chinese smokers have high regard for domestic cigarettes and predicted that winning market share will be a difficult task for international manufacturers.[120]

### Cigarette Industry Involvement With Other Tobacco Products and ENDS

Over the past two decades, multinational cigarette manufacturers have increased their investment in tobacco products other than cigarettes. MTCs may be increasing their investment in order to appeal to new consumers, to respond to tobacco control measures and health concerns, or to gain entry to new markets. For example, in 1989, RJR test marketed a high-tech cigarette called Premier, a "heat not burn" cigarette designed to deliver nicotine without combustion, in contrast to a conventional lighted cigarette. RJR reportedly spent more than US$ 800 million developing Premier, but smokers who tried it did not like the taste, and after less than a year RJR pulled the brand from test markets.[121] Other variations of the

"heat not burn" cigarette appeared in test markets in the 1990s. Although these products did not have a significant impact, the development and marketing of new tobacco products aimed at addressing consumers' health concerns or public smoking restrictions has continued in other forms. More recently, the tobacco industry has launched new "heat not burn" products,[122] and is also developing or has bought nicotine inhaler technology that does not require a heating mechanism.[123]

After 2000, manufacturers introduced and marketed a range of new smokeless tobacco products using attractive flavorings (such as mint or fruit flavors) and new delivery methods (such as lozenges or small pouches).[124] For example, Philip Morris and RJR introduced Swedish "snus"-style smokeless tobacco products in the U.S. market. These new products carried the well-known Marlboro (PMI) and Camel (RJR) brand names to benefit from the marketing expertise and brand recognition associated with these existing product lines. Multinational cigarette companies also diversified by buying smokeless tobacco companies. For example, leading U.S. cigarette manufacturers expanded into the smokeless tobacco market by acquiring the two largest U.S. smokeless tobacco manufacturers: U.S. Smokeless Tobacco (acquired by Philip Morris USA in 2009)[91] and Conwood (acquired by Reynolds American in 2006).[92] In addition, the largest Swedish smokeless tobacco corporation, Swedish Match, entered the U.S. smokeless tobacco market in the early 2000s. By 2010, Altria (the American parent company of Philip Morris USA, which sold PMI in 2008) owned 56.0% of the U.S. smokeless tobacco market by volume, and Reynolds American had a 30.3% market share.[125]

Multinational cigarette manufacturers have also attempted to enter traditional tobacco product markets in LMICs. For example, Swedish Match, Phillip Morris, and BAT have tried (thus far unsuccessfully) to capture a portion of the massive Indian smokeless tobacco market,[126] and JTI has made inroads into the rapidly growing Nigerian smokeless tobacco market.[94] If these efforts continue, traditional markets can be expected to start selling more standardized smokeless tobacco products. Godfrey Phillips (partly owned by Philip Morris) entered the India chewing product market with a pan masala in 2010, stating that the company expected that its cigarette business would "provide the synergy to its chewing product."[127] And in 2009, PMI paid approximately US$ 225 million (1.75 billion South African rand) to purchase Swedish Match South Africa.[128]

In the mid-2000s, Electronic Nicotine Delivery Systems (ENDS), battery-powered devices designed to heat a liquid, which typically contains nicotine, entered the market; since then their use has risen rapidly in the United States and in the United Kingdom (which together hold more than two thirds of the global market) as well as in some other countries.[4,129,130] Widespread advertising via television commercials and print advertisements for popular brands, often featuring celebrities, has contributed to a rise in both adult and youth ENDS use since 2010.[131,132] These products have been marketed with a variety of messages, including that ENDS are less harmful to health than conventional cigarettes, that they can be used to quit smoking (with some websites featuring endorsements by physicians), and that they can be "used anywhere" and are thus a way to circumvent smoke-free policies.[133,134]

The speed and extent of major acquisitions and market consolidation around ENDS produced by MTCs have been very rapid. In 2012 and 2013, major tobacco companies—Lorillard, Reynolds American (which is 42% owned by BAT), Altria (Philip Morris), BAT, and Imperial—purchased or developed ENDS. Lorillard's, Reynolds', and Altria's products are marketed by subsidiary companies: Lorillard Vapor Corporation, R.J. Reynolds Vapor Company, and Nu Mark, which is owned by Altria. Lorillard acquired ENDS companies that produced Blu and SkyCig brands marketed under Lorillard Vapor Corporation.[135] In the United States, Altria introduced Mark Ten in 2014 and RJR introduced VUSE in

2014.[136] BAT released the first ENDS, Vype, in the United Kingdom in 2013.[137] In 2014, Imperial introduced its own e-cigarette, Puritane, in the United Kingdom, followed by another, Jai, in France and Italy in 2015. Imperial also acquired Blu, a U.S. e-cigarette brand, from Lorillard as part of RJR's 2014 acquisition of Lorillard.[92]

Market analysis reports in 2012 and 2013 noted that despite currently accounting for slightly less than 1% of total industry sales, ENDS have the potential to generate 15% of U.S. tobacco market profits by 2020.[138,139] A 2015 equity research report noted that "full conversion" from cigarettes to ENDS has not been achieved, and that most users are dual users with conventional cigarettes.[140] Many market analysts remain positive about the long-term growth of the tobacco industry, with ENDS playing a role but not completely replacing tobacco or nicotine products. Thus, the involvement of cigarette manufacturers in the ENDS market is likely to continue to evolve.

## Privatization and Foreign Direct Investment From a Public Health Perspective

FDI and the privatization of state-owned tobacco enterprises have fueled an ongoing public health debate. On the one hand, privatization may eliminate the conflict of interest between a government's simultaneous role in the production of tobacco and its control of tobacco use. Thus, privatization can free governments to go forward with effective tobacco control efforts. On the other hand, privatization in LMICs may be based on inadequate economic analysis, may proceed too rapidly, may open markets up to the marketing power of MTCs, and may be pursued without adequate attention to public health needs.[62] These concerns are of particular relevance for privatization in countries with economies in transition, which may lack tobacco control policies and technical capacity and be more vulnerable to privatization structures that adversely impact public health.[141,142]

As the mass privatizations of state-owned cigarette-manufacturing industries were taking place in the 1990s, concerns were raised about this process and the consequences of the global expansion of MTCs for public health. In countries that had weak tobacco control measures or lacked experience and technical capacity and did not prioritize tobacco control over economic concerns,[145] privatization of cigarette-manufacturing industries operated without a strong regulatory framework for tobacco control. This undermined national and international efforts to reduce the consumption of tobacco products and influenced important aspects of tobacco control policies.[49,51,143]

The recent broad literature review by Gilmore, Fooks, and McKee[6] goes so far as to conclude that privatization without strong regulation is a threat to public health: Privatization leads to dramatic increases in production, massive cigarette marketing campaigns, and price competition (relative to both tobacco and other goods). Consistent with marketing campaigns, smoking rates among urban populations, particularly women, increased in a number of countries after privatization.[6]

Privatization agreements were often reached with little transparency.[51,142] Members of the public health community have raised concerns that large FDIs would be very likely to create a strong bargaining position for MTCs. Public health advocates feared that MTCs would bargain (and in some countries, have already bargained) for additional provisions other than those specified under the FDI policy framework, such as agreements not to raise tobacco excise taxes or not to ban tobacco marketing. This has occurred especially in countries where MTCs contributed significantly to total FDI (e.g., Kyrgyzstan, Uzbekistan[5,49]), as well as in countries receiving a significant proportion of government revenue from tobacco excise taxes (e.g., Indonesia[100]). Unfortunately, a lack of transparency in many deals means there is limited evidence in the public domain. Public health experts have cautioned that

such arrangements can severely undermine tobacco control efforts and may have implications for future tobacco control efforts in host countries.[142] For most countries after privatization, tobacco industry growth has been accompanied by successful lobbying against excise taxes, limits on advertising, limits on smoking in public places, and other tobacco control policies.[5] Unlike their predecessor state monopolies, privatized tobacco companies often "circumvent existing legislation and work assiduously to overturn unfavourable legislation and create new favourable legislation in ways that SOTMs [state owned tobacco monopolies] did not…. [P]rivatisation augments both the capacity and motivation of the supplier to increase production and marketing and dilute the impact of regulation."[6,p.637]

Going beyond the health impact, Gilmore and colleagues[6] found that privatization has been less beneficial than expected when (1) governments have not sought competitive tenders for sale of state enterprises; (2) governments have granted tax concessions in privatization agreements; (3) foreign investors have been complicit in smuggling, which reduces tax revenues; and (4) foreign investors have shifted from locally grown to internationally sourced tobacco leaf.

Countries have had very different experiences with the process of privatizing their cigarette-manufacturing industries and have different market structures and existing tobacco control infrastructure. Thus, generalizations about the privatization of cigarette enterprises must be made with care, because many factors may influence tobacco control policies (e.g., tobacco marketing bans, taxation level of cigarettes) and the environment in which such measures are implemented. The following sections describe experience with privatization across diverse contexts: among countries of the former Soviet Union; among countries that retain cigarette production under government ownership; and among some countries that have had success after privatization.

### The Privatization Process in Former Socialist Countries of East and Central Asia

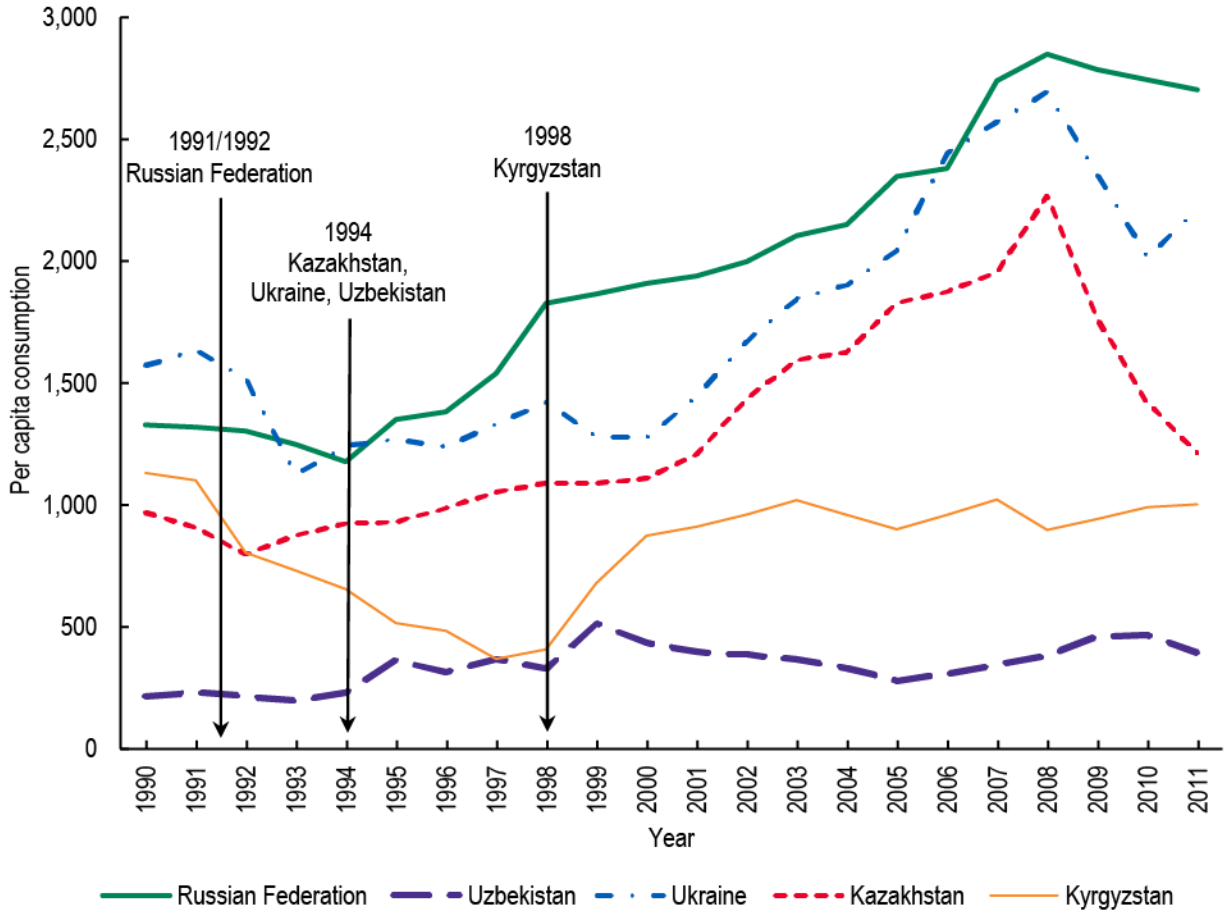
Extensive research has shown that in former socialist countries in East and Central Asia, privatization of cigarette-manufacturing industries proceeded rapidly and was completed without appropriate tobacco control measures in place. As discussed previously, most countries of the former Soviet Union completed the privatization of their cigarette-manufacturing industries between the mid-1990s and late 1990s. Data from 2008 and 2010 indicate that these countries have struggled to adopt strong tobacco control measures, lack bans on tobacco marketing, and have low prices and taxes on tobacco products.[144–146] These countries also experienced new, aggressive, and sophisticated marketing from MTCs, and many received technical support on excise taxation from MTCs, which have a strong vested interest in low tax rates.

During the privatization process of the state tobacco industry in Moldova, BAT developed strategies to prevent the implementation of tobacco control legislation on tobacco marketing. According to industry documents, without advertisement restrictions, BAT estimated that per capita consumption would grow from 1,250 cigarettes in 1994 to 1,650 cigarettes in 2003.[51]

During the privatization process in former socialist countries, civil society, institutions, and policymakers had limited engagement with tobacco control issues and limited ability to administer and enforce existing regulations. Tobacco companies were able to take advantage of the lack of existing tobacco control capacity and experience to influence tobacco control policies in these countries. For example, Szilágyi and Chapman[9] clearly describe how MTCs tried to abuse the existing ban on tobacco advertisement and promotion in Hungary and successfully lobbied to get it weakened.

When observing the effects of the privatization of cigarette-manufacturing industries in countries of the former Soviet Union, identifying which problems are inherent in privatization and which may be specific to the tobacco industry is complex. The experiences of these countries show that privatization of cigarette-manufacturing industries has increased the sales and marketing of cigarettes. This situation has been exacerbated by MTCs' aggressive efforts to control new markets, especially in the countries of the former Soviet Union,[62] and the high speed at which these countries sought premature privatization. As shown in Figure 12.3, the Russian Federation, Kazakhstan, Ukraine, Kyrgyzstan, and Uzbekistan experienced increases in tobacco consumption after the privatization of their state-owned cigarette-manufacturing industries. One of the most important factors affecting consumption is the excise tax system; the Russian Federation has one of the lowest tax rates on cigarettes in the world, and the tax rates of the other former Soviet countries are generally low on a global scale. For comparison, in 2008 the proportions of cigarette retail prices attributable to tax were 74% in Hungary, 20% in Kazakhstan, 71% in Lithuania, 94% in Poland, 37% in the Russian Federation, 45% in Ukraine, and 32% in Uzbekistan.[147] These countries have had divergent experiences since privatization.

**Figure 12.3 Per Capita Consumption of Cigarettes in Selected Countries of the Former Soviet Union, and Year When Privatized Cigarette Production Began, 1990–2011**




*Note:* Multinational tobacco companies (MTCs) entered the market in Ukraine in 1992, but production did not start until 1994. Similarly, negotiations between MTCs and Kyrgyzstan began in 1994, but the MTC did not start production until 1998.
*Source:* ERC Group 2011.[148]

In the Russian Federation, smoking prevalence increased dramatically from 1992 to 2003, particularly among women (from 6.9% to 14.8%) and in rural areas (where prevalence tripled among women).[151] Studies have identified two major reasons for this increase. First, MTCs employed aggressive advertising campaigns. For example, in Moscow, cigarette advertising was placed on 50% of all billboards and 75% of all plastic bags.[149] Industry documents reveal that MTCs waged a calculated campaign to expand the cigarette market to women and young people.[143] Secondly, MTCs have introduced new kinds of cigarettes that were attractive to nonsmokers, such as a number of filtered cigarette brands. Before privatization, Russian cigarettes had tended to be unfiltered; the proliferation of filtered cigarettes made smoking more palatable to women and young people.[67] MTCs employed similar advertising strategies in Kazakhstan. After buying a substantial share in Almaty Tobacco in 1993, Philip Morris aggressively targeted rural areas with advertisements in the local language that glorified agricultural life and appealed to hopes for prosperity.[150] At the same time, a strong tobacco lobby successfully opposed new advertising restrictions.

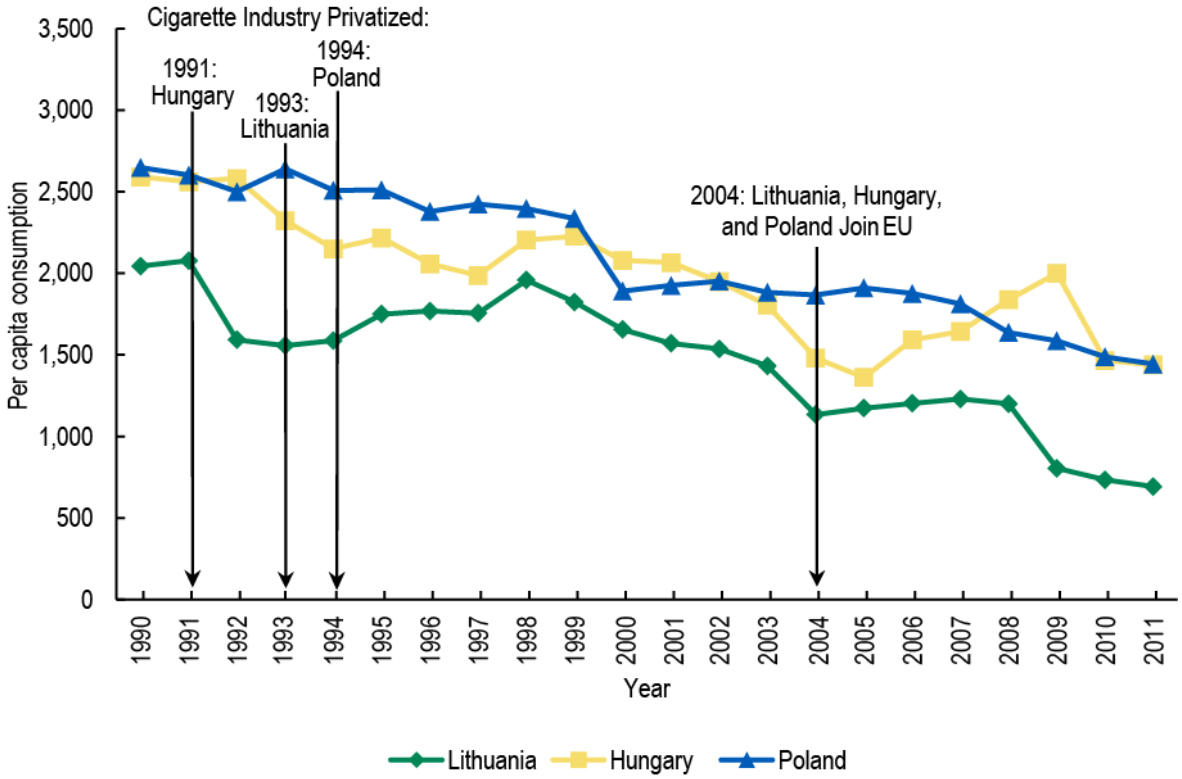
In Ukraine and Uzbekistan, tax reductions accompanied the privatization process, which was followed by increased consumption (Figure 12.3). In Ukraine, cigarette taxes were reduced in the mid-1990s and did not return to their 1995 level until 2007, and consumption subsequently declined.[72] BAT invested in the tobacco industry in Uzbekistan in late 1995 and worked to ease previously enacted advertising and smoking bans and manipulate the tax system to keep its prices low while minimizing competition. According to industry documents, BAT also actively took advantage of the Uzbek Ministry of Finance's lack of expertise in tobacco taxation. Using its influence in the government, BAT helped draft legislation that halved the excise tax on domestically produced cigarettes while introducing high, protective import taxes.[151] BAT was also given an exemption from import taxes for its first 5 years of operation in the country.[152] Uzbekistan has a strong industry lobby that has opposed changing the tax rates on cigarettes.[151,152] In 2005, Uzbekistan changed its tax system on cigarettes from *ad valorem* to a tier-specific excise tax, but did not raise the specific tax to keep up with inflation from 2005 through 2008.[153] This inflation-erosion of the tax is a factor in the 25% increase in cigarette consumption in Uzbekistan between 2005 and 2009.[72]

Kyrgyzstan sold its Bishkek tobacco factory to Germany's Reemtsma in 1998. For the next 6 years, cigarette consumption increased steadily in Kyrgyzstan (Figure 12.3). However, this increase should be considered in light of two important factors. First, smuggled cigarettes accounted for a large portion of the market before privatization in Kyrgyzstan, and as discussed previously, large-volume smuggling of cigarettes is known to be a tool MTCs use to create a market for their products before they are available legally.[6,154] As expected, a shift back to legal cigarettes occurred after privatization in 1998. According to data from ERC Group,[72] however, a good estimate of the entire market size of Kyrgyzstan is not available after 1990, when smuggling was likely low and legitimate sales were at a level to which they have not returned. Second, prices fell in 1997 when the excise tax per 1,000 pieces was cut from US$ 5.00 to US$ 1.50.[72] Thus, differentiating between the effects of privatization and other factors affecting consumption (price, in this case) is difficult.

Results are different in former socialist countries that have successfully implemented strong tobacco tax policies. Lithuania privatized its cigarette-manufacturing industry in 1993 and joined the European Union (EU) in 2004. Between 2001 and 2005, its smoking population increased slightly because of an increase in the number of female smokers from about 232,000 in 2001 to about 244,000 in 2005.[4] To comply with EU requirements, Lithuania had until January 2010 to adopt the taxation and duty levies required by the EU. By 2008, Lithuania had implemented many tobacco control policies, and total taxes

accounted for 71% of the retail price of a pack of 20 L&M cigarettes, the most popular brand in the country.[147] In 2009, the specific excise taxes made up 31.2% of the retail price and the *ad valorem* excise taxes were 25%.[72] As a result of tobacco control policies and taxation, consumption from 2005 to 2008 was well below its peak in the early 1990s (Figure 12.4). After more than 10 years of privatization, the process has been relatively successful from a public health perspective in Lithuania partly because of sustained pressure from anti-tobacco groups and the country's accession to the EU in 2004.

**Figure 12.4 Per Capita Consumption of Cigarettes in Lithuania, Hungary, and Poland, and Year When Privatized Cigarette Production Began, 1990–2011**




*Sources:* ERC Group 2009[72] and 2011.[148]

Cigarette consumption trends in Hungary and Poland were similar to those in Lithuania.[155] Despite the significant contraband sales estimated by the industry, total consumption has declined in both Poland and Hungary since the high levels of the early 1990s (Figure 12.4). The successes of Hungary and Poland can be attributed partly to their 2004 accession to the EU and to its requirements; both countries have been increasing their taxes to comply with these requirements. Poland's tobacco industry was privatized over the course of the mid- to late 1990s.[156] In November 1995, Poland enacted a broad tobacco control law (Act on the Protection of Public Health Against the Effects of Tobacco Use),[157] which included public smoking restrictions, educational anti-smoking efforts, free availability of cessation treatment, banning tobacco advertising, and disclosing the ingredients in tobacco products. The Act was eventually amended to include health warning labels, reductions in tar and nicotine levels, a comprehensive ban on tobacco advertising and promotion, and earmarking 0.5% of excise tax revenues for a national tobacco prevention program. As a result of these and other efforts, tobacco consumption in Poland declined from 101 billion pieces in 1990 to 55 billion pieces in 2011, a

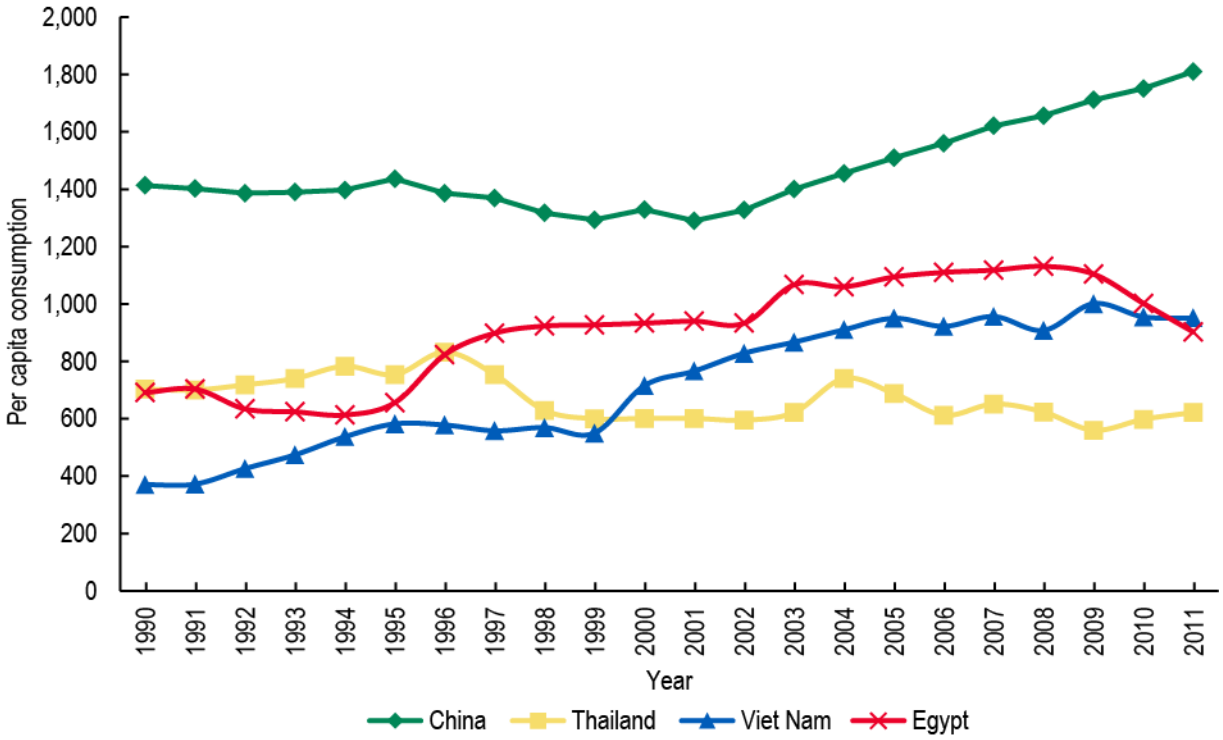
substantial improvement for a country that had one of the world's highest rates of tobacco consumption in the 1980s.[156]

### Experiences of Countries That Retain State-Owned Tobacco Enterprises

In most countries that retain state-owned tobacco enterprises, cigarette consumption has continued to rise over the past two decades. Figure 12.5 shows trends in consumption in four such countries. Egypt and Viet Nam saw overall increases in per capita consumption during this period. In Egypt, retail sales declined after a series of tax hikes that began in 2010.[119] Thailand has retained its own cigarette-manufacturing industry but has nonetheless achieved long-term reductions in cigarette consumption. Thailand's strong civil society, active medical groups, and vigorous government commitment to strong tobacco control policies, which are not present in other countries discussed here, contribute to this trend. Additionally, Thailand used tobacco tax increases to fund development of a semi-autonomous foundation for public health, ThaiHealth.[158]

In China, CNTC has 98% of the Chinese market, and from 2000 to 2011, consumption in China rose from 1,329 to 1,810 pieces per capita per year (Figure 12.5).[72] In 2012, taxes made up only 10% of the typical retail price of a pack of cigarettes.[159] Because of its leading position in market share and its strategy for international growth, China's tobacco industry is discussed later in this chapter.

**Figure 12.5 Per Capita Consumption of Cigarettes in Four Countries (China, Egypt, Thailand, and Viet Nam) With State-Owned Tobacco Enterprises, 1990–2011**




*Source:* ERC Group 2011.[148]

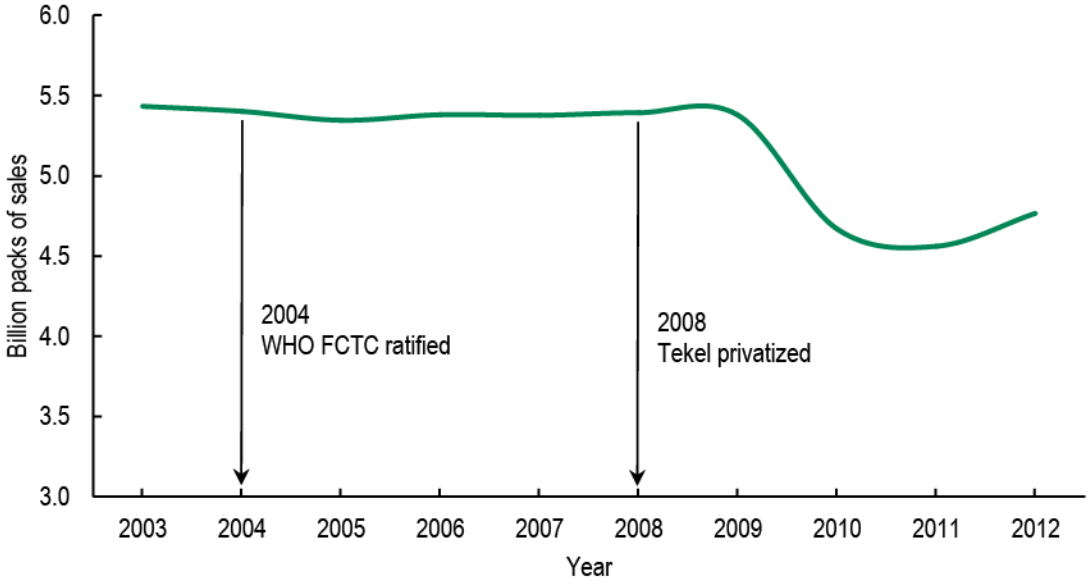
### Successful Tobacco Control After Privatization: Turkey

Turkey kept Tekel, its state-owned tobacco industry, until 2008. However, in 1984 the Turkish government began allowing foreign companies to sell their products in Turkey, and in 1991 the government began allowing them to invest directly to produce their products in Turkey. In 1994-1995, foreign companies started producing cigarettes in Turkey in addition to the state-owned cigarette-manufacturing industry.[160]

In 1996 Turkey passed a tobacco control act that included a complete ban on tobacco advertising and promotion and restricted smoking in public places.[163] Despite the law, per capita consumption of cigarettes increased to 1,706 pieces in 1999. After 1999, however, per capita consumption of cigarettes declined steadily, reaching 1,438 pieces in 2007, a difference of 15.7%.[72] At the same time, MTCs stimulated higher demand for their products and increased their share of the market. Per capita consumption of MTC brands increased by 32%, from 779 pieces in 2003 to 1,030 pieces in 2007. By 2007, Tekel held only 32% of the tobacco market in Turkey.[4]

The overall reduction in cigarette consumption between 1999 and 2008 was partially due to steady increases in taxes and, hence, the real and nominal prices of cigarettes. Then, after the privatization of Tekel in 2008, a substantial tax increase had a very measurable impact on consumption (Figure 12.6). Between late 2008 and mid-2010, the excise tax per pack of cigarettes increased to 63% of the retail price, and the average retail price of a pack of cigarettes increased 29%.[161] In addition, after privatization, the government introduced a stronger comprehensive tobacco control law which became effective in mid-2008, and Turkey joined 17 other countries in implementing comprehensive national smoke-free policies.[161]

**Figure 12.6 Sales of Packs of Cigarettes Before and After Privatization of Tekel in Turkey, 2003–2012**




*Notes:* Sales refers to sales of cigarettes made by all producers, including multinational tobacco companies and Tekel. WHO FCTC = World Health Organization Framework Convention on Tobacco Control.
*Source:* Euromonitor International 2016.[4]

## China as a Market Leader

China's state monopoly—the China National Tobacco Corporation—merits special attention due to its size and global impact. In 2014, it was the world's largest tobacco company, with a 44.2% share of the world market (PMI was next at 16.7%)[4] and seven of the top ten brands.[162] CNTC was the world's largest producer of cigarettes, and it had the largest number of domestic customers (300 million in 2010).[163] Nominally, China's regulator is the State Tobacco Monopoly Administration. Although its policy role is distinct from CNTC's operational business, STMA and CNTC share the same leadership, structure, and website.[163]

CNTC contributed US$ 94 billion in profits (2011) and US$ 170 billion in tax revenue (2012) to the Chinese government, which amounted to 7% of the government's total revenue.[162–164] The retail value of CNTC's tobacco sales was projected to grow 91% between 2010 and 2015.[163,165] The CNTC strategy, as described by observers, is to (1) consolidate from provincial monopolies to a national monopoly with a tiered structure of national brands (low-end to premium), (2) market with Chinese cultural icons, "health" claims (such as low-tar, light, and mild), and corporate social responsibility (e.g., sponsorship of 100 schools named after tobacco brands), and (3) use research and product development to target women and young smokers with flavorings, fashionable packages, and "young" marketing via sporting events.[156,163,164]

In order to support its premium brands, CNTC is developing an international supply chain, which includes FDI. In 2013 CNTC created a subsidiary in North Carolina, China Tobacco International of North America, to manage its contract relations with U.S. tobacco farmers.[40] Tobacco remains the largest cash crop in North Carolina; exports grew by 10% in 2013.[166] In 2014, CNTC's Brazilian subsidiary created a joint venture with Alliance One to grow tobacco leaf for export to China.[39,167]

CNTC is projected to achieve 50% of global market share by 2050. Currently, the company exports less than 1% of the 2.27 trillion cigarettes it produces,[168] but observers have stated that CNTC aims to expand its international presence using a three-part strategy.[163] First, CNTC will harness its production efficiency—factories that can produce 400 packs per minute—and export more cigarettes made in China.[162] Second, it will establish production of Chinese brands abroad. The first factories are in Romania, Cambodia, Lao People's Democratic Republic, and Myanmar.[163] Third, it will license its brands for production and sale by other companies abroad.[163] To implement this strategy, CNTC is recruiting support from other global tobacco companies: JTI, Imperial, and PMI. Under this arrangement, multinational companies gain access to the Chinese market in exchange for their expertise in technology, management, marketing, and distribution.[163]

The PMI joint venture allows CNTC expanded access to produce and sell Marlboro cigarettes in China. In exchange, a CNTC subsidiary has begun a joint venture with PMI, which started by marketing Chinese heritage brands in Europe and Latin America.[163,164] After building upon PMI's marketing network, CNTC aims to develop Chinese brands like Hongtashan to compete with Marlboro on a global scale. Both companies may expect to profit through this embrace of collaboration and competition.[163] For its part, PMI's ambition, in the words of an industry analyst, is "to become CNTC's key strategic partner and thus be in a position to capture any meaningful opportunity that may arise should state control of the industry ever be relaxed."[169]

At the same time, China has shown progress toward stronger tobacco control measures and WHO FCTC implementation, both at the national and local level. In November 2014, the State Council published proposed rules that would ban all forms of advertising, prohibit indoor smoking in public places (now a matter of municipal discretion), and expand pictorial health warnings to 50% of the pack.[170] A number of cities, including Beijing in 2015, have implemented comprehensive smoking bans which include workplaces and hospitality venues. However, it remains to be seen how these tobacco control efforts will be balanced against state interests in tobacco production and sales.

## Trends in International Investment Law

The era of tobacco privatization overlaps with two other trends. One is trade liberalization, which has accelerated since the 1990s with implementation of the WTO, its family of trade agreements, and hundreds of regional and bilateral trade agreements. The other is the growth of international investment agreements, which include bilateral investment treaties and investment chapters of free trade agreements.

As reported by Baker and colleagues,[33] global tobacco companies use FDI to take advantage of market access they have gained from the reduction or elimination of tobacco tariffs through trade negotiations. Regional and bilateral trade agreements also benefit MTCs by expanding market access rules to cover trade in services and strengthening protection of trademarks and other intellectual property rights. The most significant service sectors for tobacco include wholesale distribution, retail distribution, packaging, and advertising.

IIAs provide investor–state dispute settlement, which is an international arbitration process under which investors can seek compensation for laws, regulations, or other government measures that allegedly violate investment obligations. ISDS offers an additional procedural right to foreign investors by permitting them to bring claims at the international level, rather than solely in domestic courts. Some countries have been able to limit the scope of protected investments in order to manage the impact of ISDS on domestic law, such as by excluding tobacco-related investments.

IIAs protect investors in the event of expropriation, denial of "fair and equitable treatment" (FET), discrimination (national treatment and most-favored-nation treatment), and limits on transfer of assets of capital flows, among other protections. Global tobacco companies have made use of the first two:

- *Indirect expropriation* rules protect against government measures that have an effect equivalent to seizing the property of investors without just compensation. Arbitrators have upheld regulations (including bans) as a legitimate exercise of police powers, but the outcome depends on the facts of each case.[171]
- *Fair and equitable treatment* has a range of interpretations, and in some treaties is qualified, but in general it provides a minimum level of treatment for investors, including, for example, protection from a denial of justice.[171]

### Tobacco Industry Litigation

PMI has used ISDS to challenge strong tobacco control measures, and along with BAT, it has also financed several countries' parallel disputes under the WTO dispute settlement system. In two investment disputes PMI has sought millions of dollars in compensation from Australia (for its plain [standardized] packaging law)[172] and Uruguay (for its increased-size pictorial health warnings and

requirement that each brand only have a single presentation in an effort to ban misleading brand variants).[173] Both claims focused on indirect expropriation and FET. For example, in the Australia dispute brought by Philip Morris Asia under a BIT, the company argued that the plain packaging legislation amounted to an "unlawful expropriation" of its investments in Australia.[172,¶7.3]

Both legal challenges have since ended. On December 17, 2015, the tribunal overseeing the Australian case issued a unanimous decision finding that Philip Morris Asia's claim was "an abuse of rights" because the company would have been aware of the pending legislation when it acquired the Australian subsidiary and did so "for the principal, if not sole, purpose of gaining treaty protection."[174,p.184] The tribunal therefore ruled that it did not have jurisdiction to hear the claim.[174] Regarding the Uruguay dispute, on July 8, 2016, the tribunal ruled against Philip Morris on all claims.[175]

One immediate impact of tobacco-related trade and investment disputes can be to cause delays in the process of implementing strong tobacco control measures, sometimes referred to as "regulatory chill."[176] Countries—notably Hungary, Ireland, France, New Zealand, and the United Kingdom—moved ahead with legislation despite the threat of litigation.[177–180] Tobacco companies have also threatened countries with future litigation in an effort to counter proposed tobacco control measures. For example, when the government of Togo was considering adoption of plain-packaging legislation, the country received a letter from Philip Morris cautioning that the proposal would violate binding international trade agreements and provide tobacco manufacturers with the right to "significant compensation."[181] ISDS disputes can be very expensive to litigate, especially for small LMICs. The tobacco industry has successfully recruited a broad business coalition to warn that governments risk litigation based on treatment of tobacco companies and trademarks.[182]

## Summary

Globalization is an inexorable trend for industries in general, including tobacco. Two key aspects of globalization are investment and trade.

The clear trend is toward further concentration of the tobacco industry in the hands of a few large MTCs. This concentration is driven in part by global initiatives to reduce investment barriers through bilateral and multilateral trade agreements. These initiatives enable MTCs to seek production efficiencies, lower costs, and extend their markets at a time when governments have been increasingly privatizing to raise capital and reduce debt. Thus, forces for privatization and FDI as well as mergers and acquisitions affect the process of industry consolidation, a process that is at work in the tobacco industry as well as in many other industries.

Concentration in the tobacco industry has resulted in substantial consolidation, such that five firms (four MTCs and one state-run company) controlled 85% of the global tobacco market as of 2014.

These trends have had differing specific results in different countries, though it is clear that privatization and consolidation in this sector pose major challenges for public health efforts. Going forward, this environment presents both a major challenge and an opportunity for public health. On the one hand, many countries have been and are at risk from the marketing of tobacco products, and many privatization agreements have had a negative impact on tobacco control efforts. On the other hand, with tobacco manufacturing now in the hands of the private sector in most countries, governments may be

able to move forward with tobacco control and public health efforts without the conflicts of interest inherent in operating state-owned tobacco enterprises.

Privatization was largely completed by the end of 20th century, when state-owned facilities changed ownership either fully or partially to MTCs in most countries worldwide, with a few exceptions. China's state-owned tobacco company, with over 40% of the world's cigarette market share distribution, is the major exception. Many governments had great expectations from these transfers to foreign investors, including higher export earnings, greater employment opportunities in tobacco production, increased tax revenues, and a higher standard of living for tobacco farmers due to better yields, quality, and prices for tobacco production supported by the MTCs. As a result, governments are often reluctant to act on strong tobacco control policies in hopes that multinational tobacco companies will stay in their countries and fulfill these expectations. Currently, however, little or no research shows the extent to which MTCs have met these expectations**.** At the same time, as part of ongoing consolidation and cost-cutting practices, MTCs have been closing their production facilities in a number of countries, costing governments unemployment benefits and loss of tax revenues from income and profit taxes. MTCs may use the threat of such consolidation to influence decision-makers toward weaker tobacco control policies.

Additionally, following trends in global trade, tobacco companies have sought to use trade agreements and IIAs to challenge tobacco control laws in some countries. This practice follows the tobacco industry's history of using litigation as a systematic strategy against tobacco control policies, at both the local and national levels, in many countries. The advent of trade and investment treaties has created new opportunities for tobacco product manufacturers and their representatives to delay or obstruct tobacco control policies around the world. Because of its vast financial resources, the tobacco industry is a formidable opponent in litigation; the industry's resources often dwarf those of countries and subnational jurisdictions that must defend their policies. Sometimes the mere threat of litigation may be sufficient to intimidate countries into delaying or abandoning tobacco control measures. Recently, countries negotiating the Trans-Pacific Partnership Agreement have recognized this problem by adding, for the first time in any trade agreement, a general exception that allows any party the right to deny the benefits of ISDS with respect to any claims challenging a tobacco control measure.[183]

## Research Needs

Recent studies have provided crucial evidence of the correlation between privatization, market liberalization, and investment in the growth and efficiency of the tobacco industry. However, ongoing research is needed to continue to study the long-term impact of privatization and FDI in different environments as well as trends in tobacco use in countries that retain government ownership of tobacco enterprises. This research is essential, and it should be expanded to focus on China's state monopoly, its impact on tobacco control, and its relationships with other global tobacco companies. As with other aspects of tobacco control, ongoing surveillance is needed to monitor the use of international trade and investment treaties to influence tobacco control policies.

Research is also needed to better understand tobacco industry strategies to both shape and use trade and investment treaties to promote tobacco use and to interfere with countries' efforts to implement tobacco control policies that accord with the WHO FCTC and its guidelines. Research is needed regarding the tobacco industry's strategies and tactics to counter tobacco control measures—to block, diminish, or delay implementation of the most innovative and robust components of tobacco control—as well as the options available to countries to address these industry actions.

## Conclusions

1. Over the past few decades, the privatization of domestic tobacco companies and direct investment by multinational tobacco companies, particularly in low- and middle-income countries, have contributed to the globalization of the tobacco industry.
2. The impact of privatization on public health is varied and is influenced by the strength of domestic regulation. Some countries have implemented strong tobacco control measures after privatization, leading to reductions in tobacco use. However, in the majority of countries, privatization leads to significantly greater efficiency and production, massive marketing campaigns, and increased cigarette consumption—particularly among women and young people.
3. China's state tobacco monopoly is a market leader, with over 40% of global cigarette market share, almost all of which is consumed domestically. The China National Tobacco Corporation appears poised to expand beyond domestic sales by using foreign direct investments, partnerships with multinational tobacco companies, development of an international supply chain to support its premium brands, and by other means.
4. Increasingly, the tobacco industry is using trade and investment treaties to challenge innovative tobacco control policies. The tobacco industry also uses the threat of litigation, with its attendant costs, and lobbying campaigns to deter governments from advancing tobacco control policies, especially in low- and middle-income countries.

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## Section 5
## Policy and Other Influences on the Supply of Tobacco Products

# Chapter 13
# Licit Trade in Tobacco Products

# Chapter 13
# Licit Trade in Tobacco Products

The liberalization of trade in recent decades has affected the global market for tobacco products and has been shown to affect cigarette consumption, particularly in low- and middle-income countries. This chapter examines the current state of licit trade in cigarettes and tobacco leaf and its impact on tobacco control efforts. Specific topics include:

- Import, export, and price trends for both cigarettes and tobacco leaf across different countries and world regions
- The potential impact of trade liberalization on cigarette consumption, as revealed by a review of the literature and by economic analyses
- Global, regional, and bilateral trade agreements and their impact on tobacco use.

The current trade environment for tobacco leaf and tobacco products underscores the importance of implementing and enforcing effective tobacco control policies, particularly in ways that do not discriminate between imported and domestic products. Broad policies, such as tobacco excise tax increases, bans on smoking in public places and workplaces, packaging and labeling measures, and comprehensive bans on marketing, are important tools for controlling tobacco use and mitigating the impact of trends in international trade.

## Chapter Contents



## Figures and Tables

## Introduction

The past few decades have seen an expansion of international trade in tobacco leaf and tobacco products due to increased economic globalization (see chapter 12 for further discussion on globalization). This expansion has been spurred by global, regional, and bilateral trade agreements that reduce tariff and non-tariff barriers to trade and facilitate the investments of multinational tobacco companies (MTCs) in new markets. The increased competition that results frequently leads to lower tobacco product prices and more aggressive marketing efforts which increase tobacco use and its adverse health consequences. Trade liberalization is likely to have its greatest impact on low- and middle-income countries (LMICs) because of their historically less open markets and generally weaker tobacco control policies.

This chapter provides an overview of trends in the trade of tobacco leaf and tobacco products by World Health Organization (WHO) Region and country income group, using data from the Food and Agriculture Organization of the United Nations (FAOSTAT). (Note that quantities of tobacco leaf and tobacco products are expressed in tonnes, a unit of mass equal to 1,000 kg, or 2,204.6 pounds.) Tobacco products in this chapter generally refer to cigarettes, due to limited data for other tobacco products. This chapter discusses empirical evidence on the effects of trade liberalization on tobacco use and provides new estimates that update and extend previous research. It also describes major global, regional, and bilateral trade agreements, their implications for tobacco trade, and their impact on tobacco control regulations. The chapter emphasizes the need for strong tobacco control policies to offset the impact of increased trade in tobacco.

## Overview of Tobacco Trade

### Trends in Global Trade

#### *Tobacco Leaf*

International trade in tobacco leaf has trended upward during the past few decades. Most of the countries trading tobacco are net importers of tobacco leaf; of the 164 trading countries (or territories) in 2012, only 45 (27.4%) exported a higher value of tobacco leaf than they imported.[1]

In 2012, global trade in tobacco leaf represented only 0.97% of the total value of agricultural imports and 0.91% of the total value of agricultural exports.[1] However, trade in tobacco leaf is a significant economic activity for some countries. In Paraguay, trade in tobacco leaf accounted for 13.9% of the total value of imported agricultural products; in Zimbabwe, that figure was 11.3%, and in Malawi, 10.6%.[1] For all other tobacco-trading countries, the share was less than 10%. When the export earnings from tobacco leaf are compared with total agricultural export earnings in 2012, the proportion is much higher for Zimbabwe (61.4%) and Malawi (60.1%). In 2012, value from tobacco exports relative to total agricultural exports was also high in Mozambique (38.0%), Macedonia (23.1%), Bangladesh (15.9%), Zambia (12.0%), and Tanzania (11.9%).[1]

In 2012, approximately 52% of the world's tobacco leaf was exported by just five countries: Brazil (23.6%), India (8.9%), People's Republic of China (8.0%), the United States (6.2%), and Malawi (5.3%).[1] Approximately 37% of global tobacco leaf imports in 2012 were accounted for by five countries: the Russian Federation (9.5%), the United States (8.3%), China (6.9%), Germany (6.6%), and the Netherlands (5.8%).[1]

The quantity of tobacco leaf exports increased fairly steadily between 1980 and 2009, followed by a slight decrease beginning in 2009-2010 (Figure 13.1). Between 1980 and 2002, the value of tobacco leaf exports fluctuated, but export value has risen fairly steadily since 2002.[1]

The quantity of tobacco leaf imports generally increased from 1980 to 2012. Import values varied during this same period, but generally trended upward after 2007 (Figure 13.2).

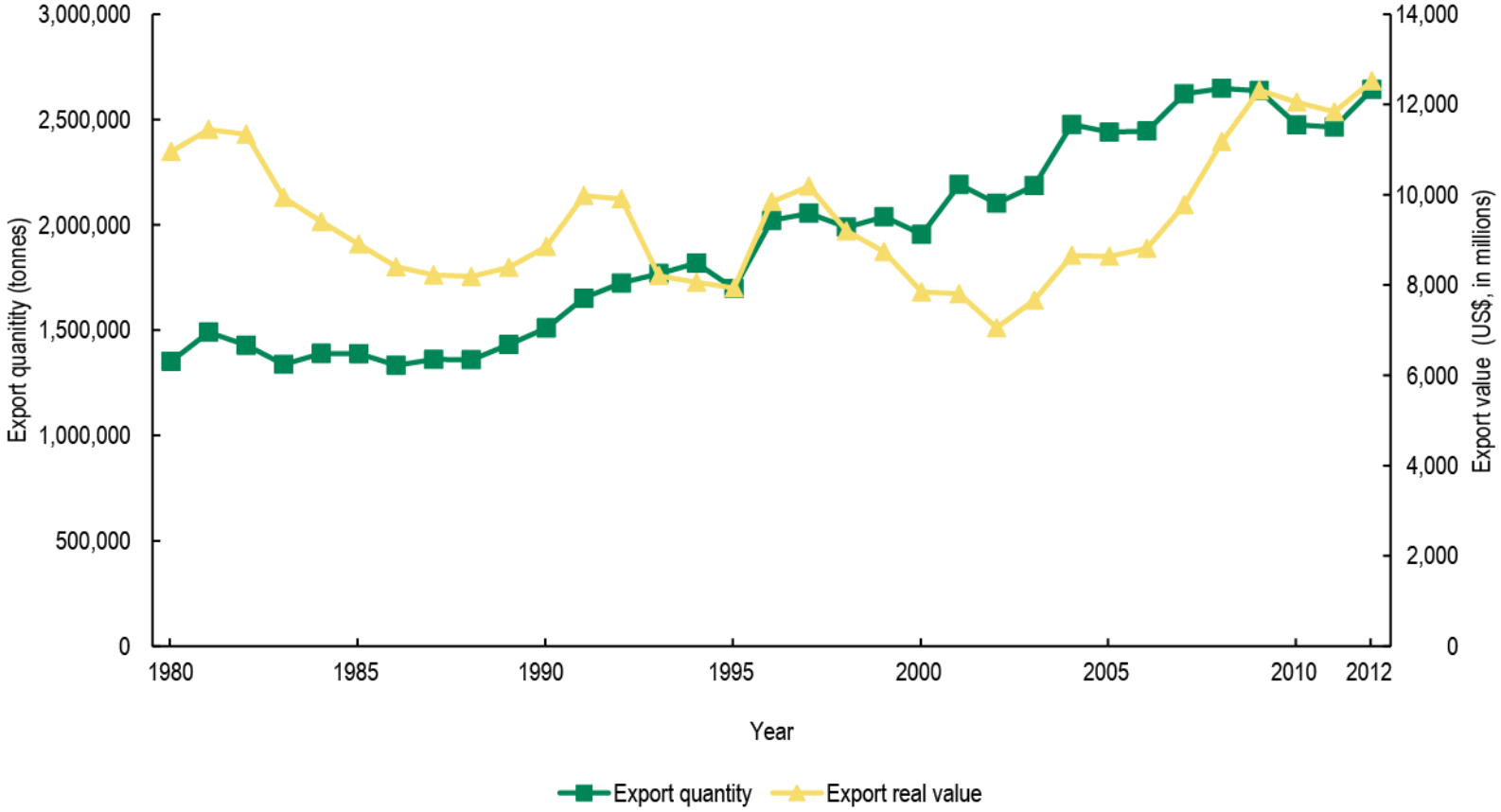
Until the early 1990s, high-income countries (HICs), most notably the United States, were the leading tobacco leaf exporters (Figure 13.3). Since then, upper middle-income countries have become the leading exporters. In 2012, upper middle-income countries accounted for 42.9% of the global quantity of tobacco leaf exported, and HICs accounted for 23.0%. The remaining exports came from low-income countries (18.6%) and lower middle-income countries (15.5%). When the value of exports is compared, HICs have a lower share (29.4%) of the global value than LMICs (70.6%).[1]

Figure 13.4 shows trends in tobacco leaf import quantity by country income group. HICs have accounted for most of the tobacco leaf imports for many decades (60% in 2012). This high rate of imports was driven by the significant cigarette production in these countries, even in those that were large tobacco growers and exporters (e.g., United States, Germany). HICs have increasingly relied on imports of low-priced, high-quality leaf from LMICs. In contrast, low-income countries import little tobacco leaf because of their limited role in global cigarette manufacturing.[1]

The Region of the Americas exported the largest amount of tobacco leaf—36.4% of global exports in 2012 (Figure 13.5), Brazil exported the largest quantity, followed by the United States, Argentina, Canada, and Guatemala. The European Region was second, with an overall percentage of 21.8%; top European exporters were Belgium, Italy, Turkey (a large grower and trader of oriental tobacco), the Netherlands, and Greece. The African Region was third (19.1%), mainly because of large quantities of tobacco leaf exported by Malawi, Zimbabwe, Tanzania, Mozambique, and Zambia.[1]

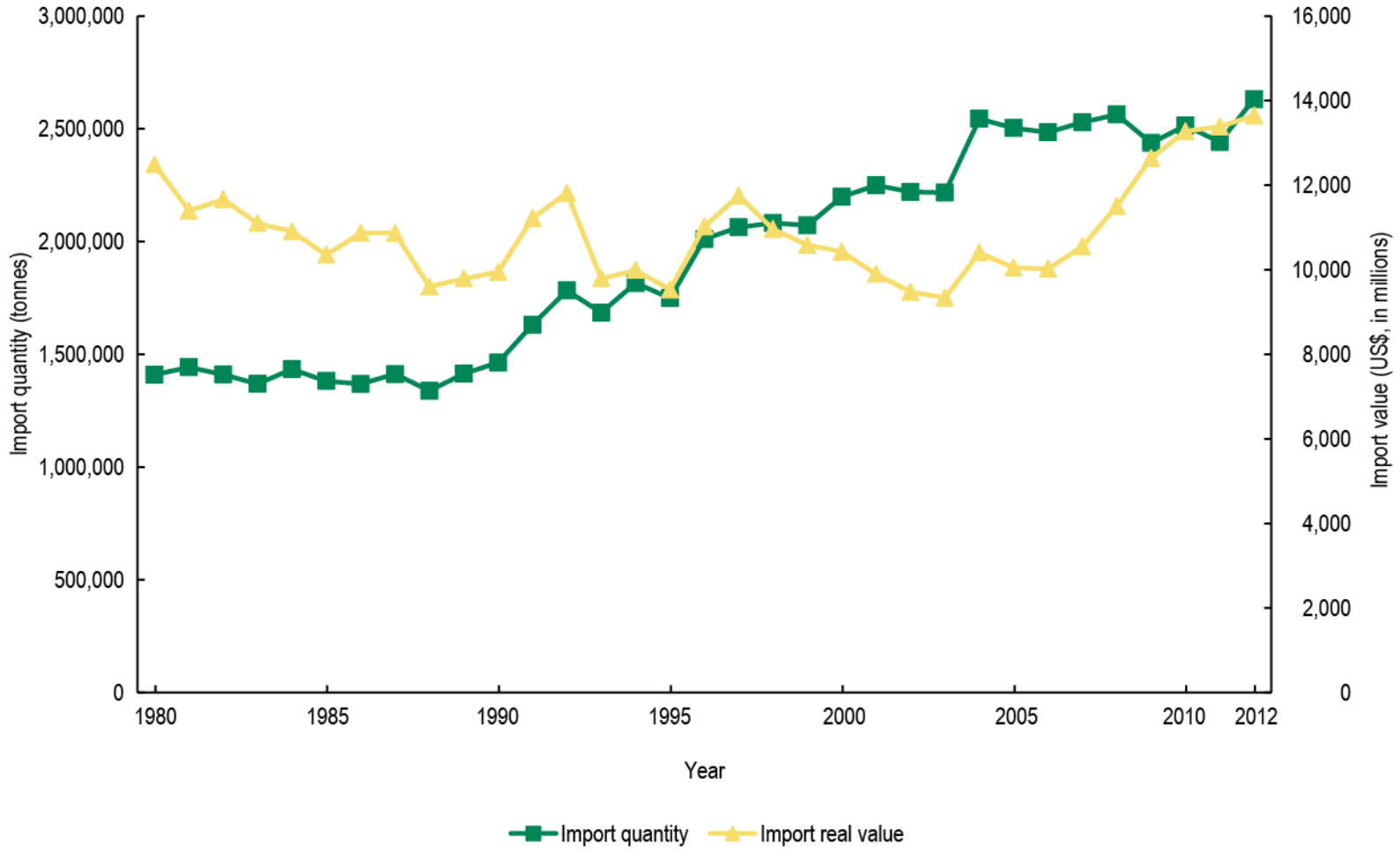
European countries, led by the Russian Federation, Germany, the Netherlands, France, and Belgium, were the largest importers of tobacco leaf, accounting for 51.6% of global leaf imports in 2012 (Figure 13.6). The Western Pacific Region and the Americas Region were next with 18.3% and 14.1% of global leaf imports, respectively, followed by smaller shares for the South-East Asia (5.8%), African (5.6%), and Eastern Mediterranean (4.5%) Regions.[1]

