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One Hundred Years in the Making: The Global Tobacco Epidemic

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nicotine, tobacco control, FCTC, lung cancer, tobacco industry

Abstract

Today's global tobacco epidemic may represent one of the first instances of the globalization of a noninfectious cause of disease. This article focuses on the first century of the global tobacco epidemic and its current status, reviewing the current and projected future of the global tobacco epidemic and the steps that are in progress to end it. In the United States and many countries of Western Europe, tobacco consumption peaked during the 1960s and 1970s and declined as tobacco control programs were initiated, motivated by the evidence indicting smoking as a leading cause of disease. Despite this policy advancement and the subsequent reductions in tobacco consumption, the global tobacco epidemic continued to grow exponentially in the later years of the twentieth century, as the multinational companies sought new markets to replace those shrinking in high-income countries. In response, between 2000 and 2004, the World Health Organization developed its first public health treaty, the Framework Convention on Tobacco Control, which entered into force in 2005. An accompanying package of interventions has been implemented. New approaches to tobacco control, including plain packaging and single representation of brands, have been implemented by Australia and Uruguay, respectively, but have been challenged by the tobacco industry.

INTRODUCTION

Today's global tobacco epidemic reflects perhaps the earliest example of the globalization of a noninfectious cause of disease. The tobacco plant was originally a New World plant used by the natives largely in ceremonial ways. Christopher Columbus encountered tobacco during his first voyage and brought it to Europe, and subsequently trade in tobacco quickly flourished. The plant is in the genus *Nicotiana*, a term originating with Jean Nicot, the French ambassador to Portugal who introduced tobacco to the French court. His name, of course, was the origin of the word nicotine, the addiction-causing component of tobacco. Now, more than 500 years later, tobacco use is ubiquitous, the cigarette industry is global, and the companies are multinational. The epidemic is driven largely by a handful of extremely large corporations: Philip Morris International, the China National Tobacco Corporation (a state monopoly), British American Tobacco, Japan Tobacco International, and Imperial Tobacco.

Sustained efforts to control the epidemic started when research began to document the adverse health consequences of smoking. January 2014 marked 50 years since the US Surgeon General first concluded that smoking cigarettes caused lung cancer in men. The 1964 Surgeon General's Report characterized the problem of smoking and health as follows: "Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action" (41, p. 33). Thus, the era of evidence-based tobacco control interventions began, as the United States and other countries initiated efforts to educate the population and to counter the tobacco industry's marketing.

In the five decades since the 1964 Surgeon General's report, much more has been learned about the tobacco epidemic: its consequences, control measures that work and that do not work, and the actors involved, particularly the tobacco industry, which has used aggressive, dynamic, often immoral, and sometimes illegal strategies to grow its markets (7, 33, 45). Although continually opposed by the tobacco industry, tobacco control has had successes in many countries. Tobacco use and rates of some of the diseases it causes have declined in many high- and middle-income countries. In the United States, for example, cigarette consumption increased progressively across the twentieth century, peaking in the early 1960s, and then fell as tobacco control measures were implemented and took hold (**Figure 1**) (45). Nevertheless, tobacco use remains highly prevalent in some high-income countries, and many low- and middle-income countries are at risk for increasing their use of tobacco as a result of the strategies of the multinational tobacco companies. The current global burden of disease associated with tobacco use is enormous: 6 million deaths annually. On the basis of current trends, Peto & Lopez (31) estimated that 10 million people annually will die prematurely because of tobacco by 2030, two-thirds of these deaths will occur in low- and middle-income countries, and, absent effective global tobacco control, a shocking 1 billion people are projected to die from tobacco use this century, 900 million more than in the previous century (31).

This article focuses on the first century of the global tobacco epidemic and its current status. We review the current status and projected future of the global tobacco epidemic and the steps that are in progress to end it.

RISING CIGARETTE USE AND SCIENTIFIC DISCOVERY

The tobacco epidemic was born out of the cigarette, now a device that is highly engineered to deliver nicotine and to promote and sustain addiction. Until the latter half of the 1800s, tobacco consumption was confined almost entirely to chewing, snuff, and pipe smoking by middle-aged men. Three major inventions led to the popular use of tobacco in the form of cigarettes. First was

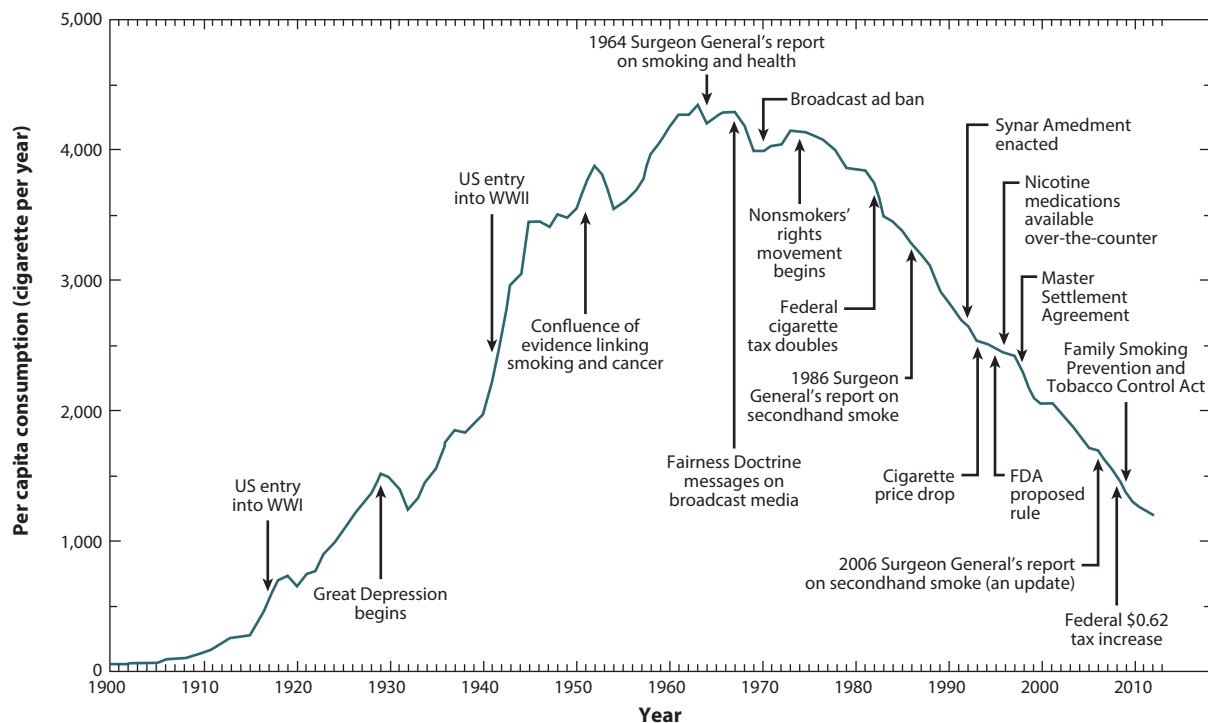


Figure 1

Surgeon General Report on the rise in tobacco consumption in the twentieth century and its decline, 2014. Abbreviation: FDA, (US) Food and Drug Administration.

the 1839 discovery in Virginia of a standard method for producing flue-cured tobacco leaves. Flue-cured “yellow” tobacco resulted in a mild-flavored and inhalable smoke that was more appealing to the general public than was the previously available harsh dark tobacco. Second was the 1852 invention of safety matches, which made smoking possible anywhere. Third was James Bonsack’s invention of the first practical cigarette-making machine in 1880; because cigarettes had been made by hand up to this point, Bonsack’s machine significantly cut manufacturing costs (13).

