

Section 4
Non-Price Determinants of Demand

Chapter 6
The Impact of Smoke-Free Policies

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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.

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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 colleagues⁴ 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 colleagues¹² 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 colleagues¹³ 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 colleagues¹⁴ 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 colleagues¹⁵ 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 colleagues¹⁷ 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 Liang¹⁸ 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 colleagues¹⁹ 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 colleagues²⁰ 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 colleagues²¹ 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 Physicians²² 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 colleagues²³ 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 colleagues²⁴ 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 colleagues²⁵ 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.

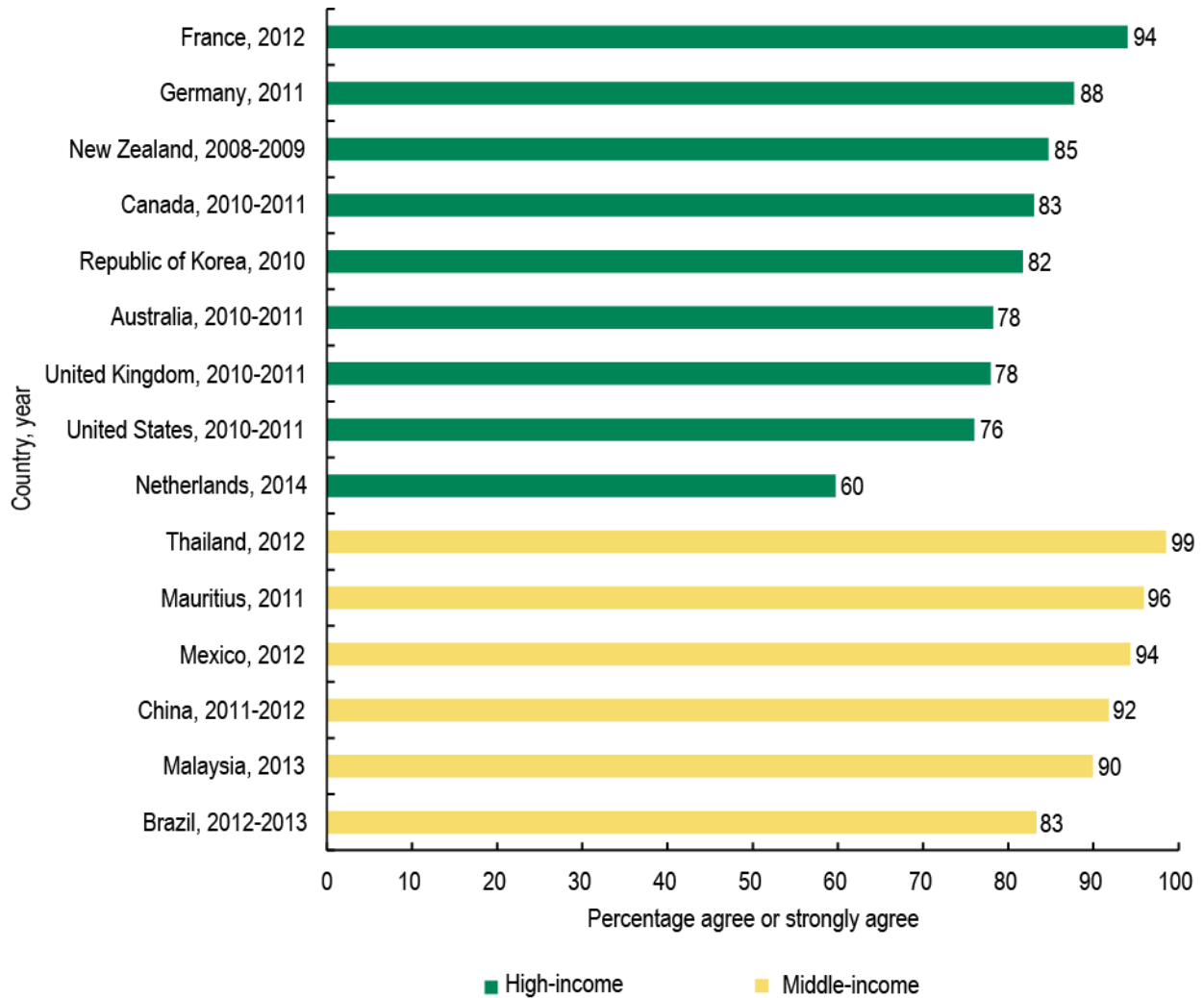
Some studies have determined the economic impact of the decrease in disease and hospitalizations attributed to comprehensive smoke-free policies. For example, Ong and Glantz^{26,27} examined the effect of a national comprehensive smoke-free policy on cardiovascular health and the resulting cost savings 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).