## Figure 13.1 Global Tobacco Leaf Exports, Quantity and Inflation-Adjusted Value, 1980–2012



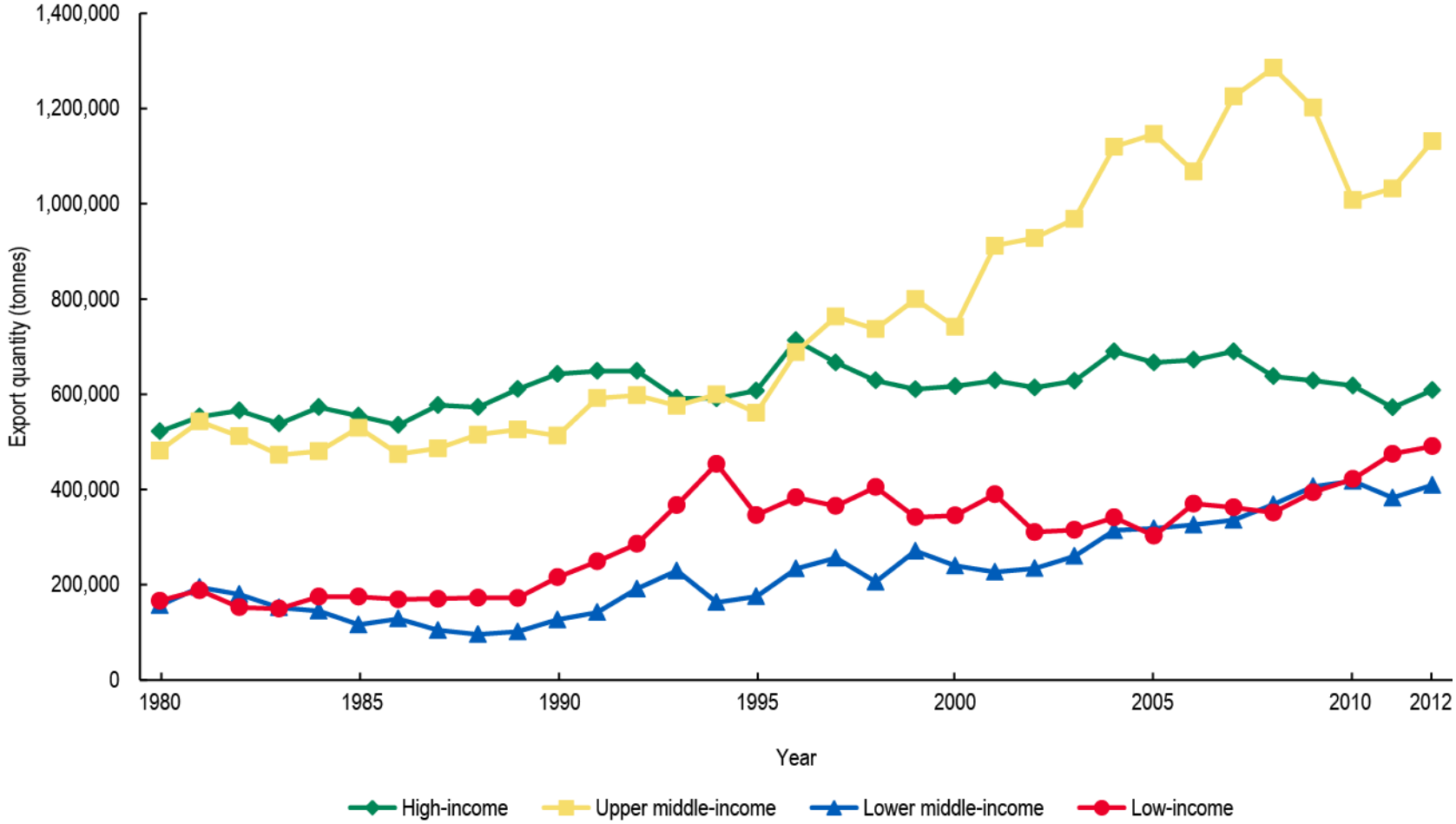

*Note:* Export value adjusted for inflation using 2012 U.S. dollars.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.2 Global Tobacco Leaf Imports, Quantity and Inflation-Adjusted Value, 1980–2012



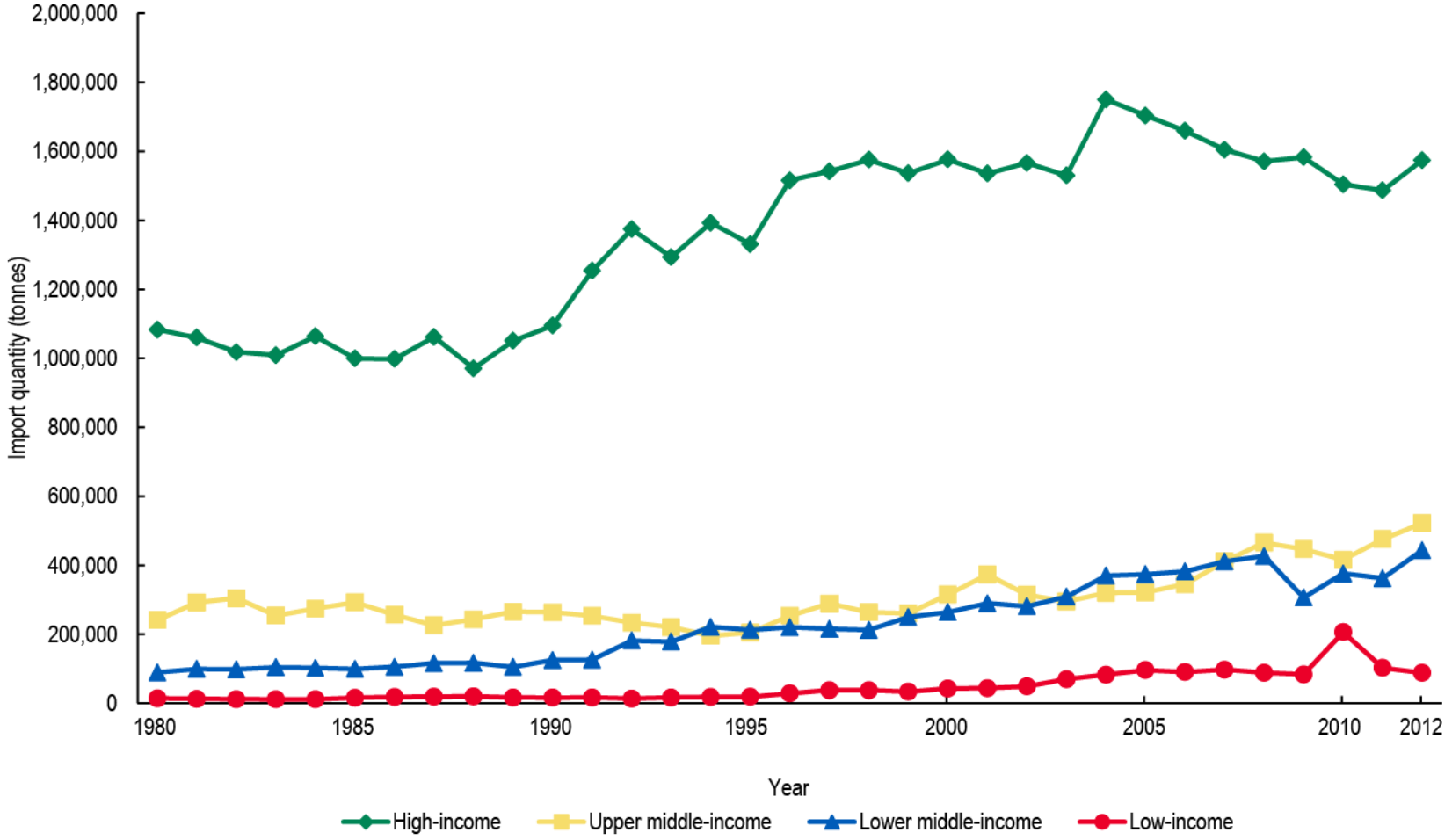

*Note:* Import value adjusted for inflation using 2012 U.S. dollars.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.3 Tobacco Leaf Export Quantity, by Country Income Group, 1980–2012



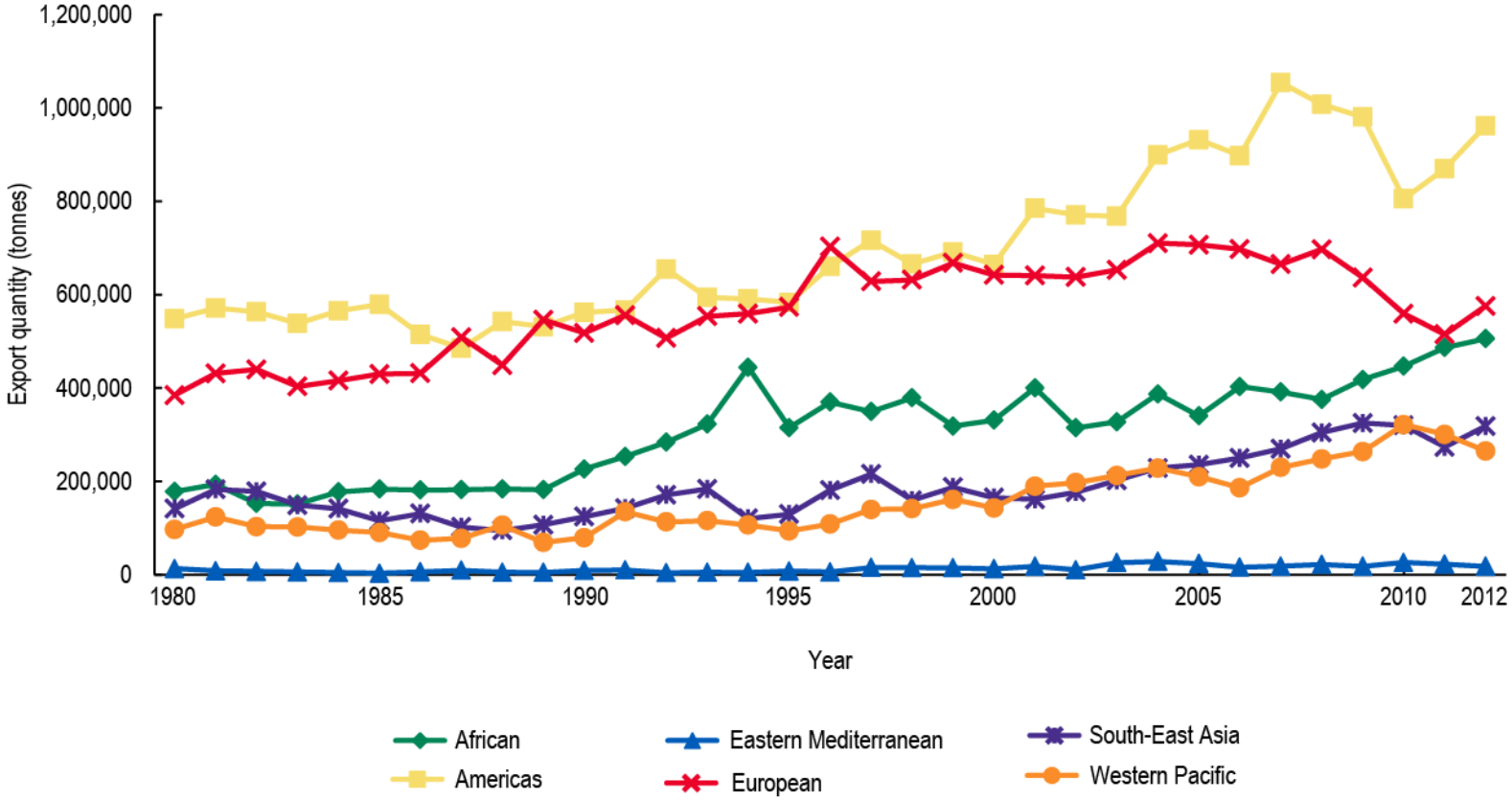

*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.4 Tobacco Leaf Import Quantity, by Country Income Group, 1980–2012



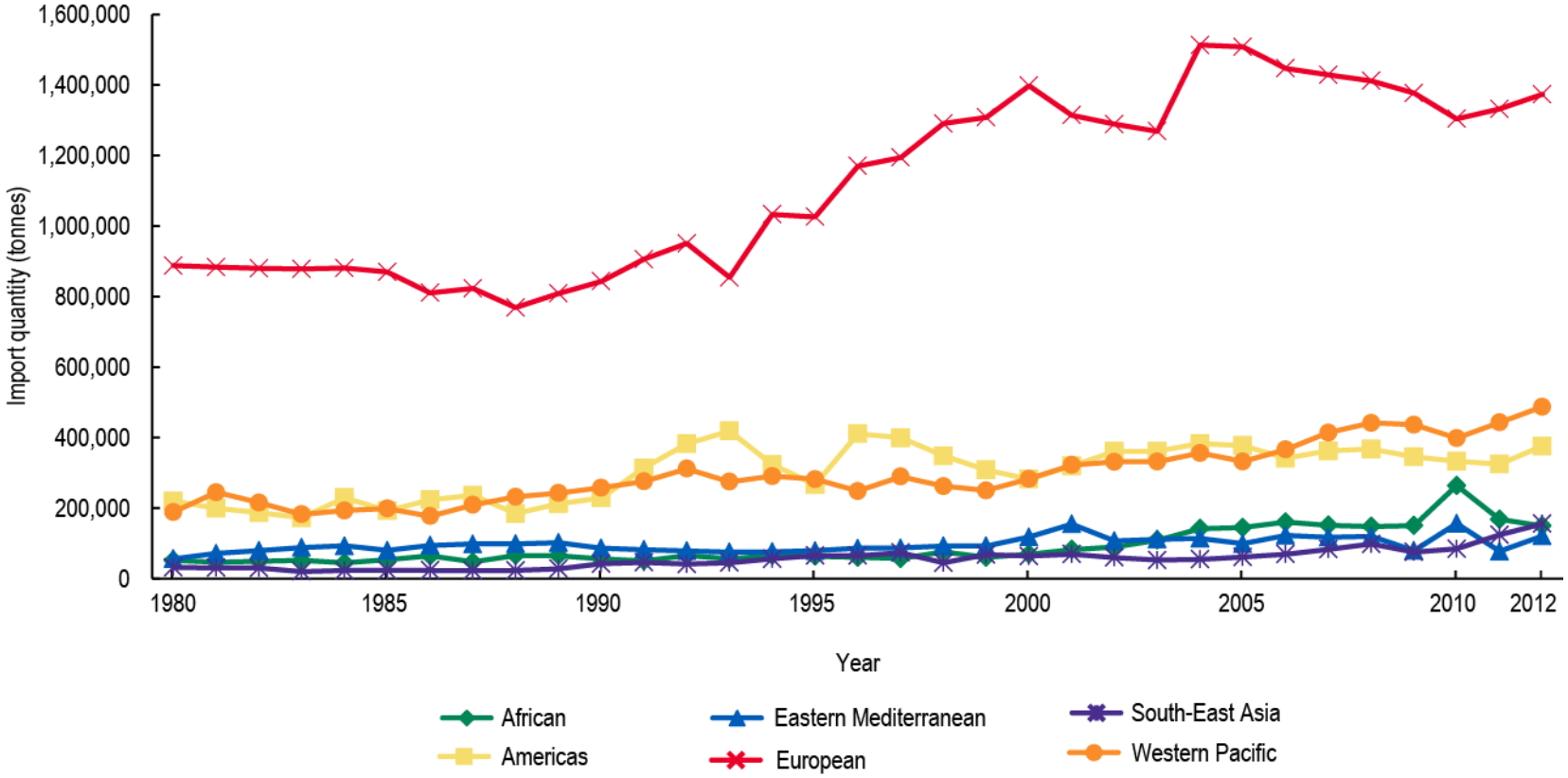

*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.5 Tobacco Leaf Export Quantity, by WHO Region, 1980–2012




*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.6 Tobacco Leaf Import Quantity, by WHO Region, 1980–2012




*Source:* FAOSTAT 1980–2012.[1]

### *Cigarettes*

The number of countries or territories trading in cigarettes increased by about one-third between 1970 and 2012 (from 144 to 188 countries or territories). This figure included countries either importing or exporting any quantity of cigarettes. Most trading countries are importers. Of the 188 trading countries in 2012, only 49 (26.1%) had a positive trade balance (in U.S. dollars) in cigarettes.[1]

Although tobacco products are widely traded, they account for a relatively small share of overall global trade. Even exports and imports in cigarettes, by far the most traded tobacco product, still made up only 0.11% (45 billion U.S. dollars [US$]) of the total trade in goods and services in 2012.[1] In countries where cigarettes account for the largest share of trade, their absolute share is still low; those at the high end include Armenia (1.28%), Guinea-Bissau (1.11%), Niger (1.09%), Moldova (0.94%), and Cambodia (0.93%).[1] As a share of gross domestic product (GDP), trade in cigarettes is generally minimal, less than 1% for most countries, with the highest shares in 2012 in Tonga (1.7%), Moldova (1.5%), Cambodia (1.5%), Kiribati (1.3%), and Mauritania (1.2%).[1]

In 2012 the five largest exporters of cigarettes exported 520,561 tonnes of cigarettes, or 45.9% of world cigarette exports. The top exporters were: Germany (15.0% of total cigarette exports), the Netherlands (9.8%), Poland (9.2%), China (6.1%), and Indonesia (5.7%). The five largest importers of cigarettes imported 298,501 tonnes of cigarettes, accounting for roughly 29% of world cigarette imports: Japan (8.1%), Italy (7.5%), the United Arab Emirates (5.1%), the Netherlands (4.5%), and France (4.2%).[1]

World cigarette exports generally increased in both quantity and value from 1980 to 1996, decreased from 1996 to 1999, and then increased again in the mid-2000s (Figure 13.7). The most rapid increases took place in the late 1980s and early 1990s—coinciding with the expansion of the General Agreement on Tariffs and Trade (GATT), adoption of numerous regional and bilateral trade agreements, and privatization of many domestic tobacco monopolies—all of which together greatly liberalized trade in tobacco products.

Similar trends have been seen with world cigarette imports, which rose in quantity and value from 1980 to 1997 before falling and then stabilizing; however, after 2003 import levels began to rise again, at a pace similar to the earlier steep rise (Figure 13.8). A comparison of Figures 13.7 and 13.8 shows that the quantity of exported cigarettes exceeds the quantity of imported cigarettes. As discussed in chapter 14, this apparent difference is thought to be due largely to illicit trade in cigarettes and other tax evasion strategies.

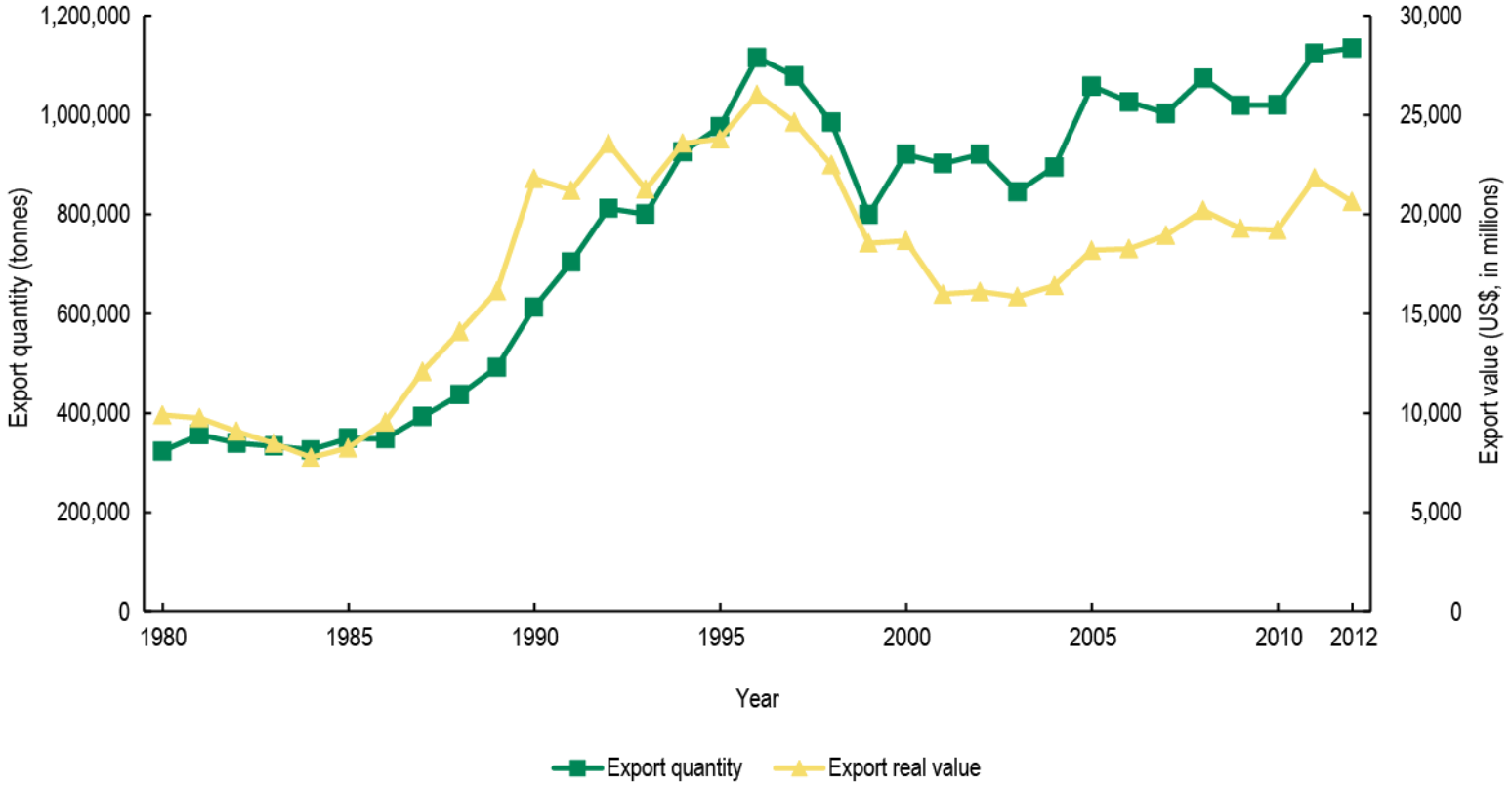
Trends in exports show marked differences when disaggregated by country income group (Figure 13.9). As a group, HICs are the leading cigarette exporters, accounting for 70% of global cigarette exports in 2012. At 30% in 2012, LMICs accounted for a much smaller share of global cigarette exports, although the absolute quantities they export have increased over time. Similar trends have been observed for cigarette imports, as shown in Figure 13.10.[1]

When exports are disaggregated by WHO Region (Figure 13.11), the data indicate that European countries have long accounted for the largest share of global cigarette exports. In 2012, cigarettes from the European Region were 63.8% of all cigarette exports by quantity.[1] The European Region's share of global cigarette exports was even higher in terms of value (70.6% in 2012) because of the high price of European cigarettes.[1] In 2012, the five largest exporters in the European Region—Germany, the Netherlands, Poland, Romania, and Switzerland—accounted for 63.4% of European exports by value.

Historically, the Americas Region, led by the United States, was the second-largest exporting region in the world; however, the Americas Region's exports fell markedly after the late 1990s because of decreased export of cigarettes from the United States.[1] Export quantity from the Western Pacific Region has risen gradually over time and was the second-highest in the world by 2012. The African, Eastern Mediterranean, and South-East Asia Regions export very small quantities of cigarettes.

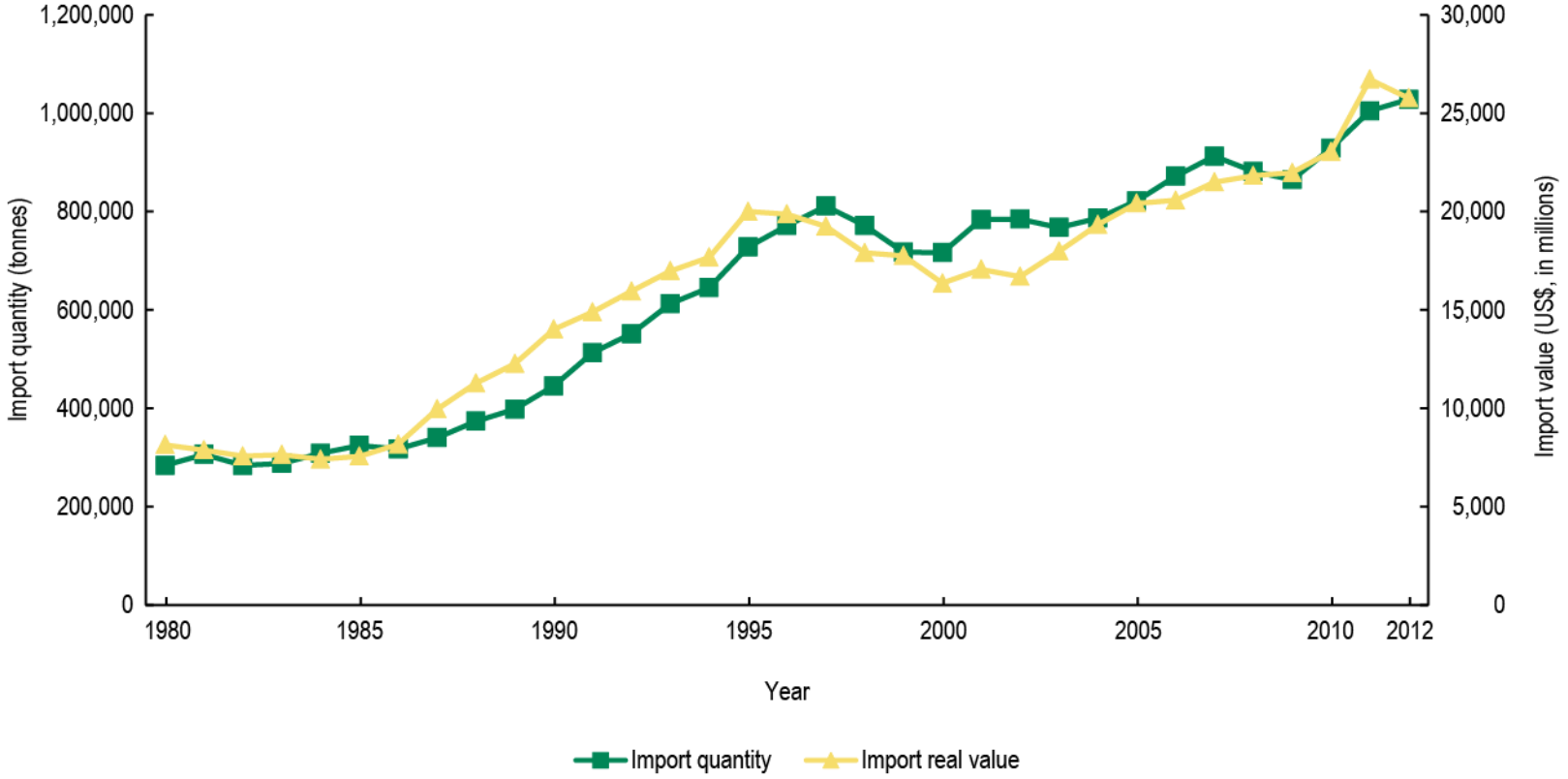
As with cigarette exports, the European Region has long accounted for the largest share of imports (47.1% in 2012) (Figure 13.12). Italy, the Netherlands, France, Germany, and Spain were the largest importing countries in the European Region.[1] The Western Pacific Region has been the second-largest importer since the late 1980s, accounting for 23.2% of imports in 2012; Japan, China, Singapore, Cambodia, and Viet Nam are the largest importing countries in this region. Singapore imports more than its domestic consumption because it is an important re-exporter of cigarettes.[2] The Eastern Mediterranean Region is now third in terms of global cigarette imports (19.9%); the United Arab Emirates, Saudi Arabia, Iraq, Lebanon, and Iran are the largest importers in this region.[1] Many Eastern Mediterranean Region countries have high smoking prevalence rates but produce few cigarettes. Only small quantities of cigarettes are imported by the African, Americas, and South-East Asia Regions.

## Figure 13.7 Global Cigarette Exports, Quantity and Inflation-Adjusted Value, 1980–2012



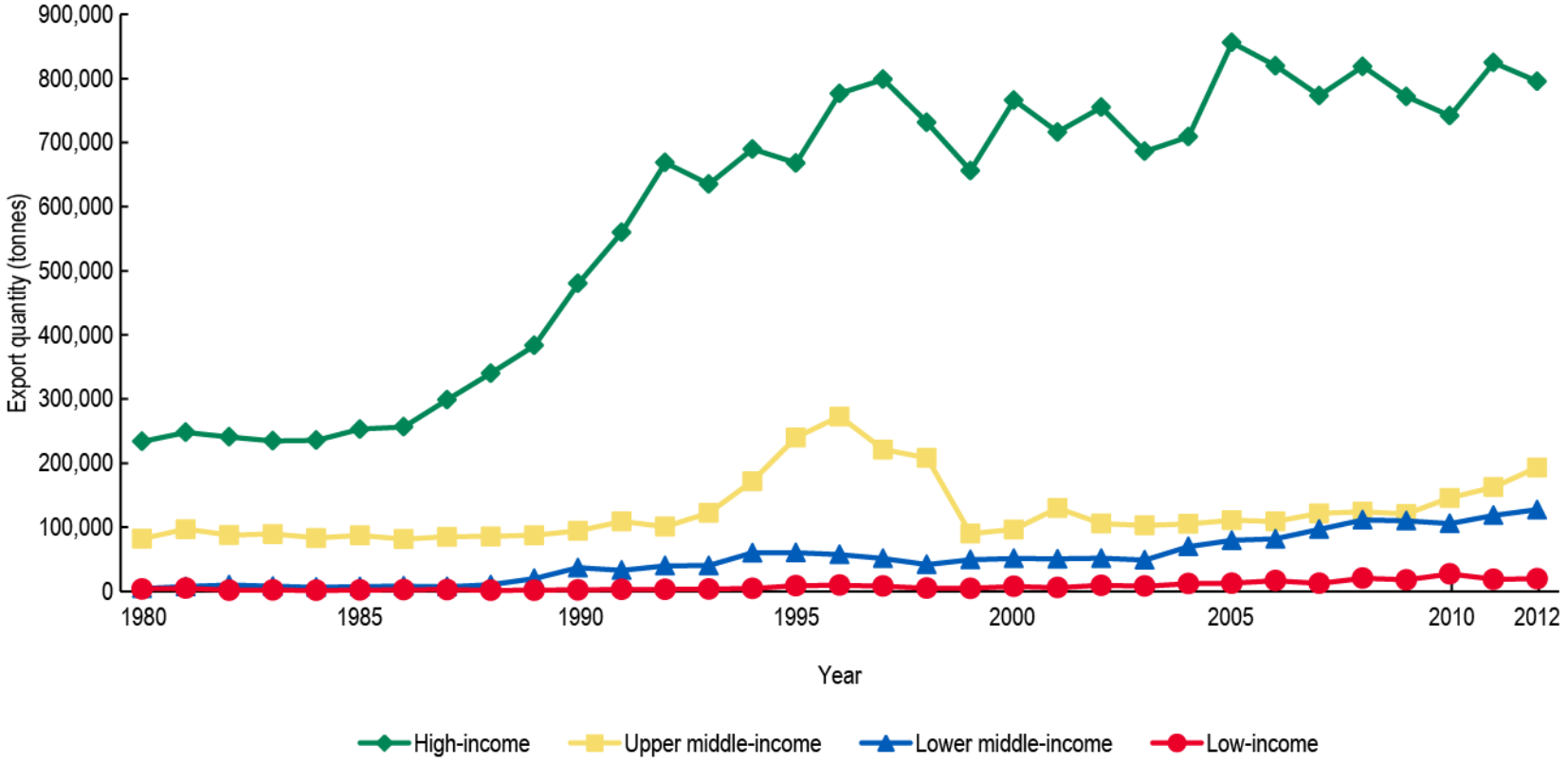

*Note:* Export value adjusted for inflation using 2012 U.S. dollars.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.8 Global Cigarette Imports, Quantity and Inflation-Adjusted Value, 1980–2012



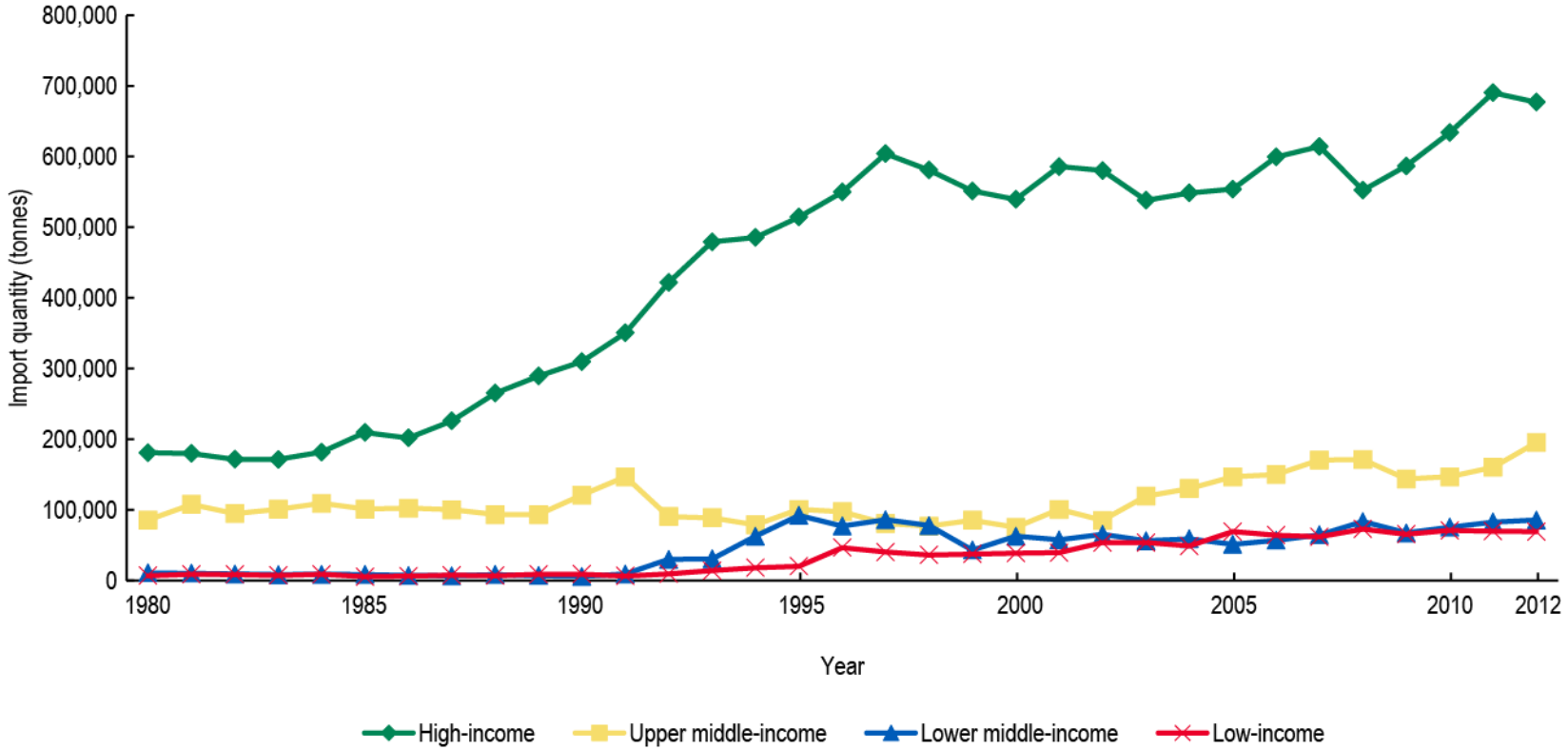

*Note:* Import value adjusted for inflation using 2012 U.S. dollars.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.9 Cigarette Export Quantity, by Country Income Group, 1980–2012



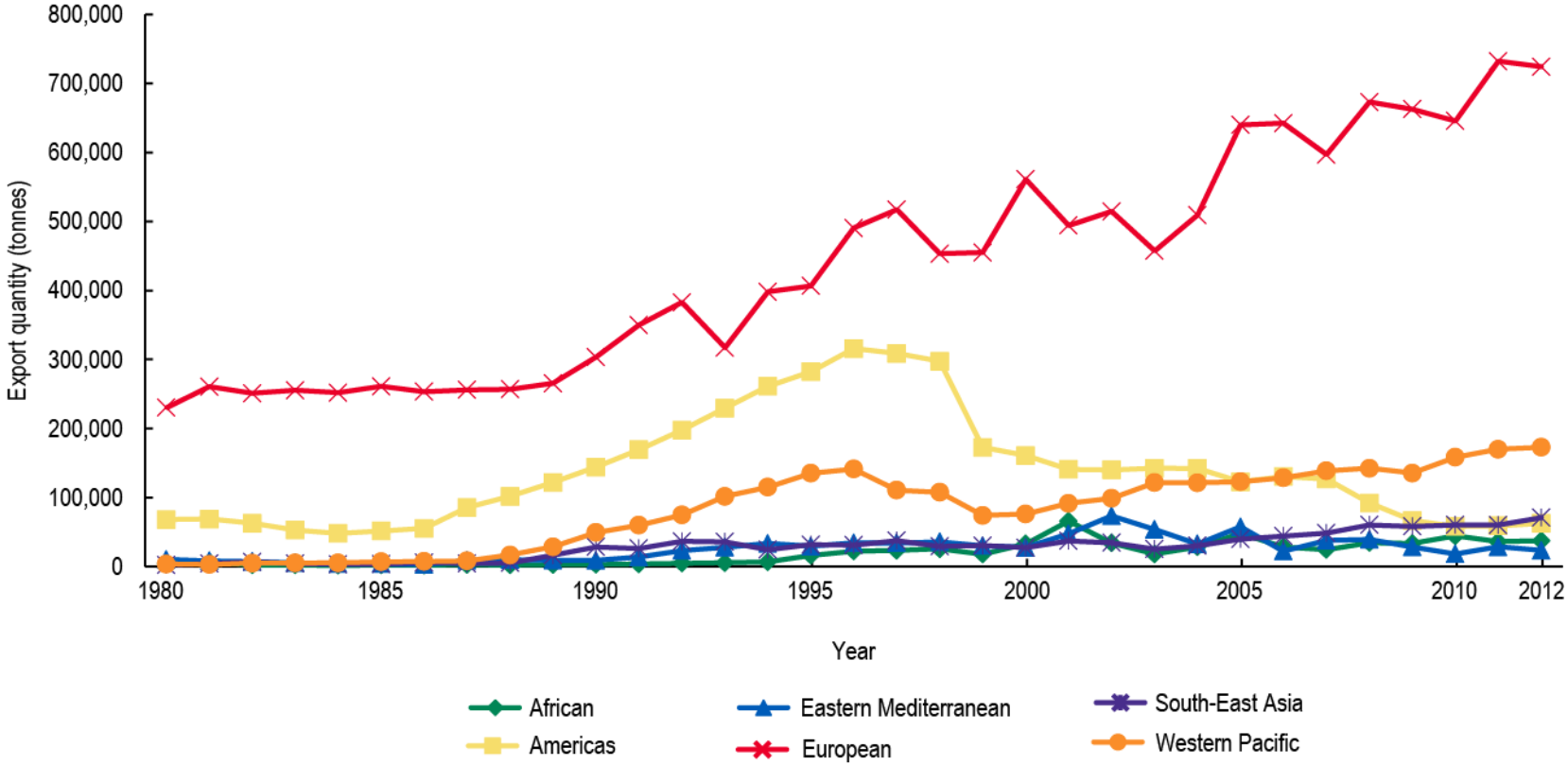

*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.10 Cigarette Import Quantity, by Country Income Group, 1980–2012



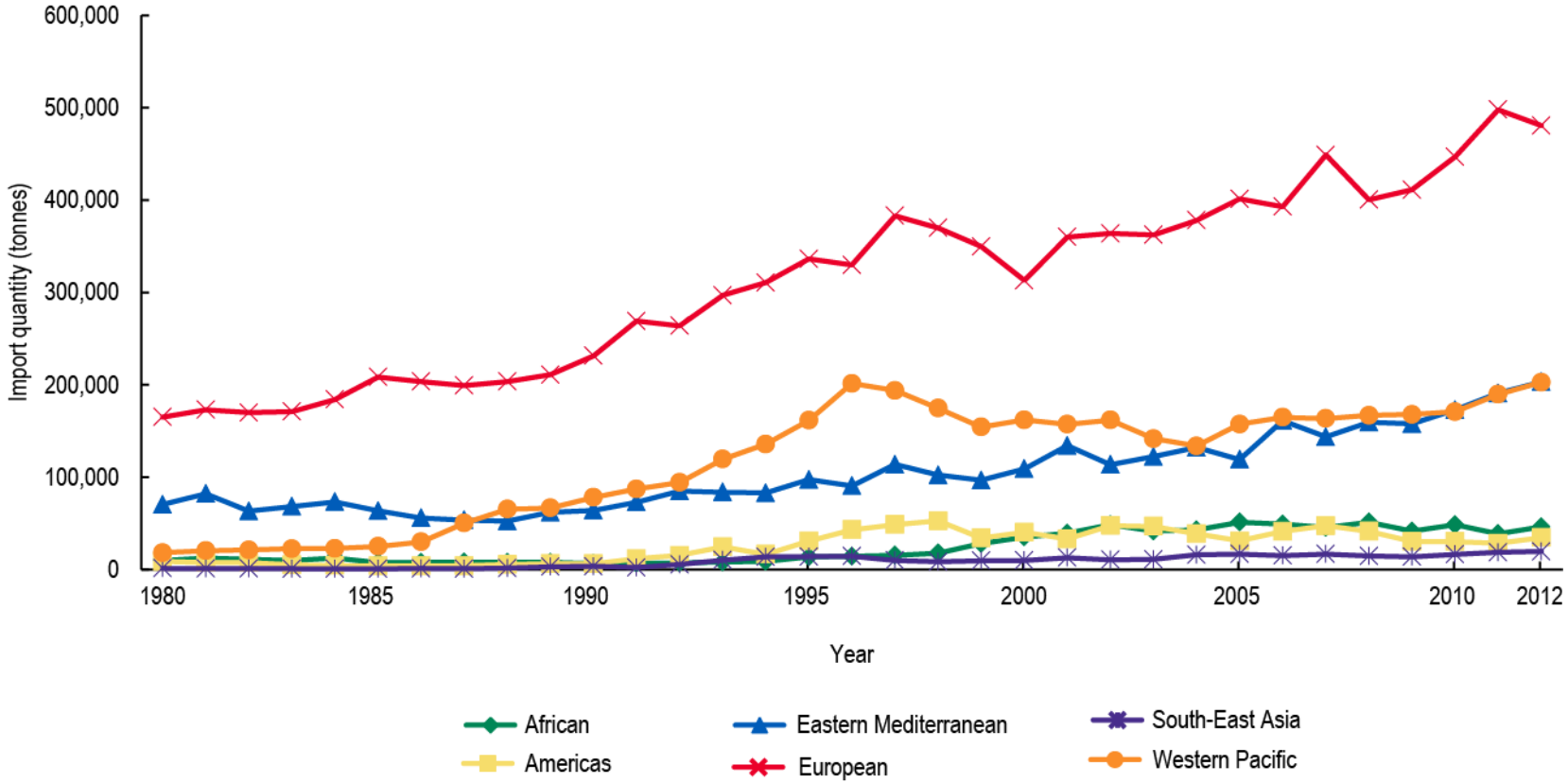

*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.11 Cigarette Export Quantity, by WHO Region, 1980–2012




*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.12 Cigarette Import Quantity, by WHO Region, 1980–2012




*Source:* FAOSTAT 2015.[1]

## Case Studies of Major Raw and Manufactured Cigarette Exporters and Importers

### *Tobacco Leaf*

***Brazil.*** Brazil is the largest tobacco leaf exporter in the world, accounting for 23.6% of global exports in 2012.[1] Brazil's tobacco leaf exports have been increasing steadily, giving it an increasingly strong position in the global market. By adopting state-of-the-art farming techniques and technologies during the past 30 years, Brazil has increased its production capacity and the quality of its leaf.[3] Also contributing to the increase in exports from Brazil since 2000 were the drop in the value of Brazil's currency and the supply gap in the international market created by the sharp drop in exports from Zimbabwe.[3]

In 2012, Brazil's largest export partners were Belgium, China, the Russian Federation, the Netherlands, and the United States. Nearly half of Brazil's exports went to these five countries. The United States has been a major importer of Brazilian tobacco leaf for many years. China has recently become a major partner, importing US$ 477.8 billion in Brazilian tobacco in 2012, compared with US$ 101.8 billion in 2004.[4] The growth in demand from China reflects the country's restructuring policy, which aims to improve the quality of cigarettes produced in China and increase its cigarette exports.

***China.*** China is the largest tobacco grower in the world, accounting for more than 40% of global production in 2012.[1] However, China exports only 6.8% of the tobacco leaf it grows and imports the equivalent of 5.8% of its domestic production.[1] Thus, China's tobacco industry is self-contained; tobacco leaf grown in China is used mainly in the local manufacturing of cigarettes for domestic consumption. China is also the world's largest producer of cigarettes.[5]

The scale of the Chinese tobacco industry allows it to play an important role in global tobacco trade. In 2012 China was the third-largest exporter of tobacco leaf, accounting for 8.0% of world exports.[1] The increase in China's trade in tobacco leaf coincided with the decline of U.S. tobacco leaf exports and the economic crisis in Zimbabwe that began in 2001. Although China exported more tobacco leaf in 2012 than it imported (by 32,063 tonnes), its trade balance in value terms is negative, reflecting the difference in quality between tobacco leaf exports and imports.[1]

China has the potential to become more important in the global trade in tobacco leaf and tobacco products. It may overshadow other large traders because of its high production capacity and cheap labor, and the low prices at which it is able to sell in the international market. In 2005, China began restructuring its cigarette industry to become internationally competitive.[6] Similar efforts were undertaken in the country's agricultural sector.[7] As discussed in chapter 12, these and other efforts suggest that China is poised to become a larger player in the global cigarette export market.

***United States.*** The United States was the world's leading exporter of tobacco leaf for many decades, until losing this position to Brazil in the late 1990s. In 2012, the United States was the fourth-largest exporter in terms of quantity and was second in terms of value.[1] Since 2010, U.S. leaf exports have been falling and imports have been rising because lower priced, higher quality leaf imports are replacing domestically grown tobacco leaf in U.S. cigarette production. The major U.S. tobacco leaf import partners are Brazil, Turkey, Canada, India, and Malawi.[4]

***Zimbabwe.*** In 2004, Zimbabwe was among the world's top five tobacco leaf exporters. By 2012, Zimbabwe had dropped to 6th place, accounting for only 5.0% of global leaf exports (compared with

9.0% in 2000) and 26.1% of African leaf exports (compared with 53.5% in 2000).[1] Zimbabwe's place in the international leaf market was significantly reduced by the land reform policy implemented in 2000, which led to a sharp devaluation of the Zimbabwean dollar, while the country's government was pursuing the application of an official fixed exchange rate, resulting in a misalignment between the official and actual international rates.[3] This misalignment led to the development of a parallel unofficial rate. However, an exemption was given to tobacco crops, whereby a proportion of the products were exported under the fixed rate, and the other proportion were exported under the unofficial international exchange rate. The unofficial exchange rate was applied only to merchants and direct exporters. Farmers did not benefit from the exemption because they were prohibited from directly exporting their crops, making tobacco farming unprofitable. Consequently, Zimbabwe faced increased production costs (inputs bought from outside the country at international prices) and lower revenues (revenues at the local devalued currency).[3] This situation led to a substantial decline in production capacity, with the quantity of tobacco leaf exports falling by 75% between 2001 and 2009 before rebounding.[1]

The government of Zimbabwe gradually revised its policy to reduce the harm caused to the farming sector, eventually eliminating the fixed-exchange-rate policy.[3,8] Additionally, many large landowners moved to Mozambique and other neighboring countries to grow tobacco. The consequences of these policies for Zimbabwe continue to be seen. In 2006, leaf production was about 45,000 tonnes, compared with production capacity of more than 200,000 tonnes before the land reform policy of 2000.[1] As of 2009, leaf production had increased to more than 85,000 tonnes; estimates for 2012 were approximately 115,000 tonnes.[1]

### *Cigarettes*

***Germany.*** Germany is the world's largest exporter of cigarettes; in 2012, Germany exported 170,714 tonnes of cigarettes, worth US$ 3.9 billion, or 19.7% of global export value.[1] Germany is also an important exporter of tobacco products manufactured by several MTCs, including Philip Morris International (PMI), British American Tobacco (BAT), Reemtsma (a subsidiary of Imperial Brands PLC), and Japan Tobacco International. In 2012, about 80% of the country's national production was exported.[2] Germany's 10 top export partners in 2012 included European Union (EU) countries (53% of their total exports), Japan, Saudi Arabia, and on a smaller scale, the United Arab Emirates; the former Soviet Union was also an important export trade partner before its dissolution in the early 1990s. In 2012, Germany's 10 top import partners were all EU countries, accounting for 93% of Germany's total cigarette imports: Croatia, Czech Republic, France, Lithuania, Luxembourg, the Netherlands, Poland, Romania, Switzerland, and the United Kingdom of Great Britain and Northern Ireland.[4]

***The Netherlands.*** The Netherlands is the second-leading exporter of cigarettes both in terms of value and quantity, accounting for 15.2% of the value of cigarettes exported globally in 2012 and exporting nearly 111,650 tonnes in that year.[1] The Netherlands is a key supplier for several major markets; it is also an important transit country for large shipments that are broken down for further distribution.[2] The Netherlands' importance to international tobacco exporting and distribution helps to explain the large gap between the country's production capacity and local consumption. In 2013 the production and import of cigarettes—74 billion and 26.96 billion pieces, respectively—far outpaced the domestic tax-paid consumption of cigarettes, which was estimated at approximately 10.69 billion pieces.[2]

Until 2014, the Netherlands was a major production base for PMI, but the PMI facility in the Netherlands discontinued production of cigarettes in 2014, and it is now producing only semi-

manufactured goods to be used in cigarette production in other PMI factories.[9] BAT was also an important producer but closed its plant in 2008, moving production to Poland and Germany. In 2012, 60% of the Netherlands' cigarette exports went to EU destinations, led by Italy, France, Belgium, Germany, Spain, and the United Kingdom.[4]

***United States.*** The United States is the world's 13th-largest cigarette exporter in terms of quantity, accounting for 1.9% of all cigarettes exported globally in 2012, and the world's 14th-largest exporter in terms of value.[1] The cigarette market is shrinking in the United States, as in many countries in Western Europe, with falling consumption, production, and exports.[2] U.S. production and exports increased steadily for many years, peaking in the mid-1990s, and then declining. In the mid-1990s, U.S. cigarette exports accounted for 33.9% of the value of global cigarette exports; by 2005 the U.S. share had decreased to 8.2%, and by 2012 the U.S. share had decreased to 1.9%.[1] Much of the decrease can be explained by cigarette companies' investments in production facilities in countries that were once major importers of cigarettes produced in the United States.[2] The major destinations of U.S. exports include Japan, Mexico, Canada, the Russian Federation, and Honduras; together, these countries imported 88.8% of U.S. cigarette exports (by value) in 2012.[4]

***Japan.*** Japan is the world's largest cigarette importer, accounting for 8.0% of the quantity of global imports in 2012.[1] In 2014, the country consumed 179.3 billion cigarettes, produced 119 billion, imported 73.3 billion, and exported 10.7 billion.[2] Japan imports most (82.5%) of its cigarettes from the Netherlands, the United States, Switzerland, and Germany.[4]

## Price of Tobacco Products

### *Tobacco Leaf*

The United Nations Conference on Trade and Development (UNCTAD) compiles a variety of data, including price instability indexes and trends in the free market prices of selected commodities, including unmanufactured tobacco.[10] The price instability index for tobacco is the percentage deviation of the import price of leaf from its exponential trend level for a specific period. Because the United States is a major leaf importer, this global index was compiled based on the U.S. import unit value of unmanufactured tobacco using available data. The price instability index for 2003–2012 was 4.7, down from 7.6 for 1993–2002 and 6.9 for 1983–1992, indicating that the price for tobacco leaf has stabilized over time. Moreover, for 2003–2012, the index indicated that tobacco leaf prices were more stable than prices for any other commodity. By comparison, the price instability index for coffee was 13.2; for gold, 6.1; and for agricultural raw materials (e.g., cotton, jute, wool), 9.9. The relative stability of tobacco leaf prices is likely one of the reasons that farmers are attracted to growing tobacco.[10]

Figure 13.13 shows trends in the price per kg of tobacco leaf exports for HICs, for LMICs, and at the global level between 1980 and 2012. Leaf prices were obtained by dividing the value of leaf exports by the quantity exported by a country at a given time. As with cigarette export prices, the price of tobacco leaf exported by HICs is well above that exported by LMICs, but HICs and LMICs experienced similar and largely downward trends through the early 2000's before beginning to rise slightly.

### *Cigarettes*

The export price of cigarettes has varied for different countries and across time. Although a global measure is not available for the export price of cigarettes, an estimate can be obtained by dividing the

value of a country's cigarette exports by the quantity of its exports at a specific time. Figure 13.14 shows the trend in the price of cigarette exports, globally and for HICs and LMICs, between 1980 and 2012. Cigarettes exported by HICs are more expensive than those exported by LMICs, probably reflecting the higher production costs and higher quality of cigarettes produced in HICs. Overall, real prices have generally been decreasing since 1990, particularly in HICs, but they have risen somewhat in LMICs since 2001.

## Trade Liberalization and Tobacco Consumption

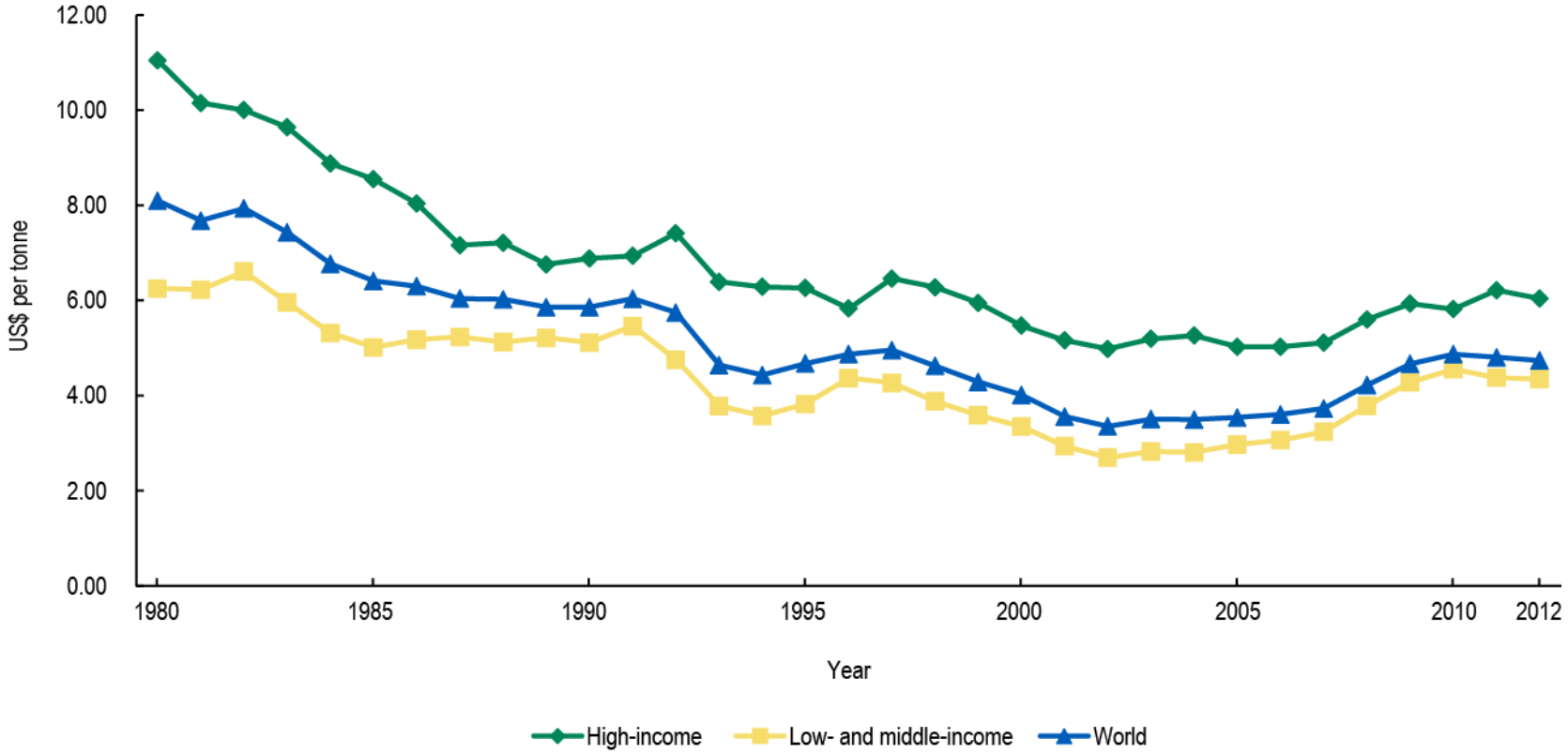
The growth of trade in tobacco leaf and tobacco products can be partly explained by the increasing number of global, regional, and bilateral trade agreements that have been implemented during the past few decades.[11] The World Trade Organization (WTO) agreements, along with major regional and bilateral trade agreements, have reduced trade barriers for many goods and services, including tobacco leaf and tobacco products, and have expanded the reach of MTCs by allowing them to increase their presence in LMICs.[12] Similar agreements on investments, particularly at the regional and bilateral levels (as discussed in chapter 12), have also opened various markets and increased investment in tobacco production.[13]

The General Agreement on Tariffs and Trade was the first major global trade agreement adopted after World War II, originally negotiated by 23 countries and officially implemented in January 1948.[14] Over time and through subsequent rounds of negotiations, the agreement grew to cover an increasing share of global trade, with new countries joining, and a larger number of products covered. The Marrakesh Agreement of 1994 led to the creation of the WTO on January 1, 1995.[15] As of July 2016, 164 countries participated in the WTO.[16] Members commit themselves to abide by a range of agreements, including GATT 1994 and other agreements that govern trade in goods, such as the General Agreement on Trade in Services, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and the Understanding on Rules and Procedures Governing the Settlement of Disputes. The objectives of the WTO include trade liberalization through addressing tariff and non-tariff barriers to trade.[17]

WTO rules permit the adoption of Regional Trade Agreements (RTAs) by member states, and hundreds of RTAs have been implemented during the past few decades. As of July 1, 2016, 267 WTO-approved RTAs are in force.[16] Estimates indicate that 60% of all international trade occurs through RTAs, and these agreements are rapidly becoming the primary means of trade liberalization worldwide.[18] RTAs liberalize trade through geographical proximity, expand areas for free trade, and have significantly helped reduce barriers to trade worldwide in tobacco leaf and tobacco products by opening up previously protected markets. Key regional trade structures include the Association of Southeast Asian Nations (ASEAN), the EU, the North American Free Trade Agreement, the Southern African Development Community, the Economic Community of West African States, the Common Market for Eastern and Southern Africa, the African Growth Opportunity Act, the Mercado Común del Sur (Mercosur), and the Caribbean Community. As of this writing, another major regional agreement, the Trans-Pacific Partnership (TPP), is in the process of being ratified.