The patent for the Bonsack cigarette-making machine was purchased by the Duke family, and the American Tobacco Company was formed with James B. Duke as its head. Duke turned the American Tobacco Company into a global monopoly, joining with Imperial Tobacco to create British American Tobacco and maintaining a two-thirds interest in the new enterprise. In 1908, the Department of Justice filed a suit against the American Tobacco Company under the Sherman Antitrust Act; in 1911, the company was found to be in violation of the Act and was subsequently divided into five companies (7). Thus, a century ago, the potential for a global tobacco epidemic driven by multinational companies was evident.

Other strategies that have driven the global epidemic were also implemented by the industry a century ago. The invention of mass-produced cigarettes required the development of mass demand. Hence, tobacco companies turned to new and highly effective marketing methods. In 1913, R. J. Reynolds launched a massive, months-long campaign before introducing its Camel cigarettes, the first mass-marketed brand. R.J. Reynolds’s efforts became the first modern cigarette campaign with national marketing and advertising; by 1923, Camel cigarettes controlled 43% of

the US market (22). Tobacco industry advertising has since used images of freedom, rebellion, health, fitness, stress relief, wealth, weight loss, and sex appeal to construct and perpetuate social attributes linked to cigarette smoking. The same tactics now sustain Marlboro as the world's most popular brand.

Throughout the early years of the twentieth century cigarette consumption rose dramatically, aside from a dip at the time of the Great Depression in the United States (**Figure 1**). That dip was an early demonstration of the costs and price sensitivity of smoking to smokers. Between 1930 and 1940, per capita cigarette consumption in the United States doubled, and by 1939, 66% of men under the age of 40 smoked (22). The rise in popular cigarette use was paralleled by worrying disease trends. By 1930, the United Kingdom had the highest lung cancer rate in the world, rising five times faster than rates for all other cancers, and by 1948, lung cancer had become the second most common cancer among men in the United Kingdom. Suspicions of a relationship between the two trends led to the first scientific studies linking cigarette smoking to lung cancer.

Five case-control studies, of which three are considered landmark, were published in 1950, all convincingly linking smoking to a higher risk of lung cancer (10, 23, 55). In 1953, Ernst Wynder demonstrated that cigarette tar caused tumors on the backs of mice, and in the following year Richard Doll and Austin Bradford Hill published findings from a nationwide prospective study of British doctors, which showed that the risk of lung cancer greatly increased among smokers relative to the risk among comparable nonsmokers (11, 56). The general public learned about these academic reports in the 1952 article "Cancer by the Carton," published in the then widely read weekly *Reader's Digest* (29). The story was followed by a slight dip in consumption, documenting the potential utility of media in reaching the public.

These early scientific studies and their potential impact on tobacco consumption concerned the United States tobacco industry, which launched a lawyer-driven campaign of fraud and deception. It created the Tobacco Industry Research Committee (TIRC) in 1954 to conduct its own scientific studies with the goal of debunking the earlier studies and deflecting attention away from cigarettes as a cause of disease. On January 4, 1954, the major tobacco companies released the "Frank Statement to Cigarette Smokers" in 448 newspapers throughout the United States. In it the industry declared, "We accept an interest in people's health as a basic responsibility, paramount to every other consideration in our business . . . We believe the products we make are not injurious to health . . . We always have and always will cooperate closely with those whose task it is to safeguard the public health" (38). At the same time, the industry began to mass-market filtered cigarettes and, later, low-tar products (as measured by a machine) that promised a healthier smoke. The percentage of cigarettes with filters increased from 2% in 1950 to more than 50% in 1960. The marketing strategy was effective, and cigarette sales boomed. Later, filters and other design features intended to reduce machine-measured tar yields were found to have had no benefits to health, and, in fact, the industry's marketing strategies around filters and tar yields were found by a Federal District Court to be fraudulent (43, 40).

Despite the tobacco industry's efforts to deny the relationship between cigarette smoking and disease, the growing scientific consensus regarding the link between smoking and lung cancer was reflected in the 1962 Royal College Report in the United Kingdom and the first Surgeon General's Report in the United States in 1964, both entitled *Smoking and Health* (34, 41). The reports concluded that cigarette smoking is causally related to lung cancer, and the Surgeon General's report characterized the problem as needing control. The compilation of evidence and definitive causal conclusions provided the critical rationale for legislative and other actions to control tobacco use, including the initiation of health warnings on all cigarette packages and advertising restrictions on radio and television.

Policy Translation

Shortly after the release of the 1964 Surgeon General's Report, the United States implemented the first health warnings on cigarette packages and began public education programs on the harms of smoking. Other countries quickly followed suit, including Finland, Norway, and Singapore. Early tobacco control strategies differed from country to country, reflecting particular political, social, and economic situations. In the United States, aggressive national regulation was difficult to implement owing to the long-standing influence of the tobacco industry on local, state, and federal governments. Moreover, US federalism dictated that states were responsible for many relevant policies (e.g., smoke-free air policies). Advocates in the United States combated the tobacco industry primarily by focusing on state and local action.

A major shift in policy approaches to controlling tobacco occurred in the late 1980s with the rise of new evidence that secondhand tobacco smoke caused death and disease in nonsmokers. Evidence of the adverse health effects of secondhand smoke on the children of smokers was first published in the 1960s; major studies from Japan and Greece on lung cancer in adults appeared in 1981 (17, 39). Hirayama's study from Japan showed that nonsmoking wives of smokers were almost twice as likely to die of lung cancer as were nonsmoking wives of nonsmokers. The industry attempted to subvert these early findings with intense campaigns by its consultants. Following the publication of Hirayama's report, the *British Medical Journal* was flooded with letters to the editor claiming that the study was flawed by misclassification, confounding, and statistical error.