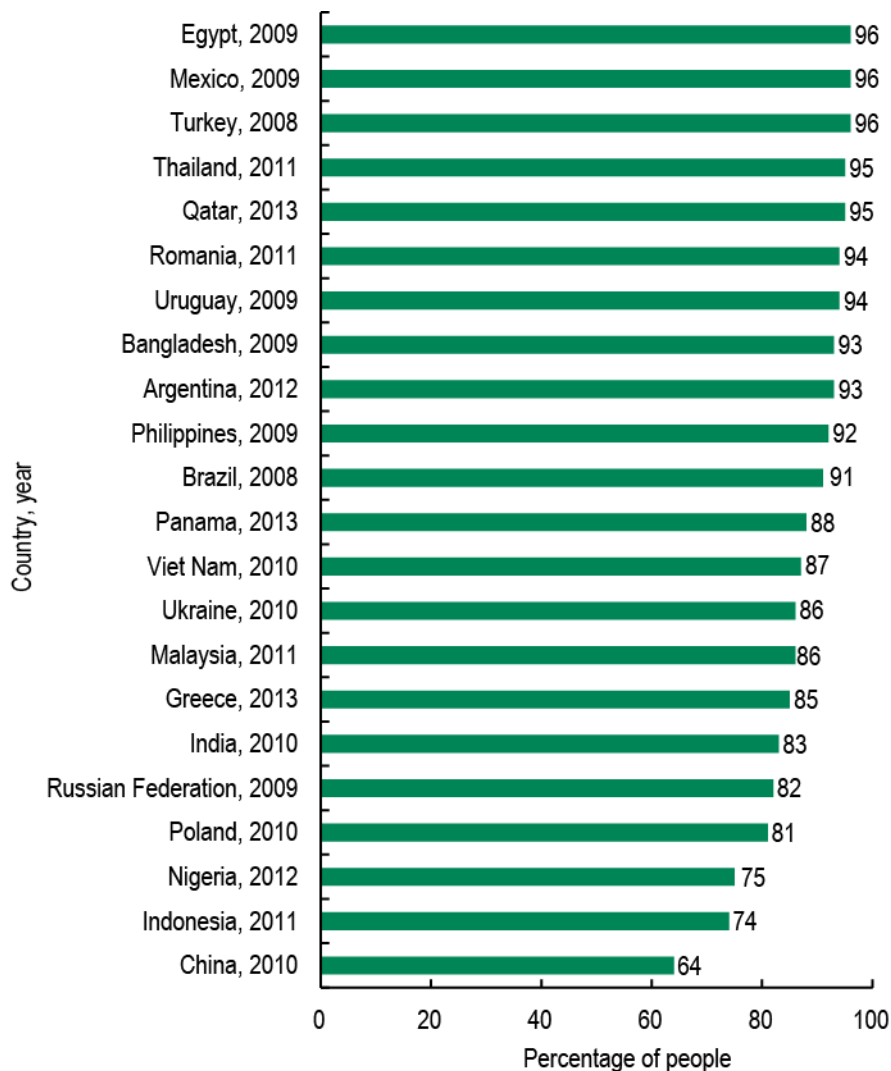
Figure 6.1 Percentage of Smokers in Middle-Income and High-Income Countries Who Agree That Cigarette Smoke Is Dangerous to Nonsmokers