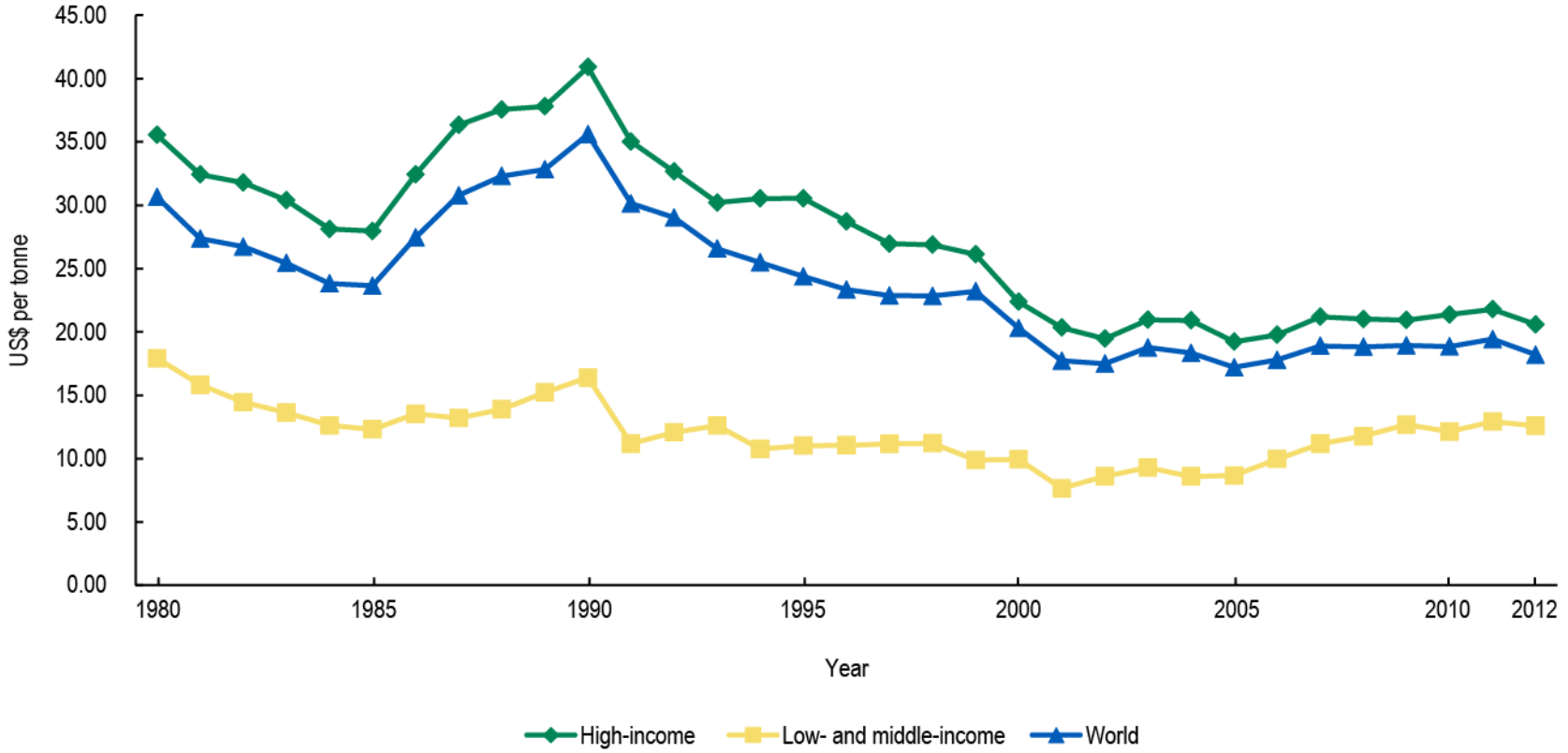
The ongoing process of trade liberalization continues to raise questions about the extent to which further liberalization might stimulate tobacco consumption, as the opening of previously closed markets in LMICs has been shown to do. The following section reviews the literature on the relationship between trade liberalization and tobacco consumption.

## Figure 13.13 Real Price of Tobacco Leaf Exports for High-Income Countries and Low- and Middle-Income Countries and at the Global Level, 1980–2012




*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Figure 13.14 Real Price of Cigarette Exports for High-Income Countries and Low- and Middle-Income Countries and at the Global Level, 1980–2012




*Note:* Country income group classification based on World Bank Analytical Classifications for 2012.
*Source:* FAOSTAT 1980–2012.[1]

## Literature Review

As described in a literature review by Bettcher and colleagues,[12] trade liberalization poses clear risks to tobacco control. Several studies show that trade liberalization may increase competition in the tobacco market, leading to lower prices, increased marketing of tobacco products, and brand proliferation, thus stimulating both demand for and consumption of tobacco products. Additionally, agreements governing the implementation of non-tariff barriers to trade may make some types of domestic regulation of tobacco unlawful, or may impede domestic regulation by creating uncertainty and other deterrents to regulatory action.[19] As described below, several studies have looked quantitatively at the impact of trade liberalization on tobacco consumption, and all have concluded that the expansion of trade in tobacco products through reduced trade barriers has led to an increase in cigarette consumption.

Section 301 of the 1974 Trade Act and its subsequent amendments are the principal statutory authority under which the United States can impose trade sanctions against foreign countries that use unjustifiable, unreasonable, or discriminatory practices to limit access to their markets by U.S. companies. Chaloupka and Laixuthai[20] examined the impact on cigarette consumption of actions taken in the 1980s by the United States under Section 301. They also estimated the market share of U.S. cigarettes in four Asian countries from 1970 to 1991 and compared these estimates to similar data from six Asian countries that historically limited market access to foreign tobacco firms, including U.S. firms. These authors found that opening formerly closed markets in countries such as Thailand, Japan, the Republic of Korea, and China to U.S. cigarettes increased per capita consumption by almost 10% in those countries (in 1991) and substantially increased the market share of U.S. cigarettes. The authors suggested that the increase in consumption after opening the markets could have resulted from lower prices and/or the increased marketing of tobacco products due to increased competition in cigarette markets.[20]

Taylor and colleagues[11] explored the impact of trade liberalization on tobacco consumption. This study used annual data on import penetration (total imports as a percentage of GDP) as a measure of trade openness for 42 countries from 1970 to 1995. These authors found that trade openness significantly increased cigarette consumption in LMICs but not in HICs. Trade liberalization could have had no significant impact on consumption in HICs because openness is greater in this group of countries and increasingly open trade has a diminishing marginal effect on consumption. Conversely, lower income countries are expected to face a larger marginal effect from trade openness.

Using a similar methodology, Bettcher and colleagues[12] estimated the impact of trade liberalization on cigarette consumption in more than 80 countries from 1970 to 1997. Three measures of trade openness were used: (1) import penetration, (2) a dummy variable estimating the degree of openness to incoming foreign direct investment (FDI), and (3) exchange-rate distortions, or the black market premium. The inward FDI measure did not yield significant results, but estimates showed a significant relationship between import penetration and cigarette consumption, particularly in low- and lower middle-income countries. The black market premium coefficients were negative and significant, implying that with fewer exchange-rate distortions, more investments were likely to enter a market, leading to higher consumption. The authors concluded that "given the probable link between openness and the consumption of cigarettes and the array of effective tobacco-control policies that exists (such as price increases, complete advertising and promotion bans, clean indoor-air laws, health warnings and counter-advertising), strong tobacco-control policies need to be implemented as globalization takes its course."[12,p.53]

Sarntisart[21] explored the potential impact of lowering tariff rates pursuant to the 2004 ASEAN Free Trade Agreement (FTA). Using 2003 as a base year, he looked at changes in consumption, government tobacco revenue, and economic welfare in Thailand following a tariff reduction on imported cigarettes (from 22.5% to 5.0% of cost, insurance, and freight value) under the ASEAN FTA. The government owns the Thai Tobacco Monopoly and controls the prices of cigarettes; the structure of prices is determined by several factors, including the factory price, tariff for imported cigarettes, excise tax rate, health tax rate, local tax rate, profit margin, and value-added tax. Sarntisart predicted that if the Thai government decided to bear the decreased revenues caused by the reduced tariff, controlled prices would remain unchanged, consumption and economic welfare would not be affected, and tobacco industry profits, including importers' profits, would increase. However, if the government decided not to bear the costs of the reduced tariff, cigarette retail prices would decrease, consumption would increase, and importers' profits would increase. Government revenues would still decrease but to a lesser extent. Cigarette consumption would be expected to increase more in the urban areas and among middle-aged and child smokers. Using optimistic assumptions, the tariff reduction would lead to an additional 134 tobacco deaths in 2023, costing Thailand's economy 82 million Baht (US$ 2.1 million) in future income in 2023 and each year after. This study also noted that importers and the Thai Tobacco Monopoly might decide to use their additional profits resulting from the tariff reduction for political lobbying and other activities that could undermine national tobacco control measures.[21]

### Econometric Analysis: Impact of Trade Liberalization on Cigarette Consumption

Following the approach used by Taylor and colleagues[11] and Bettcher and colleagues,[12] this section provides new estimates on the impact of trade liberalization on cigarette consumption. Two sets of data were used for the per capita consumption figures: (1) consumption data compiled and updated by the American Cancer Society (ACS) for the *Tobacco Atlas 2012*,[22] and (2) a combination of consumption data from the U.S. Department of Agriculture (USDA)[23] and ERC Group.[24] The ACS data included figures on consumption in 125 countries between 1970 and 2003, and the USDA/ERC Group data included consumption between 1990 and 2004 in 141 countries.

The econometric estimation used three explanatory variables: (1) per capita real GDP,[25] (2) real price, based on a Marlboro cigarette pack (20 cigarettes) from a mid-priced store, in U.S. dollars at constant prices for 1996 (data from capital cities),[24] and (3) various measures of trade openness including import penetration (total imports as a share of GDP), trade as a share of GDP, and FDI net inflows as a share of GDP for one set of analyses, and taxes on international trade as a share of revenue for another set. Data for these measures of trade openness came from the World Bank.[25]

A simple log-log functional form was used with a generalized least-squares estimation to correct for potential heteroscedasticity. The estimations were made with and without the real price variable. The price data were available only from 1990 to 2004, so when the price variable was included in the models using ACS data, the years from 1970 to 1989 were lost. The models were also estimated separately for low-income countries, using the 2006 World Bank Analytical Classifications.[26]

Tables 13.1–13.4 summarize the results of this analysis. Increased import penetration was found to be associated with greater cigarette consumption, and this effect was greater in low-income countries than middle- and high-income countries. Cigarette consumption increased with greater reductions in trade barriers and increases in imports of goods and services.

The results indicated that consumption decreased as taxes on international trade increased as a percentage of revenue, thus reducing the flow in traded products. Taxes on international trade can be viewed as a trade distortion measure that reduces trade openness. Again, this effect was greater in low-income countries than middle- and high-income countries.

Increasing income seems to encourage consumption, with the impact being higher among low-income countries than among middle- and high-income countries. The price estimates are generally insignificant, most likely reflecting the poor quality of the limited price data.

### Table 13.1 ACS Data Using Trade Openness as a Share of GDP

| Years of data, by group | Number of observations | ln $GDP_{i,t}$ (SD) | ln $(M/GDP)_{i,t}$ (SD) | ln $P_{i,t}$ (SD) | Constant (SD) |
|---|---|---|---|---|---|
| **All data** | | | | | |
| 1970–2003 | 2,686 | 0.45 (0.005) | 0.076 (0.01) | — | 3.04 (0.06) |
| 1990–2003 | 810 | 0.39 (0.01) | 0.19 (0.02) | –0.1 (0.02) | 3.09 (0.10) |
| **Low-income group** | | | | | |
| 1970–2003 | 623 | 0.62 (0.02) | 0.26 (0.03) | — | 0.9 (0.12) |
| 1990–2003 | 103 | 0.44 (0.16) | 0.36 (0.08) | –0.012* (0.03) | 1.71* (0.92) |

*Key:* ln = natural logarithm, GDP = gross domestic product, SD = standard deviation, M = measure of trade openness, P = real price, *i* = country code, and *t* = year.
*Note:* All coefficients are statistically significant at p=.01 except for those followed by an asterisk (*). Country income group classification based on World Bank Analytical Classifications for 2006.
*Source:* Data from Eriksen et al. 2012.[22]

### Table 13.2 ACS Data Using Taxes on International Trade as a Share of Revenue

| Years of data, by group | Number of observations | ln $GDP_{i,t}$ (SD) | ln $(tax/trade/revenue)_{i,t}$ (SD) | ln $P_{i,t}$ (SD) | Constant (SD) |
|---|---|---|---|---|---|
| **All data** | | | | | |
| 1970–2003 | 583 | 0.39 (0.01) | –0.05 (0.01) | — | 3.82 (0.08) |
| 1990–2003 | 368 | 0.38 (0.01) | –0.04 (0.01) | –0.03 (0.01) | 3.81 (0.10) |
| **Low-income group** | | | | | |
| 1970–2003 | 118 | 0.62 (0.05) | –0.3 (0.04) | — | 2.51 (0.39) |
| 1990–2003 | 130 | 1.19 (0.25) | –0.37 (0.09) | 0.15* (0.09) | –1.24* (1.06) |

*Key:* ln = natural logarithm, GDP = gross domestic product, SD = standard deviation, P = real price, *i* = country code, and *t* = year.
*Note:* All coefficients are statistically significant at p=.01 except for those followed by an asterisk (*). Country income group classification based on World Bank Analytical Classifications for 2006.
*Source:* Data from Eriksen et al. 2012.[22]

### Table 13.3 USDA/ERC Group Data Using Trade Openness as a Share of GDP

| Years of data, by group | Number of observations | ln $GDP_{i,t}$ (SD) | ln $(M/GDP)_{i,t}$ (SD) | ln $P_{i,t}$ (SD) | Constant (SD) |
|---|---|---|---|---|---|
| **All data** | | | | | |
| 1990–2004 | 1,918 | 0.09 (0.001) | 0.52 (0.02) | — | 4.22 (0.06) |
| 1990–2004 | 982 | 0.09 (0.01) | 0.29 (0.02) | 0.17 (0.02) | 5.13 (0.10) |
| **Low-income group** | | | | | |
| 1990–2004 | 573 | 0.03 (0.002) | 0.71 (0.05) | — | 3.03 (0.15) |
| 1990–2004 | 139 | 0.43 (0.1) | 0.5 (0.08) | 0.1 (0.03) | 1.33 (0.52) |

*Key:* ln = natural logarithm, GDP = gross domestic product, SD = standard deviation, M = measure of trade openness, P = real price, *i* = country code, and *t* = year.
*Note:* All coefficients are statistically significant at p=.01. Country income group classification based on World Bank Analytical Classifications for 2006.
*Sources:* U.S. Department of Agriculture 2005.[23] ERC Group 2005.[24]

### Table 13.4 USDA/ERC Group Data Using Taxes on International Trade as a Share of Revenue

| Years of data, by group | Number of observations | ln $GDP_{i,t}$ (SD) | ln$(tax/trade/revenue)_{i,t}$ (SD) | ln $P_{i,t}$ (SD) | Constant (SD) |
|---|---|---|---|---|---|
| **All data** | | | | | |
| 1990–2004 | 858 | 0.10 (0.01) | –0.14 (0.01) | — | 6.31 (0.07) |
| 1990–2004 | 478 | 0.01* (0.01) | –0.12 (0.01) | 0.18 (0.01) | 6.87 (0.10) |
| **Low-income group** | | | | | |
| 1990–2004 | 219 | 0.04 (0.01) | –0.47 (0.03) | — | 6.90 (0.13) |
| 1990–2004 | 75 | 0.78 (0.11) | –0.23 (0.06) | 0.11 (0.06) | 1.29 (0.74) |

*Key:* ln = natural logarithm, GDP = gross domestic product, SD = standard deviation, P = real price, *i* = country code, and *t* = year.
*Note:* All coefficients are statistically significant at p=.01 except for those followed by an asterisk (*). Country income group classification based on World Bank Analytical Classifications for 2006.
*Sources:* U.S. Department of Agriculture 2005.[23] ERC Group 2005.[24]

The impact of trade liberalization on cigarette consumption has been more significant in low-income countries because they generally have weaker tobacco control policies than HICs. Weak policies provide opportunities for the tobacco industry to engage in aggressive marketing practices—for example, through low prices and increased tobacco marketing—thereby encouraging consumption. This combination of policies and industry practices could explain the greater impact of trade liberalization in low-income countries than in HICs.

## Trade Agreements and Tobacco Control

International trade and investment agreements have been used by the tobacco industry and sympathetic countries to challenge or threaten tobacco control measures. Such challenges can be made through a variety of mechanisms, including by members bringing claims under WTO law, under regional or bilateral free trade agreements, or investors bringing claims under international investment agreements (as described in chapter 12). According to the principles of the most-favored-nation treatment, WTO members are required to give other WTO members the same advantages in the import or export of like products in terms of customs duties and charges, rules, internal taxes or charges, and internal sales laws and regulations. Under Article XX, which describes General Exceptions, GATT authorizes members to

introduce measures to protect the health and life of humans, animals, and plants. However, these measures must not be applied "in a manner [that] constitutes a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail or a disguised restriction on international trade."[14,p.37]

Since 2001 a number of WTO disputes have involved tobacco control measures.[27] In *Dominican Republic – Importation and Sale of Cigarettes*,[28] tax stamp measures intended to address illicit trade in tobacco products were found to be implemented in a way that violated GATT 1994. In *Thailand – Customs and Fiscal Measures on Cigarettes from the Philippines*,[29] a WTO panel found that Thailand violated customs valuation rules and that specific tobacco tax measures were discriminatory under GATT. In *United States – Measures Affecting the Production and Sale of Clove Cigarettes*,[30] the WTO Appellate Body found that the ban on flavored cigarettes (with an exception for menthol) called for in the U.S. Family Smoking Prevention and Tobacco Control Act of 2009 violated Article 2.1 of the Agreement on Technical Barriers to Trade (TBT Agreement),[31] requiring that imported products "shall be accorded treatment no less favourable" than domestic products.[27] In 2011, Cuba, the Dominican Republic, Honduras, and Indonesia challenged Australia's plain packaging law under the TBT Agreement and TRIPS.[32] Tobacco control laws may also be challenged under regional and bilateral free trade agreements, which have become more common since 2001. For example, Philip Morris (Norway) unsuccessfully challenged Norway's bans of tobacco product point-of-sale displays under the European Economic Area agreement.[33] These cases and the legal issues behind them are described in more detail in the WHO report *Confronting the Tobacco Epidemic in a New Era of Trade and Investment Liberalization*.[27]

### Box 13.1: Public Health Implications of Tobacco-Related Trade Disputes

As described below, drawing on discussions from previous reports of the U.S. Surgeon General, two trade disputes (*Thailand – Restrictions on Importation of and Internal Taxes on Cigarettes*[34,¶81] and *United States – Measures Affecting the Production and Sale of Clove Cigarettes*[30,¶95]) have suggested that governments can adopt strong tobacco control policies if these policies are applied equally to domestic and foreign products. The 2000 Surgeon General's report *Reducing Tobacco Use*[35] stated:

> [A trade dispute] was initiated by the U.S. Trade Representative in response to petitioning by the U.S. Cigarette Export Association in April 1989 over Thailand's virtual ban on the import of cigarettes and complete ban on cigarette advertising and other promotional activities in that country. The complaint cited various restrictions on the importation and sale of cigarettes and referred to discriminatory duties and taxes on cigarettes imports. . . . After no agreement [with Thailand] could be reached, the U.S. Trade Representative consented to submit the complaint to the GATT dispute resolution process.
>
> The panel created by GATT investigated the U.S. complaint that the import barriers and advertising restrictions were a violation of the international agreement's principles. In October 1990, the GATT Council sustained the panel's recommendations and ruled that the ban on imports was a violation of the GATT treaty. However, the council upheld the high Thai cigarette excise taxes (applied to both domestic and foreign cigarettes) and the right of the government to restrict the overall supply of cigarettes. Regarding the Thai advertising ban, the council noted that GATT allows member nations to use various policies to protect public health if the policies are applied to both domestic and foreign products. A cigarette advertising ban that made it difficult for new foreign firms to

> compete with existing domestic firms was ruled justifiable under the treaty, because allowing advertising could stimulate the demand for cigarettes, particularly among youth. . . . This decision was based on Article XX of GATT, which states that: "Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries . . . nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting parties of measures . . . necessary to protect human . . . health . . . ." The GATT ruling led to an agreement in November 1990 between the United States and Thailand that allowed the importation of U.S. cigarettes into Thailand.[35,p.315-16] (certain internal citations omitted)

The 2014 Surgeon General's report *The Health Consequences of Smoking—50 Years of Progress*[36] stated:

> Since [the WHO] FCTC came into force in 2005, seven tobacco control policies adopted by [WHO] FCTC Parties and one [WHO] FCTC-consistent tobacco control policy adopted by a non-Party (United States) have been the subject of discussions within WTO committees. . . . Although some of these cases do not have wide-ranging implications for tobacco control, some may prove to be significant, including the *U.S. Clove Cigarettes* case, in which the Appellate Body of WTO held that parts of the Tobacco Control Act are inconsistent with WTO obligations. . . . In this case, Indonesia requested a WTO dispute resolution panel in June 2010 based on the U.S. ban on characterizing flavors (other than tobacco or menthol) in cigarettes included in the Tobacco Control Act. Indonesia argued to the panel that the law was discriminatory because imported clove cigarettes were banned, although domestic menthol cigarettes are allowed to remain in the market. Alternatively, the United States argued that excluding menthol from the cigarette flavor ban was justified under WTO obligations because banning menthol cigarettes (which are regularly smoked by tens of millions of [U.S.] adults) presented different public health issues and potential consequences compared to banning other flavored cigarettes (which were used regularly by very few [U.S.] adults.) The WTO found that the distinctions on what flavors were banned in the United States were based upon health considerations; however, the WTO appellate body was not persuaded that there was a legitimate regulatory reason to ban clove cigarettes but not menthol cigarettes and held that the ban on clove cigarettes was inconsistent with the WTO obligation to treat imported products no less favorably than similar domestic products.[36,p.825-26] (certain internal citations omitted)

Today, much activity is focused on negotiation of large regional free trade agreements, such as the Regional Comprehensive Economic Partnership and the Transatlantic Trade and Investment Partnership. These agreements offer nations the possibility of preferential access to a number of markets through one agreement, thereby improving the competitiveness of their exports to those markets. Negotiation of regional FTAs has raised a number of issues that may impact tobacco control, including further reduction of customs duties on tobacco products, expansion of trademark rights, expansion of investment protection provisions, and a new focus on regulatory harmonization. Specific concerns about the tobacco industry's use of investment provisions to challenge legitimate tobacco control measures led to inclusion in the TPP, for the first time in any trade agreement, of a provision permitting parties to preclude investment claims concerning tobacco control measures.[37]

## Summary

Trade in tobacco leaf accounts for a very small proportion (<1%) of global agricultural imports and exports. A few countries, however, rely heavily on export earnings from tobacco leaf; in 2012, these

included Zimbabwe, Malawi, Macedonia, Bangladesh, Zambia, and Tanzania. A small number of countries dominate the global export of tobacco leaf—five countries exported more than half of the world's tobacco leaf in 2012. The import of tobacco leaf is also dominated by a small number of countries; five countries together accounted for nearly 40% of global tobacco leaf imports in 2012.

The value and quantity of global tobacco leaf exports and imports have trended upward over the last 30 years. Since the late 1990s, upper middle-income countries have been the largest exporters of tobacco leaf, with countries in the Americas Region, Brazil in particular, being dominant. HICs, especially those in the European Region, have been the largest tobacco leaf importers for many decades.

Although many countries participate in either the export or import of manufactured cigarettes, this product accounts for a very small share of overall global trade. For example, in 2012, trade in cigarettes (both exports and imports) accounted for only 0.11% of the world's total trade value in goods and services. As with tobacco leaf, trade in cigarettes is dominated by a relatively small number of countries. In 2012, five countries accounted for nearly half of the world's cigarette exports, primarily HICs, in the European Region. Similarly, five countries accounted for about one-third of the world's cigarette imports, and again, European Region countries accounted for the largest share.

Both the quantity and value of world cigarette exports have increased in the last several decades, with steep rises seen particularly in the late 1980s and early 1990s. These rises coincided with expansion of the General Agreement on Tariffs and Trade, an increased number of bilateral and multilateral trade agreements, and other factors reflecting increased economic globalization.

The price-instability index is considerably lower for tobacco leaf than for other agricultural products; this relative stability may well be one of the reasons that farmers find the crop attractive to grow. The export price of cigarettes from HICs has exceeded the price of cigarettes exported from LMICs for many decades, probably reflecting the higher production costs and higher quality of cigarettes produced in HICs. With regard to cigarettes, higher quality does not refer to the health impact of the product, rather it reflects features such as packaging, flavoring, or other product design features which may increase the appeal to consumers.

The increase in tobacco trade has been facilitated by adoption of a variety of international, regional, and bilateral trade agreements which have reduced tariff and non-tariff barriers to trade for a variety of goods and services. Trade in tobacco has also increased as a result of foreign investment, as described in chapter 12. In addition to the WTO agreements, the number of regional and bilateral trade and investment agreements has increased sharply since the early 1990s, providing opportunities for multinational companies, including tobacco companies, to enter or increase their presence in new markets.

Trade agreements have implications for the availability and accessibility of tobacco-related goods and services within and across countries and, as a result, for tobacco consumption. A number of studies have analyzed the impact of trade liberalization on tobacco consumption, and all have concluded that expanded trade in tobacco products has led to an increase in consumption. The new estimates presented in this chapter also show that increased trade openness increases cigarette consumption globally, with a greater impact on low-income countries, where tobacco control measures are generally weaker than in middle- and high-income countries.

Further liberalization of trade in tobacco leaf and tobacco products can be expected to increase tobacco product consumption, particularly in low-income countries. However, governments have many tools available to avert a rise in consumption, including tobacco excise tax increases, bans on smoking in public places and workplaces, packaging and labeling measures, and comprehensive bans on marketing. Such policies may be introduced or strengthened but should be nondiscriminatory and necessary to protect public health.

## Research Needs

In an increasingly globalized world, global, regional, and bilateral trade agreements will continue to exert an important influence on tobacco use and tobacco control efforts. There is a continued need to understand how specific trade agreements, and trade liberalization in general, impact trade in tobacco and tobacco products, tobacco consumption, and tax evasion, and how the entry of products from multinational tobacco companies can affect the pricing and marketing strategies of local companies. Research is also needed on how trade agreements influence adoption and implementation of tobacco control policies. How tobacco companies and their allies may seek to shape the contours of trade agreements to advance their business models and spur growth (or hamper decline) in tobacco consumption is also an important focus for further research.

## Conclusions

1. Trade in tobacco leaf accounts for a very small proportion (<1%) of global agricultural imports and exports, and very few countries rely heavily on earnings from trade in tobacco leaf.
2. Although many countries participate in either the export or import of manufactured cigarettes, these products account for only a very small share of overall global trade in goods and services.
3. International, regional, and bilateral trade agreements have reduced tariff and non-tariff barriers to trade, increased trade in tobacco leaf and tobacco products, and contributed to the globalization of the tobacco industry.
4. Increased liberalization of trade has contributed to increased tobacco use in low- and middle-income countries. During the period when trade in tobacco products was liberalized, most low- and middle-income countries had weak or no tobacco control measures in place.
5. Recent World Trade Organization decisions involving challenges to domestic tobacco control policies suggest that governments can address public health concerns associated with increased liberalization of trade in tobacco leaf and tobacco products by adopting and implementing effective tobacco control policies and programs that apply evenly to domestic and foreign tobacco growers and manufacturers.

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## Section 5
## Policy and Other Influences on the Supply of Tobacco Products

# Chapter 14
# Tobacco Tax Avoidance and Tax Evasion

# Chapter 14
# Tobacco Tax Avoidance and Tax Evasion

Tax avoidance (licit) and tax evasion (illicit) undermine the effectiveness of tobacco control policies, particularly higher tobacco taxes. These activities range from legal actions such as purchasing tobacco products in lower tax jurisdictions, to illegal ones such as smuggling, illicit manufacturing, and counterfeiting. This chapter examines:

- Types of tax avoidance and tax evasion
- Measurement of tax avoidance and evasion
- Determinants of tax avoidance and evasion
- Measures to counteract tax evasion, including the World Health Organization Framework Convention on Tobacco Control Protocol to Eliminate the Illicit Trade in Tobacco Products.

The tobacco industry and others often argue that high tobacco product taxes lead to tax evasion. However, the evidence shows that non-tax factors including weak governance, high levels of corruption, poor government commitment to tackling illicit tobacco, ineffective customs and tax administration, and informal distribution channels for tobacco products are often of equal or greater importance. Addressing illicit trade requires concerted attention to these root causes.

## Chapter Contents



## Figures

## Introduction

Activities aimed at circumventing taxes for tobacco products through licit (tax avoidance) and illicit (tax evasion) channels undermine the effectiveness of tobacco control policies. Extensive tax avoidance and evasion diminish, but do not eliminate, the degree to which significantly higher tobacco taxes can reduce tobacco use and increase government revenues. Tax avoidance and evasion activities can weaken the impact of pictorial health warning labels and other pack markings, bans on the use of various product descriptors, and other forms of product regulation by increasing the availability of tobacco products not subject to these policies. Tax avoidance and evasion can also reduce the effectiveness of policies restricting youth access to tobacco products.

Individual tobacco users, small-scale operators, large crime syndicates, and, at times, the tobacco companies themselves have engaged in a variety of tax avoidance and tax evasion activities. Because these actors may have a stake in keeping their tax avoidance or tax evasion secret, it is often difficult to assess the extent to which these activities take place. Tobacco companies have argued that high tobacco taxes are the primary cause of tax avoidance and tax evasion and that governments that raise taxes will increase the level of tax avoidance and tax evasion, potentially decreasing revenues collected. However, research demonstrates that many factors besides tobacco taxes are of equal or greater importance in determining the level of tax evasion, and that governments can raise taxes and at the same time effectively decrease tax evasion.

Governments have adopted various strategies to limit tax avoidance and tax evasion and have strengthened enforcement efforts and increased penalties to curb tax evasion. While these efforts have had some success, considerable work remains to be done.

Article 15 of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC) obliges Parties to control illicit trade in tobacco products. As will be described in this chapter, illicit trade in tobacco products is now the subject of its own international treaty. The WHO FCTC Protocol to Eliminate the Illicit Trade in Tobacco Products (ITP), adopted in November 2012 and ratified by 24 countries (as of October 2016), aims to eliminate all forms of illicit trade in tobacco products by using a combination of national measures and international cooperation.[1]

## Means of Circumventing Taxes

Terms to describe tobacco tax avoidance and tax evasion activities are often used interchangeably, but all have specific and distinct meanings (see Box 14.1). Further information on terminology can be found in the following publications: *WHO Technical Manual on Tobacco Tax Administration*,[2] *Combating the Illicit Trade in Tobacco Products from a European Perspective* (WHO FCTC Regional Studies Series paper),[3] *Effectiveness of Tax and Price Policies for Tobacco Control* (International Agency for Research on Cancer handbook),[4] *Understanding and Measuring Cigarette Tax Avoidance and Evasion: A Methodological Guide* (Tobacconomics and the Economics of Tobacco Control Project),[5] *Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences* (U.S. National Research Council [NRC] and Institute of Medicine [IOM]),[6] *Preventing and Reducing Illicit Tobacco Trade* (report by the Centers for Disease Control and Prevention [CDC], an agency of the U.S. Department of Health and Human Services),[7] and a book chapter by Merriman and colleagues.[8]

### Box 14.1: Tobacco Tax Avoidance and Tax Evasion Terminology

**Tax avoidance:** Legal methods of circumventing tobacco taxes, including tax-free purchases and the purchase of tobacco products in other jurisdictions in amounts allowable under customs regulations.

**Tax evasion:** Illegal methods of circumventing tobacco taxes, including the purchase of smuggled and illegally manufactured tobacco products.

**Illicit trade:** Any practice or conduct prohibited by law, which relates to production, shipment, receipt, possession, distribution, sale, or purchase, including any practice or conduct intended to facilitate such activity (as defined by Article 1 of the World Health Organization Framework Convention on Tobacco Control).

**Smuggling:** The illegal trading of products across borders.

**Large-scale organized smuggling:** The illegal transportation, distribution, and sale of large consignments of cigarettes and other tobacco products.

**Bootlegging:** The purchase, by individuals or small groups, of tobacco products in low-tax jurisdictions in amounts that exceed the limits set by customs regulations, for resale in high-tax jurisdictions.

**Ant smuggling:** The organized and frequent crossing of borders by a large number of individuals with relatively small amounts of low-taxed or untaxed tobacco products.

**Illicit manufacturing:** The production of tobacco products contrary to law. The laws in question may be taxation laws or other laws (such as licensing or monopoly-related laws) that restrict the manufacture of tobacco products.

**Counterfeit tobacco production:** A form of illicit manufacturing in which the manufactured products bear a trademark without the consent of the owner of the trademark. Illegally manufactured products may be sold on the domestic market or smuggled into another jurisdiction.

**Illicit whites** (also called "cheap whites"): Cigarettes manufactured by legitimate business enterprises, but for which a large share of production is sold illegally outside of the jurisdiction in which they are produced.

Circumventing taxes through illicit tobacco production and trade involves both genuine and counterfeit tobacco products. Illicit manufacturing of genuine tobacco products is more likely to be done by a legal tobacco company, which does not declare these products to tax authorities but diverts them through illegal channels to domestic and international black markets. Counterfeit products, on the other hand, are more likely to be produced by illegitimate tobacco companies. Due to the nature of counterfeiting, companies producing counterfeit products are less likely to keep records on these products or where they are produced.

Figure 14.1 depicts an organizational scheme for classifying the type, agent, venue, and scale of the activities involved in tax avoidance and tax evasion. This figure gives an idea of the complexity of these activities, which may be carried out by individuals acting alone, by small groups, or by organized criminal networks. It is not intended to reflect all licit and illicit activities, including legal sales that do not avoid or evade taxes.

Tax avoidance activities differ by the type or location of purchase, and individuals pay some taxes on purchases, except for those that are duty free. For example, when individuals residing in higher tax jurisdictions purchase tobacco products in nearby lower tax jurisdictions, they pay the tax levied in the

lower tax jurisdiction. This *cross-border shopping* can involve shopping across local, state, or national borders. Purchasing tobacco products in more distant low-tax jurisdictions during a visit is called *tourist shopping*. When individuals purchase their products in low-tax jurisdictions online, through the mail, or over the phone, this activity is referred to as *Internet and other direct shopping*. For these purchases, individuals pay the tax specified in the jurisdiction where the seller is located. Purchasing tobacco products on airlines or in tax-free areas of airports and other travel-related venues is called *duty-free shopping* and does not involve any tax payment.[4]

Tobacco companies can avoid taxes by stockpiling, reformulating, and/or repositioning their products so that their tax liability is reduced.[9] As will be described in this chapter, these activities are facilitated by weak tax administration, complex tax structures, and loopholes in tobacco tax systems.

In contrast to tax avoidance, tax evasion involves illegal methods of circumventing tobacco taxes. *Bootlegging*, often performed by individuals or small organized groups, takes place across different tax jurisdictions, such as U.S. states or European Union (EU) countries, where crossing borders is relatively easy.[4,6] In the case of *cross-border bootlegging*, the quantity purchased exceeds amounts specified by law or customs regulations, and purchases are intended for resale in a higher tax jurisdiction.[10] As with cross-border tax avoidance, bootleggers pay the taxes that apply in the low-tax jurisdiction where the products are purchased.[4]

Large-scale smuggling or illicit trade, where all taxes are generally circumvented, is a much more serious issue because it typically involves transport of large quantities of cigarettes, usually internationally known brands, over longer distances, and distribution by large organized crime networks.[11] Large-scale smuggling provides revenue to criminal networks, generating additional costs associated with violence or law enforcement.[2] Large-scale illicit trade often targets exported cigarettes because they are rarely taxed in the exporting country. In some cases, large-scale smuggling occurs when products are destined for one country but are illegally distributed to other countries along the transit route. In other cases, domestic tobacco manufacturers produce tobacco products and identify them as intended for export, but then divert these cigarettes into the domestic market.[12]

Tobacco tax avoidance and evasion have stakeholders who are affected positively or negatively by these activities (Figure 14.2). Public health, society, and many governments are the losers in both cases. For example, Joossens and colleagues[10] estimated that illicit cigarettes accounted for 11.6% of cigarette consumption in 84 countries in 2007. The authors further estimated that, if global illicit trade were eliminated, governments would immediately gain at least 31 billion U.S. dollars (US$) in revenue, and beginning in 2030, more than 160,000 lives would be saved per year. Some governments, however, benefit insofar as local taxes are paid before products are smuggled out of their jurisdiction. Smokers who consume counterfeit or smuggled legitimate cigarette brands may appear to gain a short-term economic benefit from these products' relatively lower prices versus legally available brands, but they are also losers in terms of the economic and health consequences of smoking. Legitimate tobacco companies gain from smuggling their legitimate products because their sales increase, but they lose from counterfeiting because of the competition from counterfeit brands.

## Figure 14.1 Circumventing Taxes by Tax Avoidance and Evasion

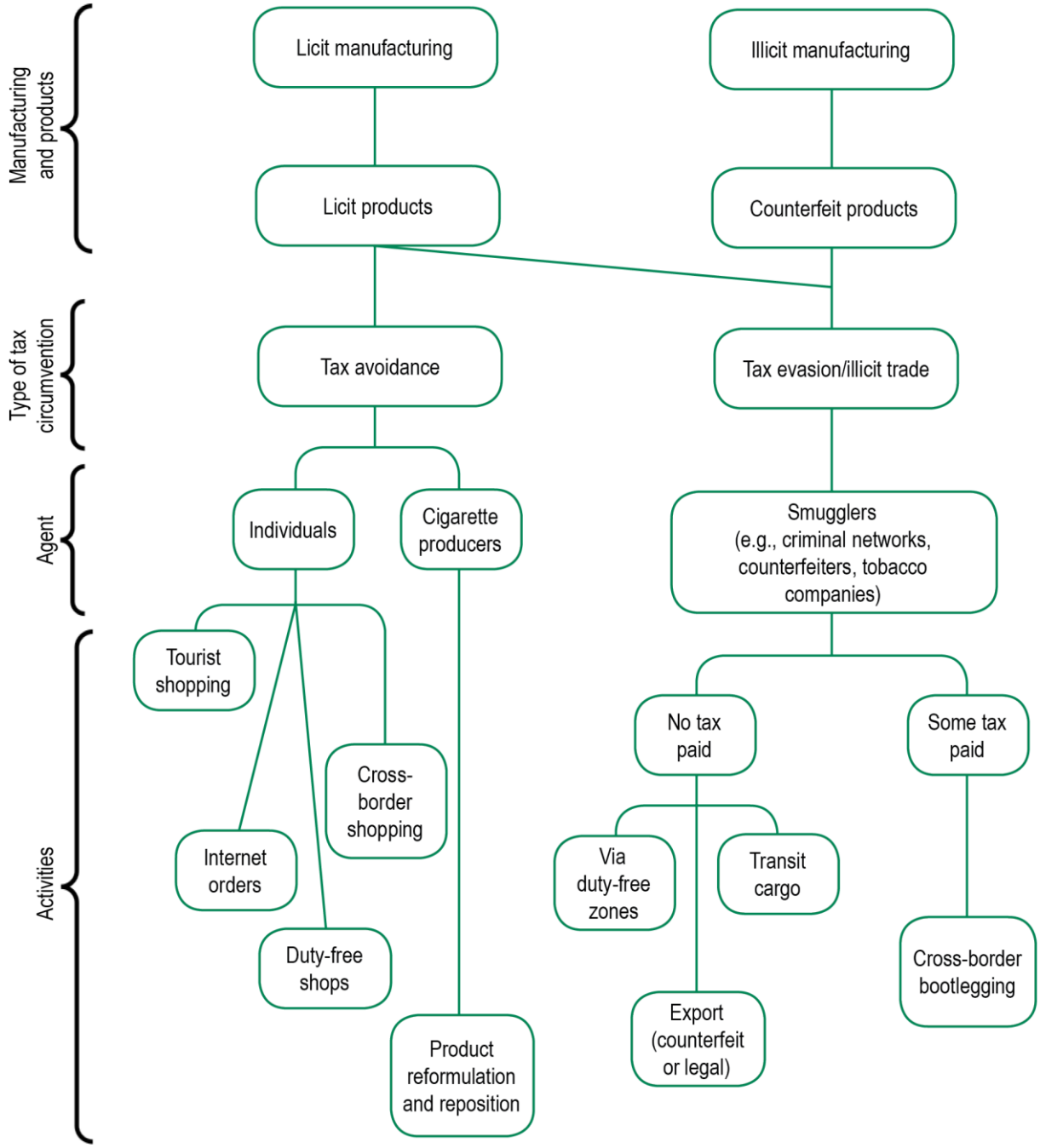
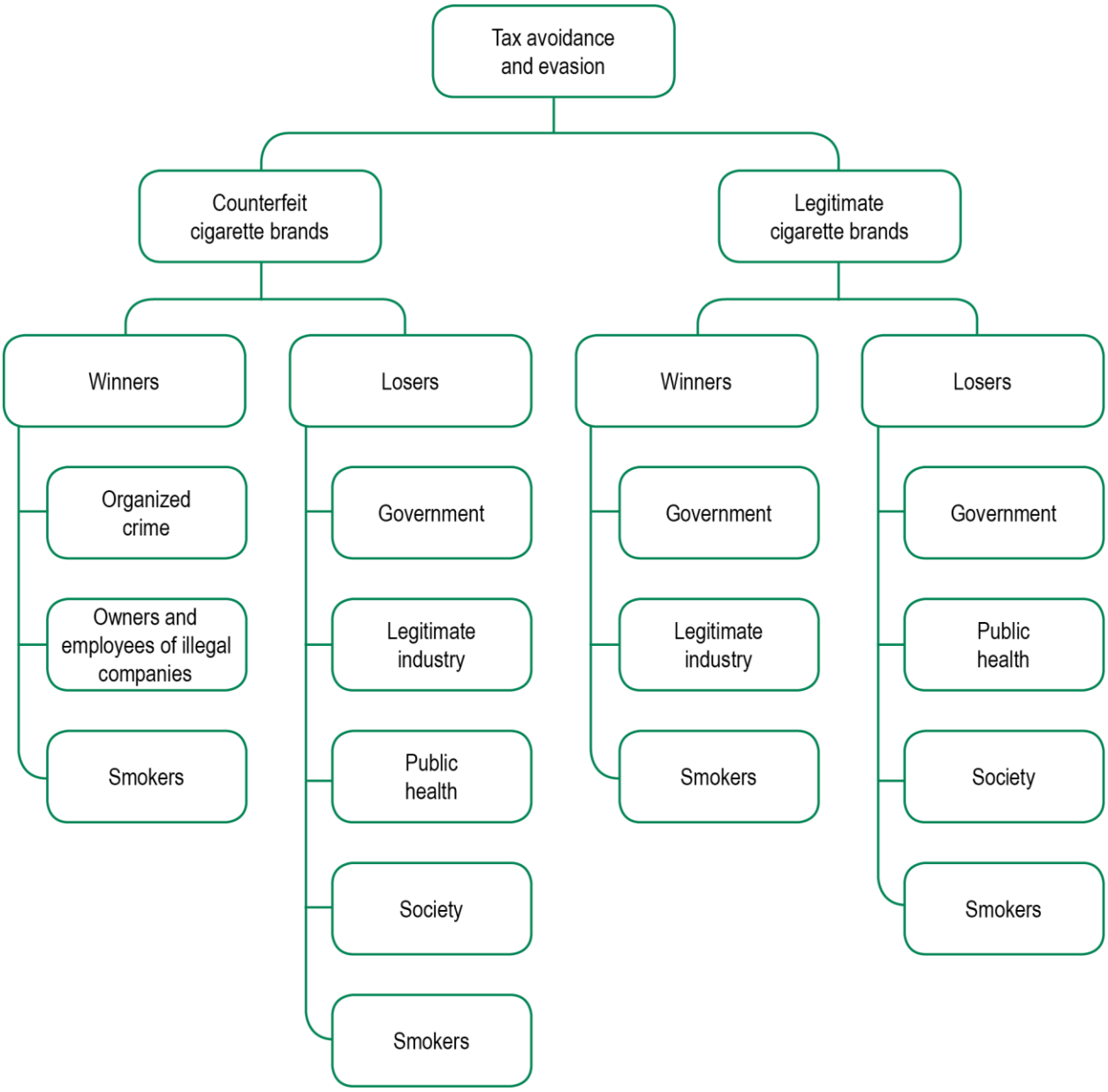


**Figure 14.2 Winners and Losers in Tobacco Tax Avoidance and Evasion**




## Measurement of Tobacco Tax Avoidance and Evasion

It is a challenge to understand the nature of tobacco tax avoidance and evasion that goes on at the country, regional, or global level and estimate the extent of these practices. Studies of tax avoidance and evasion have used several approaches, including relying on expert opinion, monitoring tobacco trade, comparing sales with consumption, as well as survey-based methods, econometric modeling of the determinants of tobacco demand, and observational methods such as assessing littered cigarette pack collections.[4–6] Each method has its limitations, but applying multiple approaches will enhance an estimates' reliability.[4,6,13] Producing reliable measures of the extent of tax avoidance and evasion can help governments design effective countermeasures that enhance the effectiveness of tobacco control policies, protect tax revenues, and decrease the threat of criminal activity.

## Expert Opinion

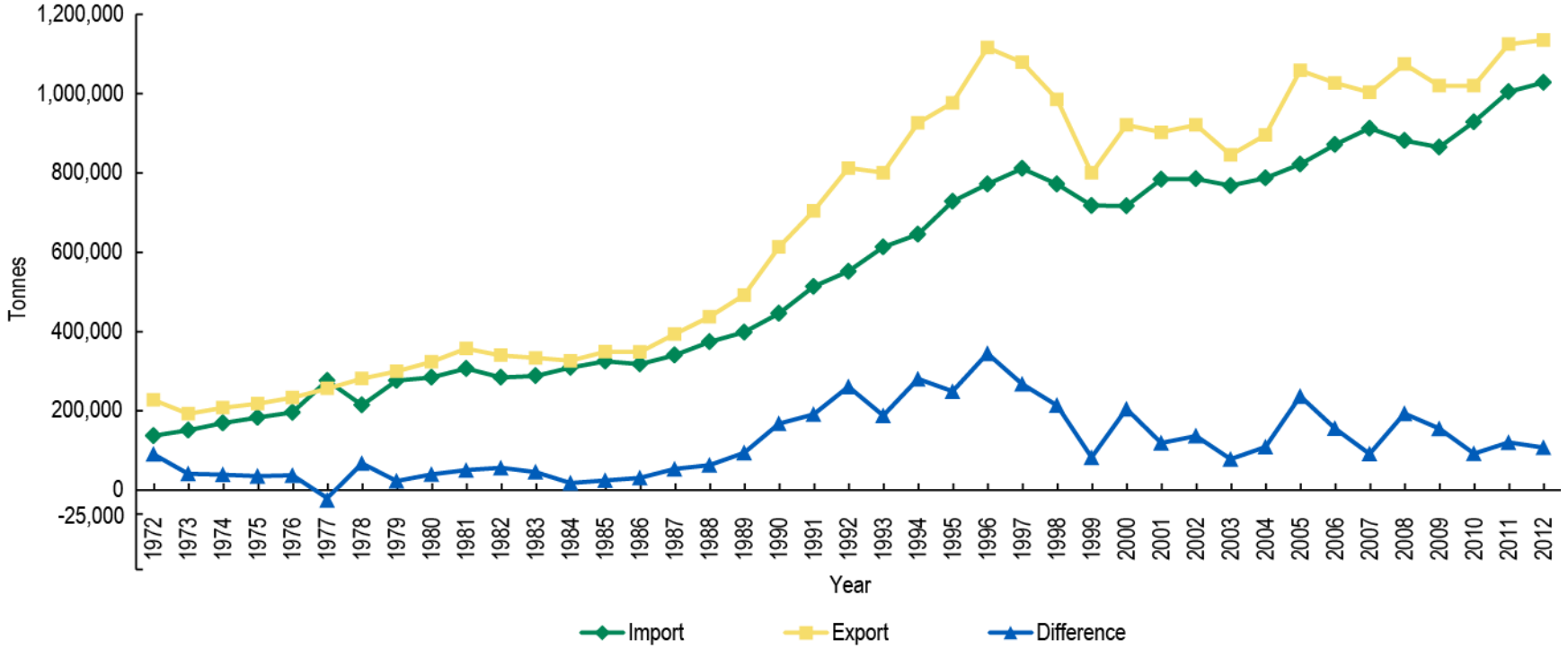
Use of expert opinion is a common method for quantifying the level of tax evasion and avoidance, especially for estimates reported in trade and government publications.[4] Consultants commonly called on include tobacco industry representatives, tobacco control advocates, academics, and policy and/or customs officials who are familiar with local market conditions and may have knowledge of a particular situation. One limitation of this method is that the opinions may be biased, given the expert respondent's position. Additionally, opinions based on seizures of illicit goods will be inaccurate if the seizures are not representative of the entire market, and may not be meaningful for comparisons over time or between countries because of differences in investigative techniques, reporting procedures, and enforcement. Despite these limitations, measures based on expert opinion are generally consistent with those derived from other approaches.[6,13]

## Monitoring Trade

Trade in tobacco products is monitored to measure global, regional, and (to some degree) country-level illicit trade. At the global and regional levels, this approach compares reported tobacco exports and imports and assumes that discrepancies between exports and imports reflect illicit trade. At the country level, this approach compares exports destined for a country to the destination country's reported imports. However, this method does not capture illicit trade of counterfeit products and illicit production of genuine products, and some discrepancies between exports and imports may be explained by other factors, such as errors in commodity classification, time lags between exports and imports, misallocation of imports by country, and over-invoicing of exports. Nonetheless, persistent discrepancies not explained by other factors can provide some estimate of the level of illicit trade.[5,6]

Merriman and colleagues[8] compared recorded cigarette imports and exports from the mid-1970s through the mid-1990s. They found that the ratio of exports to imports ranged from 1.14 to 1.57 during this period and concluded that about 6% of global cigarette consumption might be illicit.[8] Figure 14.3 shows the total global cigarette exports and imports, and the discrepancy between the two from 1972 to 2012. The discrepancy between exports and imports rose sharply in the early 1990s, peaking in 1996.[14] The subsequent drop, albeit uneven, suggests that diversion of exported cigarettes has since become a less important source of illicit cigarettes.

## Figure 14.3 Global Cigarette Exports and Imports and the Trade Discrepancy Between Them, 1972–2012




*Source:* FAOSTAT 1972–2012.[14]

## Comparing Sales With Consumption

Comparing tax-paid sales with consumption levels estimated from nationally representative consumer behavior surveys, called a tax gap analysis, makes it possible to estimate the taxes that would have been collected for the estimated level of consumption and compares the result with the amount of taxes actually collected. The difference between these two values is an indicator of the level of tax avoidance and evasion. Several sources of reporting bias are possible when applying this methodology.[12] Survey respondents may understate their actual cigarette consumption, creating uncertainty about the extent of tax avoidance and evasion.[4] For example, a 2010 report of the U.S. Department of Treasury found that the U.S. National Survey on Drug Use and Health and the National Health Interview Survey indicate that consumption is roughly 30–40% lower than what tax-paid sales data indicate.[15] A second problem is that tax-paid sales data generally reflect shipments at the producer or distributor level and not actual consumption.[16]

This methodology has been widely used despite the questions it raises. For example, the U.S. Department of the Treasury suggested that federal-level tax avoidance could exceed US$ 2 billion, depending on the degree of under-reporting of consumption in surveys.[15] In the United Kingdom of Great Britain and Northern Ireland, Her Majesty's Revenue and Customs estimated that the share of untaxed cigarettes in the United Kingdom market reached nearly 20% in 1999/2000 but fell to 13% in 2006/2007, while the estimated illicit share of hand-rolling tobacco was 53% in 2006/2007.[17,18]

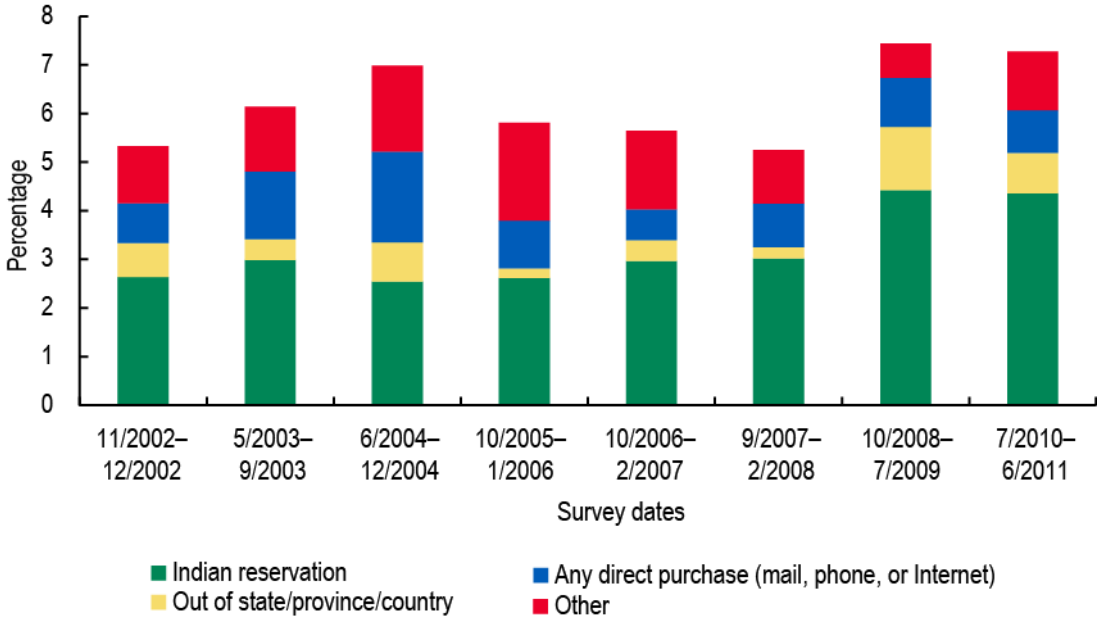
The NRC and the IOM estimated that between 8.5% and 21% of the total cigarette market in the United States is accounted for by illicit sales, representing between US$ 2.95 billion and US$ 6.92 billion in lost gross state and local tax revenues. The lower end of this estimate was based on a comparison of self-reported consumption to tax-paid sales data; the upper end was based on a national littered pack study.[6]

## Survey-Based Measures

Information collected from surveys of smokers' purchasing behaviors can be used to assess tax avoidance and evasion based on location and purchase price. This approach mainly detects tax avoidance rather than tax evasion, given that smokers may buy smuggled or bootlegged cigarettes from legitimate retailers unaware that taxes have not been paid on these cigarettes.[13]

Guindon and colleagues[19] reported data from the International Tobacco Control Policy Evaluation (ITC) Project surveys of representative samples of smokers in 16 low-, middle-, and high-income countries conducted between 2002 and 2011. These surveys asked questions on cross-border, duty-free, Internet, and other direct purchases, as well as purchases on Indian reservations and other options that could reflect untaxed or low-tax purchases, such as buying from street vendors. The authors found relatively low rates of tax avoidance and evasion in some countries (e.g., Australia, Mexico, and Uruguay), but higher rates in others (e.g., the United Kingdom, France, and Canada), with different trends and predominant types of behaviors in each country. In the United States, tax avoidance increased from about 5% in 2002 to about 7% in 2011, mainly because of increased purchases from Indian reservations (Figure 14.4).

**Figure 14.4 Tax Avoidance by U.S. Smokers at Last Purchase, November 2002–June 2011**

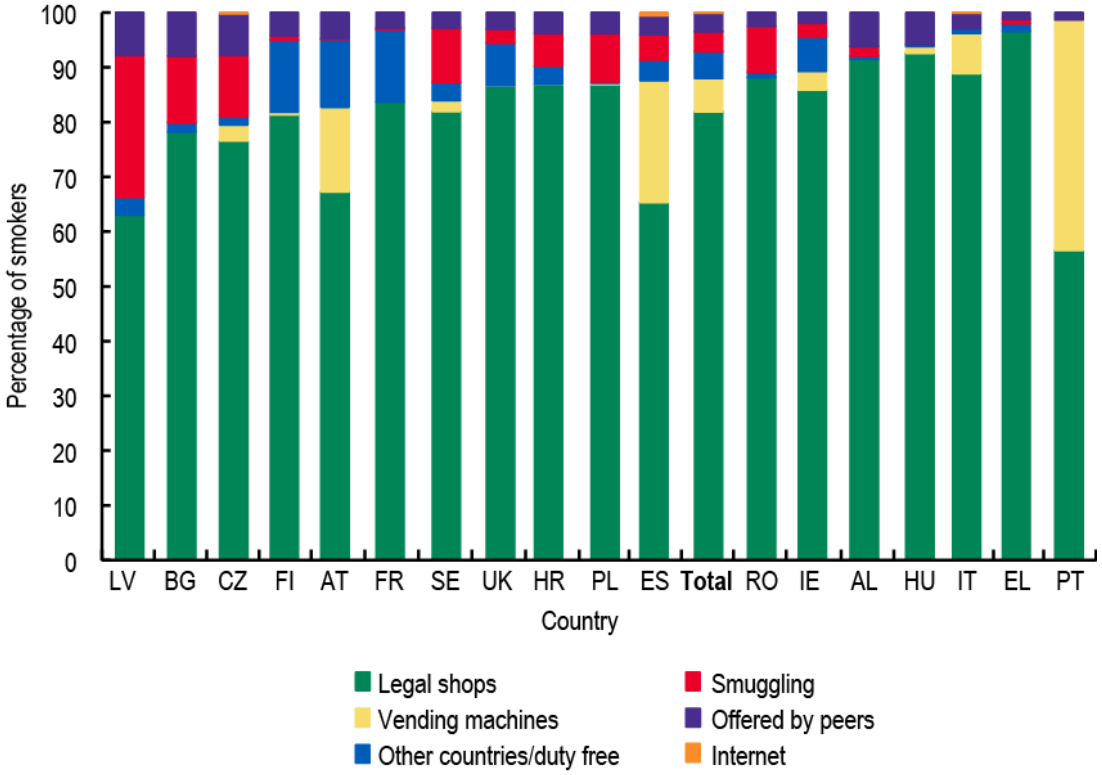



*Source*: Guindon et al. 2014.[19]

An annual survey conducted in Italy between 2005 and 2008 on purchase behaviors, with results validated using annual seizures of cigarettes by the Guardia di Finanza (Financial Guard under the Minister of Economy and Finance), found that most smokers (91%) purchased cigarettes from tobacco shops. Only 7% purchased cigarettes from vending machines, less than 1% reported purchasing from smugglers, and none reported buying cigarettes online.[20]

Another example of estimating tax avoidance and evasion using survey data about consumption is the Pricing Policies and Control of Tobacco in Europe (PPACTE) project conducted in 2010 in 18 European countries.[21] Using computer-assisted personal interviews, this survey asked adults age 15 years and older where they purchased their cigarettes in the last month. Although the majority of respondents reported that they had purchased their cigarettes through legal shops, a substantial number of current smokers in Latvia (25.9%), Bulgaria (12.2%), the Czech Republic (11.2%), Sweden (9.9%), Poland (8.8%), and Romania (8.4%) had purchased smuggled cigarettes in the past month. This study found that purchases via the Internet were insignificant, but duty-free purchases from other countries were common, especially in Finland, France, Austria, and to some extent in the United Kingdom (Figure 14.5).