Scientific consensus that passive smoking causes lung cancer in adults solidified in 1986 when the US Surgeon General, the International Agency for Research on Cancer, and the US National Academy of Sciences all concluded that secondhand smoke caused lung cancer in nonsmokers (42). These reports were followed by a 1992 report (46) by the US Environmental Protection Agency, with potential regulatory implications, as well as by the International Agency for Research on Cancer's updated 2002 report (20) and the 2006 US Surgeon General's report (44). The 2006 report characterized the scientific community as reaching consensus on the adverse health effects of secondhand smoke, and the tobacco industry has, in fact, generally stopped contesting the dangers of passive smoking.

Several decades ago, the tobacco industry extensively criticized the scientific research used to link secondhand smoke to disease and attempted to provoke controversy and uncertainty over the health effects of secondhand smoke, the extent of exposures, and the effectiveness and costs of controlling it. Industry documents now reveal that as early as the 1970s the industry was aware that policies restricting or ending smoking in public places would severely undermine the social acceptability of smoking, create an environment that would make it easier for smokers to stop smoking, and discourage young people from starting (12).

The consolidation of scientific evidence and the shift toward the protection of nonsmokers led to a major new legislative agenda for tobacco control. Initially, policy actions were taken at local and state levels to separate smokers and nonsmokers within the same space (nonsmoking sections), followed by separate smoking spaces (smoking rooms), and then complete bans. The movement toward complete bans was motivated largely by evidence that ventilation and air cleaning could not remove cigarette smoke toxins from the air (1).

In 2002, Delaware became the first state in the United States to become completely smoke free in all public places and workplaces, including restaurants and bars, and other states soon followed. Canada's Northwest Territories passed a comprehensive smoke-free law in 2004, and also in 2004, Ireland, Norway, and New Zealand became the first countries to enact comprehensive smoke-free indoor air laws. In 2006, Uruguay became the first South American country to implement a 100% smoke-free regulation in workplaces, restaurants, and bars.

Industry Racketeering and Litigation

For decades, the tobacco industry continued to deny the relationship between cigarette smoking and disease and pointed to its own research as evidence that smoking was not harmful or addictive. As recently as 1994, the top seven tobacco industry executives swore under oath to the United States Congress that they did not believe smoking to be addictive (16).

Between 1950 and 1997, the tobacco industry in the United States enjoyed a successful record in civil litigation that was unique to almost any industry: They did not pay even one cent in settlements or awards for any injuries claimed by cigarette smokers in their civil lawsuits (7). However, in the early to mid-1990s, more than 40 states commenced litigation against the tobacco industry, seeking monetary, equitable, and injunctive relief under various consumer protection and antitrust laws.

Faced with the prospect of defending multiple actions nationwide, the four major US tobacco companies (Philip Morris USA, R. J. Reynolds Tobacco Company, Brown & Williamson Tobacco Corporation, and Lorillard Tobacco Company) sought a congressional remedy, primarily in the form of a national legislative settlement. However, while the proposed legislation was being discussed in Congress, some individual states began settling their litigation for the recovery of costs paid for health care against the tobacco industry. On July 2, 1997, Mississippi became the first state to reach a settlement. During the next year, Florida, Texas, and Minnesota followed, with the 4 states recovering a total of more than \$35 billion. The settlement with the state of Minnesota was unprecedented in terms of monetary relief, injunctive requirements, and the aforementioned release of approximately 35 million pages of internal industry documents (2).

In November 1998, the attorneys general (the chief lawyers) of the remaining 46 states, as well as of the District of Columbia, Puerto Rico, and the Virgin Islands, entered into the Masters Settlement Agreement (MSA), which forced the 4 major US tobacco companies to pay \$264 billion over a period of 25 years to compensate for tobacco-related health costs (28).

Key to these settlements and the turnaround in litigation was the release of the previously confidential industry documents, as an outcome of the litigation, particularly by the State of Minnesota. The documents revealed that the industry knew for more than four decades that smoking tobacco caused cancer, that they were aware of the addictive nature of nicotine, and that they manipulated nicotine content and delivery to increase addiction. The documents also outlined a well-developed and well-executed strategy to cover up this information; to target vulnerable populations, including youth and women; and to undermine tobacco control efforts. The confidential industry documents detail how these companies used their own research institutes to produce contradictory results, paid scientists to challenge established scientific methods such as epidemiology, and publicly rejected claims that their products were dangerous or addictive (12, 19, 30). The documents also show how the industry used the tactics globally, in such secret initiatives as “Project Whitecoat” (3).

Since the Master Settlement Agreement in 1998, the tobacco industry has continued to face challenges in the United States and internationally. Most importantly, in the United States, the federal government sued the tobacco industry for violation of the law created to address racketeering (RICO) in the case of the *United States v. Philip Morris*. In its opinion, the District Court concluded, “As set forth in these Final Proposed Findings of Fact, substantial evidence establishes that Defendants have engaged in and executed—and continue to engage in and execute—a massive 50-year scheme to defraud the public, including consumers of cigarettes, in violation of RICO.” The tobacco industry was found guilty under a law created to deal with organized crime; much of the evidence came from its internal documents. These legal findings in the United States have global implications by documenting the criminal behavior of the tobacco industry (40).

Industry Globalization and Policy Transfer

Despite policy advancement and subsequent reductions in tobacco consumption in some countries, the global tobacco epidemic continued to grow exponentially in the later years of the twentieth century, as the multinational companies sought new markets to replace those shrinking in high-income countries. The tobacco industry took full advantage of trade liberalization, foreign direct investment, new production technologies, global communications, and other elements of the emerging globalized economy to gain customers in low- and middle-income countries and to increase profits.

In 1998, 75% of the world's cigarette market was controlled by just 4 companies: Philip Morris, British American Tobacco, Japan Tobacco, and the China National Tobacco Corporation (9). The last's share was attributed almost entirely to its near monopoly in the enormous Chinese market, but the other companies tirelessly pursued worldwide sales. The major transnational tobacco companies established a presence in almost every country. By the late 1990s, each of the 3 largest transnational tobacco companies owned or leased manufacturing facilities in more than 50 countries (15).

Recognizing the global threat of the industry's expansion, key individuals within the global tobacco control community reached out to potential colleagues in targeted middle-income countries in an effort to prompt tobacco control. Poland is exemplary. The production and sale of cigarettes were among the first economic sectors to be privatized in postcommunist Poland. Within a few years, Polish tobacco companies were taken over by the transnational tobacco industry, and by the end of the 1990s, more than 90% of the country's tobacco industry belonged to transnational companies (58). During this period of rapid privatization, government authorities made considerable concessions to the transnational tobacco companies, such as agreeing to keep tobacco taxes low. As a result, in the early 1990s the average price of a pack of cigarettes in Poland was lower than the price of a loaf of bread (58).