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

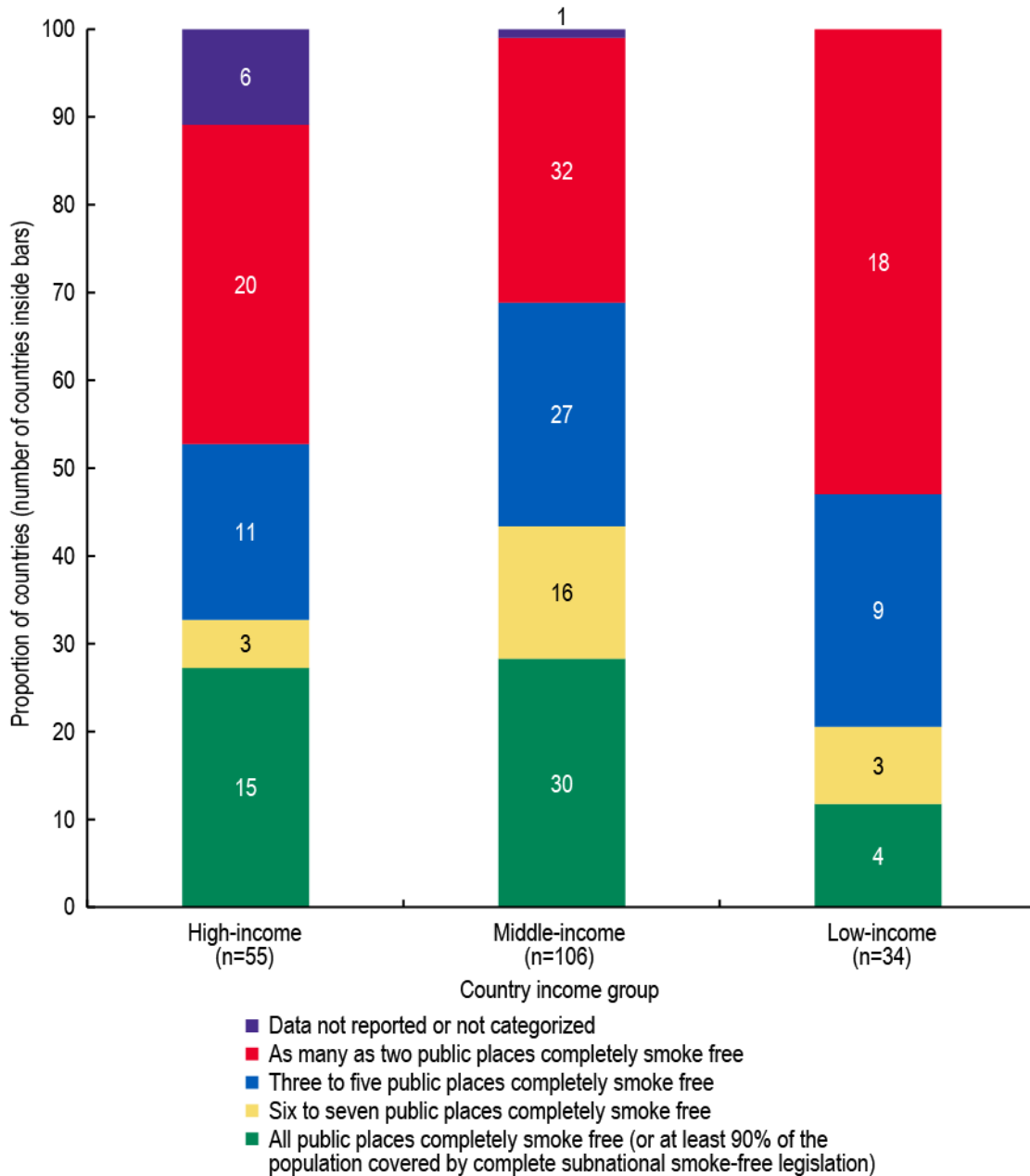


Source: Asma et al. 2015.¹⁵⁸ Reprinted with permission.

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 colleagues⁵⁶ 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 colleagues⁶¹ 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 colleagues⁶³ 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.