**Figure 14.5 Where Current Smokers Acquired Cigarettes in the Past 30 Days, by Country, 2010**




*Country Abbreviations:* LV = Latvia, BG = Bulgaria, CZ = Czech Republic, SE = Sweden, PL = Poland, RO = Romania, HR = Croatia, ES = Spain, UK = England, IE = Ireland, AL = Albania, FI = Finland, EL = Greece, FR = France, AT = Austria, HU = Hungary, IT = Italy, PT = Portugal.
*Note*: Countries are sorted by legal shops, including vending machines, in ascending order.
*Source:* Gallus et al. 2012.[21] Reprinted with permission.

## Econometric Modeling

Several studies use econometric analyses of cigarette demand, employing tax-paid cigarette sales data as a proxy for cigarette consumption and including measures of opportunities and/or incentives for tax avoidance and evasion that attempt to account for the differences between sales and consumption. Most cigarette demand studies that examine tax avoidance and evasion have come from the United States[22–30] with one study from Western European countries[8] and one global analysis.[31] In these studies, the variables that reflect tax avoidance and evasion are constructed on the assumption that these activities occur because of differences in prices and strength of governance between jurisdictions. These studies account for the distribution of population living near borders, tourist travel, distances between high- and low-tax jurisdictions, Internet penetration, exports, and other factors reflecting access to lower tax/price jurisdictions, as well as corruption and other measures reflecting strength of governance.[8,30–32] Estimates from the econometric models are used to predict sales with and without the tax avoidance/evasion measures, and the difference between predicted sales and actual sales reflects the extent of tax avoidance and evasion.

For example, Thursby and Thursby[28] and Yürekli and Zhang[29] used annual data from U.S. states and associated changes in sales with changes in tax differences over time, estimating that the extent of cross-border shopping and bootlegging varied over time but accounted for less than 10% of overall consumption. Similarly, Stehr[30] compared survey data from the U.S. Behavioral Risk Factor

Surveillance System with tax-paid cigarette sales data, and found that the tax avoidance response to tax changes accounted for as much as 9.6% of cigarette sales between 1985 and 2001.

Merriman and colleagues[8] applied the demand analysis approach to data from 23 European countries from 1989 to 1995, concluding that a tax increase that raises incentives for home country citizens to purchase cigarettes abroad will significantly reduce domestic sales. Yürekli and Sayginsoy[31] used data from 110 countries in 1999 and constructed a large-scale illicit trade variable based on the assumption that part of exports to neighboring countries or trade partners is camouflaged and smuggled while in transit. They estimated that, globally, 3.4% of cigarettes consumed in 1999 had been acquired through large-scale illicit trade.

### Observational Methods

Tax avoidance and evasion information can also be captured by collecting littered cigarette packs, examining smokers' cigarette packs in face-to-face surveys, swapping packs, and similar approaches. Observational methods have a number of sources of potential bias. Asking to see cigarette packs during surveys may lead to under-reporting if respondents do not want to acknowledge that they purchase smuggled cigarettes or if they remove foreign tax stamps on smuggled cigarettes, given fears of prosecution, confiscation, or embarrassment.[4–6] Depending on where littered packs are collected, littered pack collection can overestimate the extent of tax avoidance and evasion because they may reflect tourism or commuting patterns. Street intercept methods may not result in a representative sample of the population. Lastly, interviewers may have limited expertise and ability to distinguish counterfeit cigarettes or examine product constituents. Observational data collection is, however, a useful method for capturing some aspects of tax avoidance and evasion.[13]

Observational approaches have been used in several countries.[5,6] For example, Ciecierski[33] used a cross-sectional consumer survey to estimate the extent of tax avoidance and evasion in Poland between 2004 and 2006. Trained interviewers asked to examine respondents' cigarette packs for tax stamps, health warnings, and other pack markings; cigarette packs that did not have a Polish tax stamp and/or had health warnings in languages other than Polish were assumed to reflect tax avoidance and evasion. The study found that on average, 11% of cigarettes brought to sale in Poland during this period were not legally permitted. Another examination of health warnings and tax stamps on respondents' cigarette packs—the 2010 PPACTE survey—led to estimated rates of tax avoidance and evasion similar to those based on respondents' purchase behaviors.[21]

Lakhdar[34] examined a random sample of cigarette packs from a waste collection center to identify the countries of origin of foreign cigarettes entering France. Foreign cigarettes accounted for 18.6% of the sample in 2005 and 15.5% in 2006. This study determined that the contraband market for tobacco products was modest, and the main problem was cross-border shopping. In the United States, Merriman[35] collected littered cigarette packs around Chicago to assess the extent of avoidance and evasion of the local Cook County and Chicago cigarette taxes. He found that about 75% of packs collected in Chicago did not have the Chicago tax stamp. This figure, however, may overestimate the level of tax avoidance and evasion, considering the large number of commuters to Chicago from other jurisdictions, as well as the large number of tourists in the city who may discard packs purchased where they reside. Stoklosa and Ross[36] estimated that 15.6% of cigarette packs gathered from 30 districts in Warsaw, Poland, had been smuggled because they had foreign tax stamps.

Fix and colleagues[37] conducted a pack return survey in the United States using the 2009 and 2010 ITC survey samples. Eligible participants were invited to mail back an unopened pack of their usual brand of cigarettes and were paid US$ 25 if they did. Tax stamps were assessed to determine whether the returned pack was taxed in the respondents' state of residence. About one in five (20% in 2009 and 21% in 2010) packs did not have the appropriate tax stamp.

## Determinants of Tax Avoidance and Evasion

Price and tax differences between countries or jurisdictions may create financial incentives to avoid or evade taxes. However, the enabling environment also determines the level of profitability of this tax evasion or avoidance, which reflects the probability of being caught and associated costs. Yürekli and Sayginsoy[31] argue that relative price disparities increase the financial incentive to smuggle, but smuggling is also influenced by the willingness to attempt to smuggle and the ability of the government to interdict smuggling.[38] Willingness to smuggle reflects the smuggler's *perceived* probability of being caught, which in turn is influenced primarily by the *actual* level of law enforcement.

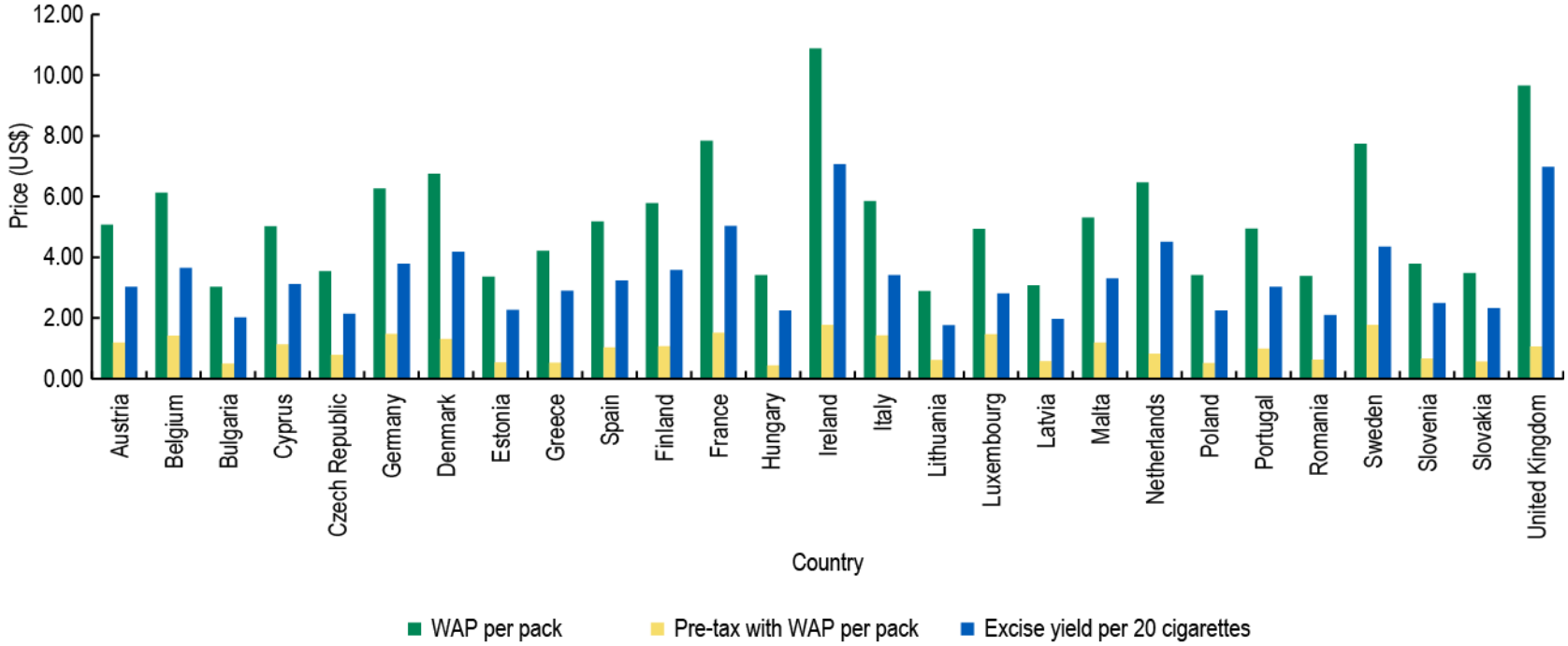
### The Impact of Tax and Price Differences

The impact of tax and price differences on type and level of illicit trade activities has been examined extensively by economists. For example, price differences between adjacent geographical areas motivate bootlegging and legal cross-border shopping, according to studies conducted in the United States,[22,25,29,39–41] multiple European countries,[8,42] Estonia,[43] the United Kingdom,[44,45] France,[34] and many other countries.

Studies in the United States indicate that the large tax differentials between neighboring high-tax to low-tax jurisdictions provide incentives for tax avoidance and bootlegging, while greater distance from low-tax jurisdictions reduces the incentive. Baltagi and Levin,[39] for example, found that an increase in price in a higher tax neighboring state increased taxed sales in a low-tax state, with the effect larger in the long term than in the short term. Similarly, Yürekli and Zhang[29] found that revenue loss from short-distance cross-border sales is sensitive to differences in excise tax rates between neighboring states. DeCicca and colleagues[41] found that a 1% price increase in a state will increase the likelihood of a smoker purchasing cigarettes in a neighboring state by 3.1%.

Cross-border shopping has been a concern in many European countries because of fairly substantial differences in retail prices and the relative ease of transit between countries. Prices vary between countries because of differing taxation (e.g., differences in tax structures and the tax share in price) but also because of industry pricing strategies and exchange rate fluctuations. Pre-tax price differentials may also influence levels of tax avoidance and tax evasion.[4] In spite of the harmonization of tobacco tax structure in the EU, final prices still vary among member countries (Figure 14.6).

## Figure 14.6 Taxation and Weighted Average Price on a Pack of 20 Cigarettes, in U.S. Dollars, in Selected EU Countries, 2012-2013




*Note:* WAP = weighted average price. Price per pack shown in 2012 U.S. dollars.
*Sources:* European Commission 2012-2013[72] and World Health Organization 2013.[50]

Several studies have examined bootlegging and cross-border shopping in the EU. For example, assessing frequency-of-travel data and other data from 18 European countries between 1989 and 1995, Merriman and colleagues[8] found that a cigarette tax increase significantly reduced domestic tax-paid sales due to both a reduction in cigarette consumption and an increase in cross-border purchases and bootlegging. Similarly, Taal and colleagues[43] analyzed tax avoidance and evasion in Estonia between 1995 and 1999 and found that illegal purchases of cigarettes—for example, cigarettes on which Estonian taxes were not paid—were made primarily by tourists and foreign visitors to Estonia, while half of legal cigarette purchases in Estonia were made by visitors, especially by Finnish and Swedish tourists. This is consistent with reports from Finnish authorities indicating that legal cross-border cigarette shopping by Finnish travelers amounted to 12% of total national sales in 1996.[46] Likewise, tobacco taxes increased substantially in France in 2003 and 2004, followed by a rise in cross-border purchases of tobacco products, both legal and illegal.[34]

In contrast, the evidence is mixed when examining illicit activities, particularly larger scale organized smuggling. This is important because the volume of bootlegged tobacco products is much smaller than the volume of large-scale smuggling,[47] hence the impact of large-scale smuggling on regional economies and public health is much greater.

For example, Joossens and Raw[48] report that less cigarette smuggling took place in Northern European countries with relatively higher incomes, taxes, and prices than in Southern European countries with relatively lower incomes, taxes, and prices. Merriman and colleagues[8] reported no significant association between experts' estimates of large-scale smuggling from 33 European countries and average cigarette prices. Joossens and colleagues[10] examined the worldwide illicit market using 2007 data from 84 countries, and reported that the illicit market share was much higher in low-income countries with the lowest cigarette prices, compared to high-income countries with higher prices (Figure 14.7). Conversely, Ramos[49] examined the illicit cigarette market in Argentina, Brazil, Paraguay, and Uruguay between 2007 and 2008 and concluded that price was the main determinant of the illicit market because of the large number of price-sensitive low-income smokers in this region.

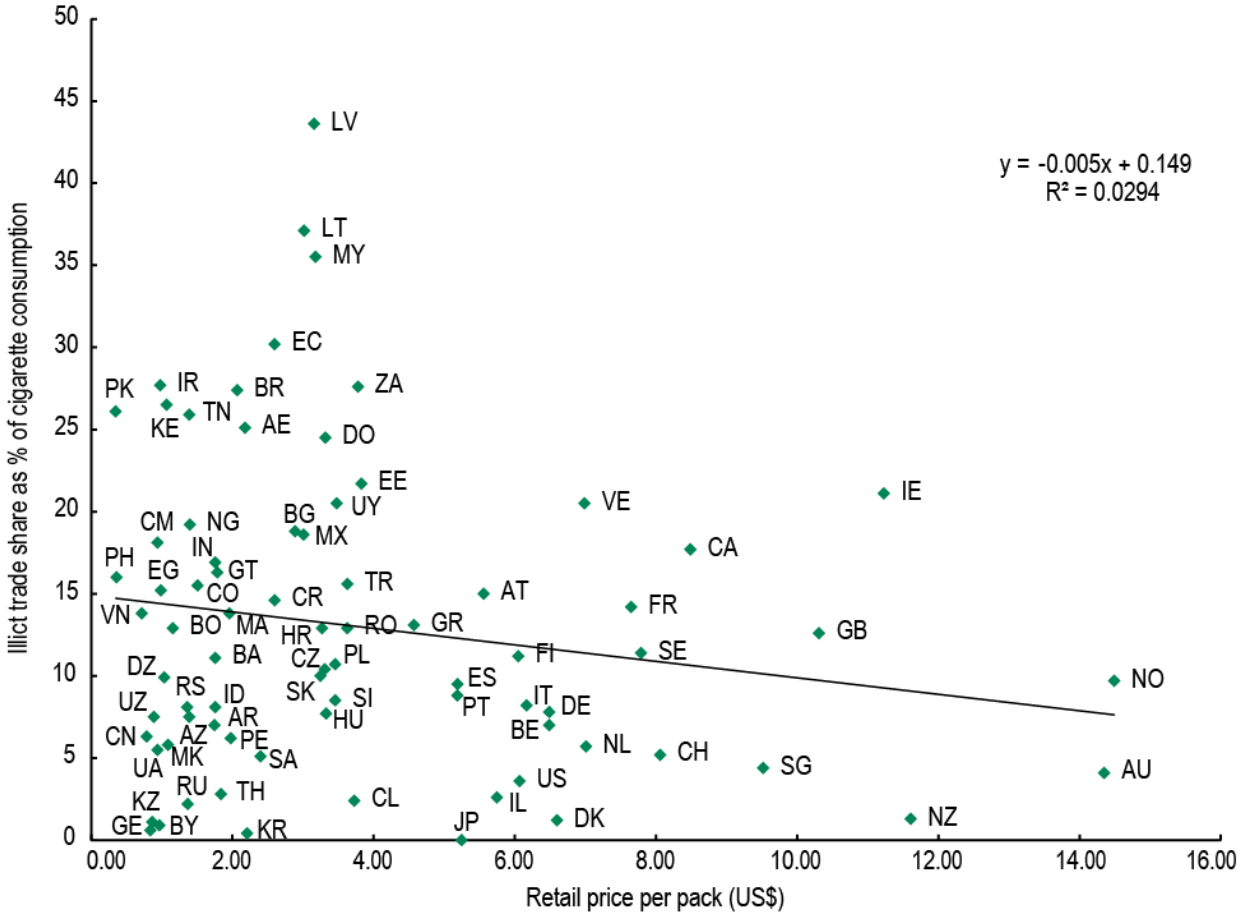
**Figure 14.7 Illicit Trade Versus Retail Price for the Most Popular Brands, by Country Income Group, 2007**


*Source:* Joossens et al. 2009.[10]

The lack of a strong positive association between average cigarette prices and share of the market accounted for by illicit cigarettes is further illustrated in Figure 14.8.[50,51] This figure shows country-level data from WHO on the retail price of the most popular cigarette brand along with Euromonitor International estimates of illicit cigarette market share for 78 countries. In contrast to the hypothesis that higher cigarette taxes and prices will lead to increased illicit trade, the data suggest the opposite, with illicit market share generally falling as cigarette prices rise.

Cigarette taxes and estimated illicit cigarette trade levels in the United Kingdom from 1993 through 2010 are shown in Figure 14.9. Cigarette taxes and the market share for illicit cigarettes both rose in the 1990s, but between 2000 and 2010 cigarette taxes continued to rise, while the share of illicit cigarettes fell from 30.9% in 2000 to 21.0% in 2010[52] in part because of significant efforts by the government of the United Kingdom to curb illicit tobacco trade.[53] These opposing trends have contributed to both reduced smoking prevalence and increased tobacco tax revenues in the United Kingdom.[54]

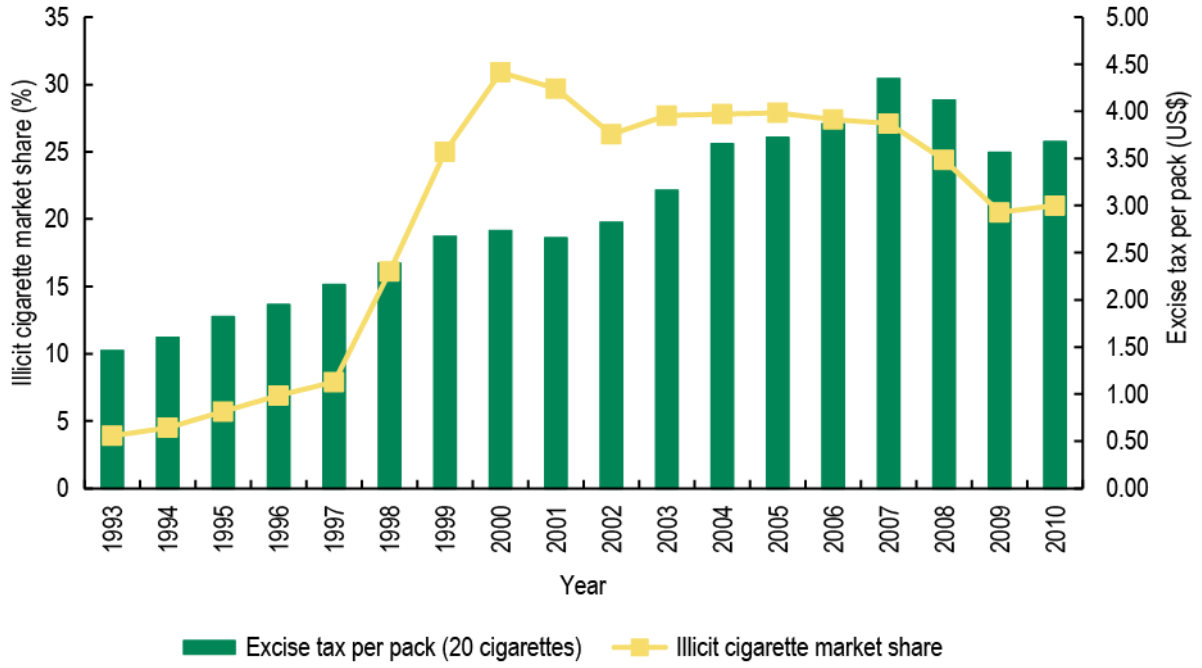
## Figure 14.8 Share of Illicit Trade Versus Retail Prices of the Most Popular Brands, by Country, 2012




*Country Abbreviations:* AE = United Arab Emirates, AR = Argentina, AT = Austria, AU = Australia, AZ = Azerbaijan, BA = Bosnia and Herzegovina, BE = Belgium, BG = Bulgaria, BO = Bolivia, BR = Brazil, BY = Belarus, CA = Canada, CH = Switzerland, CL = Chile, CM = Cameroon, CN = China, CO = Colombia, CR = Costa Rica, CZ = Czech Republic, DE = Germany, DK = Denmark, DO = Dominican Republic, DZ = Algeria, EC = Ecuador, EE = Estonia, EG = Egypt, ES = Spain, FI = Finland, FR = France, GB = United Kingdom, GE = Georgia, GR = Greece, GT = Guatemala, HR = Croatia, HU = Hungary, ID = Indonesia, IE = Ireland, IL = Israel, IN = India, IR = Iran, IT = Italy, JP = Japan, KE = Kenya, KR = Republic of Korea, KZ = Kazakhstan, LT = Lithuania, LV = Latvia, MA = Morocco, MK = Macedonia, MX = Mexico, MY = Malaysia, NG = Nigeria, NL = Netherlands, NO = Norway, NZ = New Zealand, PE = Peru, PH = Philippines, PK = Pakistan, PL = Poland, PT = Portugal, RO = Romania, RS = Serbia, RU = Russian Federation, SA = Saudi Arabia, SE = Sweden, SG = Singapore, SI = Slovenia, SK = Slovakia, TH = Thailand, TN = Tunisia, TR = Turkey, UA = Ukraine, US = United States, UY = Uruguay, UZ = Uzbekistan, VE = Venezuela, VN = Viet Nam, ZA = South Africa.

*Sources:* World Health Organization 2013[50] and Euromonitor International 2012.[51]

**Figure 14.9 Cigarette Taxes and Estimated Illicit Cigarette Market Share, United Kingdom, 1993–2010**




*Note:* Prices were converted to U.S. dollars.
*Sources:* Her Majesty's Customs and Excise 2015[107] and ERC Group 2011.[52]

## Weak Governance

Large-scale illicit trade activities, including illicit trade in tobacco products, are generally conducted by criminal networks, which operate more easily in countries where governance is weak, corruption is high, and the control of authorities is lax.[55,56] Illicit trade in cigarettes often co-exists with illicit trade in other products in environments where smuggling is tolerated by governments and the citizenry.[6] Besides organized criminal networks, terrorist organizations have also engaged in cigarette smuggling. A report from the U.S. Congressional Research Service notes that "the production, smuggling, and sale of tobacco products, including genuine and counterfeit cigarettes, is a lucrative form of financing for organized crime as well as terrorist groups"[57,p.11] and "cigarette smuggling schemes as a means for financing terrorists have been discovered in a range of countries and regions, including the United States, Europe, Turkey, the Middle East and North Africa, and Iraq."[57,p.12]

Titeca and colleagues[58] examined cigarette smuggling in central and eastern Africa using qualitative field research and secondary data from nongovernmental organizations, academic literature, multilateral organizations, and the press. These authors identified a number of reasons for smuggling in this region, including weak state capacity to monitor borders and high levels of corruption (specifically, corrupt government officials who allowed large-scale smugglers to operate). Significantly, rebel groups operating in the eastern part of the Democratic Republic of Congo engage in cigarette smuggling to finance their activities. This study concludes that these factors explain the high levels of smuggling, despite the low cigarette prices in the region.

Hajdinjak[59] analyzed the connection between armed conflicts following the dissolution of the former Yugoslavia and the growth of trans-border crime in the region, including smuggling and corruption. The author argues that political elites, security forces, and organized crime cooperated with one another to

foster the development of a regional smuggling network, which extended to neighboring countries including Albania, Bulgaria, Macedonia, and Romania. Although smuggling channels were initially focused on arms and oil, they expanded to include consumer goods, including cigarettes. According to this study, "the region became one of the most important links in the European cigarette smuggling business."[59,p.70]

Economists have examined the impact of governance or corruption on the size of illicit trade. Merriman and colleagues[8] studied the relationship between weak governance and illicit trade using data from 33 countries. As their measure of governance, the authors used Transparency International's Corruption Perceptions Index (1998),[60] which measures perceptions of the degree of corruption based on surveys of business people, risk analysts, and the general public. Merriman and colleagues found a significant association between corruption and illicit tobacco trade, with more corrupt countries having higher levels of illicit trade, and less corrupt countries having lower levels. Yürekli and Sayginsoy[31] used 1999 data from 110 countries to examine the relationship between average retail prices of cigarettes and anti-smuggling law enforcement, using the World Bank's control of corruption indicator as a proxy for enforcement of anti-smuggling laws. Their simulation study found that "increasing cigarette taxes and improving anti-smuggling law-enforcement would significantly increase government revenues while decreasing global cigarette consumption and smuggling activities."[31,p.559]

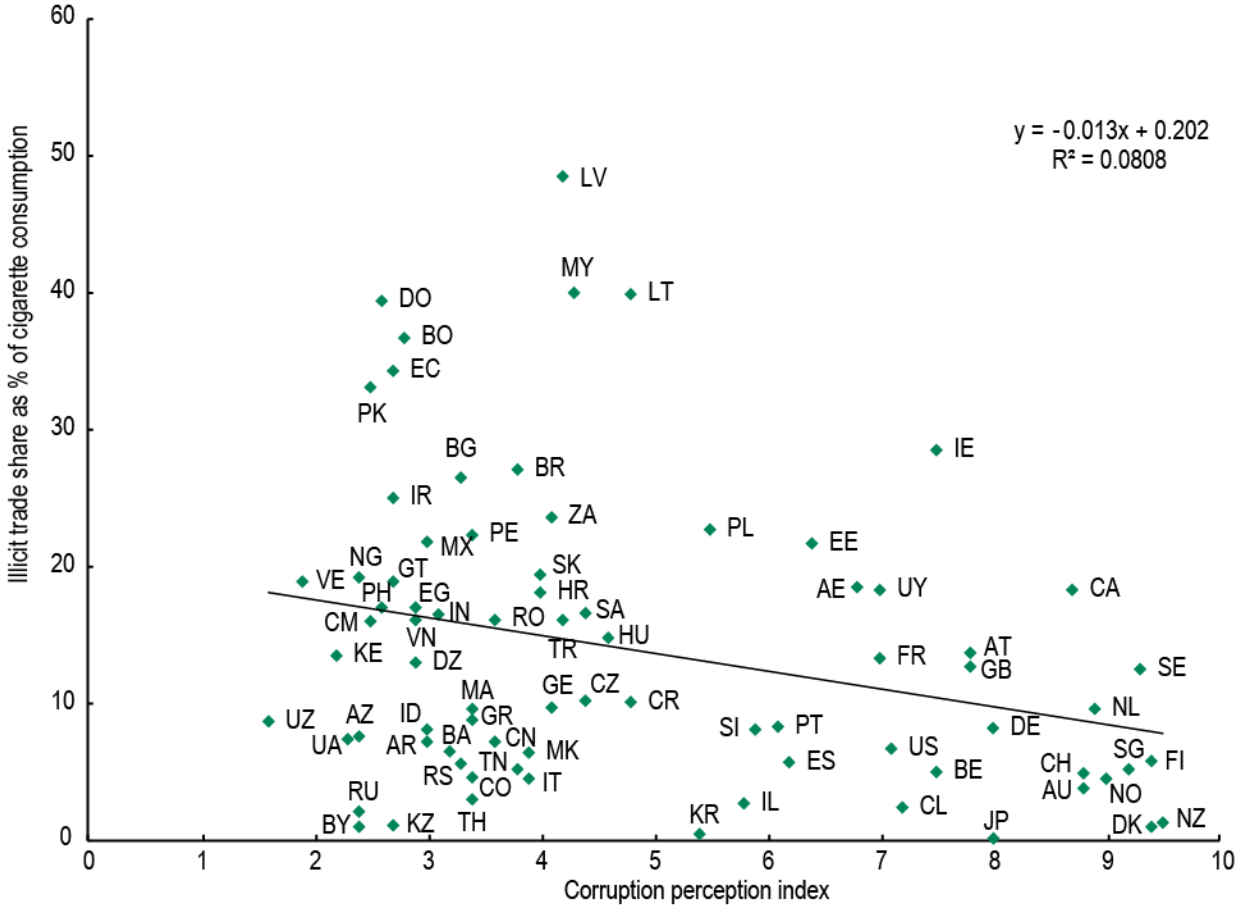
Figure 14.10 illustrates the association between corruption and illicit trade using the Transparency International Corruption Perception Index (2011)[61] and Euromonitor International's estimated market share for illicit cigarettes in 2011.[51] Consistent with evidence from the studies described above, illicit trade is higher in more corrupt countries, and lower in less corrupt countries.

### Tax and Customs Administration and Control of Illicit Trade

Illicit tobacco trade circumvents many kinds of laws in many countries, including internal laws, criminal laws, and tobacco control laws, which are enforced by customs administrations, the military, and local or federal government agencies. Dealing with illicit trade is the responsibility of customs and tax administrators in many countries, but research has shown that many factors hamper administrators' ability to effectively tackle illicit trade.[6] Mechanisms for improving agencies' effectiveness in combating illicit trade include appropriate human resources measures and technologies, supportive judicial systems, and increased collaboration and coordination between customs and enforcement agencies within and between countries.[6,7]

Many countries have extensive sea and land borders that are unsupervised for various reasons. Political unrest, geographic conditions, and the presence of traditional trade routes along borders increase the risks and costs to customs agencies of monitoring these areas. Traditional trade routes that cut across formal borders can be found in many parts of the world; given their vast number, it may not be economically viable to control traditional routes, especially when activities across them involve small amounts of trade.

## Figure 14.10 Share of Illicit Trade Versus Corruption, by Country, 2011

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*Note:* Lower scores on the corruption perception index indicate higher levels of corruption.
*Sources:* Euromonitor International 2011[51] and Transparency International 2011.[61]

Investments in technology play an increasingly important role in controlling illegal trade in tobacco products. X-ray scanners have been found highly effective in detecting smuggled goods,[62] but despite the effectiveness of these devices, customs agencies may be unable to scan all cargo entering their countries. Because of heavy traffic at borders, scanners may only be used on cargo deemed suspicious, based on information the customs agency receives or identifies from its own databases. Therefore, investments in technology require support from intelligence networks and coordination and communication within customs. Additionally, close collaboration between customs and enforcement agencies within countries as well as between different countries helps reduce illicit cigarette trade.[6,7] Such collaborations are, however, relatively rare.

Examples of successful collaboration to reduce illicit trade can be seen in the EU. A number of EU countries worked together to reduce smuggling from Andorra, an independent country located between Spain and France, in the 1990s. Authorities in Spain, France, Britain, Ireland, and Andorra, as well as the European Anti-Fraud Office (OLAF) collaborated to seal the Andorran border, deploying civil guard brigades in the valleys and hills to make smuggling more difficult. Political pressure was applied to the Andorran government to enact new legislation making it illegal to smuggle tobacco into neighboring countries.[6,63] These measures reduced the supply of cigarettes smuggled from Andorra.

### *National Efforts to Curb Illicit Cigarette Markets*

Countries have dealt with the illicit trade in cigarettes in different ways. Some try to reduce the size of the illicit cigarette market by reducing tobacco taxes or avoiding raising them. Others have increased taxes and at the same time have taken more aggressive actions to curb illicit trade. As will be discussed later in this chapter, litigation has also been employed by countries to curb smuggling.

The CDC has concluded that:

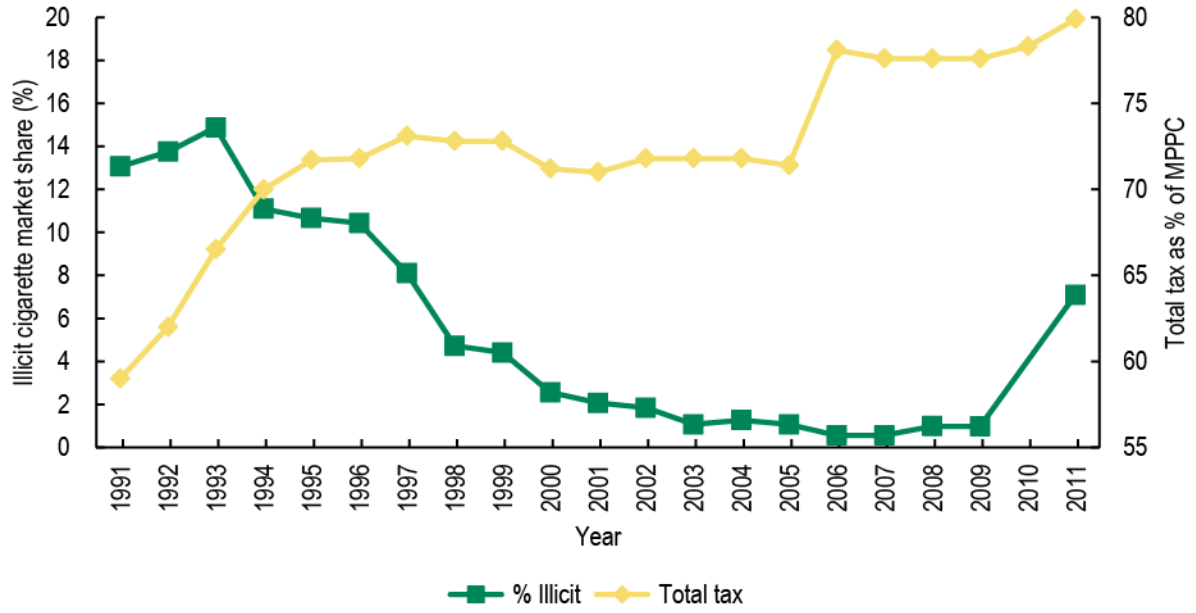
> Governments that have adopted and implemented some combination of enhanced coordination, enforcement, and penalties; track-and-trace systems; licensing; high-tech tax stamps; tribal tobacco sales policies; public education efforts; and tax harmonization have been successful in curbing illicit tobacco trade. The more comprehensive and coordinated approaches have been more effective in addressing this problem. A collaborative, comprehensive approach at the federal, state, local, and tribal levels could similarly reduce the U.S. illicit tobacco trade problem and strengthen existing and future comprehensive tobacco prevention and control work.[7,p.6]

In Canada, cigarette smuggling accelerated after cigarette taxes were increased by 500% between 1982 and 1992.[64] The high taxes resulted in considerably higher cigarette prices in Canada than in the United States.[65] Canadian cigarettes were exported to the United States and taken back into Canada illegally via Native American reservations located on the Canadian/U.S. border.[66] To address their smuggling problem, in 1994 the Canadian government reduced the federal excise tax dramatically,[64] which resulted in a reduction in cigarette tax revenues and an increase in smoking rates among both youth and adults.[12,67] However, after allegations that tobacco companies were complicit in the smuggling of the early 1990s, the government again increased federal excise taxes, and this tax increase plus higher prices led to reductions in smoking and increases in federal tax revenues.[68–70] Canada also negotiated settlements with the tobacco industry to curb smuggling, and put in place a contraband tobacco enforcement strategy which included coordination between Canadian and U.S. law enforcement agencies.[6]

Sweden took a similar path. In 1996 Sweden implemented the EU tax system, which is a mixture of specific and *ad valorem* rates, and the Swedish government increased taxes twice in 1997, raising the excise tax from 72.1% to 75.6% of retail price. However, in 1998, because of perceptions of increased smuggling, excise taxes were reduced to 70.8% of retail prices, reducing excise tax revenues while increasing tax-paid cigarette sales.[52,63] A steady rise in cigarette consumption over the next few years proved difficult to reverse until tax rates were increased. As in Canada, when tax rates were increased again, cigarette tax revenues increased despite falling cigarette sales.[71]

Other countries have committed to curbing smuggling and at the same time raising cigarette taxes and prices, resulting in higher tax revenues and reduced smoking. Spain is one example. Despite having relatively low taxes on cigarettes, Spain faced substantial cigarette smuggling in the mid-1990s, with the illicit cigarette market share reaching 14.9% in 1993[52] (Figure 14.11). In addition to a number of tax increases, Spain introduced strong measures against illicit trade, such as reducing the transporting of illicit cigarettes into the country at the "container level" through intelligence, customs activity, improved technology, and national and European cooperation, which helped to strictly control illicit trade in Andorra and Gibraltar.[47] As a result, the illicit market shrank to less than 1% of the total market by 2006, while the total tax on the most popular price category (MPPC) rose from 59% of price in 1991 to 78% in 2006[52] (Figure 14.11). Thus Spain stands as a powerful counter-example to two myths about taxation and illicit trade: It had very high rates of illicit trade when its taxes were low, and it successfully reduced illicit trade as taxes increased.

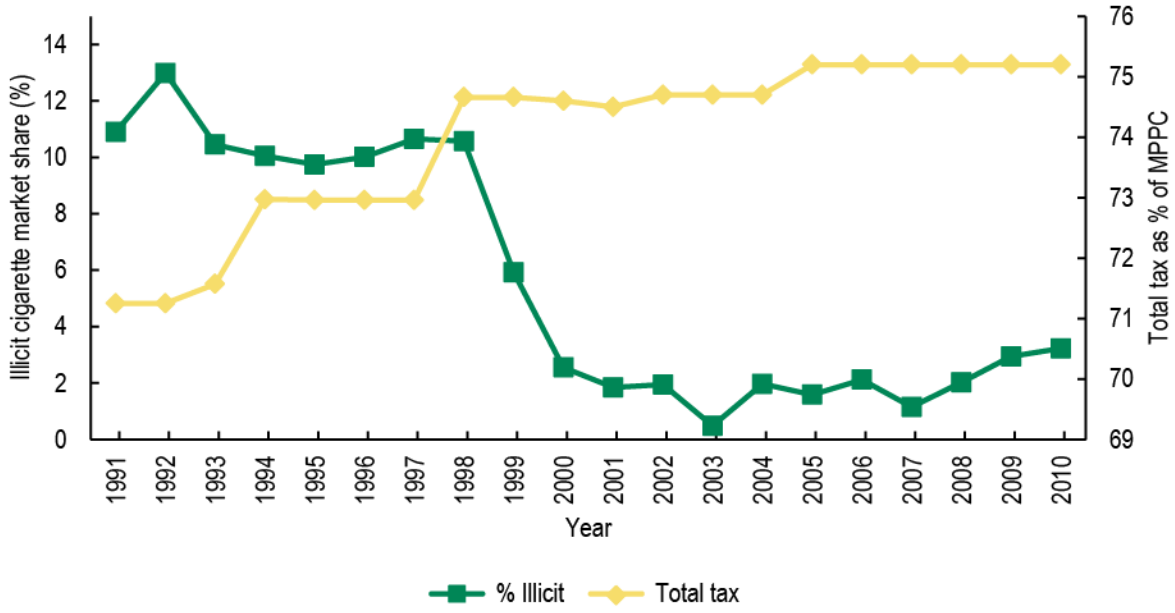
**Figure 14.11 Illicit Cigarette Market Share and Percentage of Most Popular Price Category Accounted for by Taxes, Spain, 1991–2011**




*Note*: Percentage of contraband data is not available for 2010. MPPC = most popular price category of cigarettes.
*Source:* ERC Group 2011.[52]

Italy's experience in countering cigarette smuggling was similar to Spain's. The market share for illicit cigarettes in Italy was estimated at 13% in 1992[52] when the total tax share of the MPPC was 72%[72] (Figure 14.12). To combat smuggling, the Italian government implemented several measures, including introducing barcodes on cigarette packs to help detect illicit cigarettes; adopting legislation treating tobacco smuggling like other serious crimes; and increased control over the Italian coast and additional surveillance by enforcement authorities, which were given increased powers and logistic and technical support.[73] The Italian government also strengthened its cooperation with the EU. These efforts paved the way for law enforcement and judicial authorities to tackle the issue of tobacco smuggling efficiently and effectively. By 2010, both specific and *ad valorem* excise taxes increased such that the total tax share in the retail price of the most popular price category increased to 75.2%, and at the same time, the share of illicit cigarettes on the market declined to 3.2%.[52]

### Figure 14.12 Illicit Cigarette Market Share and Percentage of Most Popular Price Category Accounted for by Taxes, Italy, 1991–2010




*Note:* MPPC = most popular price category of cigarettes.
*Sources:* European Commission 1991–2002[72] and ERC Group 2011.[52]

The government of Turkey increased taxes on all tobacco products, which resulted in significantly increased tax revenues despite illicit market penetration. Between 2005 and 2011 the Turkish government increased the specific excise floor by 141.7% and raised the *ad valorem* rate from 58% to 65% of the retail price, nearly tripling the average price of cigarettes.[74] During that time, cigarette tax revenues rose by 124%[74] while the illicit cigarette market share fluctuated between 14.3% and 17.5%.[51]

Brazil successfully reduced tax evasion from illegal manufacturing through implementation of a combination of policies (control and monitoring system, licensing of manufacturers, and enforcement).[4] During the mid-1990s, Brazil struggled with the illicit activities of domestic manufacturers who exported cigarettes to neighboring countries, especially Paraguay; these exported cigarettes then re-entered Brazil via illegal routes as contraband. To combat this practice, the Brazilian government levied a 150% tax on cigarettes exported to other countries in Latin America and the Caribbean.[75] In response, domestic companies changed their tactics to under-reporting production and distributing untaxed cigarettes in the local market. This led Brazil to adopt state-of-the-art monitoring technology for domestic producers, coupled with licensing of all manufacturers and applying a digital tax stamp on cigarette packs. This new system led to the closure of several non-compliant manufacturers and near elimination of Brazil's problem of illegal manufacturing.[4]

## Duty-Free Shops and Free Trade Zones

Some evidence indicates that the availability of duty-free sales of tobacco products has facilitated illicit trade in tobacco products in many countries, with cigarettes destined for duty-free shops diverted into the black market. This evidence comes from previously internal tobacco industry documents and information provided by customs and tax officials.[2,76,77] In Romania, for example, customs officials and border police state that duty-free shops are the source of much of the cigarettes smuggled into the

country, an opinion also held by police in other countries, including Bulgaria.[78] Duty-free tobacco product sales have since been banned in Romania.[79] Bulgaria reduced the duty-free import limit for travelers from non-EU countries (except at airports) from 200 to 40 cigarettes in order to combat illicit trade.[80]

Many governments use tax-free zones (TFZs) or free trade zones (FTZs) to promote trade, but these zones also facilitate illicit trade in tobacco products.[4] They provide a free-trading environment; only a minimal level of regulation governs the companies approved to operate in these zones. Goods that are stored in TFZs are exempted from taxes, including import tariffs, value-added taxes, and excises, where applicable. Goods are subject to tax at their final destination if sold out of the country, and are subject to domestic taxes if sold within the country.[81,82]

### The Tobacco Industry's Involvement in Illicit Trade

Evidence for direct or indirect involvement of the cigarette industry in illicit trade comes from previously internal tobacco industry documents and litigation against the companies, as well as from investigative journalism, government investigations, and other sources.[6,83] Research shows that organized illicit cigarette trade has sometimes occurred with the knowledge and/or participation of tobacco companies themselves and in some cases would not have occurred without their compliance.[6,83]

Based on studies of previously internal tobacco industry documents and analysis of legal investigations and agreements, the NRC and the IOM concluded that "tobacco companies at a global level have promoted and facilitated the smuggling of legally manufactured cigarettes"[6,p.62] and that "in the recent past the tobacco industry was complicit in the illicit trade in Asia, Eastern Europe and the former Soviet Union, Canada, Latin America, and the European Union."[6,p.62] Further, the NRC and the IOM stated that "the decline in the illicit market following litigation (or threats of litigation) underscores the industry's role in facilitating the illicit trade."[6,p.63] However, the NRC and the IOM reported that no evidence indicated that the tobacco industry participated in illicit trade in the United States as of 2015, although there may be lag time between illicit activity and detection.

As the NRC and the IOM and others have noted, a number of potential economic incentives could motivate tobacco companies to engage in illicit trade, including the possibility of expanding their brands to new markets, gaining a competitive advantage over rival international tobacco companies, and deterring governments from increasing taxes.[6] Additionally, smuggling helps tobacco companies sell their brands in countries otherwise closed to them because of import bans or because of higher duties and taxes on legal imports, which make the international companies' brands more expensive than domestic brands. By helping to keep the average market price low, illicit trade also increases total sales. Research indicates that the main economic motives of international tobacco manufacturers are both to increase their profits in the short run and to gain long-term benefits by influencing countries' tax policies. For example, tobacco companies have used potential or ongoing illicit trade to persuade governments to reduce cigarette tax rates or duty fees, or not to increase them.[83]

Another study that linked tobacco companies to smuggling was the work of Lee and Collin,[84] who reported that previously internal British American Tobacco (BAT) documents from the early 1990s to 2003 revealed that contraband tobacco was both highly profitable and integral to BAT operations in the People's Republic of China over the past two decades. Although BAT initially used smuggling as a means of gaining access to the highly restricted Chinese market, the company continued the practice in

order to build market presence. The authors of this study noted that "public statements by BAT have portrayed smuggling as 'inimical to our long-term business interests,' [but] internal documents illustrate how the company's strategy in China … centred on the supply, oversight, and control of the illicit trade."[84,p.1086]

Similarly, Collin and colleagues[76] produced a detailed case study of BAT's involvement in smuggling across Asia, using previously internal company documents that show that BAT's corporate strategy for Asia relied heavily on illicit trade, which produced large profits, gave the company access to closed markets, and created pressures for opening markets. The documents also show that BAT saw its strategic challenge as the need to "maintain both careful management of illicit trade and sufficient separation from it to ensure deniability."[76,p.ii108] Gilmore and McKee[85] also used previously internal BAT documents to identify the company's initial strategies to enter the Soviet Union following its collapse in 1991. They found that BAT used a staged approach to market penetration, and the company's tactics included large-scale involvement in smuggling to establish imports.

Skafida and colleagues[86] focused on the role of tobacco industry lobbying and smuggling in Bulgaria. These authors reported that previously internal tobacco industry documents, supplemented by other materials, suggest that transnational tobacco companies were involved in cigarette smuggling to and through Bulgaria for decades beginning as early as the mid-1970s. They found that the companies exaggerated the extent of illicit trade and worked to convince authorities that tax increases lead to cigarette smuggling.

According to LeGresley and colleagues,[87] previously internal tobacco industry documents from BAT show that the company engaged in cigarette smuggling to gain access to emerging markets in Africa. Specifically, BAT used illicit trade to "gain leverage in negotiating with governments for tax concessions, compete with other transnational tobacco companies, circumvent local import restrictions and unstable political and economic conditions, and gain a market presence."[87,p.339] Nakkash and Lee[88] examined BAT's involvement in cigarette smuggling in Lebanon, a country strategically located in the Middle East, and found evidence in previously internal company documents that smuggling was an important component of BAT's market entry strategy in Lebanon and neighboring countries.

The involvement of major multinational tobacco companies in illicit trade has been the subject of litigation in a number of countries, including Canada, Colombia, and Ecuador, as well as the EU.[83] In these cases, multinational tobacco companies were accused of supplying illicit cigarettes or of being aware of the illegal destination of their products.[2,83] Since 1997, three BAT employees—two managers from Canada and one executive from China, Hong Kong Special Administrative Region (SAR)—have either pled guilty to or been convicted of charges relating to tobacco smuggling.[89] In a Canadian case in 2008, Imperial Tobacco Canada and Rothmans, Benson & Hedges pled guilty to helping people sell or possess illegal cigarettes during the 1990s. The defendants paid a total of 1.15 billion Canadian dollars (US$ 1.12 billion) in fines and settlements to the federal and provincial governments.[90]

In 2000, the European Commission took several tobacco companies to court, accusing them of involvement in cigarette smuggling among other things.[2] In 2001, ten European countries, led by Italy, joined the litigation. The resulting settlements required Philip Morris International to make payments that were initially estimated to be up to US$ 1.25 billion over the course of 12 years.[91] Similar settlements were subsequently reached with Japan Tobacco International (2007), BAT (2010), and Imperial Tobacco (2010).[92]

### Illicit Trade Routes

Trade routes for illicit cigarettes are often convoluted and take advantage of the factors described above: FTZs, weak controls over distribution of in-transit products, ineffective customs authorities, and corruption. These trade routes are constantly changing in response to efforts to curb illicit trade.

Many studies have focused on trade routes for illicit cigarettes in various world regions. Joossens and Raw[48] described trade routes for cigarette smuggling in Europe, identifying a major trade route into Eastern Europe and a major route into the former Soviet Union, and noting that smuggling in the region primarily involves well-known international brands. LeGresley and colleagues[87] analyzed previously internal BAT documents related to Africa and found that "distributors offered BAT detailed knowledge of major entry points to the African continent,"[87,p.341] and that these appeared to be historically successful entry points for contraband. The authors concluded that "contraband tobacco trade is exceedingly dynamic in terms of supply routes and modes of transport. It is not a consequence of price differentials."[87,p.343]

Nakkash and Lee[88] examined smuggling in Lebanon. These authors learned from previously internal BAT documents that, in addition to being a target market for transnational tobacco companies, Lebanon is a key point for cigarette smuggling in the Middle East and Africa. One previously internal BAT document described Lebanon, Cyprus, Syria, and Jordan as "an intertwined group of markets with very fluid and changing channels of distribution."[88,p.327] Shafey and colleagues[75] investigated cigarette smuggling in Brazil and concluded that the main source for contraband cigarettes coming into that country is Paraguay. Ramos[49] examined illicit trade in tobacco in the four Southern Common Market (Mercosur) countries (Argentina, Brazil, Paraguay, and Uruguay) and delineated the trade routes emanating from Panama, the largest illegal cigarette supplier in the region. Ramos concluded that illegal trade in tobacco in the Mercosur countries primarily involves low-priced, little-known brands, and that cultural and governmental acceptance of smuggling contributes to the region's problem. This study concluded that "handling illicit merchandise is socially accepted" and that "governments may also be ambiguous in their view as to whether to intensify the fight against illegal commerce."[49,p.12]

Yürekli and Sayginsoy[31] summarized information from various studies and sources to produce a comprehensive global diagram of smuggling routes. These authors also conducted a simulation analysis to identify policy options to achieve the objectives of public health agencies and governments, concluding that "increasing cigarette taxes and improving anti-smuggling law enforcement would significantly increase government revenues while decreasing global cigarette consumption and smuggling activities" and that "if a tax increase is not accompanied by an improvement in law enforcement, then the level of global smuggling would increase, but governments would still enjoy increased tax revenues."[31,p.559]

## Measures to Tackle Illicit Activities: The Illicit Trade Protocol

Article 15 of the WHO FCTC obliges Parties to control illicit tobacco trade. During the second session of the Conference of Parties (COP) to the WHO FCTC in 2007, an Intergovernmental Negotiating Body was established to draft and negotiate a protocol on illicit trade of tobacco products, which would use, build on, and complement Article 15. The Protocol to Eliminate the Illicit Trade in Tobacco Products was adopted at the fifth COP in November 2012 and was opened for signature by the Parties to the WHO FCTC on January 10, 2013.[93] Ratification, acceptance, approval, accession, or formal

confirmation or approval by 40 countries is required for the ITP to enter into force. Twenty-four countries have ratified the protocol as of October 2016.[1]

The ITP aims to eliminate all forms of illicit trade in tobacco products by using a combination of national measures and international cooperation. Among other things, the ITP recognizes that illicit trade in tobacco products:

- "is contributing to the spread of the tobacco epidemic"[93,p.3]
- "undermines price and tax measures designed to strengthen tobacco control and thereby increases the accessibility and affordability of tobacco products"[93,p.3]
- "undermines the economies of Parties and adversely affects their stability and security"[93,p.4]
- "generates financial profits that are used to fund transnational criminal activity, which interferes with government objectives."[93,p.4]

The ITP will oblige Parties to implement national measures that would strengthen control over the supply chain, including:

- Implementing a tracking and tracing system, as defined in the next section, for all tobacco products that are manufactured in or imported into a country
- Licensing of those involved in tobacco product manufacturing or distribution as well as those involved in manufacturing or distribution of the machinery used to produce tobacco products
- Strengthening control measures in free zones and for tobacco products in international transit, and strengthening enforcement efforts and penalties for those found to have engaged in illicit trade.

The ITP also obliges cooperation among Parties. This may involve working closely with one another on investigations of illicit trade, providing mutual legal assistance and allowing extradition, and sharing information and technical assistance.[93] As explained in the treaty, all relevant provisions of the ITP apply to duty-free sales.

### Tracking and Tracing Regimes

An effective tracking and tracing regime would secure the distribution system and facilitate the investigation of illicit trade. *Tracking* refers to the ability of competent authorities to systematically monitor the movement of tobacco products from the place of manufacture, through the distribution chain, to the intended market of retail sale, making sure all relevant duties and taxes have been paid. *Tracing* refers to the ability of competent authorities, on the occasion of an audit or a seizure of a genuine product, to recreate the route taken by a tobacco product from the place of manufacture, through the distribution chain, to the point where the product has been diverted into illegal trade channels.[94] The ITP obligates each Party to establish a national and/or regional tracking and tracing system for all tobacco products manufactured in or imported into its territory, and these national systems would be part of a global tracking and tracing system.[93]

Turkey and Brazil were among the earliest countries to adopt high-tech tax stamps (which contain encrypted codes and information that can be read with portable scanners, making them very difficult to counterfeit) and related monitoring systems.[6,95] Other countries have followed, including Canada in July

2012, and the Philippines, which implemented the stamps on cigarettes in August 2014 after its 2012 sin tax reform legislation.[6]

In the United States, the 2009 Family Smoking Prevention and Tobacco Control Act requires the Food and Drug Administration, an agency of the U.S. Department of Health and Human Services, to issue regulations regarding the establishment and maintenance of records that will be used to track and assist in the investigation of illicit trade, smuggling, or counterfeiting of tobacco products. The statute does not set a deadline by which this regulation must be issued.[96] In 2005, California became the first U.S. state to adopt high-tech tax stamps[6]; the state's experience with the new stamp, its licensing requirements, and enforcement activities have been very positive, generating nearly US$ 153 million in annual state tax revenues in 2008.[6] As of 2013, encrypted cigarette tax stamps were also in place in Massachusetts and approved for use in New Jersey and Michigan.[6]

### Licensing Tobacco Producers, Distributors, and Retailers

A licensing system and the exercise of due diligence by businesses are key measures for securing the tobacco products supply chain in order to prevent counterfeiting and evasion of taxes on sales; both are called for in the ITP. Secure business practices are cost-effective, sustainable tools for controlling smuggling. Approaches to securing business transactions include strict control of the production and distribution chain through licensing, improved market surveillance, and safer production processes.[93]

Licensing allows authorities to control the supply chain by identifying and monitoring individuals and businesses involved in the tobacco trade. Licensing of retailers may be challenging where there are a large number of street vendors selling tobacco products. Similarly, licensing growers of tobacco may be difficult in jurisdictions with many small-scale farmers. However, licensing enables enforcement officials to establish a database of tobacco-related businesses, facilitating inspections and law enforcement.[93] An effective licensing regime would allow a license to be revoked if the licensee is convicted of tobacco-related illegal activity.

Licensing systems are in place in most European countries, although only a few countries license participants in each stage of the chain of legal tobacco trade.[97] In 2007, the IOM recommended that all U.S. states license retail sales outlets that sell tobacco products[98]; as of 2015, only a few states and localities required licenses, and their requirements varied greatly.[6]

### Posting Bonds on Cigarette Shipments

To deter the diversion of cigarettes to the black market, WHO has proposed that Parties could use bonds to hold tobacco exporters accountable for their exports.[99] To secure the movement of cigarettes between excise regimes, an exporter would be required to put up a financial guarantee prior to export, and would forfeit the bond if the product fails to arrive at its declared destination with all its applicable taxes paid. If properly implemented, this measure would create an incentive for manufacturers to ensure legal distribution of their products because they would assume a financial risk for products that end up as contraband. The existing guarantee system used to control movements between European Community states, the Community transit guarantee,[100] may serve as a model for developing a global export bond regime.

### Improved Enforcement and Application of Stronger Penalties

Globalization of trade over the past few decades has been accompanied by significant increases in the volume and speed of goods moving internationally, and by changes in the roles played by customs agencies, including border security. The traditional function of customs agencies has been to collect duties on imported goods, which contributes to government revenues. Over time, the role of customs offices has evolved to include protecting society and securing the international trade supply chain, which can involve fighting organized crime and terrorism and facilitating trade in addition to revenue collection. Combating commercial fraud has always been challenging for customs administrations, primarily because the financial rewards for perpetrators who commit revenue-related fraud can be considerable, but penalties are comparatively low.[6]

Because of its impact on both public health and criminal activity, addressing large-scale smuggling takes a higher priority than addressing small-scale smuggling. Combating smuggling requires improved detection and enforcement and stronger penalties—all of which raise the risks for people involved in this criminal activity. To improve detection, major threats and high-risk areas must be identified and dealt with. To step up enforcement, it is important to increase the penalties for people caught smuggling, seize the assets of criminals, and impose custodial sentences for major smugglers. Stronger penalties applied to owners of premises where illegal tobacco products are sold would increase the owners' expected costs and reduce their likelihood of engaging in illicit trade. To tackle large-scale smuggling, security in port areas is much more important than along shorelines. Undervaluation, tariff misclassification, and exemption fraud are very often much more significant threats than individuals bringing small quantities through uncontrolled paths along land borders, especially in low- and middle-income countries.