Cigarettes quickly became the most heavily advertised product in the country. The use of state-of-the-art marketing techniques had a powerful effect on the previously unexposed Polish public. The number and percentage of occasional smokers rose and the number of children experimenting with cigarettes, especially girls between the ages of 11 and 15, increased dramatically (27).

In the midst of this transition, Witold Zatoński, a medical doctor at the Maria Skłodowska-Curie Memorial Cancer Center and Institute of Oncology in Warsaw, worked with multiple international colleagues to counteract the industry. For example, Richard Peto, a professor of medical science and epidemiology at the University of Oxford, visited Poland and presented evidence to policy makers to show that tobacco smoking was a major contributor to the reduction of Polish life expectancy, which was no longer comparable to that of the Germans, their neighbors to the west, as it had been in the mid-1960s, but rather was comparable to the life expectancy of people in India and China (W. Zatoński, personal communication). Together, they were able to convince Polish policy makers to pass comprehensive tobacco control in 1995.

The WHO Framework Convention on Tobacco Control and Bloomberg Initiative to Reduce Tobacco Use

Despite some individual policy successes, such as Poland, by the mid-1990s tobacco control groups recognized the need for multinational cooperation and effective international action to control transnational factors. Between 1970 and 1998, the World Health Assembly, the decision-making body of the World Health Organization (WHO), had adopted 17 resolutions on different aspects of tobacco control. Although nations occasionally referenced these resolutions when passing national

tobacco control legislation, the lack of any legally binding authority made the resolutions inconsequential for many nations.

In 1994, at the Ninth World Conference on Tobacco and Health in Paris, a resolution calling on national governments, ministers of health, and the WHO to “immediately initiate action to prepare and achieve an International Convention on Tobacco Control to be adopted by the United Nations” was passed (26). The conference marked the first international forum in which the idea of a Framework Convention was formally endorsed and was the beginning of official efforts to secure support from within the WHO for its development.

With major lobbying from tobacco control advocates backed by influential countries, such as Canada and Finland, and organizational leadership from WHO Director General Gro Harlem Brundtland, the World Health Assembly officially launched work on the development of the Framework Convention on Tobacco Control (FCTC) in 1998. The FCTC represented the first treaty negotiated under the auspices of the WHO and the first collective response to noncommunicable diseases (NCDs). The treaty text was unanimously adopted at the World Health Assembly in 2003, and the treaty became binding international law less than two years later. Within 5 years, more than 168 states had signed the treaty and 154 states had ratified it, making it one of the most quickly accepted treaties in UN history.

To date, the United States has not become a party to the FCTC nor have Indonesia and Argentina. Throughout the FCTC negotiations, the United States was subject to intense criticism from civil society and members of the US Congress for undermining efforts to reduce death and disease caused by tobacco around the world. At the start of the FCTC process there had been hope that the United States would be a productive participant in the negotiations. However, after the Bush Administration replaced the Clinton Administration in 2001, the United States objected to, among other things, provisions that warning labels on cigarette packages be printed in the main language(s) of the country of sale, the precedence of public health over trade, and a comprehensive ban on advertising (52). In a published letter to President Bush, Congressman Henry Waxman (Democrat, California) said, “the position of the US has been in virtual lockstep with the tobacco industry throughout the treaty negotiation” (49). The US position was so extreme that its senior public health official and head of the US delegation, Tom Novotny, resigned in May of 2001 (21).

As of 2015, the FCTC remains “in review” by the State Department, having never been forwarded to the Senate by the White House. Notably, President Obama expressed a strong commitment to the FCTC as a member of the US Senate when he joined a letter to then President Bush urging him to send the treaty to the Senate for consideration (52). The letter stated, “The FCTC is a historic opportunity to protect current and future generations both at home and abroad from some of the devastating consequences of tobacco use. The United States must be up to the challenge of turning this opportunity into a reality.” Since entering presidential office, however, Obama has failed to send the treaty to Congress. There was some speculation that President Obama would move on the treaty if, and when, the Family Smoking and Prevention Act was approved by Congress. The Act officially gave the US Food and Drug Administration authority over tobacco and brought US law in line with all binding obligations within the treaty. However, since it passed and entered into force in 2009, the President has still failed to submit the treaty for a Senate vote (14). Consequently, the US does not have any voting rights with the treaty’s Conference of Parties and has not actively participated in the further development of the treaty regime.

Following the successful negotiation of the FCTC, the Bloomberg Initiative to Reduce Tobacco Use was formally launched in early 2007 with an initial commitment of \$125 million from former New York City Mayor Michael Bloomberg. In 2008, Bill Gates diversified beyond his focus on global health issues related to vaccines and maternal and child health to join Bloomberg

in funding the initiative's work, bringing the initiative's overall funding to more than \$500 million (4). In 2012, Bloomberg increased his personal investment in the initiative again, committing an additional \$220 million over 4 years and bringing his personal commitment to more than \$600 million (25).

The Bloomberg Initiative, working with the WHO, sought a new paradigm for tobacco control in the form of MPOWER. MPOWER is a package of proven tobacco control strategies: monitoring tobacco use and the industry (M); protecting nonsmokers from exposure to second-hand tobacco smoke (P); offering assistance to smokers who want to quit (O); warning consumers of the health consequences of tobacco use (W); enforcing bans on advertising, sponsorship, and promotion (E); and raising tobacco taxes (R). The contents of MPOWER overlapped completely with articles of the FCTC.

From the beginning, the initiative was targeted primarily at large, heavily populated low- and middle-income countries with high smoking rates, in particular China, India, Indonesia, Russia, and Bangladesh. A key aspect of the initiative was its competitive grants program, which awarded more than 125 grants in 36 countries in its first 5 years (6). The Bloomberg Initiative also targeted training programs, journalism workshops, in-country development of mass media public education campaigns, and capacity building. In just 5 years, more than 7,000 public health professionals and 5,000 journalists from low- and middle-income countries received training in tobacco control that was supported by the initiative (5). The funds increased tobacco control advocates' ability to engage targeted governments and expedite policy adoption.

Since the FCTC entered into force and MPOWER was launched, increasingly comprehensive tobacco control policies have been adopted worldwide. There is mounting coverage of the world with the MPOWER provisions, particularly for monitoring, because of the success of the Global Adult Tobacco Survey (GATS) (**Figure 2**). Although implementation is uneven and quite incomplete around the world (**Figure 3**), the policy progress achieved between 2007 and 2010 is forecasted to result in approximately 7.5 million fewer smoking-related deaths by 2050 (24).