Viriychaiyo and Lim⁶⁴ 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

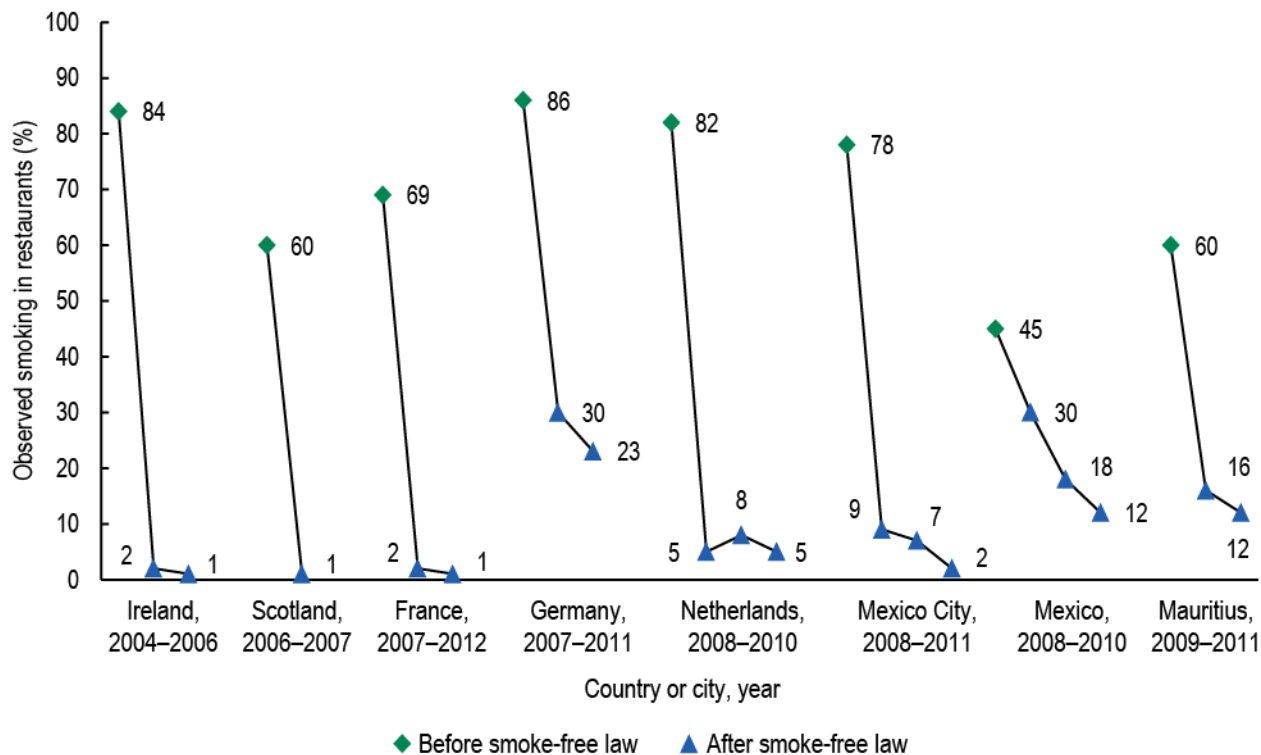
Comprehensive smoke-free legislation is a major policy intervention that works at several levels. It improves air quality and reduces nonsmokers' SHS exposure; it encourages smokers to reduce their tobacco consumption by limiting the times and places where they can smoke; and it can motivate smokers 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 colleagues⁵⁶ 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 colleagues⁷¹ 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 colleagues⁷² 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.