### Increased Resources and Stronger Cooperation

Providing sufficient intelligence resources for customs and excise administrations, both directly and through cooperation with other agencies, will increase the frequency of contraband detection and seizures. Investment is needed in both human resources—such as increasing the number of excise officers, especially those operating at crossing points—and in capital resources, such as scanners, fixed installations at high-risk borders and inland locations, and transportable equipment for use elsewhere.

Investment in technology is critical to the fight against illegal trade in tobacco products. Many customs agencies have identified the need for technological tools, which were successfully introduced, for example, in Italy when incidents of tobacco smuggling became increasingly serious.[73] Other nonintrusive methods such as the use of sniffing dogs have also proven to be efficient.

At the national level, it is important to enlist the aid of other governmental agencies such as the border patrol and coast guard. Formal memoranda of understanding between these agencies help to define their respective roles in countering illicit activities in the tobacco market. Cooperation between different enforcement agencies at a national level results in efficiencies, as specific local experiences show.[101,102]

Successfully counteracting illicit measures at the national level requires international cooperation, which involves information sharing between countries as well as between international agencies such as Interpol, the World Customs Organization, Europol, and OLAF. The worldwide exchange of data needs improvement. Only a thorough knowledge of illicit activities makes it possible to undertake effective and efficient intelligence strategies. Effective international cooperation may also include sending

officers abroad, the value of which is illustrated by the positive results obtained by the United Kingdom's Revenue and Customs network of overseas officers and intelligence-led investigations.[62]

### Ending Sales of All Duty-Free Tobacco Products

A number of countries have banned or substantially restricted duty-free sales of tobacco products. For example, travelers in the EU have not been able to purchase duty-free tobacco products since 1999. All duty-free tobacco product sales were banned in Nepal in 2008 and in Romania in 2010, and Bulgaria banned these sales at its land borders with non-EU countries. Beginning in 2001, Canada levied a federal tax on tobacco products sold in duty-free shops.[2]

### Public Awareness Campaigns

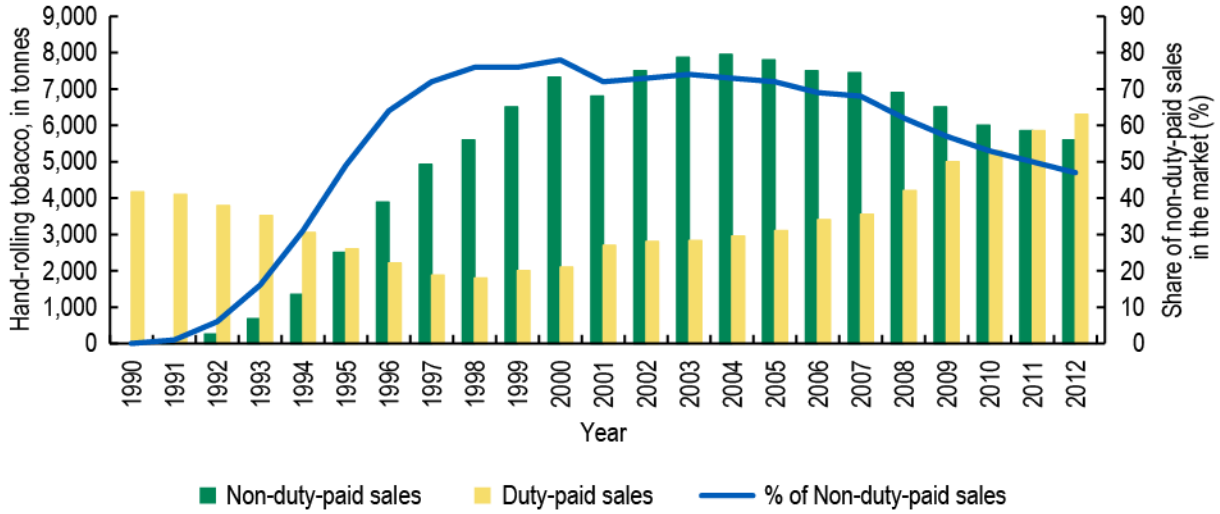
Informing the public about the criminal nature of illegal trade and production—what the law is, and the consequences of being caught in such illegal activities—is another potential strategy for curbing illicit trade. This information is particularly relevant for low-income and poorly educated populations which may be more likely to purchase smuggled cigarettes.[49] The NRC and the IOM documented campaigns against illicit trade in Canada; China, Hong Kong SAR; Ireland; Singapore; the United Kingdom; and the United States (Chicago).[6] The United Kingdom's effort, "The North of England Tackling Illicit Tobacco for Better Health Programme," was a social marketing media–based program with two key messages: one concerning the role of illicit tobacco in uptake of tobacco use by young people, and the other on the crime brought to communities by illicit trade. Research shows that this program was effective in raising awareness of the consequences of illicit tobacco trade and in increasing calls to telephone hotlines reporting on illicit tobacco. Research also indicates that this program was an important component of the comprehensive approach the United Kingdom took to successfully reduce illicit trade in the 2000s.[103]

## Illicit Trade in Other Tobacco Products

While most of the research and policy attention centers on illicit trade in cigarettes, evidence suggests that other tobacco products, such as smokeless and roll-your-own tobacco, are also smuggled. For example, studies show that many smokeless tobacco products in Bangladesh, Sri Lanka, and Nepal are smuggled from India.[104,105]

Tobacco meant to be hand-rolled into products for personal use (roll-your-own, or hand-rolling tobacco) is also smuggled in Europe, especially in the United Kingdom. According to Her Majesty's Revenue and Customs,[45] the United Kingdom seized 2,700 tonnes of hand-rolling tobacco between 2000 and 2011. Latest United Kingdom estimates are that smuggling of hand-rolling tobacco costs 2.2 billion pounds in lost revenue per year.[45] Figure 14.13 shows that the market share of smuggled hand-rolling tobacco in the United Kingdom reached almost 80% in 2000 but declined to less than 50% in 2012.[106]

**Figure 14.13 Hand-Rolling Tobacco Market in the United Kingdom—Duty-Paid Versus Non-Duty-Paid Sales, 1990–2012**




*Source:* Tobacco Manufacturer's Association 2014.[106]

## Summary

Circumventing taxes on tobacco products through licit means (tax avoidance) and through illicit means (tax evasion) undermines the ability of tobacco control policies to reduce tobacco use. The most serious challenge is posed by large-scale smuggling, because it involves large quantities of tobacco products, has a greater impact on public health and regional economies, and frequently provides revenue for organized criminal networks and terrorist organizations. Previously internal tobacco industry documents, investigative reporting, and litigation show that tobacco companies at the global level have promoted and facilitated cigarette smuggling.

A variety of methods have been used to estimate the extent of tax avoidance and evasion, including consulting expert opinion, comparing tobacco product exports and imports, comparing tax-paid sales with consumption, surveying consumers' purchasing behaviors, comparing taxed sales with estimated consumption using demand analysis, and observational methods. Estimating the extent of tax avoidance and tax evasion is difficult, given that those involved may have a stake in keeping their involvement in these activities secret.

Large tax differences between jurisdictions create incentives for tax avoidance (e.g., cross-border shopping) and tax evasion (e.g., bootlegging). These incentives diminish as the distance between jurisdictions increases. In contrast, the evidence linking price to the level of large-scale illicit trade is mixed, indicating that factors other than price are equally or more important determinants. Large-scale illicit trade, generally conducted by criminal networks, flourishes in countries and regions with weak governance, high levels of corruption, and lax law enforcement, and where smuggling of other commodities is also common. Illicit trade routes are constantly evolving in response to governments' efforts to curb illicit trade.

Experience from many countries demonstrates that illicit trade can be successfully addressed, even when tobacco taxes and prices are raised, and curbing illicit trade results in increased tax revenues and reduced tobacco use rates. Government commitment to combating illicit trade is essential. Successful

strategies include implementing tracking and tracing systems; controlling the supply chain by licensing all parties involved in tobacco product manufacturing and distribution; implementing appropriate policies, stronger enforcement, and enhanced penalties; and international cooperation in investigation and prosecution of participants in illicit trade.

The ITP, the first protocol of the WHO FCTC, was adopted in November 2012. The ITP recognizes that illicit trade increases the accessibility and affordability of tobacco products, fuels the tobacco epidemic, undermines tobacco control policies, reduces government revenues, and helps to fund transnational criminal activities. Once in force, the ITP will oblige Parties to implement a variety of measures, with special emphasis on those that strengthen control over the supply chain of tobacco products, and to cooperate in global efforts to eliminate illicit trade in tobacco products.

## Research Needs

Research is needed to better understand the extent of tax avoidance and evasion, and the effectiveness of interventions to curb them. Generating adequate data on the extent of tax avoidance and evasion is challenging when illicit activities are involved. Developing reliable measures to determine the magnitude of the problem is essential, particularly in low- and middle-income countries, given that much of the existing data on tax avoidance and evasion come from North America and Europe. There is also a need to understand transfer pricing activities of multinational tobacco companies. A better understanding of the determinants of illicit trade—including the supply of illicit tobacco products—is needed in order to maximize the effectiveness of interventions to limit illicit trade. Systematic evaluations that examine the effectiveness of interventions to reduce illicit trade would contribute to the evidence base. Lastly, while much of the research to date has focused on cigarettes, illicit trade in other tobacco products is an area that would benefit from further research.

## Conclusions

1. Tax avoidance and tax evasion, especially large-scale smuggling of tobacco products, undermine the effectiveness of tobacco control policies and reduce the health and economic benefits that result from these policies.
2. In many countries, factors such as high levels of corruption, lack of commitment to addressing illicit trade, and ineffective customs and tax administration, have an equal or greater role in explaining tax evasion than do product tax and price differentials.
3. Illicit trade has sometimes included the involvement of tobacco companies themselves.
4. Experience from many countries demonstrates that illicit trade can be successfully addressed, even when tobacco taxes and prices are raised, resulting in increased tax revenues and reduced tobacco use.
5. Implementing and enforcing strong measures to control illicit tobacco trade would enhance the effectiveness of significantly increased tobacco taxes and prices and strong tobacco control policies in reducing tobacco use and its health and economic consequences.

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## Section 6
## Economic and Other Implications of Tobacco Control

# Chapter 15
# Employment Impact of Tobacco Control

# Chapter 15
# Employment Impact of Tobacco Control

Adoption and implementation of effective tobacco control policy interventions are often influenced by concerns over the potential employment impact of such policies. This chapter examines employment issues and discusses the following:

- An overview of current tobacco-related employment, including employment in tobacco growing, manufacturing, wholesale and retail sales, and tobacco-expenditure-induced employment
- Trends in tobacco-related employment including the shift toward low- and middle-income countries
- Impact of globalization, increased workforce productivity, and new technologies on tobacco-related employment
- Impact of tobacco control policies on overall employment and how this impact varies based on the type of tobacco economy in specific countries.

Econometric studies show that in most countries tobacco control policies would have an overall neutral or positive effect on overall employment. In the few countries that depend heavily on tobacco exporting, global implementation of effective tobacco control policies would produce a gradual decline in employment. Around the world, employment in tobacco manufacturing has decreased primarily because of improvements in manufacturing technology, allowing more tobacco products to be manufactured by fewer workers, and by the shift from state-owned to private ownership, which requires companies to operate in a more competitive environment.

## Chapter Contents



## Figures and Tables

## Introduction

The World Health Organization (WHO) has projected that smoking could lead to as many as 8 million deaths per year by 2030.[1] Tobacco control policies such as increased taxes and comprehensive smoke-free laws are effective in curbing tobacco use, but some policymakers are reluctant to implement such measures for fear they might lead to significant employment losses. This chapter reviews the existing evidence on the employment effects of tobacco control policies, focusing on how and to what extent these policies affect employment, and how the effects of these policies on employment levels vary between countries.

## Current Status of Tobacco Employment

The tobacco industry generates jobs in many economic sectors. One way to classify these jobs is by their level of dependence on the tobacco industry: jobs that are directly dependent on tobacco, jobs that are partially dependent on tobacco, and jobs that are indirectly related to tobacco, referred to as tobacco-expenditure-induced jobs. Employment in tobacco growing and manufacturing falls into the first category. Tobacco growing is a labor-intensive enterprise, which encompasses all aspects of tobacco work on farms, including initial land preparation, delivery of cured tobacco, and preliminary leaf processing. Tobacco manufacturing is less labor intensive but also involves a range of activities, including reordering, blending, and cutting tobacco leaf and delivering packaged tobacco products to the wholesaler. Jobs in tobacco growing and manufacturing, often referred to as core-sector employment, are the primary focus of this chapter.

Employment that is partially dependent on tobacco includes tobacco wholesaling and retailing, specifically jobs such as transporting tobacco products, doing warehouse work, and selling tobacco products to the end consumer. These kinds of jobs, although related to the tobacco industry, are less dependent on the industry because many wholesalers and retailers derive only a small portion of their revenues from the distribution of tobacco products. The number of stores that sell tobacco products exclusively is small in some countries, such as the United States,[2] and relatively large in others, such as the People's Republic of China.[3] However, the equipment and resources that specialty stores use for tobacco products are not unique and can be shifted to nontobacco alternatives.

Indirect employment, or employment that is supported indirectly by tobacco expenditures, includes jobs in sectors that supply inputs and materials (e.g., agricultural chemicals, machinery) to the core tobacco sectors, and jobs in other sectors of the economy that are supported by what tobacco industry workers spend on consumer goods and services with the income earned in their tobacco-dependent jobs. Tobacco use also generates employment in the health care industry because of illnesses caused by tobacco.

### Directly Dependent Employment

#### *Tobacco Farming*

Although tobacco is grown in approximately 124 countries,[4] a large proportion of the world's tobacco is grown in the small number of countries that have suitable conditions for tobacco cultivation and the necessary skills and technology. Thus, employment in tobacco growing is concentrated in a small number of countries. In 2013, 10 countries grew 81.3% of the world's tobacco leaf; China alone accounted for 42.4%.[4]

As noted in chapter 10, estimating the number of people working in tobacco growing and the extent of their dependence on tobacco agriculture is challenging, and data are limited. The International Labour Organization (ILO), an agency of the United Nations with representation from governments, employers, and workers, began collecting data on the tobacco sector in 1995. A 2003 ILO report[5] estimated that 40 million people were involved in tobacco growing and leaf processing worldwide, with the largest numbers employed in tobacco growing in China (35 million), India (850,000) Brazil (723,000), Turkey (586,616), and Malawi (586,000). However, the method used by the ILO to derive these estimates was not well described and may have overestimated jobs in this area by including part-time tobacco farmers. Moreover, tobacco growing is seasonal, and tobacco farmers typically grow other crops or engage in other economic activities. Full-time equivalents (FTEs) could be used to convert the number of part-time farmers into a full-time base, but such a conversion was not performed for the ILO estimate.

In 2014, the ILO provided updated information, based on data collected from 64 countries for the period 2000–2013.[6] The ILO noted that the available data are limited and fragmented, and warned that "despite best efforts, data in the report should be interpreted with utmost caution."[6,p.ix] The report indicated substantial drops in employment in tobacco leaf growing between 2000 and 2013 for several countries, including Turkey (583,500 in 2000 to 66,500 in 2012), Brazil (462,800 in 2002 to 342,200 in 2009), and the United States (51,700 in 2002 to 14,100 in 2007). In contrast, increases were seen in Argentina (32,300 in 2000 to 58,400 in 2010), India (62,800 in 2001 to 89,300 in 2013), and Zimbabwe (8,500 in 2000 to 56,900 in 2011). The ILO data on employment in tobacco leaf growing included full-time, part-time, and seasonal workers as well as contributing family members, and reflected both small holdings and farms in which tobacco is not the primary product.

Other reports on employment in tobacco farming further highlight the considerable variability and imprecision of these estimates. For example, Hu and colleagues[7] estimated the number of tobacco growing workers in China at 17.5 million for 2006, roughly half the estimate of the earlier ILO study. Estimates may differ based on the data source used (the type, quality, and availability of data vary greatly from country to country and even within individual countries) and the methods used to estimate components of direct tobacco employment. Iglesias,[8] for example, highlighted the discrepancy in estimates of the number of jobs associated with tobacco farming in Brazil, contrasting a figure of 582,000 from the Brazilian Tobacco Growers Association (AFUBRA) with a figure of 290,400 from the Brazilian Institute for Geography and Statistics (IBGE).

Jacobs and colleagues[9] emphasize that the most important statistic in terms of employment is not the absolute number of people employed in tobacco farming, but the percentage employed in tobacco farming relative to the total agricultural labor force. Even in countries that rely heavily on tobacco production, the share of tobacco-farming employment in the total agricultural employment is small. In Malawi in 1990, for example, tobacco-growing labor measured in FTE figures was less than 3% of the total agricultural labor force FTEs. Additionally, in contrast to sectors where jobs are full-time and year-round, tobacco farming is characterized by the extensive use of seasonal workers, part-time workers, unpaid family labor, and other informal laborers.

### *Tobacco Manufacturing*

Tobacco product manufacturing, which includes production of cigarettes and other tobacco products, is estimated to have employed more than 1.2 million workers worldwide in recent years.[10] This estimate is derived from data reported for 73 countries, including all major tobacco-manufacturing countries, in the

United Nations Industrial Development Organization (UNIDO) database, with the most recent year reported varying from 2010 to 2014 (see Table 15.1). However, this estimate does not appear to include employment in informal tobacco product manufacturing. In India, for example, bidi manufacturing employs an estimated 4.2 million people, the vast majority working in the informal sector rather than in organized factories.[11]

As with tobacco farming, employment in tobacco product manufacturing is concentrated in a few countries. Based on data from the years 2010–2014, about 80% of tobacco-manufacturing employment was concentrated in three countries: India (34.7%), Indonesia (27.2%), and China (16.9%).[10] In most countries, the share of tobacco-manufacturing employment as a percentage of total employment was less than 0.5%[8]; this was true in India even when those employed in the bidi sector are included.[11]

### Partially Dependent Employment: Tobacco Product Wholesale and Retail Sales

Estimating global employment in tobacco wholesaling and retailing is difficult because tobacco product distribution varies by country. In some countries, tobacco wholesaling is a part of the manufacturing process, and employment in this sector is captured by jobs in tobacco manufacturing. In other countries, such as the United States, separate entities distribute tobacco products from manufacturers to retailers. Existing estimates of employment in tobacco wholesaling are subject to additional limitations. For example, the ILO estimated that tobacco wholesaling employed 99,606 people in the United States in 1997,[12] but noted that this includes both those primarily engaged in wholesaling tobacco products as well as those who distribute other products.

The ILO also estimated that 155,451 people were employed in the tobacco retail sector in the United States in 1997.[12] As with the wholesale data, this figure includes those employed in tobacco specialty stores and in more diverse retail outlets. Most tobacco products are sold by retailers who also sell nontobacco products. For example, in the United States in 2014, less than 20% of cigarettes were sold through tobacco specialty stores, the remainder being sold largely through convenience stores (including those at gas stations), groceries, mass merchandise stores, and pharmacies.[2] Similarly, in Australia, the vast majority of tobacco retailers also sell nontobacco products; about 80% of cigarettes sold in Australia in 2014 were sold in nonspecialty outlets.[13]

### Indirectly Related Jobs: Tobacco-Expenditure-Induced Employment

Tobacco-expenditure-induced employment is often estimated by using input–output models, and such studies find that tobacco is weak in generating jobs in other sectors of the economy. For example, Ahsan and Wiyono[14] compared the employment-multiplier effect of the tobacco industry with other industries in Indonesia and found that the cigarette-manufacturing sector ranked 48th out of 66 sectors, with an employment multiplier of 4.68. That is, if a new cigarette manufacturer in Indonesia employed 1,000 workers, 4,680 jobs would be generated in other sectors in the economy as a result. Tobacco farming, which ranked 30th in expenditure-induced employment, has an employment coefficient of 1.05, whereas rice milling and sugar factories have multiplier effects of 13.57 and 13.41, respectively. Therefore, if Indonesian smokers were to spend money on food instead of cigarettes, the increased demand for food would generate jobs in food industries and have a much larger employment-multiplier effect, creating many more new jobs in the economy than would be lost due to reduced cigarette sales.

## Trends and Regional Shifts in Tobacco-Related Employment

Although consistent and comprehensive data are not available to document trends in regional or global employment, evidence strongly suggests that tobacco's contribution to global and regional employment has decreased over the years. In its 2014 report, the ILO showed that employment in tobacco growing has declined over time in most major tobacco-growing countries.[6] For example, the ILO estimated that the number of tobacco-farming households in China, the top tobacco-leaf-producing country, fell from 6.4 million in 1998 to 1.5 million in 2010.[6] Similarly, a study conducted in Indonesia, another major tobacco-leaf producer, estimated that the number of FTE tobacco farmers fell by 21%, from 564,300 in 1996 to 444,500 in 2001.[14] In the United States, employment in tobacco growing declined from 51,700 workers in 2002 to 14,100 in 2007.[6]

Global employment in tobacco manufacturing has also declined over time in most major tobacco-producing countries[15] despite increases in cigarette production.[16] For example, in the United States, the leading country in tobacco-manufacturing employment in the Americas, employment in tobacco manufacturing fell by 34% from 1990 to 2013.[10] Similarly, tobacco-manufacturing employment in Turkey, the leading European country in tobacco-manufacturing employment, fell by 85% from 1990 to 2014.[10] Employment in tobacco manufacturing in China, the world's leading cigarette-producing country,[17] fell by nearly 25% between 1990 and 2010.[6]

Employment in India, the country with the largest number of tobacco-manufacturing workers in the world, rose sharply in the 1970s, peaked in 1997, and then slowly declined until 2005, when employment stabilized. In contrast, over the last few decades, tobacco-manufacturing employment has increased steadily in Indonesia, which employs the second-largest number of tobacco-manufacturing workers in the world, rising by more than 96% between 1970 and 2004, then remaining relatively flat.[10] Although the absolute number of jobs in tobacco manufacturing in Indonesia has increased, the manufacturing sector as a whole has seen a much greater increase in the number of jobs; therefore, the share of total manufacturing employment accounted for by tobacco manufacturing fell from approximately 27% in 1970[18] to 7% in 2014.[10]

As shown in Table 15.1, significant regional shifts have occurred in the global distribution of tobacco-manufacturing employment, most of which involves the manufacture of cigarettes.[10] The proportion of global employment in tobacco manufacturing located in the Americas and Europe has declined dramatically since 1970. At the same time, the share of employment in the South-East Asia and Western Pacific Regions has risen sharply since 1970. Many factors have contributed to the regional shifts in tobacco employment, such as globalization as well as the adoption of new technology and the resulting increase in productivity. Moreover, regional shifts in manufacturing have largely paralleled trends in consumption patterns: The share of global tobacco-manufacturing jobs has fallen in markets where tobacco consumption is declining and risen where consumption is increasing.

### Table 15.1 Regional Distribution of Tobacco Product Manufacturing Employment, by WHO Region, 1970–2014

| | 1970 | | 1980 | | 1990 | | 2000 | | 2010–2014 | |
|---|---|---|---|---|---|---|---|---|---|---|
| WHO Region | n | % | n | % | n | % | n | % | n | % |
| African | 30,694 | 13.7 | 49,209 | 3.7 | 25,097 | 1.8 | 4,626 | 0.4 | 13,192 | 1.1 |
| Americas | 122,502 | 14.7 | 150,321 | 11.4 | 94,371 | 6.7 | 61,221 | 4.8 | 67,407 | 5.4 |
| Eastern Mediterranean | 41,485 | 5.0 | 56,302 | 4.3 | 35,614 | 2.5 | 23,569 | 1.8 | 21,685 | 1.7 |
| European | 321,202 | 38.4 | 321,378 | 24.4 | 212,455 | 15.1 | 135,149 | 10.5 | 67,007 | 5.4 |
| South-East Asia | 273,741 | 32.7 | 526,410 | 40.0 | 709,785 | 50.6 | 762,620 | 59.4 | 839,457 | 67.4 |
| Western Pacific | 46,476 | 5.6 | 213,695 | 16.2 | 325,623 | 23.2 | 296,275 | 23.1 | 236,721 | 19.0 |
| Total | 836,100 | | 1,317,315 | | 1,402,945 | | 1,283,460 | | 1,245,469 | |

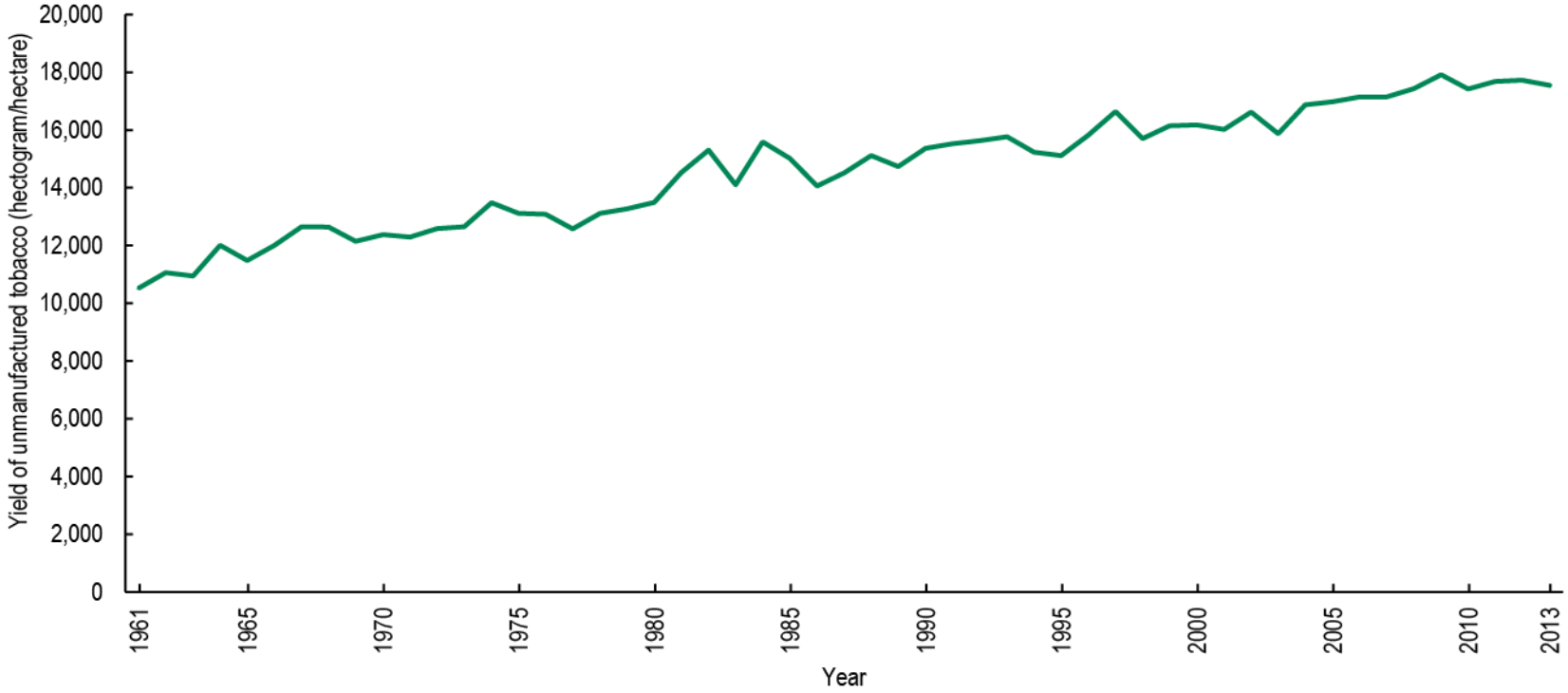
*Notes:* Countries reporting data vary for any given year. Percentages shown are of total tobacco product–manufacturing employment.
*Source:* UNIDO 1970–2014.[10]

## Technological Advances and Productivity Increases

Adoption of new technology has played a major role in increasing productivity in both tobacco growing and cigarette manufacturing, reducing the number of people needed to produce a given amount of tobacco leaf or number of cigarettes. In tobacco growing, tobacco leaf yield per hectare has increased steadily since 1961[4] (see Figure 15.1), while mechanization (e.g., the use of mechanical harvesters) has greatly reduced labor requirements.[19] For example, in the United States, tobacco harvest labor at flue-cured tobacco farms declined from 118 hours per acre in 1979 to 77 hours per acre in 1987 due to a shift from conventional barns to labor-saving bulk and big box barns.[12]

In tobacco manufacturing, the adoption of new, more capital-intensive production facilities has also decreased the demand for labor. From 1980 to 2000, global cigarette production rose by nearly 33%[16]; in contrast, global tobacco-manufacturing employment fell by 2.6%.[10] The experience of individual countries is often more dramatic. For example, in the United Kingdom of Great Britain and Northern Ireland, 3% more cigarettes were produced in 1998 than in 1980, with 75% less labor.[5] Two studies provide further evidence of a decline in employment as a result of new technology and increased productivity. Godfrey and Hartley[20] examined the type of job losses (skilled versus unskilled workers) in the tobacco industry between 1963 and 1985 in the United Kingdom. They found that the loss of 16,200 jobs (about 83.5% of all tobacco-manufacturing jobs) during this time period could be attributed to new technology. Another study in the United Kingdom examined changes in employment between 1980 and 1990 and concluded that productivity improvements in the tobacco-manufacturing industry represented a major reason for job losses.[21]

## Figure 15.1 Global Yield of Tobacco Leaf, 1961–2013




*Source:* FAOSTAT 1961–2013.[4]

The ILO also notes the powerful negative influence of privatization and trade liberalization on tobacco-related employment:

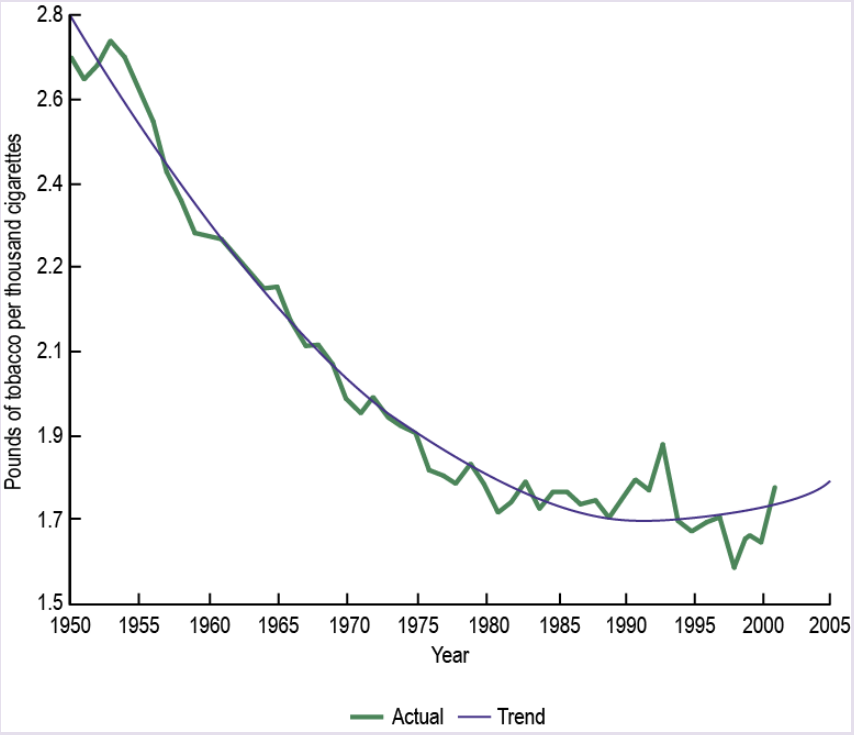
> Directly and indirectly, the combination of privatization and trade liberalization appears to accelerate this downward employment trend. In many countries, the tobacco companies are or were state-owned or state-controlled. Often they were monopolies with below average productivity due to high staffing levels, outdated equipment and/or idle capacity. When these companies are being privatized and prepared for operating in a more competitive environment, their employment levels tend to suffer.[5,p.46]

### Box 15.1: Employment in Tobacco: The Influence of Technology and Globalization in the United States

In the United States, a range of factors have contributed to decreased employment in both tobacco growing and tobacco manufacturing; these include reduced prevalence of tobacco use, technological advances, and increased use of imported tobacco in manufactured cigarettes.

Technological advances have reduced the demand for tobacco leaf and, subsequently, the demand for labor in both farming and manufacturing. Technological changes in the U.S. tobacco industry now make it possible to reduce waste by using reconstituted tobacco, opened and cut ribs, and "expanded tobacco" in the tobacco blend, which has resulted in lower demand for tobacco leaf.[46] This trend is illustrated in the figure below, which shows that the weight of tobacco per 1,000 cigarettes declined substantially between 1950 and 1980. The amount of tobacco in each cigarette was about 40% less in 2003 than in about 1960.[47]

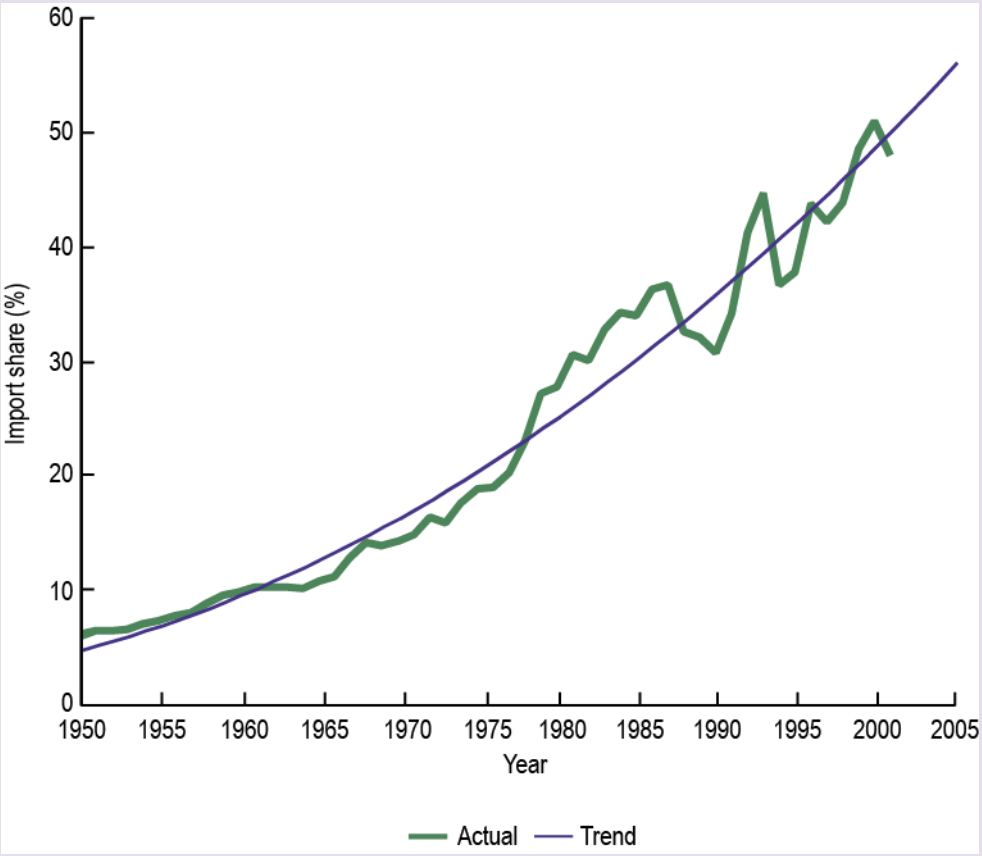
**Tobacco Content of U.S.-Manufactured Cigarettes**




*Note:* Trend $R^2 = 0.97$.
*Source:* Womach 2003.[47]

In addition, it has become easier for U.S. cigarette manufacturers to substitute less-expensive imported tobacco leaf for more costly U.S.-grown tobacco. Capehart[48] has noted that producers outside the United States have dramatically improved the quality of their tobacco leaf through improved cultivation and marketing techniques. As the figure below shows, the share of imported tobacco in U.S. cigarettes grew markedly between 1960 and the early 2000s. In 1950, imported tobacco constituted 6% of U.S. manufactured cigarettes; by 2001, 48% of the tobacco content in U.S. cigarettes was imported.[47]

**Share of Imported Tobacco in U.S.-Manufactured Cigarettes**




*Note:* Trend $R^2 = 0.97$.
*Source:* Womach 2003.[47]

## Measuring the Impact of Tobacco Control Policies on Employment

Studies examining the effect of tobacco control policies on employment typically focus on jobs in the entire tobacco sector and estimate *gross employment impact,* or they take into account the effect on employment in other industries caused by redirection of resources from tobacco to other goods and service to obtain the *net employment impact*.

## Gross Employment Impact

Studies estimating the gross employment impact of tobacco control policies rely on counting direct and indirect tobacco-related employment. Employment data on tobacco farming are available either directly through national agricultural statistics or indirectly using labor productivity data that is then converted to FTEs. Figures on tobacco product manufacturing employment are obtained from governmental statistical data by sector or industry. Tobacco wholesale and retail jobs are estimated on the basis of the tobacco share of the total wholesale or retail trade.

Studies sponsored by the tobacco industry tend to estimate the gross employment effects of tobacco control policies.[22–25] Gross estimates of economic activities associated with tobacco production and sales overestimate tobacco's contribution to the economy.[26] Decreases in tobacco expenditures do not disappear from the economy; rather, they are redistributed to the consumption and production of other goods and services, generating income and employment in other sectors. Industry-sponsored studies occasionally acknowledge this fact. For example, in its 1984 study, Chase Econometrics stated:

> It can be argued, of course, that without the tobacco industry, the expenditures on, and resources devoted to, the production of tobacco products would simply be shifted elsewhere in the economy. That is, if consumers were faced with no available tobacco products, they would reallocate their spending to other goods and services. This reallocated spending would generate additional business opportunities in other sectors of the economy along with the associated employment and incomes. Therefore, except for transitional problems and differential industry levels of productivity, *the aggregate economic results would be substantially the same* . . . . [T]he compensatory responses that *would occur* automatically within the economy and within the Chase Econometrics U.S. Macroeconomic Model in a total impact–type of study were *constrained from taking place within this analysis* [emphasis added].[27,p.3]

## Net Employment Impact

Studies estimating the net impact of tobacco control policies on employment recognize that decreases in tobacco expenditures would mean increases in expenditures on other goods and services. These studies simulate the change in employment from a reduction or elimination of tobacco consumption and apply it to formal models, such as a static input–output model or a dynamic regional economic model. Both models contain interdependencies or relationships among industry sectors or subsectors in the economy, and both can be used to simulate the effect of an external policy change on outputs and employment in each sector of the economy.

Studies using an input–output model first estimate the change in final consumer demand for goods and services resulting from a reduction in tobacco expenditures. They then calculate the induced changes in outputs based on input–output tables that describe the flow of goods and services in the economy in a matrix form. These studies then convert changes in outputs to changes in employment to obtain the employment impact. This model, however, relies on some restrictive assumptions and thus does not account for price adjustments and alternative resource allocations (e.g., imports, exports). The dynamic macroeconomic model relaxes some of these assumptions to allow prices to adjust in response to changes in product demand and changes in demand for the inputs into production. This model incorporates inter-industry transactions (input–output tables) and subsequent changes in demand for final products in response to price changes (econometric modeling). Most studies that examine the net

impact of tobacco control policies have been conducted by researchers not affiliated with or supported by the tobacco industry.[14,28–37]

The employment impact of tobacco control policies on different sectors of the economy will differ depending on the type of policy being examined. Increases in tobacco taxes will generate jobs in sectors where the government spends its tax revenues and, for those users who quit or reduce their tobacco expenditures in response to higher taxes, in the sectors where the money once spent on tobacco is being spent on other goods and services. Non-price measures that reduce the demand for tobacco products—such as comprehensive bans on advertising and promotion, mass media countermarketing campaigns, restrictions or bans on smoking in public places, and increased access to cessation interventions and other support to smokers (such as pharmacotherapy or quitline services)—will generate jobs according to the spending patterns of smokers who quit.

Studies that have empirically examined the spending patterns of recent tobacco quitters have suggested that in high-income countries (HICs) such as the United Kingdom, additional jobs tend to be created in more labor-intensive industries, including recreation, entertainment, education, and communications; in lower income countries such as Indonesia, what would have been spent on tobacco tends to be spent on higher quality food, education, housing, and health, thus generating jobs in those sectors.[14,29] The net impact of tobacco control policies on national employment depends on the magnitude of both job losses and job gains when released tobacco expenditures are redistributed in the economy.

A complete examination of the impact of tobacco control policies on employment also includes economic activity in the health care sector that is generated by treating the diseases caused by tobacco use. In the United States from 2009 to 2012, the estimated average annual cost for direct medical care for adults with smoking-attributable illness was between 132.5 billion and 175.9 billion U.S. dollars.[38] Medical treatment of illnesses attributable to tobacco generates jobs and income in the health care industry. Tobacco control measures that decrease smoking and reduce smoking-related diseases would gradually lead to a decline in health care expenditures attributable to tobacco. As in the case of tobacco product expenditures, however, resources not spent on health care would be saved and ultimately redistributed to the consumption of other goods and services and create alternative jobs in other sectors of the economy. Less illness attributable to tobacco also means that people would live longer; as a result, some health care jobs associated with caring for illnesses attributable to tobacco would be replaced by jobs in geriatric care.[39]

Barkey[28] examined the impact of eliminating both tobacco production and tobacco use on employment in the U.S. state of Indiana. He used a dynamic regional economic model for an analysis that accounted for resources released (1) from economic activities directly related to the tobacco industry, (2) from expenditures on drugs and medical services used to treat illnesses related to the use of tobacco, and (3) from economic costs of morbidity and mortality attributable to tobacco use that result in early retirement and death. This study found that if Indiana became a tobacco-free state, jobs in the health care and retail sectors would decline as an initial impact in the very short run, but employment would soon start growing again as investments and population growth stimulated the overall economy. Despite job losses in the health care and retail sectors in the short run, the impact of being a tobacco-free state on overall employment in the first year would be positive. As Barkey explains, "every other industry shows some job gain, reflecting the shifting pattern of consumer spending in the tobacco-free economy, as well as the lower business costs that obtain when tobacco-related health care costs are eliminated."[28,p.21]

## Types of Tobacco Trade Economies

The net effect of tobacco control efforts on employment depends on the relative size of job losses in the tobacco industry and on job gains in other industries to which smokers' expenditures have transferred. This process in turn depends on (1) the labor-intensity of tobacco growing and manufacturing compared with other industries and (2) the extent to which the products, inputs, and services are imported or provided by domestic firms, again comparing the tobacco industry to the industries where smokers spend their money instead.

When tobacco control policies reduce the demand for cigarettes, a country is likely to have lower employment losses if that country imports a significant percentage of the cigarettes smoked and/or leaf used to make them. In addition, the extent to which products and services purchased instead of tobacco are locally made determines the size of the gains in employment in these other sectors. Conversely, the more the tobacco leaf and other inputs and cigarettes are nationally grown and/or produced relative to the local content of the things people buy instead, the greater the likelihood that there will be a net employment loss locally.

Thus, countries face different employment effects based on the types of tobacco trade economies they have. Depending on the share of imports and exports, a country has one of four types of economies: net exporters, balanced or self-contained economies, net importers, and mixed economies.

A country is considered a net exporter if its production of tobacco leaf or cigarettes exceeds its domestic consumption. Because tobacco employment in net-exporter countries is geared more to the export of tobacco leaf or cigarettes, employment losses are possible if the global demand for these products falls. Domestic tobacco control measures that decrease local consumption will have smaller effects on employment in these countries because the amount of economic activity associated with domestic tobacco use would be redistributed in the economy as consumers purchase alternative goods and services. The relative effects of global and domestic policies will depend on the share of production that is exported. If the vast majority of a country's tobacco leaf or cigarette production is exported, then changes in domestic policies will have little impact, and changes in global policies will have a greater impact. In addition, effects on employment could be greater for net exporters of tobacco leaf than for net exporters of cigarettes because, as noted previously, tobacco growing is more labor-intensive than tobacco manufacturing.

A country has a balanced tobacco economy if its domestic production of tobacco leaf or cigarettes is used primarily for local consumption and it is largely self-sufficient in tobacco. In these countries, most tobacco-related jobs are related to growing and manufacturing for domestic use. Global tobacco control efforts, therefore, would have little effect on national employment. Tobacco-related jobs would be affected only by policies that reduce domestic tobacco consumption.

Net importers are countries that produce less tobacco leaf or cigarettes than they consume. After implementation of domestic tobacco control measures, those net importers that have little tobacco growing or production of their own would see employment grow. If domestic demand for cigarettes fell, expenditures released from tobacco consumption would generate net employment gains in the production of other goods and services. Policies that reduced tobacco use in other countries would be expected to have little or no effect on their domestic employment, given that they produce and export little or no tobacco leaf or tobacco products.

A country has a mixed tobacco economy if it is a significant grower or producer and also imports and/or exports a substantial share of tobacco leaf or tobacco products. For example, the United States grows a significant amount of tobacco (more than 271,000 tonnes in 2011) but also exports and imports large amounts (more than 187,000 tonnes in exports and 171,000 tonnes in imports in 2011).[4] Changes in both domestic and global tobacco control policies would likely affect employment in countries with mixed economics, given their domestic production and involvement in global trade.

Table 15.2 lists the top 10 countries and areas, based on quantity, for both tobacco leaf and cigarettes, for each of the four types of tobacco economies, among 146 countries and areas that produce, grow, import, and/or export more than a minimal amount of tobacco leaf or cigarettes. Among these 146 countries and areas, fewer than 25% are categorized as net exporters of cigarettes. The fraction of net exporters of tobacco leaf is even smaller because tobacco farming is concentrated in a small number of countries. Additionally, countries that are net exporters/importers of tobacco leaf are not necessarily net exporters/importers of cigarettes. For example, among the top net exporters of tobacco leaf, only India is also one of the top net exporters of cigarettes. Similarly, only Japan is among the top net importers of both tobacco leaf and cigarettes.

The employment effects of reduced demand for tobacco can also vary for different regions within a country. In regions where tobacco farming or production is concentrated, reduced tobacco demand could lead to a net employment loss. However, some or all jobs lost in tobacco regions of a country might be replaced by job gains in regions that are not involved in tobacco farming or production; the effect on national employment depends on the magnitude of the net loss or gain. Most empirical studies of the employment effects of tobacco control policies focus on national employment rather than on employment at the regional level, which limits our knowledge in this area.

## Evidence on the Effects of Tobacco Control Policies on Employment

Table 15.3 summarizes studies that have examined the effects of tobacco control policies on net employment. Overall, these studies found that employment losses were relatively concentrated, whereas employment gains tended to spread throughout the economy. Reductions occurred in core tobacco sectors, including tobacco farming and manufacturing; in tobacco-related sectors, such as wholesaling and retailing; and in ancillary sectors, such as the paper and pesticide industries. How the funds once spent on tobacco are allocated to other goods and services helps determine the sectors that could experience job increases. For example, with increased prevention and control of tobacco use in the United Kingdom, a substantial increase in jobs would occur in the distribution (i.e., wholesale, retail, and vehicle distribution), hotel, and catering sectors.[29] In Canada employment would increase in printing and publishing, transportation, wholesale, finance and real estate, and business and other services.[30] In Indonesia the top six sectors that would experience increased employment include other food crops, rice, tea, coffee, sugarcane, and root crops.[14]

## Table 15.2 Types of Tobacco Economies, Selected Countries and Areas, 2011

| Net importers | Net exporters | Balanced | Mixed |
|---|---|---|---|
| **Tobacco leaf** | | | |
| Russian Federation | Brazil | China | United States |
| Netherlands | India | Pakistan | Germany |
| United Kingdom | Malawi | Bangladesh | Indonesia |
| Malaysia | Argentina | Democratic People's Republic of Korea | Belgium |
| Ukraine | Zimbabwe | Lao People's Democratic Republic | France |
| Japan | Tanzania | Myanmar | Poland |
| Republic of Korea | Italy | Cuba | Turkey |
| South Africa | Mozambique | Syria | Philippines |
| Switzerland | Thailand | Rwanda | Viet Nam |
| Paraguay | Zambia | Cameroon | Spain |
| **Cigarettes** | | | |
| Japan | Germany | China | China, Hong Kong Special Administrative Region |
| Italy | Indonesia | Russian Federation | Greece |
| Spain | Poland | United States | Singapore |
| France | Viet Nam | Brazil | Kazakhstan |
| Thailand | Republic of Korea | Egypt | Czech Republic |
| Iran | Philippines | Pakistan | Australia |
| Saudi Arabia | Netherlands | Argentina | Portugal |
| Canada | Turkey | Algeria | Malaysia |
| Serbia | India | Belarus | Lithuania |
| Morocco | Ukraine | Venezuela (Bolivarian Republic of) | Kenya |

*Note:* Country classifications are based on the differences between production, exports, and imports.
*Sources:* FAOSTAT 2011[4] and Euromonitor International 2011.[17]

## Table 15.3 Net Employment Impact of Tobacco Control Policies: Studies

| Studies | Model and assumptions | Conclusions |
|---|---|---|
| Scotland:<br>McNicoll and Boyle 1992[31] | Static input–output model<br>Domestic consumption expenditures were eliminated.<br>Expenditures were allocated by the average expenditure pattern.<br>No change occurred in government spending. | Net gain of 7,869 jobs in 1989 |
| United States (Michigan):<br>Warner and Fulton 1994[36] | Dynamic regional economic model<br>Domestic consumption expenditures were eliminated, and the rate of consumption decline from 1992 to 2005 doubled.<br>Expenditure was allocated by the average expenditure pattern.<br>Government spending was reduced or kept at the same level by increasing other taxes. | Net job gains: 5,600 in 1992 and 1,500 by 2005; with the consumption decline, 300 in 1992 and 880 by 2005 |
| United States (Indiana):<br>Barkey 2005[28] | Dynamic regional economic model<br>Domestic consumption expenditures and tobacco production in 2003 were eliminated.<br>Expenditures were allocated by the average expenditure pattern.<br>Tobacco-induced health care expenditures were released and reallocated. Excess mortality caused by tobacco use was accounted for. | Net gain of 178,200 jobs in 2050, the end of the simulation period. Milestones are 18,000 jobs in 2005; 50,700 jobs in 2010; 97,000 jobs in 2020; 132,000 jobs in 2030; and 159,400 jobs in 2040 |
| United States:<br>Warner and colleagues 1996[37] | Dynamic regional economic model<br>Domestic consumption expenditures were eliminated, and the rate of consumption decline from 1993 to 2000 doubled.<br>Expenditures were allocated by the average expenditure pattern.<br>Government spending was reduced or kept at the same level by increasing other taxes. | Net job gains: 47 in 1993 and 133,000 by 2000; with the consumption decline: 78 in 1993 and 19,719 by 2000 |
| United Kingdom:<br>Buck and colleagues 1995[29] | Static input–output model<br>This model describes a 40% decline in tobacco product expenditures.<br>Expenditures were allocated by recent quitter, nonsmoker, former smoker, and average expenditure pattern.<br>Government spending was reduced or kept at the same level by increasing other taxes. | Net gain of 155,542 jobs; or 115,688 full-time equivalent jobs in 1990 with the recent quitter expenditure and the same government spending |
| Canada:<br>Irvine and Sims 1997[30] | Static input–output model<br>This model describes a 20% decline in tobacco product expenditures.<br>Expenditures were allocated by the average expenditure pattern.<br>Government spending was reduced. | Net loss of 6,129 jobs in 1995 |
| South Africa:<br>Van der Merwe and Abedian 1999[49] | Static input–output model<br>Domestic consumption expenditures were eliminated, and the rate of consumption decline in 1995 doubled.<br>Expenditures were allocated by recent quitter and average expenditure pattern.<br>Government spending was reduced or kept at the same level by increasing other taxes. | Net gain of 50,236 jobs occurred in 1995 by eliminating tobacco expenditures, with consumers acting as recent quitters and the same government spending |

## Table 15.3 continued

| Studies | Model and assumptions | Conclusions |
|---|---|---|
| Zimbabwe:<br>Van der Merwe 1998[35] | Static input–output model<br>Domestic consumption expenditures and tobacco production in 1980 were eliminated.<br>Average input–output pattern changed, and all tobacco production was shifted to alternative agriculture products.<br>Because of increases in other taxes, no change in government spending occurred. | Net loss of 87,798 jobs in 1980, and 47,463 jobs when all output goes to alternative agriculture products |
| Bangladesh:<br>Van der Merwe 1998[34] | Static input–output model<br>Domestic consumption expenditures and all tobacco production for tobacco products and bidis in 1994 were eliminated.<br>Average input–output pattern changed, and all tobacco production was shifted to alternative agriculture products.<br>Because of increases in other taxes, no change in government spending occurred. | Net gain of 10,989,192 jobs in 1994 |
| Bulgaria:<br>Petkova and colleagues 2003[33] | Static input–output model<br>Domestic consumption expenditures and tobacco production in 1999 were eliminated.<br>Average input–output pattern changed, and all tobacco production was shifted to alternative agriculture products.<br>Because of increases in other taxes, no change in government spending occurred. | Net loss of 5,567 jobs in 1999 |
| Egypt:<br>Nassar and Metwally 2003[32] | Static input–output model<br>A 10% increase in cigarette prices and a one unit increase of education level (as a proxy for non-price tobacco control measures) occurred.<br>Expenditures were allocated by the average expenditure pattern.<br>Because of increases in other taxes, no change in government spending occurred. | Net gain of 6,108,517 jobs in 1997 for the price increase, and net gain of 6,000,134 jobs in 1997 under non-price measures |
| Indonesia:<br>Ahsan and Wiyono 2007[14] | Static input–output model<br>Percentage increases of 25%, 50%, and 100% occurred in the cigarette tax.<br>Expenditures were allocated by the average expenditure pattern. | Net gain of 84,340 jobs with a 25% tax increase; net gain of 140,567 jobs with a 50% tax increase; and net gain of 281,135 jobs with a 100% tax increase |

*Note:* For more information about the issues summarized in this table, see Jacobs et al. 2000[9] and Food and Agriculture Organization of the United Nations 2003.[50]
*Source*: This table was adapted from Jacobs et al. 2000.[9]

With only a few exceptions, studies assessing the net employment impact of reductions in tobacco use resulting from tobacco control policies have concluded that the overall number of jobs would increase. This would be particularly true for countries that are net importers of either tobacco leaf or cigarettes, given that money spent on tobacco products tends to leave the country. In most cases, the net impact on jobs, positive or negative, is a very small share of overall employment, typically well below 1%. For example, Petkova and colleagues[33] estimated that net job losses in Bulgaria were less than 0.2% of total

employment in 1999, while Buck and colleagues[29] estimated that net job gains in the United Kingdom in 1990 were less than 0.6% of total employment that year.

In sum, studies find that net importers and countries with a balanced tobacco economy would not experience net employment declines as a result of a decrease in tobacco consumption in response to effective domestic and global tobacco control policies. In contrast, net exporters that depend heavily on tobacco could be susceptible to employment losses due to effective global tobacco control policies, although domestic policies would have little impact.

It should be noted that all studies have simulated sudden cessation or a sharp reduction in cigarette consumption. In reality, declines in tobacco consumption as a result of tobacco control policies occur gradually, allowing the economy to adjust slowly during this transition. In fact, tobacco-growing communities have made economic adjustments for decades.[40,41] For example, a survey of tobacco farmers in the United States indicated that not only are tobacco farms increasingly more diversified, but younger and more educated generations of tobacco farmers are also less interested in choosing tobacco farming as a career.[42] Finally, to the extent that there are concerns about the employment impact of tobacco control efforts, governments can allocate resources to programs that help people involved with tobacco growing and manufacturing make the transition to other sustainable livelihoods. For example, in the "sin tax" reform legislation adopted in the Philippines in 2012, 15% of the new revenues generated from significantly increased tobacco taxes was earmarked to help tobacco farmers and workers move to other economically viable alternatives.[43] Similarly, the U.S. state of Maryland used funds from the 1998 Master Settlement Agreement to fund the Tobacco Transition Payment Program, a voluntary program to allow the state's tobacco farmers to permanently transition away from tobacco growing but remain in agriculture; 94% of the state's tobacco growers took advantage of the program.[44]

## Summary

The tobacco industry generates jobs directly and indirectly in many economic sectors. Employment in tobacco farming is concentrated in the few countries that are major producers of tobacco leaf, and research has shown that the share of agricultural employment in tobacco farming has declined over the years. Global employment in tobacco manufacturing, also concentrated in a few countries, has been relatively stable over time despite a considerable increase in global production. Tobacco manufacturing's share of total manufacturing employment tends to be small and is declining in most countries. Technology has played a major role in increasing productivity in both tobacco growing and manufacturing, allowing fewer workers to grow more tobacco leaf and produce more manufactured tobacco products. Privatization, the shift from state to private ownership, has also tended to reduce employment by requiring companies to operate in a more competitive environment.

Research on the impact of tobacco control policies on employment focuses on the impact on the tobacco sector (gross employment impact), or considers employment impact in the tobacco sector along with other economic sectors to which expenditures might be redirected (net employment impact). Studies of net impact provide a more complete picture of the effect of tobacco control policies on employment. The effect of tobacco control policies on employment depends in part on the country's type of tobacco trade economy, as categorized by its share of imports and exports: net exporters, balanced economies, net importers, or mixed economies. Employment effects also differ depending on whether the particular tobacco control policy of interest impacts the domestic or global tobacco market.

For the vast majority of countries, studies have found that tobacco control policies have had no effect or a small net positive effect on national employment. For the few countries that rely heavily on tobacco exports, the economy would incur a transition cost as a result of global tobacco control efforts. Tobacco farmers in particular could be affected negatively because of the labor-intensive nature of tobacco farming, their investments in equipment for tobacco production, and because of a lack of resources to help them adapt to the changing environment. However, domestic tobacco control measures in these countries would have little effect on national employment.

The challenge of transitioning from tobacco-related employment to other viable economic activities would be moderate in the long term. The addictive aspect of smoking means that reductions in tobacco consumption would occur gradually. In fact, the transition to a smaller tobacco economy has been ongoing in HICs since the 1950s as a result of a steady decline in cigarette consumption and because of technological improvements. Improvements in technology and the tobacco industry's pursuit of increased productivity have led to significant decreases in employment in the tobacco core sector. As Schelling[45] noted decades ago, in general, the gradual transition away from tobacco farming and manufacturing to other economic activities would mean that today's tobacco farmers would not lose their jobs, but that fewer children of tobacco-farming families would become tobacco farmers themselves. This remains true today.