THE GLOBAL TOBACCO EPIDEMIC TODAY

The long-recognized need for surveillance of the global tobacco epidemic is now met by the Global Tobacco Surveillance System (GTSS), which has components directed at youth and adults. In 1999, the Global Youth Tobacco Survey (GYTS), a school-based survey of tobacco use among adolescents, was implemented by the WHO and the Centers for Disease Control and Prevention (48). Its coverage now reaches most countries, and multiple waves of data have been collected. With support from the Bloomberg Initiative, in 2009 the WHO and the Centers for Disease Control and Prevention also implemented the GATS, a standardized survey that has now been carried out by 26 countries, and several countries are now implementing a second wave of data collection (47).

The results of the GYTS and GATS document the ongoing epidemic and its heterogeneity. **Figures 4 and 5** provide a global picture of smoking among 13–15-year-old students based on the GYTS. The findings document the industry's continuing recruitment of new smokers, the global extent and heterogeneity of initiation, and the current close comparability of prevalence among male and female youths.

Table 1 provides findings from GATS through 2014 for 26 countries, covering a substantial majority of the world's smokers. Several patterns are notable: the generally higher prevalence of smoking among men, particularly in Asia; the very low smoking rates among Asian women—making them a target for the tobacco industry; the particularly high rates of smoking among men in Asian countries, Indonesia, Russia, and Greece; and the wide variation in the percentages of

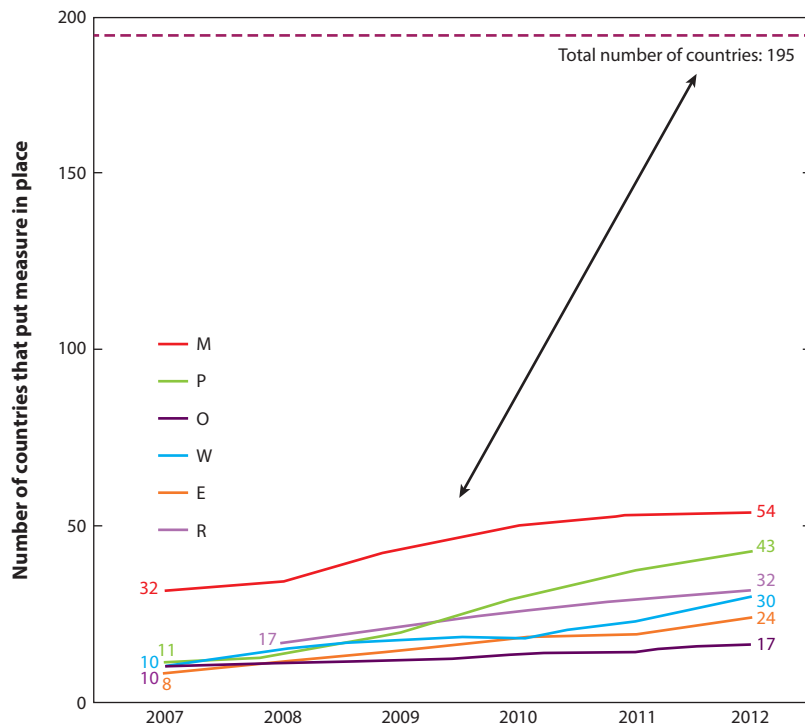


Figure 2

Five years of progress worldwide on MPOWER, 2007–2012.

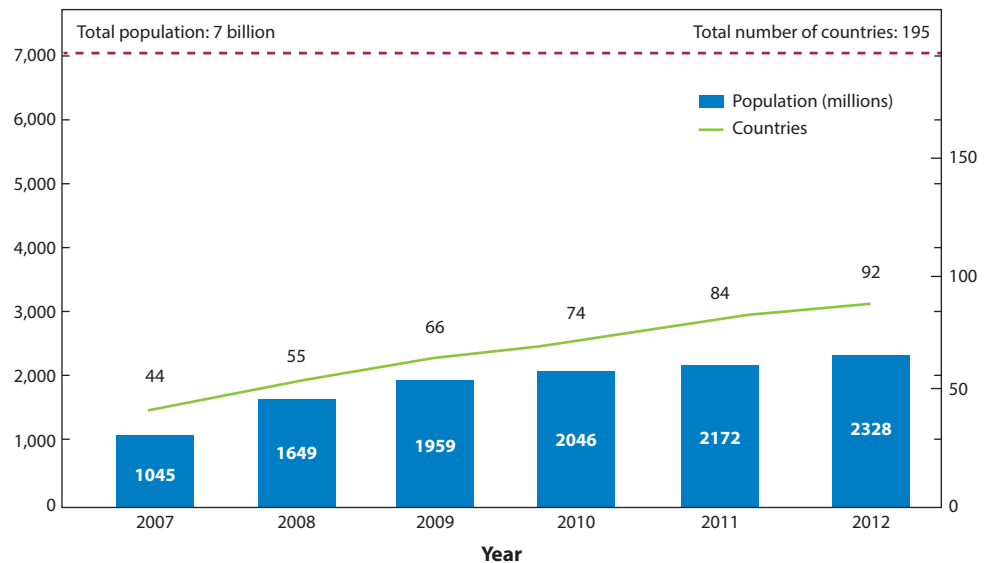


Figure 3

The number of people worldwide who are protected by effective tobacco control measures from MPOWER, 2007–2012.