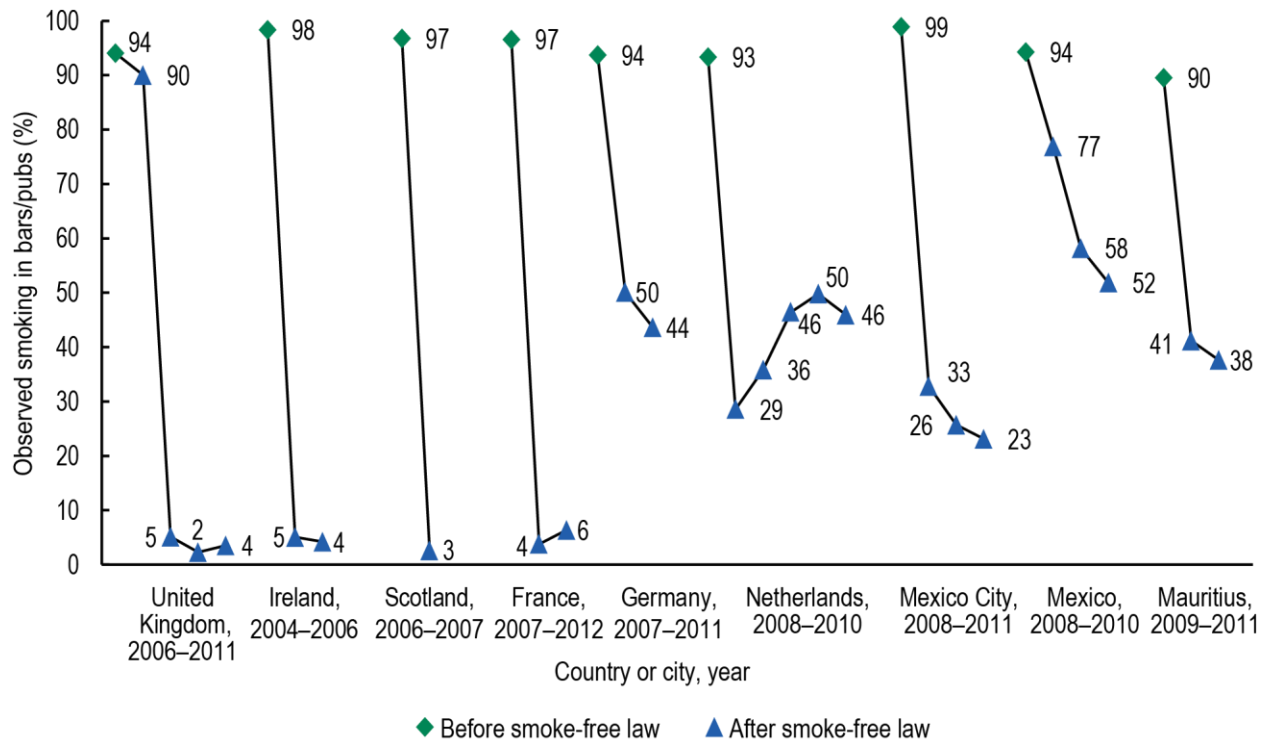
The ITC Project found that the prevalence of observed smoking in hospitality settings, including restaurants and bars, decreased dramatically in many countries that have implemented smoke-free laws in these settings. Figure 6.4 shows the prevalence of observing smoking in restaurants as reported by smokers 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 colleagues⁷⁵ 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 colleagues⁸⁸ 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 colleagues⁷¹ 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 colleagues⁹⁰ 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 colleagues⁹² 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 colleagues⁵⁵ 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 colleagues⁹⁶ suggest that a reason for the mixed findings among the relatively small studies reviewed by Callinan and colleagues⁵⁶ 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 colleagues⁹⁷ 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 colleagues⁹⁸ 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 colleagues⁵⁶ 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 colleagues⁸⁹ 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 colleagues⁸⁶ 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 colleagues⁸⁵ 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 colleagues⁶⁶ 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, Hahn¹⁰² 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 colleagues¹⁰³ 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 colleagues¹¹⁶ 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 colleagues¹¹⁷ 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 colleagues¹¹⁸ 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 colleagues¹²⁰ 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 Smith¹²³ 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 Lund¹²⁹ 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, Pakko¹²⁷ 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%.

Blecher¹²¹ 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 colleagues¹³¹ 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.

Candiotti and colleagues¹³² 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 colleagues¹²⁰ 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 colleagues¹³³ 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 colleagues¹³¹ 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 colleagues¹³³ 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 Siahpush¹⁴³ 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 Lye¹⁴⁴ 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 colleagues¹⁴⁵ 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. Mudarri¹⁴⁷ 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 Penner¹⁴⁸ 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 colleagues¹⁴⁶ 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 colleagues¹⁴⁹ concluded that the fire insurance costs attributable to smoking in Scottish workplaces are approximately £5 million annually. Similarly, the Conference Board of Canada¹⁵⁰ estimated that smoking increases life insurance premiums by CA\$ 75 per smoking employee; Javitz and colleagues¹⁴⁶ 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, Lundborg¹⁵¹ 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 colleagues¹⁴⁹ 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 colleagues¹⁴⁶ 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 Canada¹⁵³ 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 Glantz²⁷ 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, Mudarri¹⁴⁷ 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 colleagues¹⁵⁶ 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 colleagues¹⁵⁷ 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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