## Research Needs

Policymakers are sometimes reluctant to implement tobacco control measures for fear that they will have a negative impact on employment. For this reason, high priority should be given to developing accurate and comprehensive data on the number of people employed in both tobacco growing and tobacco manufacturing. Studies should specify the methods used to estimate employment; for example, to accurately measure FTE employment in tobacco growing, it is important to account for both seasonal and part-time work. Additional studies of the factors influencing employment in tobacco growing and manufacturing, including the impact of technological advances and economic globalization, as well as the potential influence of tobacco control policies, would be informative. Studies of the effect of tobacco control policies on employment should consider the net impact of these policies, which takes into account that losses in the tobacco sector may be offset by increases in other sectors of goods and services.

## Conclusions

1. The number of jobs that depend on tobacco—tobacco growing, manufacturing, and distribution—is low and has been falling in most countries.
2. Adoption of new production technologies and improved production techniques, together with the shift from state to private ownership in many countries, has reduced employment in both the tobacco-farming and -manufacturing sectors.
3. In nearly all countries, national tobacco control policies will have either no effect or a net positive effect on overall employment because tobacco-related job losses will be offset by job gains in other sectors.
4. In the few countries that depend heavily on tobacco leaf exports, global tobacco control policies could lead to job losses, but these losses are expected to be small, gradual, and unlikely to affect the current generation of tobacco farmers in these countries.

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## Section 6
## Economic and Other Implications of Tobacco Control

# Chapter 16
# The Impact of Tobacco Use and Tobacco Control Measures on Poverty and Development

# Chapter 16
# The Impact of Tobacco Use and Tobacco Control Measures on Poverty and Development

The economic and health consequences of tobacco use are particularly pronounced among the world's poorest populations, who can afford these costs the least. The interrelationships of tobacco use, individuals' economic status, and tobacco control policies are complex and, as an integral part of a comprehensive tobacco control strategy, require careful appraisal. With this aim in view, this chapter examines the following topics:

- The relationship between poverty and tobacco use, including implications for low- and middle-income countries
- The opportunity cost of tobacco use relative to other household expenditures, especially in poor households
- The impact of tobacco use on economic development, including population health and health care costs
- The implications of tobacco control strategies for the poor.

High-income countries have succeeded in curbing tobacco consumption by significantly raising tobacco taxes and prices and by employing the tobacco control strategies described in this monograph. However, today around 80% of smokers worldwide live in low- and middle-income countries, and in most countries, regardless of country income group, tobacco use is more concentrated in low-income populations. Understanding the effects of tobacco on low-income populations is particularly important in reducing tobacco use and its adverse health consequences.

## Chapter Contents



## Figures

## Introduction

Tobacco caused nearly 100 million premature deaths worldwide in the 20th century—a public health catastrophe that primarily affected high-income countries (HICs).[1] In the 21st century, tobacco is projected to cause 1 billion deaths, with the majority of these deaths expected to occur in low- and middle-income countries (LMICs).[1] Not only has the burden of tobacco use and tobacco-related disease and death shifted from HICs to LMICs, but the tobacco use epidemic has become increasingly concentrated among the poor in countries in all stages of economic development. These developments call for the consideration and careful evaluation of tobacco use and its adverse health and economic consequences as an aspect of the multiple dimensions of poverty and development. This chapter examines these consequences and the ramifications of tobacco control for people in poverty, focusing particularly on LMICs.

The 1999 World Bank report *Curbing the Epidemic: Governments and the Economics of Tobacco Control*[2] and the 2004 World Health Organization (WHO) report *Tobacco and Poverty: A Vicious Circle*[3] drew attention to the growing impact of tobacco use in LMICs and the high burden of tobacco use on the poor, in countries across a range of income levels. Since these reports were published, the evidence linking tobacco and poverty has continued to grow, and the WHO Framework Convention on Tobacco Control (WHO FCTC) has led many countries, including LMICs, to adopt evidence-based tobacco control measures.

The first section of this chapter discusses the evidence on tobacco use patterns by country income group and by the poverty status of people within these countries. The second section describes the association between tobacco use and poverty—in particular, the opportunity cost of tobacco use and the cycle of tobacco use and poverty. Next is a discussion of the impact of tobacco use on economic development within countries and the implications of tobacco control for the United Nations' (UN) Sustainable Development Goals (SDGs).[4] The fourth section focuses on the equity of tobacco control measures (both tax and non-tax measures) and the impact of these measures on the poor.

## Patterns of Tobacco Use, by Poverty and Country Income Group

Poverty is a major determinant of premature mortality and ill health worldwide. Across countries and over time, data have consistently shown a relationship between life expectancy and a country's gross domestic product (GDP).[5] Major contributors to global morbidity and mortality—such as inadequate sanitation, hunger and malnutrition, and lack of access to medical care—are closely associated with poverty. It has long been understood that even within HICs, socioeconomic position influences the level of exposure to most risk factors for poor health.[6] The influential Rose and Marmot study[7] of civil servants in the United Kingdom of Great Britain and Northern Ireland revealed an increasing risk of death with decreasing employment grade, highlighting the importance of examining inequalities within countries as well as across countries.

When the smoking of mass-produced cigarettes increased rapidly in the first half of the 20th century it grew fastest in HICs such as the United States and United Kingdom and across socioeconomic groups. However, as awareness of smoking's health hazards grew, over a period of decades, smoking prevalence steadily dropped among the more educated, higher income populations.[8] Thus, HICs' use of tobacco products and exposure to secondhand smoke (SHS) have become more concentrated in low-income populations. In HICs, smoking tends to be more prevalent among people with working class jobs, low educational levels, and low incomes.[9] In 2014, smoking prevalence among U.S. adults (ages 18 years or

older) was highest among people with a General Education Development (GED) certificate (43.0%) and lowest among people with a graduate degree (5.4%). In addition, prevalence was higher among people living below the poverty level (26.3%) than among those at or above this level (15.2%).[10]

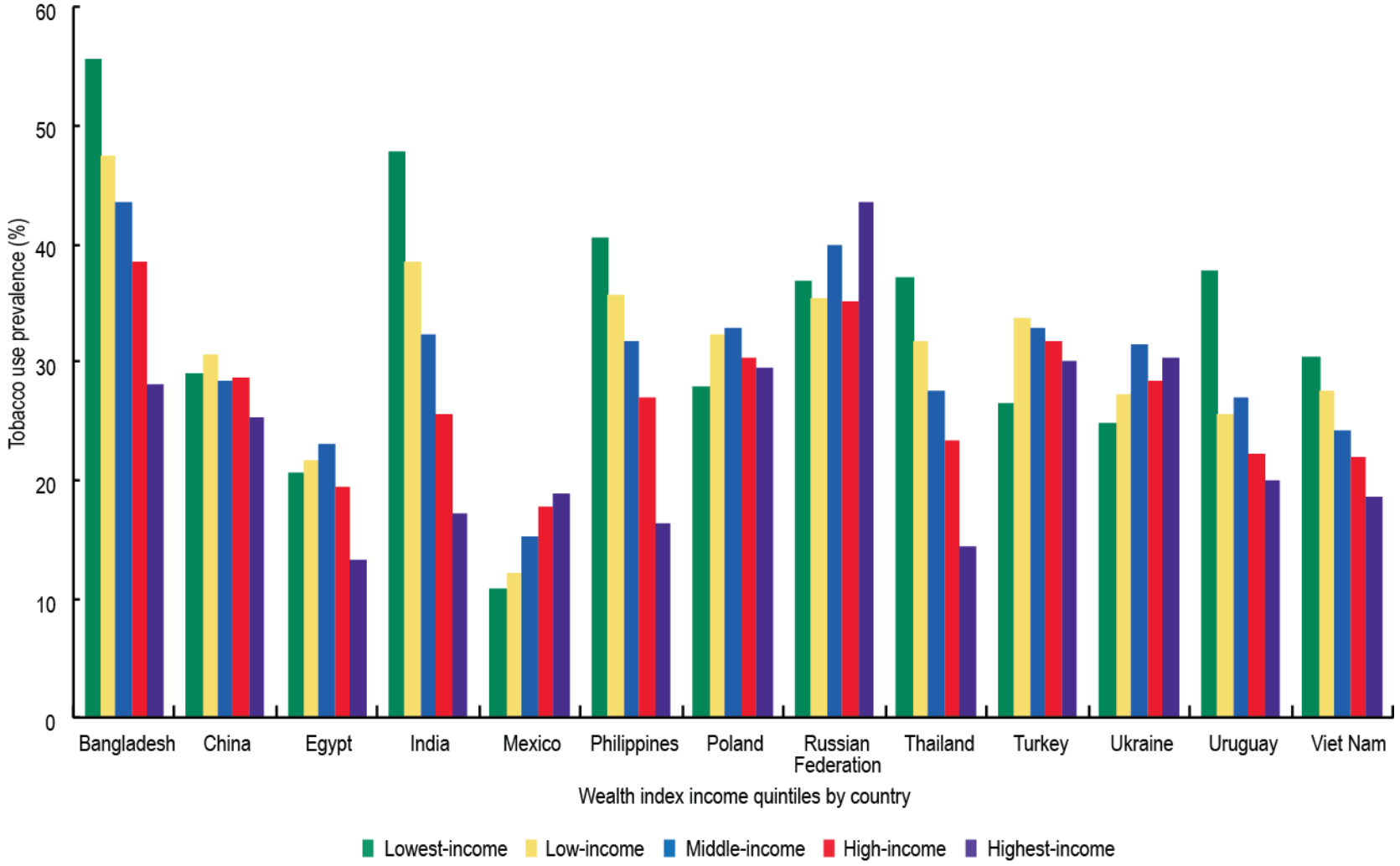
Other studies also point to the disproportionate burden of tobacco on the poor. Using data from the U.S. National Health and Nutrition Examination Survey, researchers found a linear relationship between SHS exposure and blood lead levels in youths and adults.[8] Youths in households below the poverty line had both higher SHS exposure and higher blood lead levels than youths living above the poverty line. Moreover, youths with SHS exposure had blood lead levels suggestive of the potential for adverse cognitive outcomes.[11] Studies from HICs have also suggested that tobacco retailers and retail advertising are more highly concentrated in low-socioeconomic-status (SES) neighborhoods[12] and that low SES and the presence of tobacco retailers are negatively associated with smoking cessation.[13] Moreover, tobacco product manufacturers have a history of targeting marketing strategies toward low-income and racial/ethnic populations.[14,15] These findings and others raise concerns about equity in the progress of tobacco control measures in HICs.[16]

As described in chapter 2, cigarette consumption and the number of tobacco smokers have risen in LMICs over the past few decades and have simultaneously fallen in HICs. Although tobacco use still accounts for a greater proportion of overall mortality in HICs compared with LMICs, that will change in the future, given current patterns of tobacco use.[17] At present, the majority (around 77%) of the world's approximately 1.1 billion current smokers live in LMICs.[18] An estimated 88 million smokers (8%) live in low-income countries, 318 million (29%) live in lower middle-income countries, and 455 million (41%) live in upper middle-income countries. Less than one-quarter of the world's smokers live in HICs. A large number of smokers—approximately 226 million globally—are living in poverty. This is a very rough estimate derived from national poverty headcount ratios published by the World Bank (see the Statistical Annex for more information). Additionally, many surveys show that people of lower income or lower SES tend to smoke more than the more affluent members of society.

A review of Global Adult Tobacco Survey (GATS) data from 14 GATS countries, primarily LMICs, showed overall high rates of smoking in men, early initiation of smoking in women, and low quit ratios among both men and women, when compared with HICs such as the United States and United Kingdom.[19] The 14 GATS countries are Bangladesh, Brazil, People's Republic of China, Egypt, India, Mexico, Philippines, Poland, the Russian Federation, Thailand, Turkey, Ukraine, Uruguay, and Viet Nam.

In addition to the shift in the burden of tobacco use from HICs to LMICs, tobacco consumption tends to be higher among lower income population segments in many countries (Figure 16.1). In other words, disparities in tobacco use and related health outcomes exist within LMICs as well as HICs. A systematic literature review by WHO[20] found a robust association between a higher prevalence of current smoking among adults and lower income, for both men and women. This finding was consistent across three decades of studies, across most geographic regions, and across countries at different income classifications, with an overall odds ratio of smoking of 1.45 (95% confidence interval [CI], 1.35–1.56) in the low-income group compared to the high-income group. The association was stronger for women than men, suggesting that the relationship between smoking and poverty could be stronger among women.[20]

## Figure 16.1 Prevalence of Current Tobacco Use Among Adults Age 15 and Older, by Wealth Quintile, 2008–2010




*Note:* Data are from the Global Adult Tobacco Survey 2008–2010.
*Source:* Palipudi et al. 2012.[21]

Numerous studies across many countries have provided evidence that adult smoking prevalence rates are higher among less educated and lower SES populations compared with others (unlike HICs, where historically tobacco use was high across all income groups).[20] There are exceptions, however; for example, in Mexico tobacco use is lower among the poor than the rich.[21] Although, around the world higher SES is associated with a lower probability of smoking, among existing smokers it may be associated with a higher number of cigarettes smoked.[22]

A number of factors may explain why low-income populations are more likely to smoke. First, because of literacy and knowledge gaps, the poor are generally less aware of the harmful effects of smoking on health. Second, the many stresses associated with living in poverty play a major role in continued tobacco use. Third, poor people may view smoking as one of the few ways they can reward themselves. As discussed in other chapters, research from HICs has shown that low-income groups have greater SHS exposure (chapter 6), higher exposure to tobacco marketing (chapter 7), and less access to cessation services (chapter 9), all of which contribute to increased smoking prevalence.

Patterns of smoking behavior by SES differ depending on the stage of economic development a country is in.[23] In low-income countries, smoking might be higher in affluent groups because of the cost of purchasing tobacco products, but this pattern appears to reverse as increasing economic development enables poorer segments to gain access to tobacco products. Thus, as low-income countries gradually rise to lower middle-income status through economic development, tobacco consumption would be expected to increase faster among their poorest populations. Preventing such a rise in tobacco use could be especially challenging as poorer populations are increasingly exposed to tobacco product marketing.

### Income, Demand, and Tobacco Use

The concept of income elasticity of tobacco demand illustrates the impact of income on tobacco use across populations. Income elasticity is measured as the ratio of the percentage change in tobacco consumption to the percentage change in income. If income elasticity is positive (i.e., a positive correlation between tobacco consumption and income), tobacco is considered a "normal" good, such that poor people consume less tobacco than rich people. If income elasticity is negative, tobacco is considered an "inferior" good, with poor people consuming more than rich people. If income elasticity is positive and greater than 1, a product is considered a "luxury" good. The demand for luxury goods increases with income. However, as their income rises, people may also switch to higher priced tobacco products or brands. For example, in India a rise in income level could result in smokers switching from hand-rolled bidis to machine-made cigarettes.

Existing evidence suggests that income elasticity varies across populations, geographic regions, and over time. Within HICs, such as the United States, the income elasticity of cigarettes has shifted over time: Tobacco was once a normal good (demand for tobacco increased with income) but became an inferior good (demand decreased with income) as smoking has become concentrated in lower income groups.[24] In contrast, in LMICs cigarettes might still behave as a normal good, and even within HICs cigarettes may be treated as a normal good among low-income populations.

Guindon and Boisclair[25] reviewed multiple scenarios projecting future global tobacco consumption to 2025. Their model suggested that a high positive income elasticity of demand for tobacco products accompanied by a high per capita GDP growth rate leads to exponential increases in the consumption of cigarettes. However, higher income is also associated with increased awareness of the health

consequences of tobacco use, which is likely to counteract the positive effects of income growth on tobacco consumption. The net effect of variation in income on tobacco demand is therefore less clear. Several studies have observed greater income elasticity in the demand for tobacco in lower SES groups, whereas other studies have found no systematic differences in income elasticity across socioeconomic groups. In some instances, income elasticity is negative, although it is not associated with any particular income group.

The literature provides evidence of greater income elasticity for tobacco consumption among lower income populations in some LMICs. According to this evidence, comparable increases in income across different income groups could lead to disproportionately larger increases in tobacco consumption by poor smokers compared to rich smokers in these countries.[26] Thus, tobacco is not only an indisputable threat to global health—and consequently a strong force against development—but its effects can increase in magnitude as a country experiences income growth.

Several studies have examined the differential trends in total tobacco expenditures across different income groups, which sometimes appear to result in tobacco control measures having different effects for different segments of the population. For example, Thailand enacted comprehensive tobacco control strategies between 1990 and 2000. The share of tobacco expenditures in total household expenditures did not show any significant decrease in the bottom three income deciles, although the share of expenditures decreased significantly in the upper seven deciles.[27] The tobacco control measures' uneven effect across different income groups is reflected in the estimated tobacco expenditure elasticity with respect to income, which was found to be greater than 1 for poor people but less than 1 for wealthier people.

A study from Morocco showed that tobacco expenditures increased more than twofold from the 1960s (1.2%) to 1999 (2.5%).[28] A closer look at this increase reveals a disparity in tobacco expenditures—a 4.4-fold increase in rural areas compared with a 2.7-fold increase in urban areas. Since the early 1990s, the poorest population subgroups in rural areas have spent more money on tobacco than their richer urban counterparts. Using 1998-1999 data, this study estimated the expenditure elasticity of tobacco with respect to income at 1.13 for the poorest two income groups and at 0.59 for the richest two income groups, averaging 0.73 for all income groups. This inelastic expenditure pattern for the nation as a whole and the elastic expenditure pattern for the poorest income group imply that an increase in income across all income groups would result in decreased expenditures on tobacco over time at the national level but an increase in such expenditures by the poor.[28]

In Indonesia the rate of spending on tobacco by the lowest income group rose significantly compared with the middle-income group during the period from 1981 to 1997 (227% in the lowest income group compared with 182% in the middle-income group).[29] In Egypt during 1995-1996 and 1999-2000, the share of tobacco expenditures as part of total household expenditures was highest among rural households with lower levels of income and when the head of the household was illiterate, unemployed, or employed in the lowest wage occupations (e.g., construction, trade and restaurants, transportation and storage). Between the two observation periods, the tobacco expenditure share increased significantly for lower SES groups. Tobacco expenditure elasticity was highest for the poorest income quartile in both periods.[30]

Household tobacco expenditures might increase over time due to income growth, and this effect could be greater for those starting at the lower income levels. However, it is not clear from the studies discussed above whether the greater rate of increase in tobacco expenditures among the poor reflected increased consumption or a shift to higher priced tobacco products. As a result of income growth, those at the lowest income levels might switch to higher priced products that they could not afford previously. In either circumstance, an emphasis on reducing affordability at all levels through significant price increases would be effective in reducing tobacco consumption among poor smokers. See chapter 4 for a detailed discussion of affordability.

Between-country comparisons of tobacco use by the various income groupings of countries and by the SES of people within countries provide strong evidence that the global tobacco use epidemic has shifted toward LMICs and, within LMICs, toward people of lower SES.[20] Thus, the economic and health burden of tobacco use appears to be disproportionately larger for the people who are least capable of bearing it. Greater implementation of tobacco control policies in LMICs could play a critical role in flattening the rising curve of tobacco consumption and smoking prevalence, and help reduce the impoverishing impact of tobacco use.

### Impact of Socioeconomic Status on Responsiveness to Price

As described in chapter 4, extensive evidence demonstrates that significant increases in tobacco product prices reduce tobacco use. Economic theory predicts that the effects of price on consumption will be larger among lower income consumers than among higher income consumers, with all else remaining constant. A growing number of studies based on data from household or individual-level surveys have examined the effects of price on consumption in high-, middle-, and low-income countries.

Early studies that examined differences in price responsiveness based on differences in income and related characteristics (i.e., education, socioeconomic class) in the United States concluded that smokers in lower socioeconomic groups generally respond more to changes in cigarette prices than smokers in higher socioeconomic groups. For example, Farrelly and colleagues[31] in 2001 estimated that smokers in U.S. households below the median income level were about four times more responsive to changes in cigarette prices than smokers in higher income households. Similarly, in an application of the rational addiction model (see chapter 4) in 1991, Chaloupka[32] found that smokers with lower education levels were more sensitive to price than smokers with higher education levels.

Results are somewhat less consistent in more recent U.S. studies, with some finding little difference in price elasticity of cigarette demand across income groups, and others finding greater elasticity differences, consistent with those from earlier studies. Several researchers—such as Stehr,[33] Colman and Remler,[34] and DeCicca and McLeod[35]—have continued to find that cigarette demand is least inelastic (or more elastic) among the lowest socioeconomic groups and generally becomes increasingly inelastic (or less elastic) as income rises or education increases.

Others have found more mixed evidence. For example, Franks and colleagues,[36] using data from the 1984–2004 Behavioral Risk Factor Surveillance System surveys, found that differences by income were more pronounced before the Master Settlement Agreement (MSA) in November 1998 (an agreement between a group of U.S. states and the five largest U.S. tobacco companies regarding tobacco product marketing) than after the settlement. Based on data from before the agreement (1984 to 1996), prevalence elasticities were –0.45 for the lowest income quartile and –0.22 for the remaining three

higher income quartiles. However, according to data from after the MSA (1997 to 2004), neither group was responsive to price, with insignificant price elasticity estimates of –0.14 for the lowest income quartile and –0.07 for the remaining three higher income quartiles.

Farrelly and Engelen[37] reached the opposite conclusion using data drawn from the same surveys. However, they limited their pre-MSA sample to the period from 1990 (when most states participated in the survey) through October 1998 and added 2 years to the post-agreement sample (through 2006). Their results showed that demand became more inelastic after the MSA, but, in contrast to Franks and colleagues, these researchers found that the lowest income group was more responsive to price than the other income groups. One possible explanation for the post-agreement differences is the increased availability of low-priced cigarettes from companies that were not signatories to the MSA—particularly companies that did not comply with the escrow and other provisions adopted by states and intended to keep their costs comparable to those of participating companies.[38]

Other studies have examined differences in price elasticities across socioeconomic groups in other HICs. For example, Townsend and colleagues[39] found that smokers in the highest socioeconomic classes in the United Kingdom were much less affected by price than smokers in the lowest socioeconomic classes. Similarly, Siahpush and colleagues[40] found sharp differences in the price elasticity of smoking prevalence in Australia, with estimates of –0.32 for low-income groups, –0.04 for middle-income groups, and –0.02 for high-income groups.

Since 2000, research on LMICs generally has produced similar findings. Studies have shown that tobacco use among lower income or less educated groups is more responsive to price than tobacco use among higher income or more educated groups. This result is supported by studies in such countries as Bangladesh,[41] China,[42,43] Indonesia,[44] South Africa,[45,46] and Viet Nam.[47]

Findings from a few other countries have been less consistent regarding responsiveness to price and income or education. Studies in some countries found evidence of an inverse U-shaped relationship, with demand less inelastic when moving from the lowest socioeconomic group to higher groups, before becoming more inelastic as SES continues to improve. These results were found, for example, in Myanmar,[48,49] Nepal,[50] Thailand,[27] and Turkey.[51] No clear pattern was found across income groups in other countries—for example, Egypt[30] and Sri Lanka.[52]

One possible explanation for the mixed evidence from LMICs is the variety of tobacco products and brands available, including those that are inexpensive and highly affordable, allowing users to switch to cheaper options in response to tax and price increases.[53] Limited evidence from these countries provides some support for this hypothesis. For example, van Walbeek[46] found that poor South Africans were more likely than those with higher incomes to switch to cheaper pipe and other tobacco products (e.g., self-rolled cigarettes) in the 1990s when cigarette taxes and prices were rising.

## Impact of Tobacco Use on Poverty

Poverty is broadly understood as resource deprivation in which the basic life necessities are not met. The previous section described the association between poverty and smoking prevalence; this section describes how tobacco use can contribute to or exacerbate conditions of poverty.

In the conventional measurement of poverty, a set of minimum human needs, such as food, water, and clothing, is specified. For example, one approach is to define spending more than 75% of income or expenditures on food as "ultrapoverty."[54] However, it is important to distinguish between primary poverty and secondary poverty, as defined by British sociologist B. Seebohm Rowntree[55] in the early 20th century. *Primary poverty* refers to a situation in which income or other resources are insufficient to afford the basic necessities of life (i.e., food, water, clothing). *Secondary poverty* is a state in which resources are sufficient to meet basic needs, but these resources are not used effectively. For example, secondary poverty results when a substantial amount of limited household resources are used to support an addictive behavior, such as tobacco or alcohol use, and the remaining funds are insufficient for basic necessities. Many smokers are in secondary poverty because there is not enough income left after tobacco expenditures to cover basic necessities.

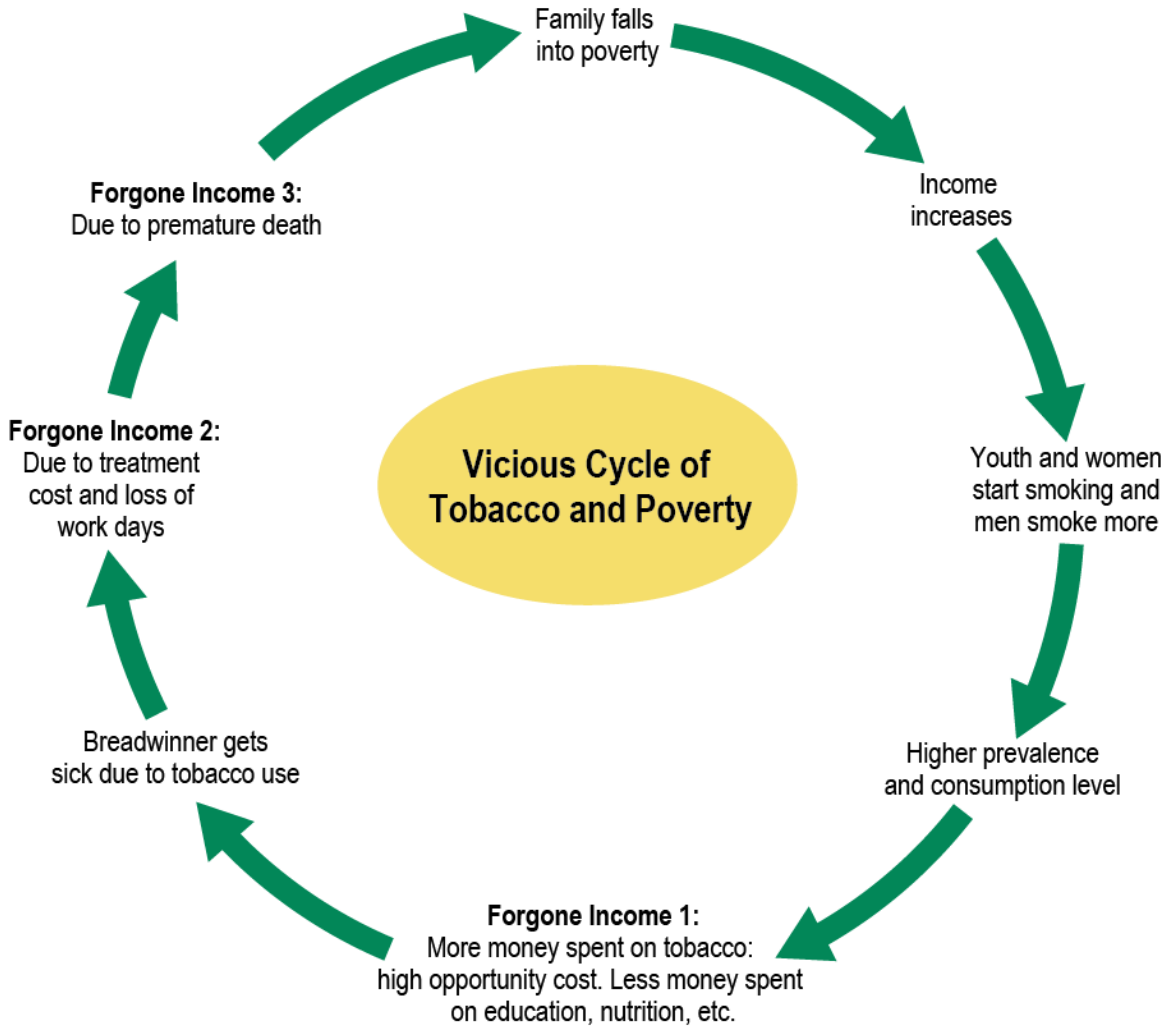
Tobacco use has a variety of negative effects on poor households and contributes to a cycle of poverty. In households with secondary poverty, tobacco expenditures are often a key factor underlying the inability to meet basic necessities. Given the prices of goods and services and the limited income of poor consumers, the purchase of tobacco requires trade-offs in the consumption of basic necessities. The *opportunity cost* of tobacco use in this situation can be defined as the amount of any necessity a poor household forgoes to purchase a tobacco product. Poor households in LMICs spend much of their income on food, leaving limited income for non-food necessities, such as clothing, housing, education, health care, and fuel. Contributing part of their limited income for tobacco expenditures implies a reduced consumption of both food and non-food necessities, causing deprivation and lower standards of living.[54] "Forgone Income 1" in Figure 16.2 represents the high opportunity cost of tobacco in which the increase in tobacco consumption among the poor is linked to an increase in spending on tobacco and less money spent on basic necessities such as education and nutrition.

Households forgo more income when the principal earner in the family falls ill due to tobacco consumption, incurs costs for treating that illness, and loses productivity and earnings ("Forgone Income 2" in Figure 16.2). These effects can be especially devastating to a family living at or below the poverty line. Because poorer, less educated, and less skilled people often earn their livelihoods through physical labor, the disability caused by tobacco consumption often results in a greater loss of income and food supplies for them than for people with more resources.[56]

In China, for example, Liu and colleagues[57] demonstrated that excessive medical expenses attributable to smoking could have caused a loss in income and an increase in the poverty rate of 1.5% in urban areas and of 0.7% in rural areas in 1998. This study estimated that excessive medical spending attributable to smoking, in conjunction with direct spending on tobacco by smokers, caused the impoverishment of 30.5 million urban people and 23.7 million rural people in China in 1998. Similarly, John and colleagues[58] estimated that 15 million people in India live in poverty as the result of tobacco use.

Smokers also have lower earnings than nonsmokers, as shown by studies conducted in several high- and upper middle-income countries, including the United States,[59–61] Germany,[62] the Netherlands,[63] Canada,[64] Albania,[65] and Finland.[66] Early studies found that the wage gap between smokers and nonsmokers was substantial.[59] More recent studies have attempted to disentangle the effects of smoking from the underlying characteristics of smokers that may contribute to lower education, reduced investments in human capital, and other factors that would lead to lower wages; these studies report that the wage gap is not as large as that found in earlier studies, but that some gap remains.[60,61,66]

## Figure 16.2 The Cycle of Tobacco Use and Poverty




Premature death of the wage-earning family member from a tobacco-related illness causes a more long-term negative impact on the household income flow ("Forgone Income 3" in Figure 16.2). All three types of forgone income scenarios represented in the figure cause poor households to become poorer, including descent into extreme poverty. Thus, poor smokers and their families may be trapped in the cycle of tobacco and poverty, with one-half of the cycle caused by the high opportunity costs of tobacco use and the other half caused by the burden of ill health from tobacco-related diseases.[3]

The economic cost of the higher prevalence of tobacco use among the poor, in combination with their often limited access to health care services, results in deteriorated health conditions causing severe health inequality and thus perpetuating the cycle of poverty. WHO noted, "inequalities between and within countries in terms of the risk of infectious diseases now have been extended to inequalities in risk factors for noncommunicable diseases."[67,p.15] The delayed effect of greater tobacco use among the poor has already appeared in HICs in the form of higher rates of lung cancer and mortality from chronic respiratory diseases among the poor than among the rich, a pattern expected to emerge in low-income countries as well.[68]

Data show that the poor bear the brunt of the high opportunity cost of tobacco expenditures, as they spend a greater proportion of household income on tobacco products than people who are not poor. Using data from the World Bank Living Standards Monitoring Survey, Djibuti and colleagues[69] reported that although rich households spend a greater amount of money on tobacco in absolute terms, poor households tend to spend a greater share of their total expenditures on tobacco. Indeed, the fraction of household income or expenditures allocated to tobacco consumption is almost invariably highest among the poorest or second poorest smokers across all country income groups.[46,50,70] For example, in the United States smokers in the lowest of three income groupings (i.e., low, medium, high) spent 7.7% of their household income on tobacco compared with 1.4% for smokers in the high-income category.[34] In Viet Nam the lowest income quintile spent 5.3% of household income on tobacco compared with 3.6% spent by the highest income quintile.[47] Similarly, in Mexico, the percentage of total expenditures allocated to tobacco was highest in the poorest (first quintile) population, and smoking households in general spent less on food, health, and education than nonsmoking households.[71]

Several studies have suggested that looking at how tobacco products "crowd out" spending in other areas reveals a more direct relationship between tobacco expenditures and their impact on spending for such needs as food, health care, and education. On the basis of data from a household sample survey in India for 1999-2000, John[72] reported that expenditures on tobacco displaced expenditures on the education of children, clean cooking fuels, and entertainment. The reallocation of household resources from basic necessities to tobacco deprives children and women of basic goods and services.

Using data from a nationally representative household survey conducted in China in 2003, Xin and colleagues[73] estimated that every five packs of cigarettes consumed per capita per month reduced household spending on education by about 17 yuan per capita per year and reduced spending on medical care by 11 yuan per capita per year. These effects are greatest among low-income rural households. Wang and colleagues[74] conducted a community-based health insurance study in several poor rural areas in China in 2002 and reported that tobacco expenditures crowded out human capital investment (e.g., education, health), future farm productivity (e.g., farming equipment, seeds), and financial security (e.g., savings, insurance). The authors observed that smokers also tended to drink more alcohol than nonsmokers, and thus took even more money away from the basic needs of all family members. Hu and colleagues[75] provided evidence from 2002 confirming that smoking households in China spent less on household necessities such as food, housing, and education than nonsmoking households. Thus, tobacco expenditures appear to have a far-reaching impact on the intra-household distribution of resources and on the welfare of other members of smokers' households.

The opportunity cost of tobacco use is largest for the poorest segment of the population in countries where tobacco use may be associated with food insecurity. In addition to increasing poverty, direct expenditures on tobacco divert funds from basic needs such as food.[58] For example, it has been estimated that if poor households in Viet Nam reallocated some of what they spent on tobacco to food purchases, about 11.2% of all food-poor, smoking households could have adequate funds to purchase a minimum basic amount of food.[76] This finding implies that the poorest, at the margin of survival, would benefit most if tobacco expenditures were reallocated to their basic needs.

This diversion of funds can have a direct impact on health outcomes, such as child nutrition. The UN has estimated that, in LMICs, more than 150 million children younger than age 5 are malnourished and underweight; almost half of these children live in South-East Asia,[77] where tobacco use rates are substantial. In these countries, enhanced tobacco control efforts would help reduce the existing heavy

burden on human capital caused by tobacco use. Based on data collected from 33,000 households in rural Java, Indonesia, from June 1998 through January 2001, Block and Webb[78] attributed persistent household food insecurity and consequent child malnutrition to the impact of tobacco consumption on allocation of household expenditures. In a similar study using data from Indonesia's national nutrition surveillance system on 175,000 urban slum households, Semba and colleagues[79] observed that paternal smoking contributed to increased short-term and chronic child malnutrition. The evidence of the diversion of household expenditures from basic necessities to tobacco use in Indonesia was further confirmed by Barber and colleagues.[80] These authors reported that in 2005, Indonesian households with smokers spent on average 11.5% of their monthly expenditures on tobacco products, compared with 3.2% for education, 2.3% for health, and 11.0% for fish, meat, eggs, and milk combined.

Efroymson and colleagues[81] reported that in Bangladesh from 1992 to 1996, the average male smoker spent more than twice as much on cigarettes per capita as on clothing, housing, health, and education combined. Moreover, the study showed that the typical poor smoker in Bangladesh could easily add more than 500 calories a day to the diet of at least one child if the resources being used for tobacco were reallocated. With the tobacco cost-shift, nearly 10.5 million malnourished people could be adequately fed, and about 350 (one-half) of the daily malnutrition-related deaths among children under age 5 could be prevented.[81] In a study using data on 77,678 households from the Bangladesh Nutrition Surveillance Project (2005-2006), Best and colleagues[82] found that parental tobacco use is associated with an increased risk of stunting, underweight, and wasting among children younger than age 5 and that households with tobacco users spent proportionately less per capita on food and other necessities. These authors suggested that tobacco control should be a part of public health strategies to decrease child malnutrition.

## Impact of Tobacco Use on Economic Development

The impact of tobacco use on development is assessed through its health and economic consequences for the population of a country. Tobacco use may impair development directly by imposing health care costs for the treatment of illnesses caused by both active smoking and exposure to SHS, and indirectly, through the loss of productivity and working years of life from resulting morbidity and mortality. And while a rapid increase in tobacco consumption might raise GDP in the short-term through both increased private expenditures on tobacco and higher public spending financed by higher tobacco tax revenues, such an increase would be offset by a subsequent rise in morbidity and mortality among middle-aged men and women at the peak of their skills and experience. The impact of tobacco-related illnesses on productivity would thus have an offsetting negative effect on a nation's welfare and economic development.

In LMICs, where health services and health insurance systems are frequently underdeveloped, people receive less formal treatment for illnesses than in HICs. Hence, private and public spending to treat tobacco-related illnesses is low and tends to understate the actual cost to the economies of those countries. In addition, because poor and near-poor people lack the private resources to bear adverse health shocks, they often resort to borrowing or the distress-selling of valuables, which in turn degrades their economic status. In a study of a representative sample of 120,942 households across India, tobacco users and people from households with tobacco users had a higher risk of borrowing and distress-selling of assets during a hospitalization than people who did not use tobacco or live in households with tobacco users.[83]

The costs of tobacco use may also include the loss of family income due to the premature death of a parent from a tobacco-related illness, and the decreased human capital investments caused by the crowding out of spending on health, nutrition, and education for children. The diversion of household spending away from the educational needs of family members may result in decreased opportunities to obtain a primary education and basic literacy skills, thus perpetuating poverty. Household spending on tobacco instead of the basic necessities of health also contributes to child malnutrition, the stunting of growth, and other health effects, as shown by previously discussed evidence from several countries.

### The WHO Framework Convention on Tobacco Control and Sustainable Development Goals

The connection between tobacco control and development has received greater attention in the years since the development and entry into force of the WHO FCTC in 2005. The text of the WHO FCTC acknowledges the impact of tobacco use on development, citing "the devastating worldwide health, social, economic, and environmental consequences"[84] and the particular burden on LMICs, national health systems, families, and the poor. The WHO FCTC also cites UN conventions on human rights and the protection of vulnerable populations, including the Convention on the Rights of the Child, and requires international cooperation.[84]

As a consequence, the United Nations Development Programme (UNDP) currently works with governments to integrate WHO FCTC implementation into countries' health and development plans through the United Nations Development Assistance Frameworks, which outline national development priorities agreed to between governments and the UN system. However, the UNDP reported[85] that most countries' framework documents were lacking specific commitments to support tobacco control or WHO FCTC implementation. In addition to interference by the tobacco industry, barriers to integrating WHO FCTC implementation into countries' development plans included deficiencies in: financial and human resources, appreciation of tobacco use as a development issue, national data to support intervention, and coordination among government departments. Among a variety of recommendations, the UNDP noted the importance of engaging in tobacco control activities across multiple sectors, including finance, justice, trade, and education ministries, along with health ministries.[85]

The Millennium Development Goals (MDGs) for the 21st century, a nonbinding set of goals adopted by the UN General Assembly at the Millennium Summit in September 2000,[86] did not explicitly include tobacco control. However, tobacco control measures are relevant to the achievement of each of the eight MDGs: decreasing poverty and hunger; expanding primary education; promoting gender equality and female empowerment; reducing child mortality; improving maternal health; combating such diseases as HIV/AIDS, malaria, and tuberculosis; ensuring environmental sustainability; and establishing global development partnerships. A WHO-commissioned study outlined connections between tobacco control and the achievement of each of the eight MDGs. To address the impact of tobacco use on development, the study recommended that development organizations and national governments explicitly incorporate tobacco control into their development plans; that tobacco taxation be used more effectively as a revenue-generating mechanism; and that finance ministries and other sectors engage in tobacco control.[87]

Several international aid agencies have acknowledged the importance of tobacco control for development, although related efforts have so far been limited. The European Commission's development policy focuses on eradicating poverty and has acknowledged the contribution of tobacco use to poverty and disease.[88] The U.S. Agency for International Development (USAID) has made a

commitment "to curb tobacco production, processing, marketing, and use"[89,p.3] and has stated that USAID will not support agribusiness activities that contribute to tobacco production, promotion, and use. USAID also says that it may work with local agricultural interests to identify alternative crops in areas where low-income farmers depend on tobacco growing.[89] The Swedish International Development Cooperation Agency, in its *Health is Wealth* development policy document, identified tobacco use as one of the major health threats contributing to health inequities worldwide, along with environmental problems, abuse of alcohol, use of illicit drugs, traffic injuries, and malnutrition.[90]

The 17 Sustainable Development Goals formally adopted by the UN General Assembly on September 25, 2015, are an effort to build on the MDGs and establish a more comprehensive and detailed set of development targets for 2030.[4] Strengthening the implementation of the WHO FCTC in all countries is one of the stated targets under goal 3 (Ensure healthy lives and promote well-being for all at all ages), in particular of goal 3.4 "by 2030, reduce by one third premature mortality from noncommunicable diseases." Tobacco control is also relevant to the achievement of many other SDGs, including goal 1 (End poverty in all its forms everywhere), goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), and goal 10 (Reduce inequality within and among countries). As the UN's Organisation for Economic and Co-operation and Development (OECD) has recommended, achieving the SDGs and their component parts will require mechanisms that fully engage the "whole government" of each country.[91]

## Tobacco Control and Equity

Given the heightened burden of tobacco use on the poor in many countries, it is especially important to ensure that tobacco control measures are reaching those who are most affected. If tobacco control measures do not benefit low-income populations as much as they do high-income populations, then this inequity imposes a double burden on those low-income populations, who are already more likely to suffer the effects of tobacco use. Thus, it is important to consider issues of equity in evaluating tobacco control policies and programs.[92]

Among tobacco control measures, tobacco taxes have received the most attention in terms of equity. A tax system serves equity when it helps redistribute income or resources among people. Requiring wealthier people to pay a greater share of their income as taxes compared to poorer people contributes to the equalization of income; such a tax system is progressive. On the other hand, when the poor have to pay a greater share of their income as taxes, income inequality increases, and the tax system is regressive. Tobacco taxes are often regressive in that the poor, who are more likely to smoke and have less income to spend, pay a larger share of their income as tobacco taxes. Tobacco taxation has sometimes been criticized for imposing a disproportionately greater financial burden on the poor than on the rich through a regressive tax structure.[93] This argument has also been used by the tobacco industry as a strategy to oppose tobacco tax increases.[94] However, the overall progressivity of the fiscal system should be considered, including indirect and direct taxes and transfers (such as food assistance programs, health insurance programs, and other programs that use tax revenues to provide money to low-income populations), and not just the progressivity or regressivity of a single element in that system.

The regressivity of existing tobacco taxes does not necessarily imply that a tobacco tax increase will be regressive. As described above, evidence from many countries shows that lower income populations are generally more responsive to tobacco tax and price increases than higher income populations. Thus, a

tax increase that raises tobacco product prices will have a greater impact on low-income smokers, leading more of them to quit, whereas higher income smokers are less likely to change their behavior and will continue to pay the higher taxes.[53,95] Moreover, tobacco taxes can contribute to reducing the social inequalities created by tobacco consumption by reducing tobacco use among lower SES populations.[96] For example, Jha and colleagues[97] estimated that during the 1990s in Canada, England and Wales, Poland, and the United States, more than half of the difference in male mortality between the top and bottom social strata was attributable to greater risks of tobacco-related mortality at ages 35–69 among the lower social strata.

Evidence demonstrates that an increase in tobacco taxes can in fact work to reduce inequities in tobacco use among adults and young people.[98,99] For example, a simulation analysis for Bulgaria by Sayginsoy and colleagues[100] showed that a 72% increase in the existing excise tax rate on cigarettes would lower the amount of taxes paid by low- and lower middle-income smokers by 3.5% and raise the amount of taxes paid by upper middle-income and high-income smokers by 10.7% and 24.9%, respectively. In other words, because lower income smokers would be more sensitive to the price increase and therefore more likely to quit, the upper income smokers would pay a larger share of the total tobacco tax revenue after the price increase. Similarly, in Sri Lanka, Arunatilake and Opatha[52] projected that although the current excise taxes are regressive, price increases would reduce the difference in the share of household income spent on tobacco between the poorest and richest groups. Likewise, in Turkey, Önder and Yürekli[101] estimated that before a tax increase, the poorest one-third of households paid 23.8% of total cigarette taxes, the middle one-third paid 33.9%, and the richest one-third paid 42.2%; a 50% excise tax increase would shift the burden of the tax to higher income households, with the corresponding shares falling to 18.9% for the poorest one-third, but rising to 35.5% for the middle group and 45.7% for the richest group.

Inequities could be further reduced by earmarking the revenue increases from higher tobacco taxes for welfare programs for the poor, such as government spending on education, health care, assistance for tobacco cessation, and efforts to build awareness of the health harms of tobacco use (see chapter 5). Examples of tobacco tax revenue dedicated or earmarked for financing health promotion include such programs as VicHealth and Healthway in Australia, and ThaiHealth in Thailand.[102] By allocating disproportionately larger shares of expenditures for the poor, such programs can accommodate tobacco taxes in a progressive fiscal system. These programs can not only compensate for the negative impact of higher taxes on poor smokers but can also benefit low-income nonsmokers. In this way, tobacco taxation can be an equitable solution to both tobacco use and poverty.

In comparison with tax measures, less research has been focused on the equity impact of non-tax measures on the poor in general and in LMICs in particular. Two studies, Farrell and Fuchs[103] (U.S) and Townsend and colleagues[39] (United Kingdom), reported that publicity about the long-term adverse health consequences of smoking tends to have a greater impact on the rich and more educated than on the poor and less educated. A later study by de Walque[104] concluded that the gradual spread of information about the health consequences of smoking in the United States since the mid-1950s led to an earlier and faster decline in smoking prevalence among more educated people. In the United States, educated individuals are less likely to smoke, and smokers who are more educated are also more likely to stop smoking.[105] However, the aggregate welfare gain from the dissemination of information on the health consequences of tobacco use could be greater for the poor than for the rich because of the knowledge gap that is typically seen between these groups.

As described in chapter 8, health warnings are an effective (non-tax) tobacco control measure. Text-only health warnings are expected to have little impact on people who are unable to read, but pictorial health warnings could have a visual impact on individuals of varying literacy/education levels.[106–109] Studies conducted in Canada, Australia, and the United Kingdom found that warnings have successfully discouraged youths, including the most vulnerable youths, from initiating smoking.[108]

Several studies have investigated the differential impact of various tobacco control measures among different socioeconomic groups in European countries.[110,111] Studies by Monsó and colleagues[112] and Varghese and others[113] have shown that responses to smoking cessation interventions differ by SES. Some tobacco control measures may have a greater effect on lower SES smokers than others, reducing inequalities in smoking prevalence and disease burden among different socioeconomic groups. For example, bans on tobacco advertising, promotion, and sponsorship may have a greater impact on populations and racial/ethnic communities that have been specifically targeted by tobacco industry marketing.[114] Pictorial health warnings also hold promise for reducing inequities based on education level and SES.[109] But despite the potential of each of these measures to benefit socially disadvantaged groups, Kunst and colleagues[110] observed that the measures implemented in European countries disproportionately benefited the upper social groups. These authors recommended that all tobacco control efforts should take into account the socioeconomic inequality represented by the heavier burden of tobacco use and illness that is borne by lower SES groups. Two recent reviews of this literature, one on adults[98] and another on youth,[99] found that there is at best mixed evidence for the effectiveness of non-tax tobacco control policies in reducing socioeconomic inequities in tobacco use.

## Summary

Tobacco use exacerbates poverty by diverting the limited resources of poor households away from basic needs such as food and shelter, health care, and education. The opportunity costs of tobacco use are greatest for the poor because they have the most difficulty meeting basic household needs. Increases in health care expenditures for treatment of tobacco-related diseases and economic losses due to premature death add additional burdens to other competing issues of the poor and of society as a whole.

An estimated 860 million adult smokers live in LMICs, and approximately 226 million globally are living in poverty. Moreover, the economic and health burdens of tobacco use appear to be greater for LMICs where, by definition, financial resources are more limited than in HICs. The higher concentration of smokers who are poor in low- and lower middle-income countries indicates that the tobacco use epidemic has not spared the poorest of the world's poor.

Typically, a lag of a couple of decades or more occurs between the initiation of smoking at an early age and the resulting illnesses or premature death, often in middle age. Countries at the lower end of the world's economic spectrum, and hence at risk of experiencing the fastest growth in tobacco consumption in tandem with economic development, can anticipate reaching the peak effects of the tobacco use epidemic about halfway into the 21st century. As development gradually transforms low-income countries into lower middle-income countries, their poorest populations will be the most susceptible to the epidemic of tobacco use occurring in the developing world. In HICs, socioeconomic inequality in smoking status has contributed significantly to socioeconomic inequality in health status, an effect likely to be repeated in LMICs unless vigorous preventive actions are taken.

Curtailing tobacco use is increasingly recognized as important for global economic development. The WHO FCTC describes "the devastating worldwide health, social, economic, and environmental consequences" of tobacco use, and the global Sustainable Development Goals adopted in 2015 explicitly include strengthening the implementation of the WHO FCTC as part of SDG goal 3 (Ensure healthy lives and promote well-being for all at all ages). Already, several national development agencies incorporate tobacco control as a development strategy. To give an example of a specific policy goal, research showing that tobacco use crowds out expenditures on food has led to suggestions that strategies to decrease child malnutrition should include tobacco control measures because of their potential to increase family resources to purchase food.

Studies have assessed the implications of tobacco control measures—both tax and non-tax measures—for reducing tobacco-related health inequities between the rich and poor. Tobacco taxes can contribute to reducing health inequities because the poor are generally more responsive to price increases than people who are not poor and because a portion of tax revenues can be earmarked for programs that directly benefit the poor. Other tobacco control strategies discussed in this monograph, including public education efforts, pictorial health warnings, advertising bans, and the provision of free or low-cost cessation services, can also contribute to reducing tobacco use in all socioeconomic groups.

## Research Needs

The complex relationships between tobacco use, poverty, and development are now well recognized. However, evidence on how these relationships operate, especially in LMICs, is limited in several areas. Further LMIC-based studies are needed that collect and analyze additional evidence on a wide range of development indicators both within and between countries. Additionally, only limited evidence exists regarding the relationships between poverty, development, and use of tobacco products other than cigarettes. Interaction between economic development and the wider array of tobacco products used in many LMICs should be considered, along with the impact of differences in taxation across this wider variety of tobacco products. The literature on the equity implications of both tax and non-tax tobacco control measures in LMICs is scant. Research to understand how both tax and non-tax measures can contribute to reducing poverty and income inequality will help LMICs avoid repeating the experience of HICs.

## Conclusions

1. Tobacco use and its consequences have become increasingly concentrated in low- and middle-income countries and, within most countries, among lower socioeconomic status populations.
2. Tobacco use in poor households exacerbates poverty by increasing health care costs, reducing incomes, and decreasing productivity, as well as diverting limited family resources from basic needs.
3. By reducing tobacco use among the poor, tobacco control policies can help break the cyclical relationship between tobacco use and poverty.
4. Tobacco control efforts that are integrated with other public health and development policies can improve the overall health of the poor and can help achieve the Sustainable Development Goals.
5. Lower income populations often respond more to tobacco tax and price increases than higher income populations. As a result, significant tobacco tax and price increases can help reduce the health disparities resulting from tobacco use.

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## Section 7
## Global Implications of Tobacco Control

# Chapter 17
# Ending the Epidemic

# Chapter 17
# Ending the Epidemic

This summary chapter reviews the major conclusions that can be drawn from the study of the economics of tobacco control and identifies priorities for future research in this field.

This monograph presents strong evidence that tobacco control measures are effective and do not harm national economies. Policies and programs that reduce the demand for and supply of tobacco products are highly cost-effective and lessen the disproportionate burden that tobacco use imposes on the poor. Given the enormous health and economic consequences of tobacco use and the rapidly evolving global market for tobacco, these interventions are now more urgently needed than ever, particularly in low- and middle-income countries (LMICs).

Research priorities (particularly in LMICs) include studies to better understand: the effects of tobacco taxation and pricing, the economic impact of tobacco use and tobacco control measures, interrelationships between tobacco use and poverty, illicit trade, economically viable alternatives to tobacco growing and manufacturing, and implementation and evaluation of the World Health Organization Framework Convention on Tobacco Control.

Implementing effective tobacco control measures makes it possible that tobacco could become a minor public health problem rather than the public health catastrophe it currently is or could soon become in most countries. Implementation of strong, comprehensive tobacco control strategies has reduced tobacco use in many countries at all income levels, and government fears that tobacco control will have an adverse economic impact are not supported by the evidence. This monograph provides the evidence that implementing effective tobacco control measures makes sense from both an economic and public health standpoint for countries at all income levels.

High-income countries have succeeded in curbing tobacco consumption by significantly raising tobacco taxes and prices and by employing the tobacco control strategies described in this monograph. However, the majority of tobacco users worldwide today live in LMICs, and in most countries tobacco use is more concentrated in low-income populations. Understanding the effects of tobacco on low-income populations is particularly important for reducing tobacco use and its adverse health consequences.

## Chapter Contents

## Figures

## Milestones in Tobacco Control Economics

More than 15 years ago, the World Bank's *Curbing the Epidemic: Governments and the Economics of Tobacco Control* drew attention to the spread of the epidemic of tobacco use and its consequences from high-income countries (HICs) to low- and middle-income countries (LMICs).[1] The report presented evidence on the effectiveness of policies to reduce the demand for tobacco products and emphasized the importance of deterring smuggling as the key supply-side intervention. The report also demonstrated that strong tobacco control efforts do not harm economies. Almost all the evidence presented in *Curbing the Epidemic* and its companion volume, *Tobacco Control in Developing Countries*, came from HICs, in large part because of their more extensive implementation of tobacco control policies, readily available data on tobacco use and its determinants and consequences, and the research infrastructure and funding available in these countries.[2] Implications for tobacco control in LMICs were derived from the evidence from HICs and the limited research available from LMICs.

Since the publication of *Curbing the Epidemic*, global research on the economics of tobacco use and tobacco control, especially in LMICs, has expanded considerably.[3] This rapid growth was fueled in part by the globalization of tobacco control policy that followed the adoption and implementation of the World Health Organization (WHO) Framework Convention on Tobacco Control (WHO FCTC), a multinational public health treaty which was negotiated beginning in 1999. Adopted unanimously by WHO Member States in May 2003, the WHO FCTC entered into force on February 27, 2005. It is a legally binding treaty which requires Parties to adopt tobacco control policies and programs that have been shown to be effective in reducing tobacco use and its health and economic consequences.[4] In developing the treaty, Member States included Articles that addressed both the demand for tobacco products (Articles 6 through 14) and the supply of tobacco products (Articles 15 through 17) while requiring that the tobacco control policies and programs of these Member States be protected from tobacco industry interference (Article 5.3). Moreover, the WHO FCTC establishes obligations relating to surveillance systems (Article 20) and undertaking research to enhance the effective implementation of the treaty.

Three factors—the research gaps identified in *Curbing the Epidemic*, *Tobacco Control in Developing Countries*, and other reports; WHO FCTC provisions on surveillance and research; and increased attention from global organizations and funding agencies—resulted in hundreds of new studies on the patterns, causes, and consequences of tobacco use in LMICs. At the same time, demand increased for country-specific evidence on the economics of tobacco use and tobacco control. Ministries of finance, industry, trade, and commerce began to show heightened interest in tobacco control, particularly through tobacco taxation. These developments were accompanied by the rise of new nongovernmental organizations (NGOs) focused on tobacco control throughout the world.[5]

More robust local and global tobacco surveillance systems have provided much-needed data for this research. Beginning in 1998, the Centers for Disease Control and Prevention (CDC; an agency of the U.S. Department of Health and Human Services) and WHO developed and implemented the Global Tobacco Surveillance System, which is a set of four integrated surveys: the Global Youth Tobacco Survey, Global Adult Tobacco Survey, Global School Personnel Survey, and Global Health Professions Student Survey.[6] Taken together, these surveys, conducted over multiple years, now provide comparable, nationally representative data on tobacco use among youth and adults for many countries.

In addition, longitudinal surveys of tobacco users have been developed and implemented by the International Tobacco Control Policy Evaluation (ITC) Project, with funding from the National Cancer Institute (NCI) of the National Institutes of Health (an agency of the U.S. Department of Health and Human Services), the Canadian Institutes of Health Research, other government agencies, private foundations, and others. The ITC Project has conducted surveys in more than 20 low-, middle-, and high-income countries, inhabited by more than 70% of the world's tobacco users.[7] The rich information collected in these and other surveys has provided researchers with the data they need to evaluate the impact of tobacco control policies on tobacco use and related outcomes.

Equally important for this research are the efforts to develop tobacco control policy surveillance systems. To help Member States implement the key demand-reduction policies required by the WHO FCTC, WHO developed the MPOWER package of the six most important and effective tobacco control measures:[8]

- **M**onitor tobacco use and prevention policies (Article 20)
- **P**rotect people from tobacco smoke (Article 8)
- **O**ffer help to quit tobacco use (Article 14)
- **W**arn about the dangers of tobacco (Articles 11 and 12)
- **E**nforce bans on tobacco advertising, promotion, and sponsorship (Article 13)
- **R**aise taxes on tobacco (Article 6).

Beginning in 2008, WHO's regular reports on the global tobacco epidemic have tracked the status of these key tobacco control measures.[9] Additional information on these policies and others required by the WHO FCTC are available through the regular reporting of the Parties' treaty implementation efforts, as required by Article 21.[10]

Economists and other tobacco control researchers are increasingly aware of the variety of national, subnational, and commercial data that can be used to assess and inform tobacco control policies. As documented in *Methods for Evaluating Tobacco Control Policies*, published by the International Agency for Research on Cancer (IARC)[11] as part of its Handbooks of Cancer Prevention series, data on tax-paid cigarette sales, tobacco production, and trade flows are often readily available from various government agencies, as are national household- and individual-level survey data on expenditures on and use of tobacco products. The IARC handbook also highlights the data available from commercial vendors, such as cigarette price data collected by the Economist Intelligence Unit, Symphony IRI Group (formerly Information Resources, Inc.), A.C. Nielsen, and others, as well as the wealth of country-specific market data provided by Euromonitor International and the ERC Group.