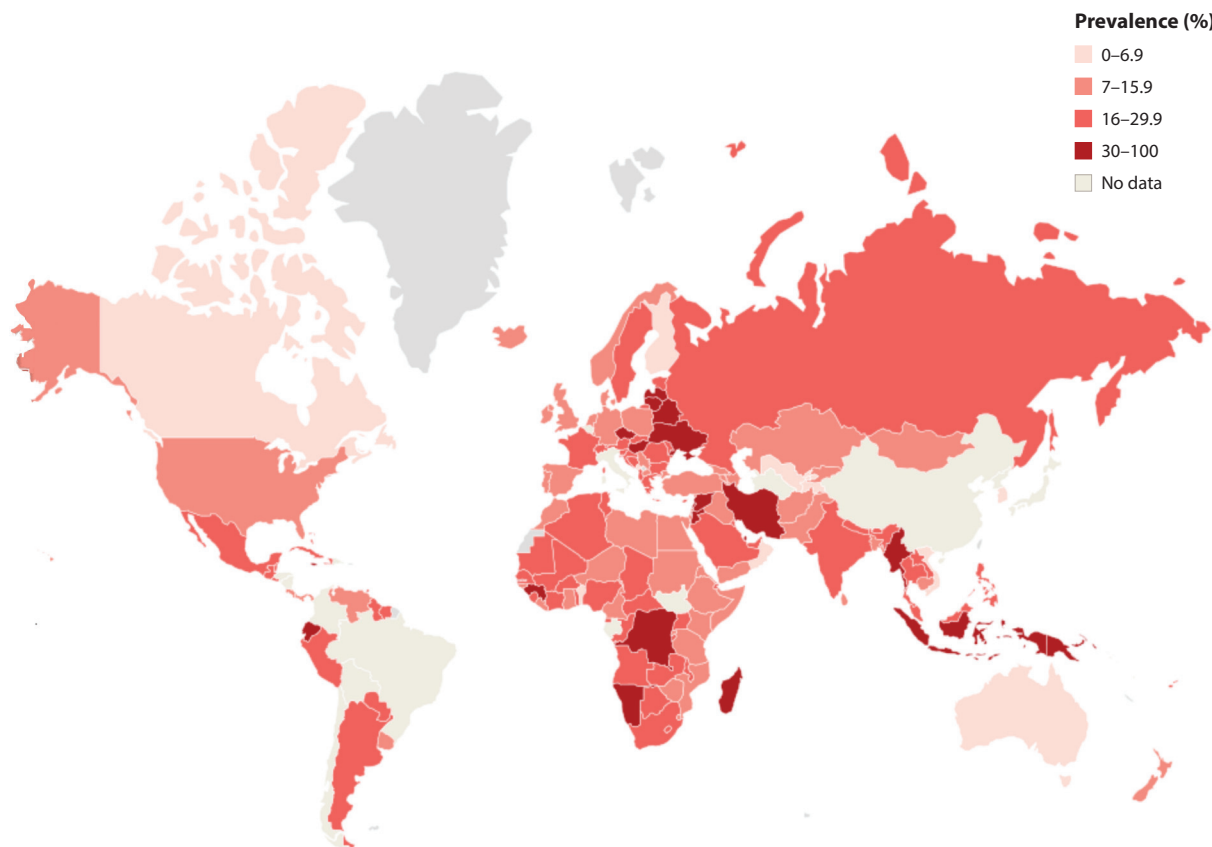


Figure 4

Percent of males (age 13–15) using any tobacco product in 2011 as documented in the Global Youth Tobacco Survey data.

former smokers. The findings make clear the challenges for global tobacco control: the large number of smokers at risk for premature mortality and excess morbidity, the persistence of high rates of smoking, and the large numbers of nonsmoking women who represent an appealing future market.

With 320 million smokers (more than the entire US population) and 1 million premature deaths caused by smoking each year, China represents the largest single stakeholder in the global tobacco epidemic. Tobacco control in China is defined by significant conflicts of interest. Although responsible for protecting the health of its citizens, the Chinese government is also the sole owner of the world's largest tobacco company, the China National Tobacco Corporation (CNTC), which is run by the State Tobacco Monopoly Association (STMA). Tobacco tax revenue comprises 5–8% of all government revenue and constitutes a major part of local government budgetary income in the tobacco-producing provinces such as Yunnan (18). China actively participated in the FCTC negotiations, during which it was known by international observers as one of the Big Four countries that effectively fought against strong commitments in the final FCTC text (52). However, since ratifying the FCTC in 2005, China has adopted a number of tobacco control laws, including implementing a complete public smoking ban in Beijing in 2015.

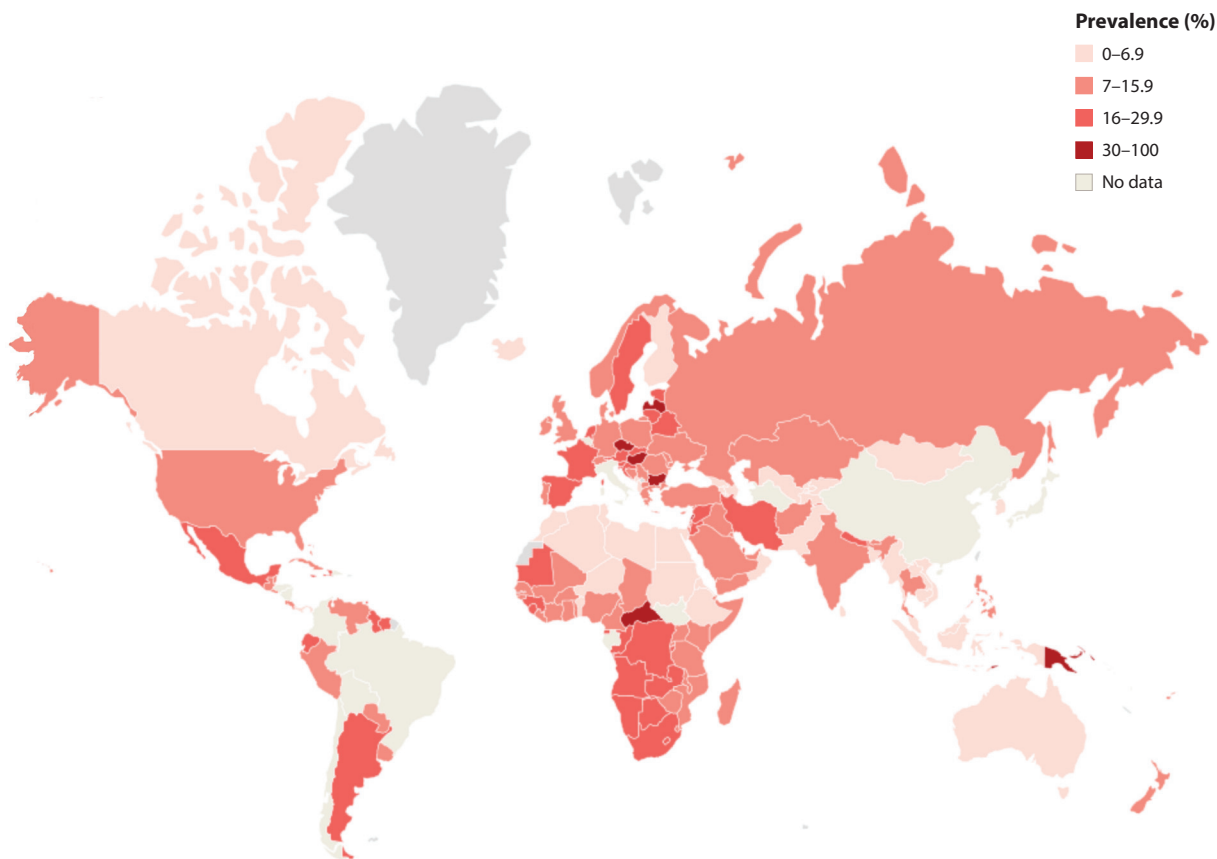


Figure 5

Percent of females (age 13–15) using any tobacco product in 2011 as documented in the Global Youth Tobacco Survey data.