Following *Curbing the Epidemic*, the World Bank and WHO developed and disseminated toolkits for researchers, which provided step-by-step methods for conducting a variety of economic analyses of tobacco use and tobacco control. These toolkits include tools for estimating the demand for tobacco products, assessing the economic costs of tobacco use, measuring tax avoidance and evasion, estimating the employment impact of tobacco control policies, and investigating the impact of tobacco control on the poor.[12] The World Bank, WHO, the Rockefeller Foundation, and others drew on these toolkits and supported workshops to train economists from LMICs on the research methods needed to conduct these analyses.

Financial and/or technical support to conduct economic research was provided by a variety of funders including NCI, WHO, the World Bank, the American Cancer Society, Cancer Research UK, Fogarty International Center at the National Institutes of Health (U.S.), International Development Research Centre's Research for International Tobacco Control program (Canada), Rockefeller Foundation's Trading Tobacco for Health initiative (U.S.), Bloomberg Global Initiative to Reduce Tobacco Use (U.S.), and the Bill and Melinda Gates Foundation (U.S.). The joint World Bank and WHO Health, Nutrition and Population *Economics of Tobacco Control* research paper series and the more recent economic report series from the Bloomberg Initiative have disseminated some of this research, and other studies have been published in a variety of economics, public health, public policy, and other peer-reviewed journals.

Despite the substantial growth in research on the economics of tobacco use and tobacco control, concerns about the economic impact of effective tobacco control policies remain a significant obstacle to their adoption and implementation. These arguments—that tobacco control policies and programs result in significant job losses, create black markets in tobacco products, cost governments much-needed tobacco tax and other revenues, and harm the poor—have been and continue to be used by opponents of strong tobacco control policies. For example, in its December 2010 submission to the U.S. Food and Drug Administration (FDA; an agency of the U.S. Department of Health and Human Resources), Altria argued that a ban on mentholated cigarettes would have many unintended consequences, including "significant expansion of the unregulated, illicit cigarette market," "increased organized crime," "an erosion in underage access prevention," "declining tax revenues and tobacco settlement payments to states," and "significant job losses within the legitimate distribution chain—from farmers to retail clerks."[13,p.3] Likewise, the Bakery, Confectionery, Tobacco Workers and Grain Millers International Union argued in its submission to the FDA's Tobacco Products Scientific Advisory Committee that a ban on menthol "would result in severe job loss for our tobacco industry members."[14] In addition, in the debate over raising the U.S. federal cigarette excise tax to fund the expansion of the State Children's Health Insurance Program (S-CHIP), Henchman and Prante, writing on behalf of the Tax Foundation, argued that this "tax increase hurts the poor more than virtually any other way of raising money to fund S-CHIP expansion" while encouraging smuggling and related crime.[15]

This monograph provides an up-to-date review of the research on the economics of tobacco use and tobacco control, highlighting findings from LMICs and addressing the opposing arguments around the economic impact of tobacco control policies. This chapter synthesizes the evidence reviewed in earlier chapters, highlighting areas where additional research is needed, and providing a framework for ending the global tobacco epidemic.

## What We Have Learned—Major Conclusions

The rapid increase in the quantity of research on the economics of tobacco use and tobacco control that has occurred since the publication of *Curbing the Epidemic* has expanded the evidence base for the effectiveness of tobacco control policies and programs. This section discusses the major conclusions developed in this monograph.

### Conclusion 1: The global health and economic burden of tobacco use is enormous and is increasingly borne by low- and middle-income countries.

As chapter 2 shows, the number of smokers age 15 years and older in the world—about 1.1 billion—has changed very little over the past 15 years. The fact that this number has not declined is mainly attributable to population growth, because smoking prevalence has decreased markedly in HICs and in most WHO Regions. As of 2015, around 80% of the world's smokers live in LMICs. Every year, around 6 million people die from tobacco use; many of these deaths occur in LMICs. In HICs, women smoke at a rate more similar to that of men (17.5% of women compared to 32.1% of men), whereas in LMICs, men are far more likely than women to smoke (35.0% of men compared to 3.6% of women). In many LMICs, however, girls are taking up smoking at rates well above adult female smoking rates, which suggests that the health and economic consequences of smoking in these countries may increase in severity in the foreseeable future. Additionally, the use of a variety of smokeless tobacco products, prevalent in some LMICs among both men and women, contributes to oral cancer and other health effects, though the burden has yet to be fully characterized.

Tobacco use imposes significant economic costs, most notably increased health care spending to treat the diseases caused by tobacco use and the lost productivity that results from tobacco-attributable death and disease (see chapter 3). Evidence from HICs shows that cigarette smoking results in a net increase in health care costs over an individual's lifetime despite the years of life lost from dying prematurely of a smoking-related disease. Because tobacco use in LMICs is expected to increase, the economic costs of tobacco use in these countries will almost certainly rise over the next few decades, further burdening already strained health care systems.

### Conclusion 2: Failures in the markets for tobacco products provide an economic rationale for governments to intervene in these markets.

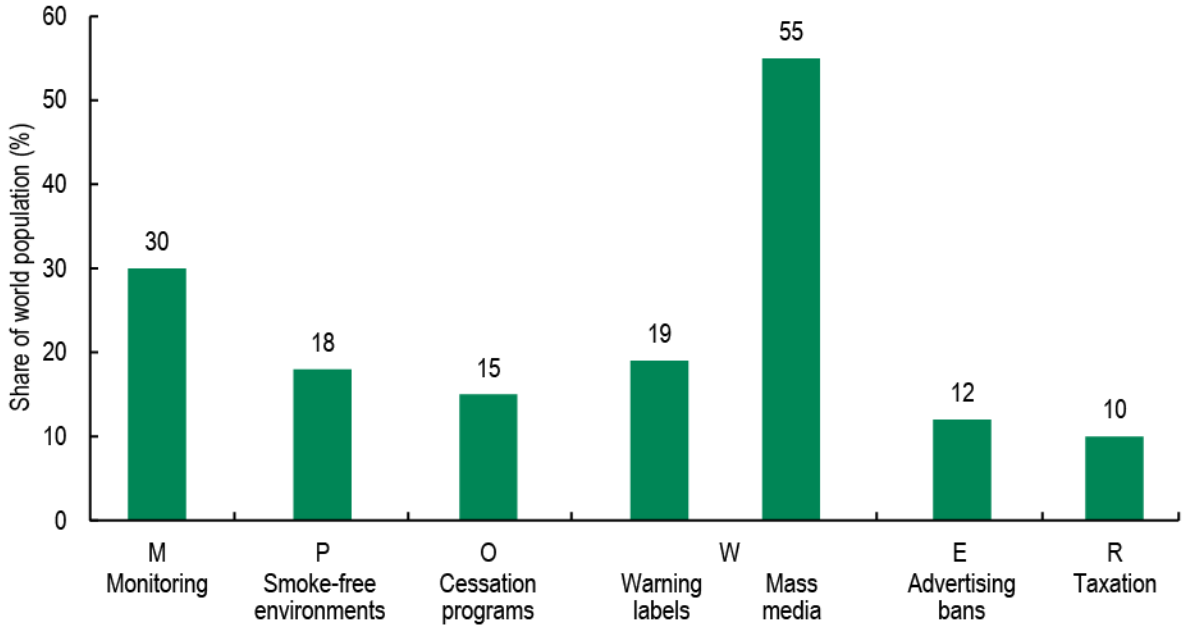
There are multiple failures in the markets for tobacco products, as several chapters describe. Chapter 8 highlights the public's often imperfect knowledge about the health consequences of consuming tobacco products and the asymmetric nature of the information available to the public. The tobacco industry contributes to information failures through product marketing, which helps distort public perceptions of the relative risks and benefits of tobacco use. In addition, the companies have withheld, denied, and distorted information about their products. Together, this has resulted in higher rates of tobacco use than would have occurred otherwise. Information failures are most pronounced in LMICs but also persist in HICs. These information failures are further complicated by initiation of tobacco use during adolescence and young adulthood, addiction, and the time-inconsistency of individual preferences. Young people are more likely to discount the long-term health consequences of tobacco use and to underestimate their potential for becoming addicted to tobacco products. The vast majority of adult tobacco users regret ever having initiated tobacco use.

In addition, externalities arise from tobacco use, with nonusers incurring costs as a result of others' tobacco use (chapter 3). The costs of tobacco use vary from country to country, and the external costs are greater in countries where public funds are used to pay for a greater share of health care costs. Nonsmokers, both children and adults, suffer numerous adverse health consequences when exposed to secondhand smoke (SHS) (see chapter 2). Estimates indicate that, globally, about 600,000 nonsmokers die prematurely each year as a result of their SHS exposure.

### Conclusion 3: Effective policy and programmatic interventions are available to reduce the demand for tobacco products and the death, disease, and economic costs that result from their use, but these interventions are underutilized.

Although there has been considerable progress in the adoption, implementation, and strengthening of tobacco control policies since the WHO FCTC first entered into force, as of 2014 much of the world's population was not adequately covered by the most effective interventions (at the highest level of achievement), as illustrated in Figure 17.1. These most effective interventions are significant increases in tobacco taxes and prices, comprehensive smoke-free policies, complete bans on tobacco marketing, information interventions, and cessation support; these are summarized below.

**Figure 17.1 Share of the World Population Covered by Selected Tobacco Control Policies, 2014**




*Note:* The tobacco control policies depicted here correspond to the highest level of achievement at the national level. For the definitions of these highest categories, refer to the *WHO Report on the Global Tobacco Epidemic, 2015: Raising Taxes on Tobacco*.
*Source:* World Health Organization 2015.[9]

Adopting a comprehensive set of tobacco control policies that reduce the demand for tobacco products would lead to significant reductions in the prevalence of tobacco use and in the death, disease, and economic costs it causes. For example, Levy and colleagues[16] estimated that implementation of MPOWER measures between 2007 and 2010 would have prevented almost 7.5 million smoking-attributable deaths globally. Moreover, Mendez and colleagues[17] estimated that global implementation of the MPOWER measures in 2010, with a doubling of cigarette prices, would reduce prevalence from 22.0% to 13.2% in 2030, resulting in almost 350 million fewer smokers. The effects on public health would become increasingly positive over time, particularly given the effectiveness of these interventions in preventing young people from initiating tobacco use, coupled with the lag between the onset of tobacco use and many of its major health consequences.

### *Tobacco Taxation*

Chapters 4 and 5 highlight the most effective of these policies, tobacco taxation, which is the subject of WHO FCTC Article 6. The evidence reviewed in chapter 4 clearly demonstrates the effectiveness of significant increases in tobacco product taxes and prices in reducing all aspects of tobacco use. Higher tobacco taxes that significantly raise tobacco product prices lead current users to quit, keep former users from resuming tobacco use, prevent young people from becoming regular tobacco users, and reduce the consumption of tobacco products by those who continue to use them. Tobacco use among youth and those in the lowest income percentiles is generally more responsive to changes in taxes and prices than tobacco use among older or higher income people.

As explained in chapter 4, although the magnitude of the impact of tax and price increases on tobacco use varies from country to country, estimates from most countries indicate that a tax increase that raises the price by 10% will reduce overall tobacco use by between 2.5% and 5.0%. Estimates from LMICs are particularly variable, and estimates from many countries indicate that a given increase in taxes and prices in LMICs will have at least as great an impact as the same increase in HICs. Specifically, in HICs, most estimates of elasticities of demand range from –0.2 to –0.6, clustering around –0.4. In LMICs, elasticity estimates range from –0.2 to –0.8, clustering around –0.5. However, in countries like the People's Republic of China, where income growth has significantly outpaced increases in cigarette prices, cigarettes have become increasingly affordable, and cigarette demand is likely to be less responsive to price. In these countries, larger tax increases that significantly reduce the affordability of cigarettes will be necessary to significantly reduce demand.

As chapter 5 shows, the inelasticity of the demand for tobacco products, the relatively low share of tobacco taxes in tobacco product prices, and effective tax administration ensure that increases in tobacco taxes will lead to increases in tobacco tax revenues in the short to intermediate term, despite the reductions in tobacco use that will eventually result from higher taxes. However, tobacco tax systems are complex in many LMICs, creating opportunities for tax avoidance and tax evasion and reducing the health and revenue impact of increases in tobacco tax rates.

Chapter 5 also describes a set of best practices for effective tobacco taxation, drawing on the *WHO Technical Manual on Tobacco Tax Administration*.[12] To date, however, few governments have adopted and implemented tobacco tax structures that are consistent with these best practices. As chapter 5 shows, although the public health impact is increasingly a motive for increases in tobacco excise taxes, the revenue that these taxes generate is often as or more important to governments than the effect on public health. Many governments, particularly those in LMICs, have adopted complicated tax structures that tax the same product at different rates on the basis of various product characteristics or prices. Few governments have reached the target of a 70% excise as a share of price recommended by the *WHO Technical Manual on Tax Administration*, and the gap between this target and actual tax shares is largest for the lowest income countries. Lastly, only a small number of governments have dedicated a portion of their tobacco tax revenues to comprehensive tobacco control programs and/or other health promotion efforts, a strategy that can further enhance the effects of tobacco taxes.

### *Smoke-Free Policies*

As discussed in chapter 6, comprehensive smoke-free policies directly address the externalities that result from nonsmokers' exposure to SHS. As consistently demonstrated in HICs that have adopted comprehensive smoke-free policies, compliance with the policies is generally high, and nonsmokers'

exposure to SHS is significantly reduced. In addition, comprehensive smoke-free policies reduce smoking among both adults and youth while strengthening social norms against smoking. The effectiveness of smoke-free policies is enhanced with implementation of public education efforts about the consequences of exposure to SHS. The evidence clearly demonstrates that comprehensive smoke-free policies do not harm business, contrary to what is often argued by the tobacco industry.

WHO FCTC Article 8 sets out the requirement for smoke-free environments, and guidelines for implementing these policies have been developed based on HICs' experiences with these measures. These guidelines incorporate several key principles including emphasizing the importance of comprehensive policies that cover, without exemptions, all indoor public places and workplaces, recognizing that there are no safe levels of exposure and that the use of designated smoking areas, ventilation, or other approaches will not provide universal protection for nonsmokers.

Despite the strong evidence for the effectiveness of comprehensive smoke-free policies, few countries have adopted policies consistent with these guidelines, and these policies are much more prevalent in HICs than in LMICs. Of the 43 countries that have adopted comprehensive smoke-free policies and measured compliance, almost two-thirds (63%) report high or very high levels of compliance.[9]

### *Tobacco Advertising, Promotion, and Sponsorship*

Tobacco companies use a variety of marketing practices that increase the demand for tobacco products, with potentially greater impact on vulnerable populations, including young people and women (chapter 7). These marketing communication strategies, including conventional mass media advertising, sales promotions, sponsorship, and other activities, contribute to information failures in tobacco product markets by distorting perceptions of the relative costs and benefits of tobacco use. Tobacco product labeling and packaging add to these distortions (chapter 8). As chapter 7 concludes, an extensive body of research has demonstrated a causal relationship between tobacco company marketing activities and tobacco use, including the uptake and continuation of tobacco use among young people. Comprehensive bans on tobacco company marketing practices directly address this market failure and lead to reductions in tobacco use in both HICs and LMICs. In countries that have adopted increasingly comprehensive marketing bans, the remaining channels, particularly product packaging and tobacco product displays at the point of sale, become more important. Addressing tobacco company marketing through the Internet and related communication platforms presents a new challenge for researchers and public health practitioners.

The WHO FCTC guidelines for Article 13 highlight several key principles for maximizing the effectiveness of a ban on tobacco advertising, promotion, and sponsorship,[18] including: the importance of a comprehensive ban that covers all direct and indirect marketing activities, such as the display of tobacco products at the point of sale; the utility of plain (standardized) packaging in eliminating the effectiveness of packaging as a marketing tool; and the importance of addressing depictions of tobacco use in entertainment media as part of a comprehensive ban on tobacco marketing.

The evidence demonstrates that tobacco product packaging and labeling can distort perceptions of the risks of using various tobacco products. These distortions are addressed in Article 11 of the WHO FCTC which obliges Parties to ban the use of misleading terms like "light," "mild," and "low-tar." Guidelines for implementation of Article 13 also address the display of emission yields for tar, nicotine, and carbon monoxide based on machine testing. In the United States, a provision of the Family Smoking Prevention

and Tobacco Control Act (2009) bans use of the terms "light," "mild," or "low," or similar descriptors, without a marketing authorization from the FDA.[19] The court in *United States of America v. Philip Morris USA, Inc.*, also prohibited the defendants and other covered persons and entities from using misleading descriptors such as "low-tar," "light," "mild," and "natural."[20,p.938;21]

Although many governments restrict some tobacco company marketing practices, few have adopted comprehensive policies that ban most of these activities. In 2012, Australia became the first country to enact legislation mandating plain packaging for cigarettes. As of September 2016, Hungary, Ireland, France, New Zealand, and the United Kingdom of Great Britain and Northern Ireland have also passed plain packaging laws, and several other countries are also considering doing so (see chapter 8).

### *Information Interventions*

As discussed in chapter 8, there are multiple information failures in the markets for tobacco products. Although the health consequences of tobacco use and exposure to SHS have been well documented, many tobacco users remain unaware of the risks from tobacco use or fail to internalize these risks. This lack of information is compounded by the addictive nature of tobacco use and the fact that many people begin using tobacco products at young ages, often thinking they will be able to quit before they experience the health consequences of tobacco use. This underestimation of the risks from tobacco use is greatest in many LMICs. Communicating information on the consequences of tobacco use is effective in correcting misperceptions of risk and reducing tobacco use.

Many approaches to disseminating information have been tried, with varying degrees of effectiveness. Authoritative reports on the health consequences of tobacco use have been released and widely covered by the news media; school-based anti-tobacco education programs and mass media public education campaigns have been conducted; and health warning labels have been required on tobacco product packaging and in advertising. Prominent pictorial health warning labels are a low-cost intervention that has been found effective in raising awareness about the health consequences of tobacco use and in increasing interest in quitting, with effects at least as strong in LMICs as in HICs. Evidence from various HICs and LMICs also shows that anti-tobacco mass media public education and counter-marketing campaigns can significantly reduce tobacco use while strengthening social norms against tobacco use and increasing public support for tobacco control policies.

The WHO FCTC Article 11 implementation guidelines provide direction for effective implementation of health warning labels.[22] According to these guidelines, health warning labels should cover at least half of the principal display area (and aim to cover as much of the principal display area as possible), be pictorial and in color, use culturally appropriate content written in all principal languages of a country, be positioned so that they are not damaged or hidden when the package is opened by normal means, not be obstructed by other pack markings, be rotated regularly and updated periodically, and provide messages that go beyond the health effects for the individual smoker. Although the majority of countries have mandatory health warning labels on tobacco product packaging, most do not meet all of these standards.

The WHO FCTC implementation guidelines for Article 12 specify the steps governments can take to implement effective public education campaigns about the harm caused by tobacco use.[23] These include: providing adequate funding to develop and sustain the necessary infrastructure (organizational structure and capacity); raising public awareness about the harms caused by tobacco use, exposure to secondhand

smoke, and tobacco industry efforts to undermine tobacco control efforts; highlighting the benefits of tobacco cessation; promoting social change; using all available communication tools; and developing and implementing campaigns that reach all populations and target particularly vulnerable populations.

More of the world's population has been exposed to a sustained, high-quality anti-tobacco mass media campaign than to any of the other highly effective demand-reduction interventions previously described (the MPOWER package). However, resource constraints make low-income countries least likely to conduct mass media campaigns.

### *Cessation Support*

Chapter 9 highlights the significant reductions in health risks that follow the cessation of tobacco use. As discussed in several chapters, adoption and implementation of strong tobacco control policies and programs will increase many tobacco users' interest in quitting and will help former users remain abstinent. Even when these strong policies and programs are not available, as described in chapter 9, there is considerable demand for cessation support not only in HICs but in LMICs. Experiences in HICs have shown that quitting is more likely to be successful when an evidence-based cessation intervention is used than when it is not. However, far less is known about the transferability of these interventions to LMICs, at least in part because tobacco dependence treatment services and products are limited in many LMICs and, when available, are often too expensive for many tobacco users interested in quitting.

Recognizing the importance of expanding access to tobacco dependence treatment services and products, guidelines that cover population- and individual-level cessation interventions have been developed for WHO FCTC Article 14.[24] These guidelines stress the importance of providing cessation interventions as part of a comprehensive approach to tobacco control, given the increased demand for cessation that results from the adoption and implementation of other tobacco control measures. The guidelines also describe the key components of a cessation program, including: use of population-level approaches such as mass media campaigns, brief advice by all health care workers, and quitlines; use of more intensive individual-level approaches that include behavioral support and, when appropriate, medications; increased availability of cessation medications; adoption of novel approaches when emerging evidence indicates that these are effective; and implementation of a stepwise approach that begins with integrating cessation into health systems and then builds capacity in countries where resources are limited.

More than 80% of countries have cessation services available in one or more settings, and three-quarters of these provide some cost coverage for these services. HICs have the highest rate of provision of cessation services (>90%), and more than half support a toll-free quitline. In contrast, low-income countries have the lowest rates of service provision, with only 18% of low-income countries covering costs for cessation services and only 9% funding a quitline.[9]

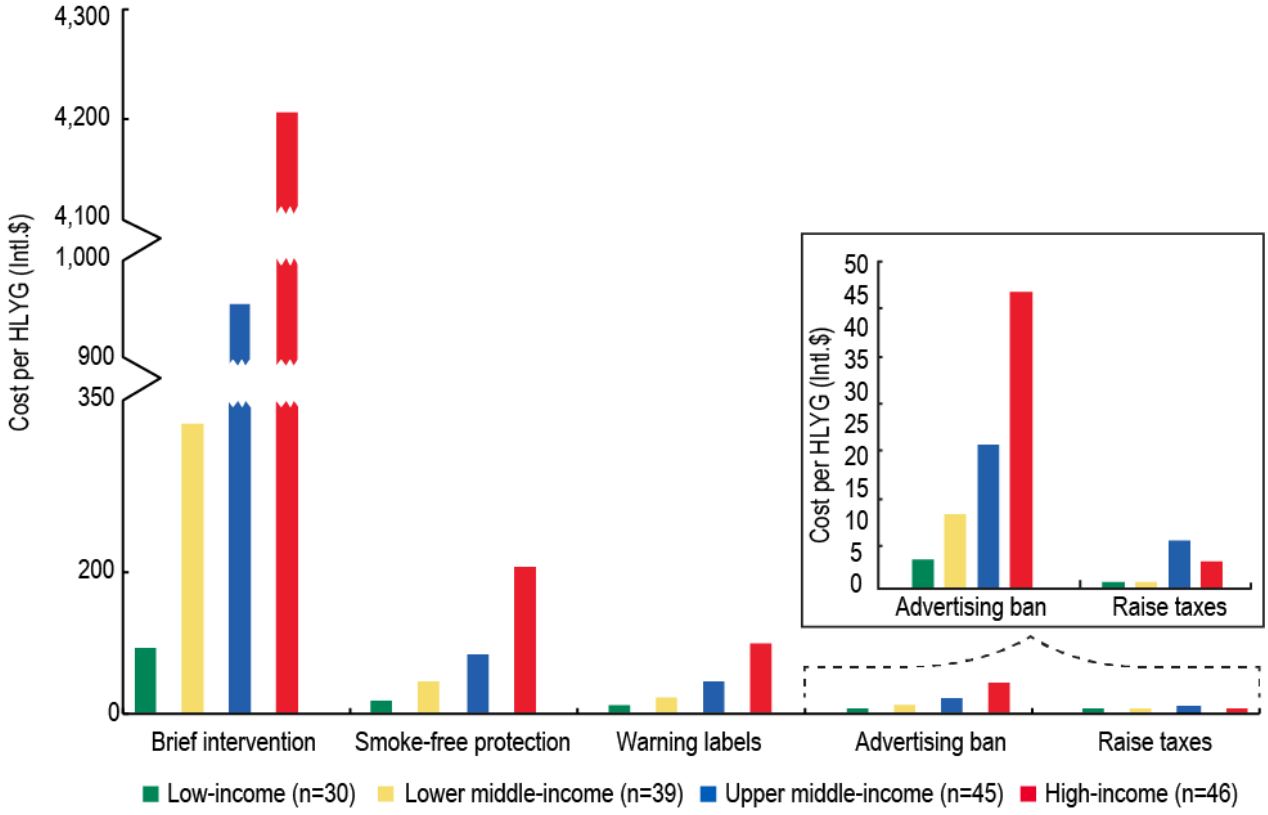
## Conclusion 4: Policies and programs that work to reduce the demand for tobacco products are highly cost-effective.

In addition to being effective in reducing tobacco use, the interventions discussed under Conclusion 3 above—tobacco taxation; smoke-free policies; bans on tobacco advertising, promotion, and sponsorship; information interventions; and cessation support—are highly cost-effective. Since 2003, WHO has been developing and refining its "CHOosing Interventions that are Cost Effective" (CHOICE) model[25] for

assessing the costs, effectiveness, and cost-effectiveness of a number of health interventions that address communicable and noncommunicable diseases as well as the costs of behaviors that contribute to them.

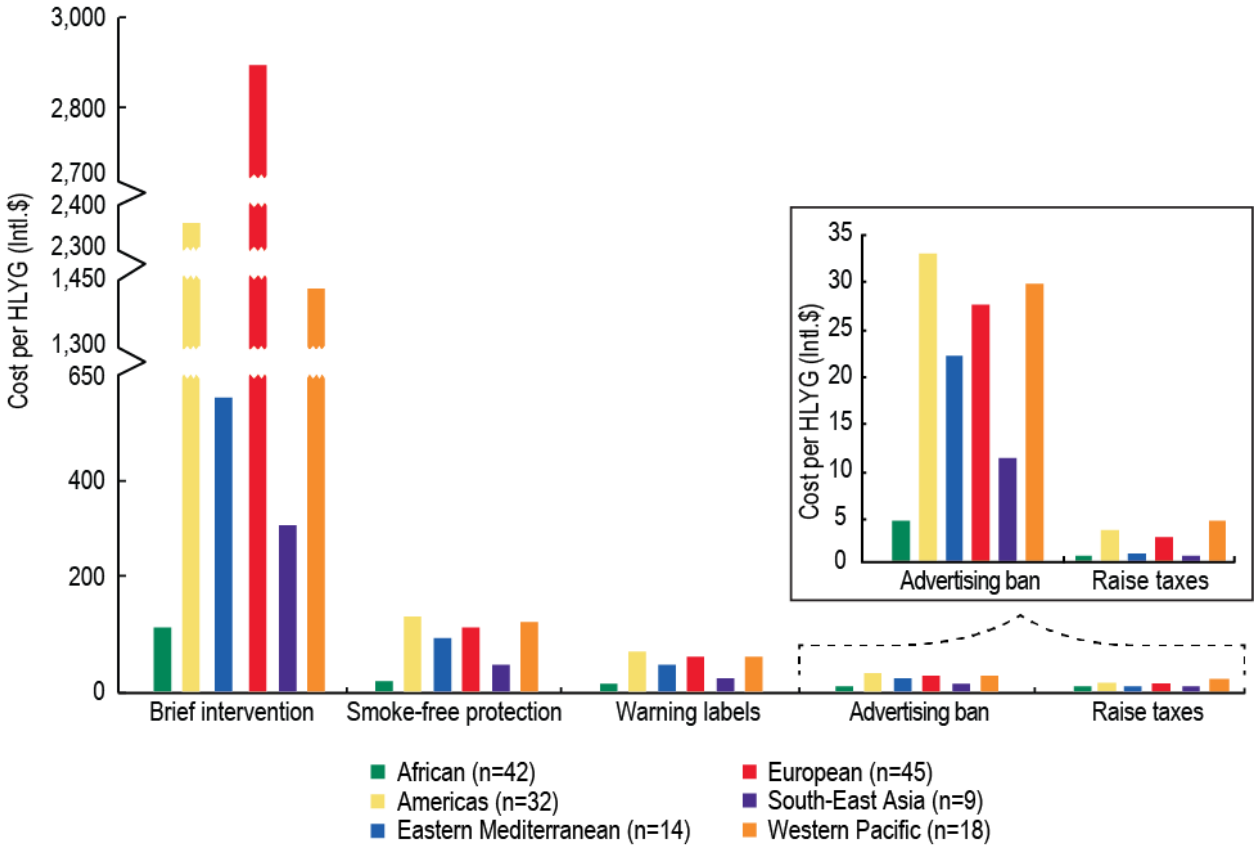
For tobacco control, CHOICE has modeled the impact of tobacco taxation, smoke-free policy implementation and enforcement, a comprehensive ban on tobacco company marketing, information dissemination via warning labels, and brief interventions (defined as brief counseling by physicians and other health care providers) for smoking cessation. CHOICE draws on existing evidence of the impact of each intervention on tobacco use to assess its effectiveness, and CHOICE economists have developed estimates of program costs (including the costs of administration, training, and media) and costs to individuals of these interventions. Figures 17.2 and 17.3 present the findings from the WHO CHOICE model by country income group and WHO Region, respectively; specifically, the figures present the costs (in international dollars) of the tobacco control policies per healthy life-year gained (HLYG).

**Figure 17.2 Tobacco Control Policies and Cost Per Healthy Life-Year Gained, by Country Income Group**




*Notes:* HLYG = healthy life-year gained. Country income group classification based on World Bank Analytical Classifications for 2014.
Source: Based on calculations from World Health Organization CHOICE model, 2016.

## Figure 17.3 Tobacco Control Policies and Cost Per Healthy Life-Year Gained, by WHO Region




*Note:* HLYG = healthy life-year gained.
*Source:* Based on calculations from World Health Organization CHOICE model, 2016.

Because of their relatively low administrative costs, tobacco tax increases and comprehensive bans on tobacco company marketing activities are generally the least costly interventions, followed by information dissemination via warning labels and enforcement of smoke-free policies, with brief interventions being the most costly. Despite the considerable revenues that are generated by tobacco taxes and the high cost-effectiveness of tobacco control policies and programs, few governments are investing in tobacco control. WHO estimated that in 2013-2014, global tobacco excise taxes generated nearly US$ 269 billion in government revenues, but governments spent a combined total of less than US$ 1 billion on tobacco control.[9]

HICs spent the most on tobacco control—US$ 1.26 per capita—but this amount was less than 1% of the per capita revenue from tobacco taxes collected in these countries. Middle-income countries spent considerably less—US$ 0.03 per capita—while low-income countries spent about four-tenths of 1 cent (US$) per capita.[9]

### Conclusion 5: Control of illicit trade in tobacco products, now the subject of its own international treaty, is the key supply-side policy to reduce tobacco use and its health and economic consequences.

Several tobacco control interventions target the supply of tobacco leaf and manufactured tobacco products, including the control of illicit trade in tobacco products, restrictions on youth access to tobacco products, support for economically viable alternatives to tobacco production, and product regulation.

#### *Illicit Trade in Tobacco Products*

Controlling illicit trade is the key supply-side intervention to enhance the effectiveness of efforts to reduce the demand for tobacco products. Evading tobacco taxes reduces tobacco product prices and costs governments tax revenues. Illicit trade can also weaken the impact of prominent pictorial warning labels, bans on the use of product descriptors, plain packaging, and various forms of product regulation because of the availability of tobacco products that are not in compliance with those policies. The tobacco industry often argues that high cigarette taxes lead to illicit trade and, more recently, has argued that plain packaging will increase illicit trade, despite the absence of evidence for this claim.[26,27] On the contrary, as described in chapter 14, the evidence demonstrates that non-tax factors, including weak governance, high levels of corruption, poor government commitment to tackling illicit trade, ineffective customs and tax administration, and informal distribution channels for tobacco products, are often of equal or greater importance than tobacco taxes in facilitating illegal trade.

Because the importance of concerted international efforts to curb illicit trade in tobacco products is recognized by many stakeholders, in 2007 the Conference of Parties to the WHO FCTC created an Intergovernmental Negotiating Body to develop a protocol for Article 15, the first protocol to arise from the WHO FCTC. The final text of the Protocol to Eliminate Illicit Trade in Tobacco Products was adopted in November 2012.[28] As of October 2016, the protocol had been ratified by 24 Parties, and will go into force after ratification by a total of 40 Parties.

#### *Youth Access to Tobacco Products*

As chapter 11 explains, most governments have adopted policies to reduce youth access to tobacco products. In general, sufficient resources are needed to maintain high levels of retailer compliance with these policies, and even when compliance is high, youth are often able to access tobacco products through social sources. In HICs, youth access policies, when consistently enforced, can reduce commercial access to tobacco products by underage youth. Evidence from HICs also suggests that strongly enforced youth access policies that successfully disrupt the commercial supply of tobacco products to minors can reduce underage tobacco use, although the magnitude of this effect is relatively small. The limited evidence on the impact of youth access policies in LMICs suggests that they can be effective in reducing youth tobacco use, but further study is needed. Efforts to limit youth access to tobacco products are an important component of a comprehensive strategy to reduce tobacco use, because they can help denormalize tobacco use among young people and engage parents and communities in broader tobacco control efforts.

#### *Crop Substitution and Diversification Programs*

As described in chapter 10, although tobacco farming occupies an essential place in the tobacco value chain, the approximately 19.1 billion U.S. dollars (US$) accounted for by farming in 2013 represents a very small share of the global tobacco product market. In comparison, the 2013 global tobacco product market was valued at US$ 783 billion. Governments have long supported tobacco growing through price

supports, subsidies, and other programs; however, the recent trend has been to reduce or eliminate these programs, especially in HICs. Some governments have replaced these programs with efforts to help farmers shift from tobacco growing to the farming of other crops. Some of these other crops can be at least as profitable as tobacco, although the viable alternatives are often specific to particular countries or regions. Crop substitution and diversification programs by themselves are unlikely to lead to a significant reduction in the supply of tobacco leaf as long as tobacco growing remains profitable and there are no barriers to farmers' switching to tobacco. Nevertheless, crop substitution and diversification programs can be an important component of a comprehensive approach to reducing tobacco use because such programs can help counter arguments that tobacco control policies and programs are economically damaging to tobacco farmers. This is especially true in the small number of countries that are highly dependent upon tobacco farming. Guidelines for implementation of WHO FCTC Article 17 (provision of support for economically viable alternative activities) and Article 18 (protection of the environment and the health of persons) have now been developed and adopted.[29]

### *Product Regulation*

As chapter 10 describes, in the United States and around the world, tobacco product regulation is a quickly developing field that faces several challenges. The design of tobacco products has evolved significantly over many decades, with some design innovations being apparent responses to consumers' concern about the health consequences of tobacco use, and others aimed at reducing costs for manufacturers. Efforts to regulate tobacco products have included limiting the availability of some products (e.g., smokeless tobacco in some countries) and reducing the delivery of various toxicants (e.g., the EU's 10:1:10 machine-based standards for tar, nicotine, and carbon monoxide). Although many countries have adopted policies that narrowly regulate some aspects of tobacco product design or availability, few countries have adopted wide-ranging product regulations. The limited evidence on these narrow regulations suggests that they have had little impact on tobacco use or its consequences at the population level. Indeed, some types of product regulation (e.g., machine-based standards to reduce toxicant delivery) may have had unintended consequences, as consumers may have viewed regulated products as less hazardous, thus contributing to increased or more prolonged tobacco use than would have occurred otherwise.

While future product regulation has the potential to significantly reduce the risks from tobacco products available in the market, there are many challenges to regulating these products in a manner that substantially improves public health. These challenges include the diversity of tobacco products available in the market currently as well as those that may be marketed in the future, the ability of the tobacco industry to respond quickly to changes in market conditions, difficulties in fully understanding the short- and long-term risks of diverse tobacco products at the individual and population levels, and the lack of capacity for testing and enforcing product regulation measures in many countries. Partial guidelines for implementation of WHO FCTC Articles 9 and 10, focused on regulation of tobacco product disclosures and the contents of tobacco products, have been developed and adopted by the Conference of the Parties.[30,31]

### Conclusion 6: The market power of tobacco companies has increased in recent years, creating new challenges for tobacco control efforts.

Since 1990, the global tobacco market has become increasingly concentrated (see chapters 12 and 13), which is explained in part by the same forces that have contributed to globalization in other industries. Reductions in barriers to trade and foreign direct investment, coupled with the privatization of state-owned tobacco enterprises and a wave of mergers and acquisitions, have led to the disappearance of dozens of tobacco companies.

As of 2014, five tobacco companies—the China National Tobacco Corporation (CNTC), Philip Morris International and Altria, British American Tobacco, Japan Tobacco International, and Imperial Tobacco Group—accounted for more than 85% of the global cigarette market.[32] Concentration is typically far higher at the regional or country level, with cigarette markets in most countries dominated by one or two firms. At the same time, the range of tobacco products marketed by individual companies has become increasingly diverse, as cigarette companies have merged with or acquired other tobacco product companies, developed new tobacco products (e.g., dissolvables), and entered the electronic nicotine delivery system (ENDS) market. The trend toward increased concentration seems likely to continue, particularly if China increases its presence in the world tobacco market by expanding its international sales presence. One result of this increased concentration is increased profitability for tobacco companies, several of which are among the most profitable companies in the world.[33]

Increased globalization of the tobacco industry poses several challenges for tobacco control. Countries wishing to privatize their state-owned tobacco companies have sometimes agreed to refrain from adopting strong tobacco control policies as a condition of concluding a privatization agreement. International trade and investment agreements have been used by the tobacco industry or sympathetic countries to challenge (or to threaten) domestic tobacco control measures (see chapter 12). As chapter 13 demonstrates, easing of tobacco product trade barriers has led to increased tobacco use in LMICs, probably as a result of greater price competition and increased marketing by multinational tobacco companies. In the United States, mergers of cigarette and smokeless tobacco companies have led to the common branding of a host of smoked and smokeless products (e.g., Camel cigarettes, Snus, Orbs, and Sticks), with companies marketing their smokeless products as alternatives to cigarettes for use when smokers are in smoke-free environments.[34] In addition, the greater profitability that comes with increased market power gives tobacco companies the resources to expand their marketing campaigns, invest in new product development and/or changes in the design of existing products, and lobby aggressively against the adoption and implementation of strong tobacco control measures.

The considerable market power of tobacco companies has led researchers and others to propose approaches to reducing or eliminating the profitability and influence of tobacco companies. For example, Gilmore and colleagues[35] proposed the creation of an Office for Smoked Tobacco Regulation (OFSMOKE) in the United Kingdom. OFSMOKE would be an independent regulatory agency modeled after agencies that set prices for utility companies or other sectors; the agency would cap manufacturers' prices for cigarettes at a level that would allow them to cover their costs but not to earn the high profits that result from their existing market power. This would result in a significant decline in manufacturers' prices, which would be offset by a comparable increase in cigarette excise taxes, so that retail prices would not fall.

Borland[36] proposed an alternative regulatory structure similar to that used by some governments to regulate the distribution of alcoholic beverages. In this scheme, a Tobacco Products Agency (TPA) is created to act as the intermediary between tobacco product manufacturers and tobacco retailers. As the only entity allowed to buy directly from manufacturers, the TPA's buying power would offset the market power of the manufacturers, reducing their profitability. Callard and colleagues[37] proposed a more expansive option in which governments, on their own or in partnership with one another, buy out tobacco companies and replace them with not-for-profit entities that have a public health mandate to reduce tobacco use and its consequences. This would be accompanied by legislation that sets targets for reductions in tobacco use and limits tobacco product manufacturing to these not-for-profit enterprises.

Others have proposed more market-based solutions. In 2007, for example, U.S. Senator Mike Enzi introduced the Help End Addiction to Lethal Tobacco Habits Act, which proposed a program modeled after the cap-and-trade programs targeting various pollutants.[38] Under this approach, gradually declining prevalence or consumption targets would be set each year, with tobacco companies given allowances based on initial market shares. Companies would then be free to trade their allowances with other firms while adopting their own strategies to meet the falling caps (e.g., by raising prices and/or reducing marketing spending). Although increasing its short-run profitability, the industry would largely be phased out in the long run; under this proposal, for example, the long-run prevalence target was set at 2%. A similar approach could be pursued globally. A model for such action is the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which sets targets for reductions in various greenhouse gases, to which Member States must commit.[38]

A narrower approach, specifically focused on reducing youth smoking prevalence, was part of the June 1997 proposed "global settlement," which would have settled all potential federal claims and all pending actions brought by U.S. state attorneys general, and would have protected U.S. tobacco companies from future public and private litigation.[39] The proposed "look-back" provision would have set gradually falling targets for youth smoking prevalence and would have penalized cigarette companies in proportion to market share if those targets were not met. The U.S. government proposed a similar approach in its Racketeer Influenced and Corrupt Organizations (RICO) lawsuit against the major cigarette companies. The trial judge, U.S. District Judge Gladys Kessler, held that "such a remedy is forward-looking … and would unquestionably serve the public interest."[209,p.934] Nonetheless, she did not impose such youth smoking-reduction targets, because she found that they were "not narrowly tailored to prevent and restrain [the tobacco companies'] future RICO violations."[209,p.934]

Many of the proposals above have been discussed in the context of endgame strategies, which may be defined as ways to swiftly move towards ending the tobacco epidemic—to move beyond tobacco control towards a tobacco-free future.[40] Endgame strategies may focus on the tobacco product, user, market or supply, or larger institutional structures. These proposals would almost certainly face obstacles to effective implementation and legal challenges from multinational tobacco companies. Nonetheless, they present intriguing options to counter the impact of tobacco industry marketing power and influence, and have spurred creative thinking about novel policy approaches that may be useful for jurisdictions around the world.

The Surgeon General[41] has pointed to two endgame options that may be particularly applicable to the United States: (1) reducing the nicotine content to make cigarettes less addictive,[42] and (2) greater restrictions on tobacco sales, particularly at the local level, including bans on entire categories of tobacco products.[43,44] The Surgeon General has also noted that potential endgame strategies should be

applied as part of an integrated national tobacco control strategy, based on enhanced implementation of already proven strategies, including tobacco taxation.[41]

### Conclusion 7: Tobacco control does not harm economies.

As chapter 15 shows, the share of jobs that depend on tobacco has been falling in most countries around the world. Various forces have contributed to this decline, including technological advances in tobacco farming and tobacco product manufacturing that have made both significantly less labor intensive. Globalization of the tobacco industry has accelerated the decline. As research from a growing number of jurisdictions demonstrates, tobacco control efforts do not lead to net job losses because jobs lost in tobacco-dependent sectors are replaced by jobs gained in other sectors, as resources once spent on tobacco products are spent on other consumer goods and services. Similarly, tobacco sector job losses in response to reduced tobacco use following tax increases are more than offset by increases in jobs in other sectors, which result as governments spend the new tax revenues on relatively labor-intensive activities. Given the increasingly globalized nature of tobacco markets, this is particularly true for countries where multinational tobacco companies dominate the local markets, given the outflow of the profits earned by these countries.

In the few countries that are particularly dependent on tobacco growing and tobacco leaf exports, global tobacco control policies may lead to job losses once global tobacco consumption begins to fall. However, these job losses are likely to be gradual, predictable, and far enough in the future that they will not affect the current generation of tobacco farmers. Governments concerned about the impact of tobacco control on tobacco farmers and those involved in tobacco production can implement programs that help these workers make the transition to alternative livelihoods (see chapter 10). In some countries, governments have used a portion of their tobacco tax revenues to support such programs.

Additionally, numerous studies, largely from HICs, clearly show that smoke-free policies do not adversely affect businesses, including the hospitality sector, with revenues and employment no lower, and often higher, in businesses covered by these policies. For the hospitality sector, this is likely because any reductions in business from smokers are offset or more than offset by increased patronage from nonsmokers (see chapter 6).

Finally, the improved health and well-being that come from reductions in tobacco use generates significant economic benefits. For example, a study from the United States, building on the Murphy and Topel[45] and Nordhaus[46] framework for assessing the benefits of medical research, concluded that the tobacco control efforts following the 1964 Surgeon General's report were worth as much as US$ 700 billion a year by 2004.[47]

### Conclusion 8: Tobacco control reduces the disproportionate burden tobacco use imposes on the poor.

Tobacco use is concentrated among the poor, both within and across countries, as shown in chapters 2 and 16. As a result, tobacco use explains a significant share of the health disparities between the rich and the poor, and those disparities are exacerbated by poor people's relative lack of access to the health care needed to treat the diseases caused by tobacco use and exposure to secondhand smoke. The disparities are worsened, particularly for children in low-income families, by the diversion of household spending from food, housing, health care, education, and other needs to spending on tobacco products. Moreover, tobacco use contributes to poverty, as illnesses caused by tobacco use lead to increased health care spending and reduced income.

Tobacco control policies are effective in reducing the burden of tobacco use on the poor. Research shows that in HICs and many LMICs, tobacco use among the poor is more responsive to changes in taxes and prices than is tobacco use among the rich. This means that significant increases in tobacco taxes and prices will lead to larger reductions in tobacco use and, as a result, greater improvements in health among the poor than among the rich, while increasing the relative burden of tobacco taxation on the rich. These findings are less true, however, in countries where complex tax structures and/or illicit trade keep prices for some tobacco products highly affordable, even for those with low incomes.

Research suggests that pictorial warning labels may have a greater impact in lower income countries than they do in higher income countries. Similarly, school-based education programs and efforts to reduce youth access to tobacco products—interventions that have had a limited impact in HICs—appear to have a much greater impact in LMICs. This result is consistent with the economic concept of diminishing marginal returns; that is, the marginal impact of tobacco control activities in a country where little has previously been done is likely to be greater than the impact in countries with a longer history of tobacco control efforts. Comprehensive smoke-free policies, primarily aimed at protecting nonsmokers from the serious harms of SHS exposure, also produce broad improvements in public health by promoting quitting and helping to promote nonsmoking norms.[48]

### Conclusion 9: Progress is now being made in controlling the global tobacco epidemic, but concerted efforts will be required to ensure that progress is maintained or accelerated.

In HICs, decades of concerted program and policy efforts, supported by a broad-based research effort, have now borne fruit: In most HICs, the prevalence of smoking has declined substantially, although this overall progress masks much higher rates among some sub-populations, especially the poor. Many LMICs have benefited from the experience of HICs and are increasingly making progress as well. The WHO FCTC, the first international treaty negotiated under Article 19 of WHO's constitution, has become one of most rapidly and widely embraced treaties in the history of the United Nations. With 180 Parties (179 countries and the European Union, as of November 2015), the treaty has helped galvanize the implementation of effective tobacco control measures around the world.

The WHO Framework Convention Alliance, created in 1999 by a small group of NGOs to support the WHO FCTC negotiations, has grown into a network of over 500 civil society organizations around the world and continues to play an important role in the WHO FCTC process. Additionally, over the past 10 years, the Bloomberg Philanthropies and the Bill and Melinda Gates Foundation have devoted over US$ 500 million to building local capacity and advancing strong tobacco control policies in many countries.[49,50] In March 2015, the two organizations also launched a joint Anti-Tobacco Trade Litigation Fund, pledging US$ 4 million for technical assistance and litigation support to LMICs facing tobacco industry trade law challenges to tobacco control efforts.[51] A vast global movement exists today and continues to advance tobacco control in many parts of the world. This movement is driven by countless regional and local organizations as well as the participation of advocates, health professionals, and experts from a wide variety of fields, including science, law, and economics.

Research documenting the health and economic burden of tobacco use as well as studies to inform evidence-based program and policy interventions have been key factors enabling countries to make progress in reducing tobacco use. As this monograph highlights, an extensive body of research shows that effective tobacco control policies exist and are cost-effective; foremost among these are significant

increases in tobacco taxes and prices. As discussed earlier in this chapter, a wide variety of private and public organizations have supported research on the economics of tobacco control in LMICs.

Finally, there is now recognition that the goals and interests of the tobacco industry, to sell tobacco products, and the public health community, to control and eventually eliminate tobacco use, are inherently incompatible. The guidelines for Article 5.3 note that "the tobacco industry has operated for years with the express intention of subverting the role of governments and of WHO in implementing public health policies to combat the tobacco epidemic."[52,p.1] And as U.S. District Court Judge Gladys Kessler wrote, the major U.S. cigarette companies "have marketed and sold their lethal products with zeal, with deception, with a single-minded focus on their financial success, and without regard for the human tragedy or social costs that success exacted."[20,p.4] These findings underscore the need to protect public health policies from the commercial and other vested interests of the tobacco industry, as stated in WHO FCTC Article 5.3, and to continue to monitor the tobacco industry's tactics and strategies to promote tobacco use.

Despite these successes, many threats to progress remain. Tobacco use is not yet decreasing in the WHO African and Eastern Mediterranean Regions, and even in regions and countries where tobacco use has decreased, progress can be reversed. The low smoking rates among women (relative to men) in many world regions means that women remain a potential growth area for tobacco use and thus a potential target for tobacco company marketing. The Internet and social media, often used to market newer products, provide an efficient means by which tobacco companies can reach consumers with marketing and sales opportunities. Thus, maintaining or increasing progress will require continued research and surveillance of the epidemic and implementation of the evidence-based strategies required by the WHO FCTC.

## What We Need to Know—Research Priorities

Research into the economics of tobacco use and tobacco control, particularly in LMICs, has grown tremendously in recent decades. However, gaps in our knowledge remain, as has been indicated throughout this monograph. Other authors have also identified priority research gaps in this area. For example, WHO's *A Prioritized Research Agenda for Prevention and Control of Noncommunicable Diseases*[53] notes the importance of tobacco control research for reducing noncommunicable diseases and highlights tobacco economics research priorities. Similarly, van Walbeek and colleagues[54] identified research priorities focused on tax, price, and illicit trade as part of a themed issue on WHO FCTC policy research for the journal *Nicotine & Tobacco Research.* Below we highlight several overarching research needs in the area of the economics of tobacco use and tobacco control.

### Research on Tobacco Taxation and Pricing

Although much is known about the impact of tobacco taxation and pricing on tobacco use, government revenues, and related issues (as discussed in chapters 4 and 5 and elsewhere in this monograph), country-specific evidence is often lacking, particularly in many LMICs. Research that provides country-specific estimates of the price elasticity of demand for tobacco products is important for policymakers who want to fully understand the impacts of tax and price increases. Similarly, research that assesses the differential impact of alternative types of tobacco taxes (e.g., *ad valorem* taxes versus specific taxes) on tobacco product prices and price gaps, tobacco use, and government revenues is needed to help restructure tobacco taxes to maximize their effects on public health and revenue. Research on the

differential impact of tax and price on vulnerable populations, including young people, the poor, and women, can be informative.

Governments may also consider implementing differential tax structures for different classes of tobacco products, under which some products (e.g., significantly reduced-risk tobacco products) are taxed at lower rates than more harmful products. In the short term, differential treatment may be useful to accelerate a transition from the most harmful products to less harmful products; in time, differential treatment would be ended to encourage the elimination of all tobacco product use.[55] Research to assess the impact of such policies would be important.

### Research on the Economic Impact of Tobacco Use and Tobacco Control

Research from HICs that quantifies the increased health care costs, lost productivity, and other costs resulting from the death and disease caused by tobacco use has been instrumental in informing the public, including policymakers, about the need for tobacco control interventions. In HICs, continued study of the economic costs of SHS exposure and the use of tobacco products other than cigarettes would be informative. As chapter 3 shows, comparable country-specific evidence on the economic costs of tobacco use in LMICs is limited; country-specific estimates of these costs are critically needed and would almost certainly catalyze tobacco control efforts in LMICs.

In recent years, the WHO FCTC has spurred many countries to enact tobacco control measures, including comprehensive smoke-free laws, tobacco marketing bans, and others. However, concerns about the potential economic consequences of tobacco control activities can deter policymakers from taking effective action. Research that addresses these concerns is a high priority for tobacco control efforts, especially in LMICs. This research could include assessments of (1) the impact of a decline (or a slower increase) in tobacco use on jobs in the tobacco sector and other economic sectors, and (2) the effects of smoke-free policies on the business activity of restaurants, bars, and other hospitality-sector establishments. Previous work has shown that lower tobacco use leads to reduced spending to treat diseases caused by tobacco and to the increased productivity of a healthier workforce. Therefore, research should also consider the potential economic gains resulting from tobacco control policies. Similarly, research that assesses the relative cost-effectiveness of different tobacco control measures is important, particularly in LMICs, where resources to devote to tobacco control are especially limited.

### Research on the Interrelationships Between Tobacco Use and Poverty

Tobacco use accounts for a significant proportion of the health disparities between the rich and poor and can increase poverty by diverting funds from basic necessities (e.g., food and housing), education, and health care, to tobacco products (chapter 16). However, the belief that keeping tobacco products affordable to low-income users is a pro-poor policy and that tobacco control interventions have a negative impact on the poor can deter policymakers from taking effective action to reduce tobacco use. Research that further documents the interrelationships between tobacco use and poverty could strengthen support for tobacco control interventions and the case for including tobacco control in national development strategies, including poverty reduction. Research is particularly needed to demonstrate how tobacco control policies can be used to help reduce socioeconomic disparities in tobacco use and its consequences.

### Research on Illicit Trade

The control of illicit trade in tobacco products—now the subject of an international treaty—is important for public health and law enforcement, and for ministers of finance and many other stakeholders. Therefore, research that addresses various issues in illicit trade is a high priority, including studies that identify country- and region-specific determinants of illicit trade, estimate how changes in tobacco product taxes affect the extent and nature of illicit trade, and identify effective interventions for curbing illicit trade. This evidence is especially needed to counter misinformation about the effects of tax increases on the illicit trade in tobacco products, which is often a barrier to tax increases, and to maximize the public health and revenue impact of tobacco taxes.

### Research on Economically Viable Alternatives to Tobacco Growing and Manufacturing

In the small number of LMICs where tobacco farming and manufacturing contribute significantly to overall economic activity, research that identifies economically viable alternatives to tobacco growing and manufacturing is a high priority, along with strategies for reducing economic dependence on tobacco. This research could inform crop substitution and diversification programs that would make alternative crops more attractive to tobacco farmers. It could also help develop programs to move those engaged in tobacco product manufacturing and distribution to other economically productive activities. Findings from this research could help allay policymakers' concerns about the impact of tobacco control policies and programs on economic activity in the tobacco sector and demonstrate the potential gains from economic activity that has shifted to other sectors.

### Surveillance Needs

Surveillance remains a key component of tobacco control economics research and other areas of study. The monograph points to the following five broad categories of variables for surveillance:

1. Tobacco use—that is, the prevalence of use of diverse smoked and smokeless tobacco products, and ENDS, and the frequency and intensity of use by age group, socioeconomic status, and gender—and nonsmokers' exposure to SHS.
2. Economic costs of tobacco use, including costs of health care, lost productivity, and other economic costs. This includes a focus on exposure to SHS, the interaction of SHS with other indoor and outdoor air pollutants (where applicable), and the contribution of tobacco use to the noncommunicable disease burden.
3. Tobacco-related knowledge and beliefs, including social norms regarding tobacco use, support for tobacco control policies, and the social determinants of tobacco use.
4. Financial aspects of tobacco, including tobacco product sales, tax revenues, and the extent of tax avoidance and evasion.
5. Measures related to tobacco control, including resources devoted to tobacco control programs; policy variables such as implementation, enforcement, and compliance; and industry surveillance (e.g., the economic contribution of tobacco growing and manufacturing, tobacco product prices, tobacco company marketing, lobbying efforts, and others).

Ideally, core tobacco indicators will be integrated into existing national surveillance systems and will be comparable across countries so that they can be used in regional and international comparisons and in the regional and global evaluations of tobacco control interventions.

## Ending the Epidemic

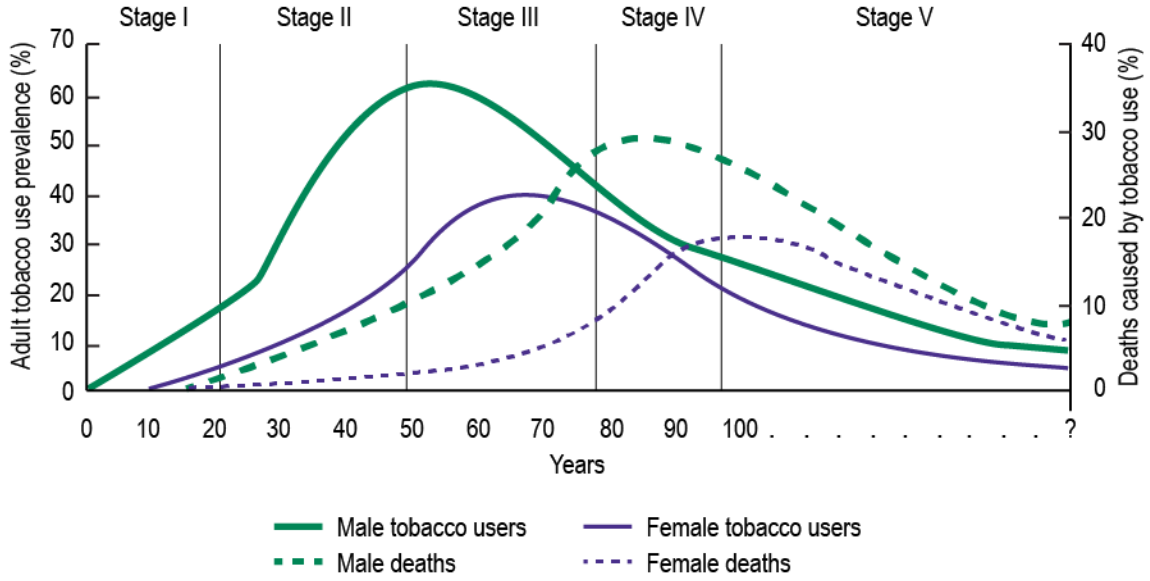
The evidence reviewed in this monograph provides reason for optimism about the prospects for swiftly ending the global tobacco epidemic. Effective implementation of comprehensive tobacco control policies and programs has more than halved tobacco use in several HICs. In the United States, for example, overall smoking prevalence has declined from 40% in 1964 to less than 17% in 2014.[41,56] Similarly, in the United Kingdom, male and female cigarette smoking prevalence has declined by about 50% since the early 1970s.[57] Globalization of the tobacco industry has been countered by the globalization of tobacco control efforts, with the WHO FCTC spurring strong tobacco control action in both HICs and LMICs. In LMICs where governments have implemented aggressive, comprehensive tobacco control strategies, smoking prevalence has also declined rapidly. For example, in Uruguay between 2003 and 2009, adult smoking prevalence rates declined from 39% to 31% for males, and from 28% to 20% for females.[58] Prevalence rates had further declined by 2011, to 29.7% among males and 19.1% among females.[59] As another example, smoking prevalence in Turkey significantly decreased among adults, falling from 31.2% (16.0 million smokers) in 2008 to 27.1% (14.8 million) in 2012, for a relative decline in smoking prevalence of 13.4% (13.5% decline for males, and 13.7% for females).[60]

With the potential for continued and more rapid progress, it is now possible to envision a dramatic change in the course of the tobacco epidemic. The model of the epidemic originally proposed by Lopez and colleagues[61] (see chapter 2), specific to cigarette smoking, could be expanded to include all types of tobacco product use and extended by adding a fifth stage to the existing four stages of the model.[62] In the proposed fifth stage, the prevalence of tobacco use by both men and women continues to decline, accompanied by a continued decline in deaths caused by tobacco use (Figure 17.4). In this scenario, tobacco use eventually becomes a minor public health problem rather than the public health catastrophe that it currently is or will soon become in most countries. Indeed, as documented in this monograph, progress is being made: The prevalence of smoking is decreasing in all country income groups and most WHO Regions, and population growth is the reason why the overall number of smokers is not declining. This is a considerable achievement that has undoubtedly averted many premature deaths.