NEW FRONTIERS OF GLOBAL TOBACCO CONTROL

Regardless of the progress made thus far in all countries to implement FCTC provisions, significant challenges to controlling tobacco remain. Although many of these challenges are specific to individual country settings and domestic realities, some are universal, including ongoing tobacco industry efforts to retain and grow their market, the rapidly changing tobacco product market, and the rise of tobacco-related trade disputes between countries.

One challenge in the current tobacco environment is the major effort under way by the top tobacco companies to remake their public image through new corporate social responsibility (CSR) programs (24). Transnational tobacco companies are increasingly acknowledging the scientific literature on the health effects of active smoking, funding youth prevention programs, and, in some cases, even voicing support at the national level for legislation, as was the case with Philip Morris in regard to regulation of tobacco by the US Food and Drug Administration. They are also active in nontobacco activities such as sponsoring the arts and supporting community programs. Companies may use CSR programs not just to enhance their public image, but also to gain access to and goodwill with politicians, influence agendas, and shape public health policy to best suit their own interests.

Table 1 Prevalence of never, current, and former smokers among adults ≥ 15 years old in 26 countries as documented by the Global Adult Tobacco Survey

		Prevalence (%), males			Prevalence (%), females		
Country	Year	Nonsmokers, never daily	Current smokers	Nonsmokers, formerly daily	Nonsmokers, never daily	Current smokers	Nonsmokers, formerly daily
African (AFR)							
Cameroon	2013	83.1	11.8	5.1	99.1	0.6	0.3
Kenya	2014	80.0	15.1	4.9	98.7	0.8	0.5
Nigeria	2012	89.2	7.3	3.5	99.3	0.4	0.3
Uganda	2013	83.9	10.3	5.8	96.0	1.8	2.2
Eastern Mediterranean (EMR)							
Egypt	2009	55.1	37.6	7.3	99.3	0.5	0.1
Qatar	2013	73.0	20.2	6.8	96.2	3.1	0.7
European (EUR)							
Greece	2013	32.4	51.2	16.4	67.0	25.7	7.3
Kazakhstan	2014	52.1	42.4	5.5	94.5	4.5	1.0
Poland	2009	41.3	36.9	21.8	64.3	24.4	11.3
Romania	2011	48.6	37.4	14.0	77.4	16.7	5.8
Russian Federation	2009	26.5	60.2	13.3	74.6	21.7	3.8
Turkey	2008	34.9	47.9	17.2	80.7	15.2	4.1
Turkey ^a	2012	–	41.5	–	–	13.1	–
Ukraine	2010	33.1	50.0	16.9	85.5	11.3	3.2
Region of the Americas (AMR)							
Argentina	2012	55.3	29.4	15.4	74.3	15.6	10.1
Brazil	2008	61.2	21.6	17.2	75.7	13.1	11.2
Mexico	2009	67.6	24.8	7.6	89.8	7.8	2.5
Panama	2013	87.5	9.4	3.1	95.0	2.8	2.2
Uruguay	2009	48.8	30.7	20.5	67.5	19.8	12.7
Southeast Asia (SEAR)							
Bangladesh	2009	46.8	44.7	8.4	97.5	1.5	1.0
India	2009	73.0	24.3	2.7	96.5	2.9	0.5
Indonesia	2011	27.0	67.0	6.0	96.7	2.7	0.6
Thailand	2009	37.5	46.6	16.0	96.2	2.6	1.2
Thailand ^b	2011	–	46.6	–	–	2.6	–
Western Pacific (WPR)							
China	2010	40.2	52.9	6.9	97.2	2.4	0.4
Malaysia	2011	51.7	43.9	4.4	98.8	1.0	0.1
Philippines	2009	41.3	47.6	11.0	88.5	9.0	2.5
Vietnam	2010	39.9	47.4	12.7	98.0	1.4	0.5

^aTurkey data updated in 2011, but missing data for nonsmokers, formerly daily and never daily.

^bThailand data updated in 2011, but missing for nonsmokers, formerly daily and never daily.

Evidence has shown that CSR programs have worked. By 2004, despite the entry into effect of the FCTC, the stock value of Philip Morris/Altria completely recovered from losses incurred as a result of US litigation and stockholder distrust (37). In 2004, British American Tobacco was awarded the Stakeholder Communication Award from the new PricewaterhouseCoopers Building Public Trust Awards (8).

The industry has also increased investment in smokeless tobacco and production of other new allegedly reduced-risk products such as electronic cigarettes (known as e-cigarettes). The market share of smokeless tobacco has risen dramatically over the past few years in many countries, and the public health community is currently playing catch-up to understand the impact of these new products on health and tobacco control (51). The popularity of e-cigarettes is particularly troublesome. All major transnational tobacco companies now have substantial e-cigarette businesses. The FCTC did not anticipate such “nontobacco” nicotine delivery systems, and these products have the potential to disrupt many aspects of traditional tobacco control and core FCTC policies, including tax, marketing, and product regulation (57).

The industry has also increasingly used WTO and other investment agreements to frustrate national tobacco control initiatives in line with the objectives of the FCTC, and their use represents a key industry strategy to challenge FCTC implementation. Recent disputes under WTO law include the *United States v. Clove Cigarettes* case in which the appellate body of the WTO held that parts of the US Family Smoking Prevention and Tobacco Control Act were inconsistent with WTO law (54). In particular, the Act’s ban on clove but not menthol-flavored cigarettes was considered discrimination against products of Indonesian origin, and the United States was ordered to reopen its market to clove cigarettes (or to ban menthol).

Another ongoing WTO case is *Australia v. Plain Packaging*. In that dispute, a number of WTO members, many of whom are parties to the FCTC and some of whom are known to have been guided by the tobacco industry, are challenging Australia’s right to require plain packaging of tobacco products (53). Various claims have been made against the packaging law, including that the measure unlawfully interferes with trademark rights and is more trade restrictive than necessary to protect health. This case raises the question of just how much authority any government has over the content and look of tobacco product packaging.

In addition to these high-profile WTO disputes, tobacco companies have also recently brought claims against countries under other international investment agreements. For example, Philip Morris International has challenged Australia’s plain packaging legislation under a bilateral investment treaty (BIT) between Australia and Hong Kong (35). The company claims that plain packaging results in an expropriation of its property rights and is unfair and unreasonable. On similar grounds, the company has also challenged Uruguayan tobacco packaging and labeling measures under a BIT between that country and Switzerland (32).