Reaching this fifth stage will depend on widespread application of the demand-reducing policies shown to be most effective in reducing tobacco use. Governments that have adopted some combination of these policies have been effective in significantly reducing tobacco use. To date, however, almost no government has adopted and implemented all the key demand-reduction policies at their optimal levels, and most of the world's population is not covered by any of them at the optimal level.[9] As described in this monograph, a comprehensive approach to tobacco control includes significant tax and price increases, comprehensive smoke-free policies, complete bans on tobacco marketing, prominent pictorial warning labels and anti-tobacco mass media public education campaigns, and support for cessation. Adopting these policies would lead to hundreds of millions fewer tobacco users, as more adults would quit and fewer children and youth would initiate tobacco use.

Interventions targeting the supply of tobacco products are also likely to play an important supporting role in ending the tobacco epidemic. Effectively addressing illicit trade will strengthen the impact of higher tobacco taxes and other demand-reduction strategies, and providing economically viable alternatives to tobacco farming and manufacturing will help facilitate the transition to a tobacco-free economy. Product regulation is also a rapidly developing component of a comprehensive tobacco control strategy.

## Figure 17.4 A New Model of the Tobacco Epidemic




*Source:* Adapted from Lopez et al. 1994.[61]
Adapted with permission from BMJ Publishing Group Ltd., from "A descriptive model of the cigarette epidemic in developed countries," Lopez A, Collishaw N, Piha T, volume 3(3), p. 246.

Tobacco use remains the single largest preventable cause of death in the world. It is responsible for around 6 million deaths and likely over US$ 1 trillion in health care costs and lost productivity each year.[33] The economic and public health burden of tobacco is expected to continue to rise, at least in the near term, as tobacco mortality rises and increasingly shifts from HICs to LMICs. Governments have the tools to reduce tobacco use and the death, disease, and economic costs that it imposes, but most have fallen far short of effectively implementing these tools. The WHO FCTC provides a framework for effective multilateral tobacco control efforts. As this monograph shows, significant increases in tobacco taxes and prices, comprehensive smoke-free policies, complete bans on tobacco company marketing, and prominent pictorial warning labels are very low-cost, highly effective options to curb tobacco use and its consequences. At the same time, tobacco taxes generate substantial revenues that can be used to support other, more costly but still highly cost-effective demand-reducing interventions, including anti-tobacco mass media campaigns and support for cessation services and treatments. Government fears that tobacco control will have an adverse economic impact are not justified by the evidence. The science is clear; the time for action is now.

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# Statistical Annex

## Statistical Annex

List of data sources and method used to calculate each estimate.

### Chapter 2

#### *Estimated and projected number of tobacco smokers and average prevalence rates for tobacco smoking by WHO Region and country income group (Tables 2.1 and 2.2, Figures 2.1 and 2.2)*

Source of prevalence rates: *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2000–2025.* Geneva: World Health Organization; 2015. Available from: http://apps.who.int/iris/bitstream/10665/156262/1/9789241564922_eng.pdf?ua=1.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Description of statistical model that produced the prevalence rates: "Global trends and projections for tobacco use, 1990–2025: an analysis of smoking indicators from the WHO Comprehensive Information Systems for Tobacco Control," Bilano et al., Lancet 2015;385(9972):966–76. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25784347.

Method: For each year, for each country, and for each sex, the number of current smokers was calculated using the estimated prevalence rate published in the source report and multiplying it by the population age 15+ for the appropriate sex and year. Countries without a published estimated prevalence rate were assumed to have the same prevalence as other countries in the same UN subregion (Table A-1). For countries without a published age-breakdown of their total population figure, the population age 15+ was estimated based on the proportion of the population age 15+ in a neighboring country in the same World Bank country income group. This method produced an estimated number of smokers in all WHO Member States. These numbers were then summed to calculate total smokers in each region by grouping WHO Member States into their World Bank country income group (Table A-2) or into WHO Regions and high-income OECD countries within each WHO Region (Table A-3). These totals were then divided by the summed populations age 15+ for each region to calculate average prevalence rates for each region.

#### *Global consumption of cigarette sticks per capita by WHO Region and country income groups (Table 2.9, Figures 2.11 and 2.12)*

Source of consumption data*: Euromonitor International* Internet database. London: Euromonitor International. Accessed 20 Feb 2016. Available by subscription from: http://www.euromonitor.com.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Method: Legal sales, measured in millions of sticks, are used as a proxy for consumption. This is done only for around 80 countries. For all other Member States, Euromonitor International makes estimates of consumption looking at level of development, neighboring countries and other factors. Countries without a published age-breakdown of their total population figure had their population age 15+

estimated based on the proportion of the population age 15+ in a neighboring country in the same World Bank country income group. Per capita calculation was made by dividing the consumption by the population age 15+ for each country.

### *Estimated number of young people ages 13–15 who smoke cigarettes and average prevalence of cigarette smoking among youth ages 13–15 by WHO Region and country income group*

Source of prevalence rates from Global Youth Tobacco Surveys (GYTS): Factsheets published by countries that ran the survey. Surveys used are listed in Table A-4.

Source of prevalence rates from Health Behaviour in School-aged Children surveys: *Health Behaviour in School-aged Children (HBSC) Study: International Report from the 2013/2014 Survey.* Copenhagen: WHO Regional Office for Europe, 2016. Available from: http://www.hbsc.org/publications/international. Surveys used are listed in Table A-4.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Source for U.S. prevalence rates*: National Youth Tobacco Survey.* Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2015. Available from: http://www.cdc.gov/tobacco/data_statistics/surveys/nyts.

Method: For each country and for each sex, the number of current cigarette smokers ages 13–15 was calculated using the current cigarette use prevalence rates from the most recent Global Youth Tobacco Survey undertaken between 2007 and 2014, or from smoking prevalence rates from the 2013/2014 Health Behaviour in School-Aged Children survey conducted at a national level and published in the source report. Surveys were administered in 156 countries, and the most recent survey conducted between 2007 and 2014 in each country was used. HBSC surveys publish rates separately for 13-year-olds and 15-year-olds; when an HBSC survey was used, the number of smokers ages 13–15 was calculated using the mean of the two prevalence rates and multiplying by the population ages 13–15, separately for each sex. The resulting numbers of smokers ages 13–15 in countries that reported an HBSC survey were then added to the numbers of cigarette smokers ages 13–15 in countries that reported a GYTS (or, in the USA, an NYTS) and summarized by World Bank country income groups (Table A-2) and by WHO Regions and high-income OECD countries (Table A-3). Although tobacco smoking rates are not strictly comparable with cigarette smoking rates, in HBSC countries the rates were assumed to be close enough not to bias the analysis. Finally, to calculate average prevalence rates and total number of cigarette smokers for each region, countries without data were assumed to experience the average prevalence rates for boys and girls in the same UN subregion (regions defined in Table A-1). For countries without a published age-breakdown of their total population figure, the population ages 13–15 was estimated based on the proportion of the population ages 13–15 in a neighboring country in the same World Bank country income group.

### *Estimated number of current smokeless tobacco users age 15+ and average prevalence of smokeless tobacco use by WHO Region and country income group (Table 2.10)*

Source of prevalence rates: *WHO Report on the Global Tobacco Epidemic, 2015*. Geneva: World Health Organization; 2015, Appendix XI. Available from: http://www.who.int/entity/tobacco/global_report/2015/table_11_2_adult_tobacco_surveys_smokeless_tobacco_use.xls.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Method: For each country and for each sex, the number of current smokeless tobacco users age 15+ was calculated using the prevalence rates published in the source report (latest adult survey undertaken by each country during the period 2004–2014) and multiplying them by the population age 15+ for the appropriate sex in 2010. The median survey year in terms of population coverage was 2010. Countries without a published survey reporting smokeless tobacco use in the period 2004–2014 were assumed to have no smokeless tobacco users, with the exception of the People's Republic of China, where unpublished results from the 2009 Global Adult Tobacco Survey were used. In total, 79% of the world's population age 15+ is covered by a survey. At least half of the population age 15+ in each group of countries (WHO Region or World Bank country income group) was represented by a survey, with the sole exception of low-income countries (40% of the population over 15 was represented). This method resulted in a global undercount of smokeless tobacco users which will be corrected in the future as more countries survey smokeless use. Countries with a survey reporting smokeless tobacco use among people in an age range other than 15+ were included in the analysis by assuming the total age rate was not too dissimilar from the rate for people age 15+. This assumption may result in some overstated and understated rates. These numbers were then summed to calculate total smokeless tobacco users in each region by grouping WHO Member States into their World Bank country income groups (Table A-2) or their WHO Regions and high-income OECD countries (Table A-3). Finally, to calculate average prevalence rates for each region, the total number of smokeless tobacco users was divided by the summed populations age 15+ in each region. For countries without a published age-breakdown of their total population figure, the population age 15+ was estimated based on the proportion of the population age 15+ in a neighboring country in the same World Bank country income group.

### *Estimated number of young people ages 13–15 who use smokeless tobacco and average prevalence of smokeless tobacco use among youth ages 13–15 by WHO Region and country income group (Table 2.11, Figures 2.13, and 2.14)*

Source of prevalence rates from Global Youth Tobacco Surveys: Factsheets published by countries that ran the survey. Surveys used are listed in Table A-5.

Source for Norway prevalence rates (an HBSC survey): *Helse og Trivsel Blant Barn og Unge*. HEMIL-rapport 1/2016, HEMIL-senteret, Universitetet i Bergen, 2016. Available from: http://filer.uib.no/psyfa/HEMIL-senteret/HEVAS/HEMIL-rapport2016.pdf.

Source for U.S. prevalence rates*: National Youth Tobacco Survey.* Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2015. Available from: http://www.cdc.gov/tobacco/data_statistics/surveys/nyts.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Method: For each country and for each sex, the number of current smokeless tobacco users ages 13–15 was calculated using the smokeless tobacco use prevalence rates published in the source report (latest Global Youth Tobacco Survey undertaken by each country during the period 2007–2014, the HBSC Norwegian survey, or the NYTS in the United States) and multiplying them by the population ages 13–15 for the appropriate sex in 2010. The median survey year in terms of population coverage was 2010, and surveys were conducted in 94 countries. Countries without a survey reporting smokeless tobacco use in the period 2007–2014 were assumed to have no smokeless tobacco users. HBSC surveys in 14 other European countries that have no GYTS data could not be used because smokeless tobacco use was not reported. In total, 73% of the world's population ages 13–15 is covered by a survey run between 2007 and 2014. WHO Regions and World Bank country income groups that are poorly represented (under 50% of their populations surveyed) are the African Region, Americas Region, high-income OECD countries group, World Bank high-income group, and World Bank low-income group. Estimates for these groups cannot be considered representative. This method results in a global undercount of smokeless tobacco users ages 13–15 which will be corrected in the future as more countries survey smokeless tobacco use. Because the Norway HBSC survey publishes rates separately for 13-year-olds and 15-year-olds, the number of smokeless tobacco users ages 13–15 was calculated using the mean of the two prevalence rates and multiplying by the population ages 13–15, separately for each sex. The resulting numbers of smokeless tobacco users ages 13–15 were summed globally and summarized by World Bank country income groups (Table A-2) and by WHO Regions and high-income OECD countries (Table A-3). For countries without a published age-breakdown of their total population figure, the population ages 13–15 was estimated based on the proportion of the population ages 13–15 in a neighboring country in the same World Bank country income group.

### *Percentage of youth ages 13 to 15 years exposed to secondhand smoke inside the home or outside the home, by WHO Region and country income group (Tables 2.13 and 2.14)*

Source of prevalence rates: Tabulated data provided by U.S. Centers for Disease Control summarizing data from 124 countries who reported these indicators in a national Global Youth Tobacco Survey between the years 2004 and 2014. Surveys used are listed in Table A-6. Individual survey data are available from: http://nccd.cdc.gov/gtssdata/Default/SelectIndicator.aspx.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2010. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Method: The range of years covered by these surveys was 2004–2014, and 124 countries were covered by a survey. Not all surveys reported both indicators: 123 (representing 78% of the world's population ages 13–15) reported exposure to secondhand smoke at home, and 79 (representing 21% of the world's population ages 13–15) reported exposure to secondhand smoke outside the home. Countries without a reported indicator or survey were assumed to experience the average prevalence rates for boys and girls ages 13–15 in the same UN subregion (regions defined in Table A-1). The results are not representative of all regions and should be used with caution. For each country and for each sex, the number of boys and girls ages 13–15 exposed to secondhand smoke in the home was calculated using the prevalence

rates given in the source surveys and multiplying by the population ages 13–15 by sex. The same was done for the number of boys and girls ages 13–15 exposed to secondhand smoke outside the home. For countries without a published age-breakdown of their total population figure, the population ages 13–15 was estimated based on the proportion of the population ages 13–15 in a neighboring country in the same World Bank country income group. To calculate average prevalence per region, the calculated number of boys and girls ages 13–15 exposed to secondhand smoke in the home was summed by World Bank country income groups (Table A-2) and by WHO Regions and high-income OECD countries (Table A-3) and divided by the summed population ages 13–15. The same method was used to summarize the exposure to secondhand smoke outside the home, by region.

## Chapter 16

### *Estimated number of smokers living below the poverty line*

Source of prevalence rates: *WHO Global Report on Trends in Prevalence of Tobacco Smoking, 2000-2025*. Geneva: World Health Organization; 2015. Available from: http://apps.who.int/iris/bitstream/10665/156262/1/9789241564922_eng.pdf?ua=1.

Source of population numbers: *World Population Prospects*, 2012 revision, medium fertility variant, population estimates by sex and year for 2013. United Nations, Department of Economic and Social Affairs, Population Division, 2012. Available from: https://esa.un.org/unpd/wpp/Download/Standard/Population.

Source of poverty ratio: *PovcalNet: An Online Analysis Tool for Global Poverty Monitoring*. World Bank, 2016. Poverty headcount ratio at national poverty line in 2011 PPP. Available from: http://iresearch.worldbank.org/PovcalNet.

Method: WHO estimated prevalence rates for 2013 were multiplied by the population age 15+ in each country in 2013 to calculate an estimate of the number of smokers in each country in 2013. The number of smokers was then multiplied by the poverty rate to calculate the likely number of smokers living below the national poverty line in each country. Where prevalence rates were missing, the population-weighted average prevalence rate of the World Bank country income group was used. Where the poverty ratio was missing, the population-weighted average poverty ratio of the World Bank country income group was used. This method assumed the smoking prevalence rate among people living below the poverty line was the same as the rate for those living above the poverty line. Since evidence shows that smoking rates vary by income level, and are generally higher among lower income groups, this method of estimation is likely to yield an underestimate.

## Table A-1 Modified UN Subregions

| UN subregion | Countries |
|---|---|
| African Islands | Comoros, Madagascar, Mauritius, Seychelles |
| Australasia | Australia, New Zealand |
| Caribbean | Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago |
| Central America | Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama |
| Eastern Africa | Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Somalia, Uganda, United Republic of Tanzania, Zambia, Zimbabwe |
| Eastern Asia | China, Democratic People's Republic of Korea, Japan, Mongolia, Republic of Korea |
| Eastern Europe | Armenia, Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan |
| Middle Africa | Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe |
| Northern Africa | Algeria, Egypt, Libya, Morocco, South Sudan, Sudan, Tunisia |
| Northern Europe | Denmark, Finland, Iceland, Ireland, Norway, Sweden, United Kingdom of Great Britain and Northern Ireland |
| Oceania | Cook Islands, Fiji, Kiribati, Marshall Islands |
| Micronesia | Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu |
| South America | Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of) |
| Southcentral Asia | Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka |
| Southeastern Asia | Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam |
| Southern Africa | Botswana, Lesotho, Namibia, South Africa, Swaziland |
| Southern Europe | Albania, Andorra, Bosnia and Herzegovina, Croatia, Cyprus, Greece, Israel, Italy, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, Spain, The former Yugoslav Republic of Macedonia, Turkey |
| USA and Canada | Canada, United States of America |
| Western Africa | Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo |
| Western Asia | Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen |
| Western Europe | Austria, Belgium, France, Germany, Luxembourg, Monaco, Netherlands, Switzerland |

*Note:* UN = United Nations.

## Table A-2 World Bank Income Grouping of Countries (2014)

| World Bank income group | Countries |
|---|---|
| High-income | Andorra, Antigua and Barbuda, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Republic of Korea, Russian Federation, Saint Kitts and Nevis, San Marino, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay |
| Upper middle-income | Albania, Algeria, Angola, Argentina, Azerbaijan, Belarus, Belize, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Cook Islands,* Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Fiji, Gabon, Grenada, Hungary, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Maldives, Marshall Islands, Mauritius, Mexico, Montenegro, Namibia, Nauru,* Niue,* Palau, Panama, Peru, Romania, Saint Lucia, Saint Vincent and the Grenadines, Serbia, Seychelles, South Africa, Suriname, Thailand, The former Yugoslav Republic of Macedonia, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Venezuela (Bolivarian Republic of). |
| Lower middle-income | Armenia, Bhutan, Bolivia (Plurinational State of), Cameroon, Cabo Verde, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Mauritania, Micronesia (Federated States of), Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Republic of Moldova, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, South Sudan, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Timor-Leste, Ukraine, Uzbekistan, Vanuatu, Viet Nam, Yemen, Zambia. |
| Low-income | Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Tajikistan, Togo, Uganda, United Republic of Tanzania, Zimbabwe. |

*Cook Islands, Nauru, and Niue were not allocated to an income group by the World Bank. To avoid excluding these three countries from the analysis, we used the World Bank allocation criteria and the GDP sourced from the CIA Factbook to allocate them to the appropriate income group.

## Table A-3 World Health Organization Grouping of Countries, and High-Income OECD Countries Within Each Region, 2014

| WHO Region | Countries | High-income OECD countries |
|---|---|---|
| African Region | Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe | None |
| Region of the Americas | Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela (Bolivarian Republic of) | Canada, Chile, United States of America |
| South-East Asia Region | Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste | None |
| European Region | Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom of Great Britain and Northern Ireland, Uzbekistan | Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland |
| Eastern Mediterranean Region | Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen | None |
| Western Pacific Region | Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu, Viet Nam | Australia, Japan, New Zealand, Republic of Korea |

*Note:* WHO = World Health Organization. High-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development.

## Table A-4 Survey of Cigarette Use by Young People Aged 13–15 Used for Each Country (Most Recent Global Youth Tobacco Survey or Health Behaviour in School-aged Children Survey Completed Between 2007 and 2014)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Algeria | AFR | AFR | Northern Africa | Upper middle-income | GYTS | 2013 |
| Angola | AFR | AFR | Middle Africa | Upper middle-income | — | — |
| Benin | AFR | AFR | Western Africa | Low-income | — | — |
| Botswana | AFR | AFR | Southern Africa | Upper middle-income | GYTS | 2008 |
| Burkina Faso | AFR | AFR | Western Africa | Low-income | — | — |
| Burundi | AFR | AFR | Eastern Africa | Low-income | GYTS | 2008 |
| Cameroon | AFR | AFR | Middle Africa | Lower middle-income | GYTS | 2014 |
| Cabo Verde | AFR | AFR | Western Africa | Lower middle-income | GYTS | 2007 |
| Central African Republic | AFR | AFR | Middle Africa | Low-income | — | — |
| Chad | AFR | AFR | Middle Africa | Low-income | GYTS | 2008 |
| Comoros | AFR | AFR | African Islands | Low-income | GYTS | 2007 |
| Congo | AFR | AFR | Middle Africa | Lower middle-income | GYTS | 2009 |
| Côte d'Ivoire | AFR | AFR | Western Africa | Lower middle-income | GYTS | 2009 |
| Democratic Republic of the Congo | AFR | AFR | Middle Africa | Low-income | — | — |
| Equatorial Guinea | AFR | AFR | Middle Africa | Upper middle-income | GYTS | 2008 |
| Eritrea | AFR | AFR | Eastern Africa | Low-income | — | — |
| Ethiopia | AFR | AFR | Eastern Africa | Low-income | — | — |
| Gabon | AFR | AFR | Middle Africa | Upper middle-income | GYTS | 2014 |
| Gambia | AFR | AFR | Western Africa | Low-income | — | — |
| Ghana | AFR | AFR | Western Africa | Lower middle-income | GYTS | 2009 |
| Guinea | AFR | AFR | Western Africa | Low-income | GYTS | 2008 |
| Guinea-Bissau | AFR | AFR | Western Africa | Low-income | — | — |
| Kenya | AFR | AFR | Eastern Africa | Lower middle-income | GYTS | 2013 |
| Lesotho | AFR | AFR | Southern Africa | Lower middle-income | GYTS | 2008 |
| Liberia | AFR | AFR | Western Africa | Low-income | — | — |
| Madagascar | AFR | AFR | African Islands | Low-income | GYTS | 2008 |
| Malawi | AFR | AFR | Eastern Africa | Low-income | GYTS | 2009 |
| Mali | AFR | AFR | Western Africa | Low-income | GYTS | 2008 |
| Mauritania | AFR | AFR | Western Africa | Lower middle-income | GYTS | 2009 |
| Mauritius | AFR | AFR | African Islands | Upper middle-income | GYTS | 2008 |
| Mozambique | AFR | AFR | Eastern Africa | Low-income | GYTS | 2013 |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Namibia | AFR | AFR | Southern Africa | Upper middle-income | GYTS | 2008 |
| Niger | AFR | AFR | Western Africa | Low-income | GYTS | 2009 |
| Nigeria | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Rwanda | AFR | AFR | Eastern Africa | Low-income | GYTS | 2008 |
| Sao Tome and Principe | AFR | AFR | Middle Africa | Lower middle-income | GYTS | 2010 |
| Senegal | AFR | AFR | Western Africa | Low-income | GYTS | 2013 |
| Seychelles | AFR | AFR | African Islands | High-income | GYTS | 2007 |
| Sierra Leone | AFR | AFR | Western Africa | Low-income | — | — |
| South Africa | AFR | AFR | Southern Africa | Upper middle-income | GYTS | 2011 |
| South Sudan | AFR | AFR | Eastern Africa | Low-income | — | — |
| Swaziland | AFR | AFR | Southern Africa | Lower middle-income | GYTS | 2009 |
| Togo | AFR | AFR | Western Africa | Low-income | GYTS | 2013 |
| Uganda | AFR | AFR | Eastern Africa | Low-income | GYTS | 2011 |
| United Republic of Tanzania | AFR | AFR | Eastern Africa | Low-income | — | — |
| Zambia | AFR | AFR | Eastern Africa | Lower middle-income | GYTS | 2011 |
| Zimbabwe | AFR | AFR | Eastern Africa | Low-income | GYTS | 2014 |
| Antigua and Barbuda | AMR | AMR | Caribbean | High-income | GYTS | 2009 |
| Argentina | AMR | AMR | South America | Upper middle-income | GYTS | 2012 |
| Bahamas | AMR | AMR | Caribbean | High-income | GYTS | 2013 |
| Barbados | AMR | AMR | Caribbean | High-income | GYTS | 2013 |
| Belize | AMR | AMR | Central America | Upper middle-income | GYTS | 2014 |
| Bolivia (Plurinational State of) | AMR | AMR | South America | Lower middle-income | GYTS | 2012 |
| Brazil | AMR | AMR | South America | Upper middle-income | — | — |
| Canada | AMR | High-income OECD | Northern America | High-income | HBSC | 2013-14 |
| Chile | AMR | High-income OECD | South America | High-income | — | — |
| Colombia | AMR | AMR | South America | Upper middle-income | — | — |
| Costa Rica | AMR | AMR | Central America | Upper middle-income | GYTS | 2013 |
| Cuba | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2010 |
| Dominica | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2009 |
| Dominican Republic | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2011 |
| Ecuador | AMR | AMR | South America | Upper middle-income | — | — |
| El Salvador | AMR | AMR | Central America | Lower middle-income | GYTS | 2009 |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Grenada | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2009 |
| Guatemala | AMR | AMR | Central America | Lower middle-income | GYTS | 2008 |
| Guyana | AMR | AMR | South America | Upper middle-income | GYTS | 2010 |
| Haiti | AMR | AMR | Caribbean | Low-income | — | — |
| Honduras | AMR | AMR | Central America | Lower middle-income | — | — |
| Jamaica | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2010 |
| Mexico | AMR | AMR | Central America | Upper middle-income | GYTS | 2011 |
| Nicaragua | AMR | AMR | Central America | Lower middle-income | — | — |
| Panama | AMR | AMR | Central America | Upper middle-income | GYTS | 2012 |
| Paraguay | AMR | AMR | South America | Upper middle-income | GYTS | 2014 |
| Peru | AMR | AMR | South America | Upper middle-income | GYTS | 2007 |
| Saint Kitts and Nevis | AMR | AMR | Caribbean | High-income | GYTS | 2010 |
| Saint Lucia | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2011 |
| Saint Vincent and the Grenadines | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2011 |
| Suriname | AMR | AMR | South America | Upper middle-income | GYTS | 2009 |
| Trinidad and Tobago | AMR | AMR | Caribbean | High-income | GYTS | 2011 |
| United States of America | AMR | High-income OECD | Northern America | High-income | National Youth Tobacco Survey* | 2013 |
| Uruguay | AMR | AMR | South America | High-income | GYTS | 2007 |
| Venezuela (Bolivarian Republic of) | AMR | AMR | South America | Upper middle-income | GYTS | 2010 |
| Afghanistan | EMR | EMR | Southcentral Asia | Low-income | — | — |
| Bahrain | EMR | EMR | Western Asia | High-income | — | — |
| Djibouti | EMR | EMR | Eastern Africa | Lower middle-income | GYTS | 2013 |
| Egypt | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2014 |
| Iran (Islamic Republic of) | EMR | EMR | Southcentral Asia | Upper middle-income | GYTS | 2007 |
| Iraq | EMR | EMR | Western Asia | Upper middle-income | GYTS | 2014 |
| Jordan | EMR | EMR | Western Asia | Upper middle-income | GYTS | 2014 |
| Kuwait | EMR | EMR | Western Asia | High-income | GYTS | 2009 |
| Lebanon | EMR | EMR | Western Asia | Upper middle-income | GYTS | 2013 |
| Libya | EMR | EMR | Northern Africa | Upper middle-income | GYTS | 2010 |
| Morocco | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2010 |
| Oman | EMR | EMR | Western Asia | High-income | GYTS | 2010 |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Pakistan | EMR | EMR | Southcentral Asia | Lower middle-income | GYTS | 2013 |
| Qatar | EMR | EMR | Western Asia | High-income | GYTS | 2013 |
| Saudi Arabia | EMR | EMR | Western Asia | High-income | GYTS | 2010 |
| Somalia | EMR | EMR | Eastern Africa | Low-income | — | — |
| Sudan | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2014 |
| Syrian Arab Republic | EMR | EMR | Western Asia | Lower middle-income | GYTS | 2010 |
| Tunisia | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2010 |
| United Arab Emirates | EMR | EMR | Western Asia | High-income | GYTS | 2013 |
| Yemen | EMR | EMR | Western Asia | Lower middle-income | GYTS | 2014 |
| Albania | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2009 |
| Andorra | EUR | EUR | Southern Europe | High-income | — | — |
| Armenia | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2009 |
| Austria | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Azerbaijan | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Belarus | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Belgium | EUR | High-income OECD | Western Europe | High-income | — | — |
| Bosnia and Herzegovina | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2013 |
| Bulgaria | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2008 |
| Croatia | EUR | EUR | Southern Europe | High-income | GYTS | 2011 |
| Cyprus | EUR | EUR | Southern Europe | High-income | GYTS | 2011 |
| Czech Republic | EUR | High-income OECD | Eastern Europe | High-income | GYTS | 2011 |
| Denmark | EUR | High-income OECD | Northern Europe | High-income | HBSC | 2013-14 |
| Estonia | EUR | High-income OECD | Eastern Europe | High-income | GYTS | 2007 |
| Finland | EUR | High-income OECD | Northern Europe | High-income | GYTS | 2012 |
| France | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Georgia | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2014 |
| Germany | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Greece | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2013 |
| Hungary | EUR | EUR | Eastern Europe | High-income | GYTS | 2013 |
| Iceland | EUR | High-income OECD | Northern Europe | High-income | HBSC | 2013-14 |
| Ireland | EUR | High-income OECD | Northern Europe | High-income | HBSC | 2013-14 |
| Israel | EUR | High-income OECD | Southern Europe | High-income | HBSC | 2013-14 |
| Italy | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2014 |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Kazakhstan | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2014 |
| Kyrgyzstan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2014 |
| Latvia | EUR | EUR | Eastern Europe | High-income | GYTS | 2011 |
| Lithuania | EUR | EUR | Eastern Europe | High-income | GYTS | 2014 |
| Luxembourg | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Malta | EUR | EUR | Southern Europe | High-income | HBSC | 2013-14 |
| Monaco | EUR | EUR | Western Europe | High-income | — | — |
| Montenegro | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2008 |
| Netherlands | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Norway | EUR | High-income OECD | Northern Europe | High-income | HBSC | 2013-14 |
| Poland | EUR | High-income OECD | Eastern Europe | High-income | HBSC | 2013-14 |
| Portugal | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2013 |
| Republic of Moldova | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2013 |
| Romania | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2013 |
| Russian Federation | EUR | EUR | Eastern Europe | Upper middle-income | HBSC | 2013-14 |
| San Marino | EUR | EUR | Southern Europe | High-income | GYTS | 2014 |
| Serbia | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2013 |
| Slovakia | EUR | High-income OECD | Eastern Europe | High-income | GYTS | 2011 |
| Slovenia | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2011 |
| Spain | EUR | High-income OECD | Southern Europe | High-income | HBSC | 2013-14 |
| Sweden | EUR | High-income OECD | Northern Europe | High-income | HBSC | 2013-14 |
| Switzerland | EUR | High-income OECD | Western Europe | High-income | HBSC | 2013-14 |
| Tajikistan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2014 |
| The former Yugoslav Republic of Macedonia | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2008 |
| Turkey | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2012 |
| Turkmenistan | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Ukraine | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2011 |
| United Kingdom of Great Britain and Northern Ireland | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Uzbekistan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2013 |
| Bangladesh | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2013 |
| Bhutan | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2013 |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Democratic People's Republic of Korea | SEAR | SEAR | Eastern Asia | Low-income | — | — |
| India | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2009 |
| Indonesia | SEAR | SEAR | Southeastern Asia | Lower middle-income | — | — |
| Maldives | SEAR | SEAR | Southcentral Asia | Upper middle-income | GYTS | 2011 |
| Myanmar | SEAR | SEAR | Southeastern Asia | Lower middle-income | GYTS | 2011 |
| Nepal | SEAR | SEAR | Southcentral Asia | Low-income | GYTS | 2011 |
| Sri Lanka | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2011 |
| Thailand | SEAR | SEAR | Southeastern Asia | Upper middle-income | GYTS | 2009 |
| Timor-Leste | SEAR | SEAR | Southeastern Asia | Lower middle-income | GYTS | 2013 |
| Australia | WPR | High-income OECD | Australasia | High-income | — | — |
| Brunei Darussalam | WPR | WPR | Southeastern Asia | High-income | GYTS | 2013 |
| Cambodia | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2010 |
| China | WPR | WPR | Eastern Asia | Upper middle-income | GYTS | 2014 |
| Cook Islands | WPR | WPR | Oceania | Upper middle-income | GYTS | 2008 |
| Fiji | WPR | WPR | Oceania | Upper middle-income | GYTS | 2009 |
| Japan | WPR | High-income OECD | Eastern Asia | High-income | — | — |
| Kiribati | WPR | WPR | Oceania | Lower middle-income | GYTS | 2009 |
| Lao People's Democratic Republic | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2011 |
| Malaysia | WPR | WPR | Southeastern Asia | Upper middle-income | GYTS | 2009 |
| Marshall Islands | WPR | WPR | Oceania | Upper middle-income | GYTS | 2009 |
| Micronesia (Federated States of) | WPR | WPR | Oceania | Lower middle-income | GYTS | 2013 |
| Mongolia | WPR | WPR | Eastern Asia | Lower middle-income | GYTS | 2014 |
| Nauru | WPR | WPR | Oceania | High-income | — | — |
| New Zealand | WPR | High-income OECD | Australasia | High-income | GYTS | 2008 |
| Niue | WPR | WPR | Oceania | Upper middle-income | GYTS | 2009 |
| Palau | WPR | WPR | Oceania | Upper middle-income | GYTS | 2013 |
| Papua New Guinea | WPR | WPR | Oceania | Lower middle-income | GYTS | 2007 |
| Philippines | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2011 |
| Republic of Korea | WPR | High-income OECD | Eastern Asia | High-income | GYTS | 2013 |
| Samoa | WPR | WPR | Oceania | Lower middle-income | GYTS | 2007 |
| Singapore | WPR | WPR | Southeastern Asia | High-income | — | — |

## Table A-4 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Solomon Islands | WPR | WPR | Oceania | Lower middle-income | GYTS | 2008 |
| Tonga | WPR | WPR | Oceania | Lower middle-income | GYTS | 2010 |
| Tuvalu | WPR | WPR | Oceania | Upper middle-income | — | — |
| Vanuatu | WPR | WPR | Oceania | Lower middle-income | GYTS | 2007 |
| Viet Nam | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2014 |

*USA National Youth Tobacco Survey follows a methodology comparable to the Global Youth Tobacco Survey (GYTS), but the reported rates are for "high-school students" and not for ages 13–15.
*Notes:* Some countries that may have completed other types of youth surveys are not used in this analysis. WHO = World Health Organization, high-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development, UN = United Nations, Health Behaviour in School-aged Children (HBSC), AFR = African Region, AMR = Region of the Americas, EMR = Eastern Mediterranean Region, EUR = European Region, SEAR = South-East Asia Region, and WPR = Western Pacific Region.

## Table A-5 Survey of Smokeless Tobacco Use by Young People Aged 13–15 Used for Each Country (Most Recent Global Youth Tobacco Survey or Health Behaviour in School-aged Children Survey Conducted Between 2007 and 2014)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Algeria | AFR | AFR | Northern Africa | Upper middle-income | GYTS | 2013 |
| Angola | AFR | AFR | Middle Africa | Upper middle-income | — | — |
| Benin | AFR | AFR | Western Africa | Low-income | — | — |
| Botswana | AFR | AFR | Southern Africa | Upper middle-income | GYTS | 2008 |
| Burkina Faso | AFR | AFR | Western Africa | Low-income | — | — |
| Burundi | AFR | AFR | Eastern Africa | Low-income | — | — |
| Cameroon | AFR | AFR | Middle Africa | Lower middle-income | GYTS | 2014 |
| Cabo Verde | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Central African Republic | AFR | AFR | Middle Africa | Low-income | — | — |
| Chad | AFR | AFR | Middle Africa | Low-income | — | — |
| Comoros | AFR | AFR | African Islands | Low-income | — | — |
| Congo | AFR | AFR | Middle Africa | Lower middle-income | GYTS | 2009 |
| Côte d'Ivoire | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Democratic Republic of the Congo | AFR | AFR | Middle Africa | Low-income | — | — |
| Equatorial Guinea | AFR | AFR | Middle Africa | Upper middle-income | — | — |
| Eritrea | AFR | AFR | Eastern Africa | Low-income | — | — |
| Ethiopia | AFR | AFR | Eastern Africa | Low-income | — | — |
| Gabon | AFR | AFR | Middle Africa | Upper middle-income | GYTS | 2014 |
| Gambia | AFR | AFR | Western Africa | Low-income | — | — |
| Ghana | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Guinea | AFR | AFR | Western Africa | Low-income | — | — |
| Guinea-Bissau | AFR | AFR | Western Africa | Low-income | — | — |
| Kenya | AFR | AFR | Eastern Africa | Lower middle-income | GYTS | 2013 |
| Lesotho | AFR | AFR | Southern Africa | Lower middle-income | GYTS | 2008 |
| Liberia | AFR | AFR | Western Africa | Low-income | — | — |
| Madagascar | AFR | AFR | African Islands | Low-income | GYTS | 2008 |
| Malawi | AFR | AFR | Eastern Africa | Low-income | GYTS | 2009 |
| Mali | AFR | AFR | Western Africa | Low-income | — | — |
| Mauritania | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Mauritius | AFR | AFR | African Islands | Upper middle-income | — | — |
| Mozambique | AFR | AFR | Eastern Africa | Low-income | GYTS | 2013 |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Namibia | AFR | AFR | Southern Africa | Upper middle-income | GYTS | 2008 |
| Niger | AFR | AFR | Western Africa | Low-income | — | — |
| Nigeria | AFR | AFR | Western Africa | Lower middle-income | — | — |
| Rwanda | AFR | AFR | Eastern Africa | Low-income | GYTS | 2008 |
| Sao Tome and Principe | AFR | AFR | Middle Africa | Lower middle-income | — | — |
| Senegal | AFR | AFR | Western Africa | Low-income | GYTS | 2013 |
| Seychelles | AFR | AFR | African Islands | High-income | GYTS | 2007 |
| Sierra Leone | AFR | AFR | Western Africa | Low-income | — | — |
| South Africa | AFR | AFR | Southern Africa | Upper middle-income | — | — |
| South Sudan | AFR | AFR | Eastern Africa | Low-income | — | — |
| Swaziland | AFR | AFR | Southern Africa | Lower middle-income | GYTS | 2009 |
| Togo | AFR | AFR | Western Africa | Low-income | GYTS | 2013 |
| Uganda | AFR | AFR | Eastern Africa | Low-income | GYTS | 2011 |
| United Republic of Tanzania | AFR | AFR | Eastern Africa | Low-income | — | — |
| Zambia | AFR | AFR | Eastern Africa | Lower middle-income | — | — |
| Zimbabwe | AFR | AFR | Eastern Africa | Low-income | GYTS | 2014 |
| Antigua and Barbuda | AMR | AMR | Caribbean | High-income | GYTS | 2009 |
| Argentina | AMR | AMR | South America | Upper middle-income | GYTS | 2012 |
| Bahamas | AMR | AMR | Caribbean | High-income | GYTS | 2013 |
| Barbados | AMR | AMR | Caribbean | High-income | GYTS | 2007 |
| Belize | AMR | AMR | Central America | Upper middle-income | GYTS | 2014 |
| Bolivia (Plurinational State of) | AMR | AMR | South America | Lower middle-income | — | — |
| Brazil | AMR | AMR | South America | Upper middle-income | — | — |
| Canada | AMR | High-income OECD | Northern America | High-income | — | — |
| Chile | AMR | High-income OECD | South America | High-income | — | — |
| Colombia | AMR | AMR | South America | Upper middle-income | — | — |
| Costa Rica | AMR | AMR | Central America | Upper middle-income | GYTS | 2013 |
| Cuba | AMR | AMR | Caribbean | Upper middle-income | — | — |
| Dominica | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2009 |
| Dominican Republic | AMR | AMR | Caribbean | Upper middle-income | — | — |
| Ecuador | AMR | AMR | South America | Upper middle-income | — | — |
| El Salvador | AMR | AMR | Central America | Lower middle-income | GYTS | 2009 |
| Grenada | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2009 |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Guatemala | AMR | AMR | Central America | Lower middle-income | — | — |
| Guyana | AMR | AMR | South America | Upper middle-income | GYTS | 2010 |
| Haiti | AMR | AMR | Caribbean | Low-income | — | — |
| Honduras | AMR | AMR | Central America | Lower middle-income | — | — |
| Jamaica | AMR | AMR | Caribbean | Upper middle-income | GYTS | 2010 |
| Mexico | AMR | AMR | Central America | Upper middle-income | GYTS | 2011 |
| Nicaragua | AMR | AMR | Central America | Lower middle-income | — | — |
| Panama | AMR | AMR | Central America | Upper middle-income | GYTS | 2012 |
| Paraguay | AMR | AMR | South America | Upper middle-income | GYTS | 2014 |
| Peru | AMR | AMR | South America | Upper middle-income | GYTS | 2007 |
| Saint Kitts and Nevis | AMR | AMR | Caribbean | High-income | — | — |
| Saint Lucia | AMR | AMR | Caribbean | Upper middle-income | — | — |
| Saint Vincent and the Grenadines | AMR | AMR | Caribbean | Upper middle-income | — | — |
| Suriname | AMR | AMR | South America | Upper middle-income | GYTS | 2009 |
| Trinidad and Tobago | AMR | AMR | Caribbean | High-income | — | — |
| United States of America | AMR | High-income OECD | Northern America | High-income | National Youth Tobacco Survey* | 2013 |
| Uruguay | AMR | AMR | South America | High-income | — | — |
| Venezuela (Bolivarian Republic of) | AMR | AMR | South America | Upper middle-income | GYTS | 2010 |
| Afghanistan | EMR | EMR | Southcentral Asia | Low-income | — | — |
| Bahrain | EMR | EMR | Western Asia | High-income | — | — |
| Djibouti | EMR | EMR | Eastern Africa | Lower middle-income | GYTS | 2013 |
| Egypt | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2014 |
| Iran (Islamic Republic of) | EMR | EMR | Southcentral Asia | Upper middle-income | GYTS | 2007 |
| Iraq | EMR | EMR | Western Asia | Upper middle-income | GYTS | 2014 |
| Jordan | EMR | EMR | Western Asia | Upper middle-income | GYTS | 2014 |
| Kuwait | EMR | EMR | Western Asia | High-income | — | — |
| Lebanon | EMR | EMR | Western Asia | Upper middle-income | — | — |
| Libya | EMR | EMR | Northern Africa | Upper middle-income | GYTS | 2010 |
| Morocco | EMR | EMR | Northern Africa | Lower middle-income | — | — |
| Oman | EMR | EMR | Western Asia | High-income | GYTS | 2010 |
| Pakistan | EMR | EMR | Southcentral Asia | Lower middle-income | GYTS | 2013 |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Qatar | EMR | EMR | Western Asia | High-income | GYTS | 2013 |
| Saudi Arabia | EMR | EMR | Western Asia | High-income | GYTS | 2010 |
| Somalia | EMR | EMR | Eastern Africa | Low-income | — | — |
| Sudan | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2014 |
| Syrian Arab Republic | EMR | EMR | Western Asia | Lower middle-income | GYTS | 2010 |
| Tunisia | EMR | EMR | Northern Africa | Lower middle-income | GYTS | 2010 |
| United Arab Emirates | EMR | EMR | Western Asia | High-income | GYTS | 2013 |
| Yemen | EMR | EMR | Western Asia | Lower middle-income | GYTS | 2014 |
| Albania | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2009 |
| Andorra | EUR | EUR | Southern Europe | High-income | — | — |
| Armenia | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2009 |
| Austria | EUR | High-income OECD | Western Europe | High-income | — | — |
| Azerbaijan | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Belarus | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Belgium | EUR | High-income OECD | Western Europe | High-income | — | — |
| Bosnia and Herzegovina | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2013 |
| Bulgaria | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Croatia | EUR | EUR | Southern Europe | High-income | GYTS | 2011 |
| Cyprus | EUR | EUR | Southern Europe | High-income | — | — |
| Czech Republic | EUR | High-income OECD | Eastern Europe | High-income | — | — |
| Denmark | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Estonia | EUR | High-income OECD | Eastern Europe | High-income | GYTS | 2007 |
| Finland | EUR | High-income OECD | Northern Europe | High-income | GYTS | 2012 |
| France | EUR | High-income OECD | Western Europe | High-income | — | — |
| Georgia | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2014 |
| Germany | EUR | High-income OECD | Western Europe | High-income | — | — |
| Greece | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2013 |
| Hungary | EUR | EUR | Eastern Europe | High-income | GYTS | 2013 |
| Iceland | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Ireland | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Israel | EUR | High-income OECD | Southern Europe | High-income | — | — |
| Italy | EUR | High-income OECD | Southern Europe | High-income | — | — |
| Kazakhstan | EUR | EUR | Eastern Europe | Upper middle-income | GYTS | 2014 |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Kyrgyzstan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2014 |
| Latvia | EUR | EUR | Eastern Europe | High-income | GYTS | 2014 |
| Lithuania | EUR | EUR | Eastern Europe | High-income | GYTS | 2014 |
| Luxembourg | EUR | High-income OECD | Western Europe | High-income | — | — |
| Malta | EUR | EUR | Southern Europe | High-income | — | — |
| Monaco | EUR | EUR | Western Europe | High-income | — | — |
| Montenegro | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2014 |
| Netherlands | EUR | High-income OECD | Western Europe | High-income | — | — |
| Norway | EUR | High-income OECD | Northern Europe | High-income | HBSC† | 2014 |
| Poland | EUR | High-income OECD | Eastern Europe | High-income | — | — |
| Portugal | EUR | High-income OECD | Southern Europe | High-income | GYTS | 2013 |
| Republic of Moldova | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2013 |
| Romania | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Russian Federation | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| San Marino | EUR | EUR | Southern Europe | High-income | GYTS | 2014 |
| Serbia | EUR | EUR | Southern Europe | Upper middle-income | GYTS | 2013 |
| Slovakia | EUR | High-income OECD | Eastern Europe | High-income | — | — |
| Slovenia | EUR | High-income OECD | Southern Europe | High-income | — | — |
| Spain | EUR | High-income OECD | Southern Europe | High-income | — | — |
| Sweden | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Switzerland | EUR | High-income OECD | Western Europe | High-income | — | — |
| Tajikistan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2014 |
| The former Yugoslav Republic of Macedonia | EUR | EUR | Southern Europe | Upper middle-income | — | — |
| Turkey | EUR | EUR | Southern Europe | Upper middle-income | — | — |
| Turkmenistan | EUR | EUR | Eastern Europe | Upper middle-income | — | — |
| Ukraine | EUR | EUR | Eastern Europe | Lower middle-income | — | — |
| United Kingdom of Great Britain and Northern Ireland | EUR | High-income OECD | Northern Europe | High-income | — | — |
| Uzbekistan | EUR | EUR | Eastern Europe | Lower middle-income | GYTS | 2013 |
| Bangladesh | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2013 |
| Bhutan | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2013 |
| Democratic People's Republic of Korea | SEAR | SEAR | Eastern Asia | Low-income | — | — |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| India | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2009 |
| Indonesia | SEAR | SEAR | Southeastern Asia | Lower middle-income | GYTS | 2014 |
| Maldives | SEAR | SEAR | Southcentral Asia | Upper middle-income | GYTS | 2011 |
| Myanmar | SEAR | SEAR | Southeastern Asia | Lower middle-income | GYTS | 2011 |
| Nepal | SEAR | SEAR | Southcentral Asia | Low-income | GYTS | 2011 |
| Sri Lanka | SEAR | SEAR | Southcentral Asia | Lower middle-income | GYTS | 2011 |
| Thailand | SEAR | SEAR | Southeastern Asia | Upper middle-income | GYTS | 2009 |
| Timor-Leste | SEAR | SEAR | Southeastern Asia | Lower middle-income | GYTS | 2013 |
| Australia | WPR | High-income OECD | Australasia | High-income | — | — |
| Brunei Darussalam | WPR | WPR | Southeastern Asia | High-income | GYTS | 2013 |
| Cambodia | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2010 |
| China | WPR | WPR | Eastern Asia | Upper middle-income | GYTS | 2014 |
| Cook Islands | WPR | WPR | Oceania | Upper middle-income | GYTS | 2008 |
| Fiji | WPR | WPR | Oceania | Upper middle-income | — | — |
| Japan | WPR | High-income OECD | Eastern Asia | High-income | — | — |
| Kiribati | WPR | WPR | Oceania | Lower middle-income | — | — |
| Lao People's Democratic Republic | WPR | WPR | Southeastern Asia | Lower middle-income | — | — |
| Malaysia | WPR | WPR | Southeastern Asia | Upper middle-income | GYTS | 2009 |
| Marshall Islands | WPR | WPR | Oceania | Upper middle-income | — | — |
| Micronesia (Federated States of) | WPR | WPR | Oceania | Lower middle-income | GYTS | 2013 |
| Mongolia | WPR | WPR | Eastern Asia | Lower middle-income | GYTS | 2014 |
| Nauru | WPR | WPR | Oceania | High-income | — | — |
| New Zealand | WPR | High-income OECD | Australasia | High-income | — | — |
| Niue | WPR | WPR | Oceania | Upper middle-income | GYTS | 2009 |
| Palau | WPR | WPR | Oceania | Upper middle-income | GYTS | 2013 |
| Papua New Guinea | WPR | WPR | Oceania | Lower middle-income | — | — |
| Philippines | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2011 |
| Republic of Korea | WPR | High-income OECD | Eastern Asia | High-income | GYTS | 2013 |
| Samoa | WPR | WPR | Oceania | Lower middle-income | — | — |
| Singapore | WPR | WPR | Southeastern Asia | High-income | — | — |
| Solomon Islands | WPR | WPR | Oceania | Lower middle-income | — | — |
| Tonga | WPR | WPR | Oceania | Lower middle-income | — | — |

## Table A-5 (continued)

| Country | WHO Region | WHO Region with high-income OECD countries in a separate group | Modified UN subregion | World Bank income group 2016 | Survey name | Survey year |
|---|---|---|---|---|---|---|
| Tuvalu | WPR | WPR | Oceania | Upper middle-income | — | — |
| Vanuatu | WPR | WPR | Oceania | Lower middle-income | — | — |
| Viet Nam | WPR | WPR | Southeastern Asia | Lower middle-income | GYTS | 2014 |

*The National Youth Tobacco Survey used in the United States follows a methodology comparable to the Global Youth Tobacco Survey (GYTS), but the reported rates are for "high-school students" and not for ages 13–15.
†Source for Norway prevalence rates is the Health Behaviour in School-Aged Children Survey conducted in Norway and uses a methodology similar to the GYTS.
*Note:* Other types of youth surveys may have measured smokeless tobacco use in countries during this period but are not used in this analysis.
WHO = World Health Organization, high-income OECD countries = countries defined as high-income by the Organisation for Economic Co-operation and Development, UN = United Nations, AFR = African Region, AMR = Region of the Americas, EMR = Eastern Mediterranean Region, EUR = European Region, SEAR = South-East Asia Region, and WPR = Western Pacific Region.

## Table A-6 Survey of Youth Exposed to Secondhand Smoke Used for Each Country

| Country | WHO Region | Survey name | Survey year |
|---|---|---|---|
| Algeria | AFR | GYTS | 2013 |
| Botswana | AFR | GYTS | 2008 |
| Burundi | AFR | GYTS | 2008 |
| Cabo Verde | AFR | GYTS | 2007 |
| Chad | AFR | GYTS | 2008 |
| Comoros | AFR | GYTS | 2007 |
| Congo | AFR | GYTS | 2009 |
| Côte d'Ivoire | AFR | GYTS | 2009 |
| Equatorial Guinea | AFR | GYTS | 2008 |
| Ghana | AFR | GYTS | 2009 |
| Guinea | AFR | GYTS | 2008 |
| Kenya | AFR | GYTS | 2013 |
| Lesotho | AFR | GYTS | 2008 |
| Madagascar | AFR | GYTS | 2008 |
| Malawi | AFR | GYTS | 2009 |
| Mali | AFR | GYTS | 2008 |
| Mauritania | AFR | GYTS | 2009 |
| Mauritius | AFR | GYTS | 2008 |
| Mozambique | AFR | GYTS | 2013 |
| Namibia | AFR | GYTS | 2008 |
| Niger | AFR | GYTS | 2009 |
| Rwanda | AFR | GYTS | 2008 |
| Sao Tome and Principe | AFR | GYTS | 2010 |
| Senegal | AFR | GYTS | 2013 |
| Seychelles | AFR | GYTS | 2007 |
| Sierra Leone | AFR | GYTS | 2008 |
| South Africa | AFR | GYTS | 2011 |
| Swaziland | AFR | GYTS | 2009 |
| Togo | AFR | GYTS | 2013 |
| Uganda | AFR | GYTS | 2011 |
| Zambia | AFR | GYTS | 2011 |
| Antigua and Barbuda | AMR | GYTS | 2009 |
| Argentina | AMR | GYTS | 2012 |
| Bahamas | AMR | GYTS | 2013 |
| Barbados | AMR | GYTS | 2013 |

## Table A-6 (continued)

| Country | WHO Region | Survey name | Survey year |
|---|---|---|---|
| Bolivia (Plurinational State of) | AMR | GYTS | 2012 |
| Brazil | AMR | GYTS | 2012 |
| Costa Rica | AMR | GYTS | 2013 |
| Cuba | AMR | GYTS | 2010 |
| Dominica | AMR | GYTS | 2009 |
| Dominican Republic | AMR | GYTS | 2011 |
| El Salvador | AMR | GYTS | 2009 |
| Grenada | AMR | GYTS | 2009 |
| Guatemala | AMR | GYTS | 2008 |
| Guyana | AMR | GYTS | 2010 |
| Jamaica | AMR | GYTS | 2010 |
| Mexico | AMR | GYTS | 2011 |
| Panama | AMR | GYTS | 2012 |
| Paraguay | AMR | GYTS | 2008 |
| Peru | AMR | GYTS | 2007 |
| Saint Kitts and Nevis | AMR | GYTS | 2010 |
| Saint Lucia | AMR | GYTS | 2011 |
| Saint Vincent and the Grenadines | AMR | GYTS | 2011 |
| Suriname | AMR | GYTS | 2009 |
| Trinidad and Tobago | AMR | GYTS | 2011 |
| United States of America | AMR | National Youth Tobacco Survey | 2014 |
| Uruguay | AMR | GYTS | 2007 |
| Venezuela (Bolivarian Republic of) | AMR | GYTS | 2010 |
| Djibouti | EMR | GYTS | 2013 |
| Iran (Islamic Republic of) | EMR | GYTS | 2007 |
| Kuwait | EMR | GYTS | 2009 |
| Lebanon | EMR | GYTS | 2011 |
| Libya | EMR | GYTS | 2010 |
| Morocco | EMR | GYTS | 2010 |
| Oman | EMR | GYTS | 2010 |
| Pakistan | EMR | GYTS | 2013 |
| Qatar | EMR | GYTS | 2013 |
| Saudi Arabia | EMR | GYTS | 2010 |
| Sudan | EMR | GYTS | 2009 |
| Syrian Arab Republic | EMR | GYTS | 2010 |

## Table A-6 (continued)

| Country | WHO Region | Survey name | Survey year |
|---|---|---|---|
| Tunisia | EMR | GYTS | 2010 |
| United Arab Emirates | EMR | GYTS | 2013 |
| Albania | EUR | GYTS | 2009 |
| Armenia | EUR | GYTS | 2009 |
| Azerbaijan | EUR | GYTS | 2011 |
| Bosnia and Herzegovina | EUR | GYTS | 2008 |
| Bulgaria | EUR | GYTS | 2008 |
| Croatia | EUR | GYTS | 2011 |
| Cyprus | EUR | GYTS | 2011 |
| Czech Republic | EUR | GYTS | 2011 |
| Estonia | EUR | GYTS | 2007 |
| Finland | EUR | GYTS | 2012 |
| Greece | EUR | GYTS | 2013 |
| Hungary | EUR | GYTS | 2008 |
| Latvia | EUR | GYTS | 2011 |
| Lithuania | EUR | GYTS | 2009 |
| Republic of Moldova | EUR | GYTS | 2013 |
| Romania | EUR | GYTS | 2013 |
| Russian Federation | EUR | GYTS | 2004 |
| San Marino | EUR | GYTS | 2010 |
| Serbia | EUR | GYTS | 2013 |
| Slovakia | EUR | GYTS | 2011 |
| Slovenia | EUR | GYTS | 2011 |
| The former Yugoslav Republic of Macedonia | EUR | GYTS | 2008 |
| Turkey | EUR | GYTS | 2012 |
| Ukraine | EUR | GYTS | 2011 |
| Bangladesh | SEAR | GYTS | 2013 |
| Bhutan | SEAR | GYTS | 2013 |
| India | SEAR | GYTS | 2009 |
| Indonesia | SEAR | GYTS | 2014 |
| Maldives | SEAR | GYTS | 2011 |
| Myanmar | SEAR | GYTS | 2011 |
| Nepal | SEAR | GYTS | 2011 |
| Sri Lanka | SEAR | GYTS | 2011 |
| Thailand | SEAR | GYTS | 2009 |

## Table A-6 (continued)

| Country | WHO Region | Survey name | Survey year |
|---|---|---|---|
| Timor-Leste | SEAR | GYTS | 2013 |
| Brunei Darussalam | WPR | GYTS | 2013 |
| Cambodia | WPR | GYTS | 2010 |
| China | WPR | GYTS | 2014 |
| Cook Islands | WPR | GYTS | 2008 |
| Fiji | WPR | GYTS | 2009 |
| Kiribati | WPR | GYTS | 2009 |
| Lao People's Democratic Republic | WPR | GYTS | 2011 |
| Malaysia | WPR | GYTS | 2009 |
| Marshall Islands | WPR | GYTS | 2009 |
| Micronesia (Federated States of) | WPR | GYTS | 2013 |
| Niue | WPR | GYTS | 2009 |
| Palau | WPR | GYTS | 2013 |
| Papua New Guinea | WPR | GYTS | 2007 |
| Philippines | WPR | GYTS | 2011 |
| Republic of Korea | WPR | GYTS | 2013 |
| Samoa | WPR | GYTS | 2007 |
| Solomon Islands | WPR | GYTS | 2008 |
| Tonga | WPR | GYTS | 2010 |
| Vanuatu | WPR | GYTS | 2007 |
| Viet Nam | WPR | GYTS | 2007 |

*Note:* WHO = World Health Organization, AFR = African Region, AMR = Region of the Americas, EMR = Eastern Mediterranean Region, EUR = European Region, SEAR = South-East Asia Region, and WPR = Western Pacific Region.



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