A key challenge to responding effectively to the evolving tobacco industry is the significant lack of agreement within the global tobacco control community over how emerging issues in the global tobacco control environment should be handled. In regard to trade, for example, the global community is split between those who believe they must work within the existing frameworks of the global trade regime and those who believe that the tobacco control community must call for fundamental changes in how tobacco and other health issues are addressed in existing and emergent agreements. For example, during the negotiations of the Trans-Pacific Partnership (TPP) agreement, some tobacco control advocates pushed for a “tobacco exception” in the text—meaning that individual nations’ tobacco regulations, such as those banning advertising or requiring warning labels—could not be legally attacked as “nontariff barriers” to the free flow of goods. After the United States refused to advance such an exception, the Southeast Asia Tobacco Control Alliance (SEATCA) successfully lobbied Malaysia to propose such a “carve out” to the text. Malaysia

eventually softened its position to reflect the US position, calling on parties to the agreement to counsel with each other before bringing a state-to-state claim regarding a tobacco measure under the TPP. Others in the tobacco control community saw this effort as futile and potentially counterproductive to the more important need to push for enforcement of the existing TPP text exemption for policies necessary to protect human life or health (36). In regard to e-cigarettes and other nontobacco nicotine products, there is a divide between those who see such products as potentially beneficial for harm reduction (and even go so far as to endorse the products) and those who see the products as potentially dangerous and threatening to the hard-fought advances won against traditional tobacco use.

Although disagreement within the tobacco control community is not inherently bad, the tobacco control story over the past half-century has consistently demonstrated how a united tobacco control community can frame issues, set agendas, and drive policy change. Cohesion was a key factor in ensuring the community's collective agency, which directly led to policy change and tobacco control programming. The dissolution of this unity weakens the community's message, its ability to set agendas, and consequently its influence in the process whereby the tobacco industry can exploit divide-and-rule opportunities.

One positive development is the emergence of a unified approach to the prevention of NCDs, in part following from attention to this emerging global challenge by the United Nations. A high-level summit meeting was held in 2011, which focused on cancer, cardiovascular disease, chronic obstructive pulmonary disease, and diabetes and on four common risk factors for these diseases, including tobacco use. This new movement for NCD control should further enhance tobacco control (50).

CONCLUSION

The global tobacco epidemic has been under way for more than a century, leading to several hundred million premature deaths in the twentieth century and, if unchecked, causing a billion more during the twenty-first century. The tobacco epidemic's first century has provided us with key lessons for controlling tobacco use, including the power of scientific evidence to spark rapid and dramatic policy change, the need for brave leadership to transform the status quo, and the need to hold transnational companies responsible for the harm that emerges from unfettered corporate greed. Above all, we must remember that the global fight to prevent tobacco-related death and disease is far from over.

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LITERATURE CITED

1. Am. Soc. Heating Refrig. Air-Cond. Eng. 2013. *Environmental Tobacco Smoke Position Paper*. Atlanta, GA: Am. Soc. Heating Refrig. Air-Cond. <https://www.ashrae.org/about-ashrae/position-documents>
2. Colombo B. 1999. Introduction: Tobacco regulation: the convergence of law, medicine & public health: a symposium in celebration of the inauguration of the William Mitchell College of Law's Center for Health Law & Policy. *William Mitchell Law Rev.* 25:Art. 12
3. Barnoya J, Glantz SA. 2006. The tobacco industry's worldwide ETS consultants project: European and Asian components. *Eur. J. Public Health* 16:69–77

4. Bill & Melinda Gates Found. 2008. *Michael Bloomberg and Bill Gates join to combat global tobacco epidemic*. Press Release, July 23. <http://www.gatesfoundation.org/Media-Center/Press-Releases/2008/07/Michael-Bloomberg-and-Bill-Gates-Join-to-Combat-Global-Tobacco-Epidemic>
5. Bloomberg M. 2011. *Accelerating the Worldwide Movement to Reduce Tobacco Use*. New York: Bloomberg Philanthr. <http://www.bloomberg.org/content/uploads/sites/2/2014/04/BloombergPhilanthropies2011TobaccoReport.pdf>
6. Bloomberg Philanthr. 2015. *Tobacco control progress*. Bloomberg Philanthr., New York. <http://www.bloomberg.org/program/public-health/tobacco-control/-progress>
7. Brandt AM. 2007. *The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product that Defined America*. New York: Basic Books
8. Broughton M. 2004. Chairman's speech to the British American Tobacco annual general meeting. Presented April 21, London
9. Crescenti MG. 1998. The new tobacco world. *Tob. J. Int.* 3:7
10. Doll R, Hill AB. 1950. Smoking and carcinoma of the lung: preliminary report. *BMJ* 2:739–48
11. Doll R, Hill AB. 1954. The mortality of doctors in relation to their smoking habits: a preliminary report. *BMJ* 1:1451–55
12. Drope J, Chapman S. 2001. Tobacco industry efforts at discrediting scientific knowledge of environmental tobacco smoke: a review of internal industry documents. *J. Epidemiol. Community Health* 55:588–94
13. Duke Homestead Hist. Site. 2006. *A brief history of the Duke family and its tobacco empire*. N.C. Hist. Sites, Raleigh. <http://www.nchistoricsites.org/duke/main.htm>
14. Family Smok. Prev. Tob. Control Act, H.R. 1256, 111th Cong. (2009)
15. Hammond R. 1998. Consolidation in the tobacco industry. *Tob. Control* 7:426–28
16. Henningfield JE, Rose CA, Zeller M. 2006. Tobacco industry litigation position on addiction: continued dependence on past views. *Tob. Control* 15(Suppl. 4):27–36
17. Hirayama T. 1981. Non-smoking wives of heavy smokers have a higher risk of lung cancer: a study from Japan. *BMJ (Clin. Res. Ed.)* 282:183–85
18. Hu TW, Mao Z, Ong M, Tong E, Tao M, et al. 2006. China at the crossroads: the economics of tobacco and health. *Tob. Control* 15(Suppl. 1):37–41
19. Hurt RD, Robertson CR. 1998. Prying open the door to the tobacco industry's secrets about nicotine: the Minnesota Tobacco Trial. *JAMA* 280:1173–81
20. Int. Agency Res. Cancer. 2002. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 83: *Tobacco Smoke and Involuntary Smoking*. Lyon: Int. Agency Res. Cancer. <http://monographs.iarc.fr/ENG/Monographs/vol83/mono83.pdf>
21. Kaufman M. 2001. Negotiator in global tobacco talks quits. *The Washington Post*, Aug. 2, p. A01. <http://www.takingontobacco.org/letter/us0105u.html>
22. Kiernan VG. 1991. *Tobacco: A History*. London: Hutchinson Radius
23. Levin ML, Goldstein H, Gerhardt PR. 1950. Cancer and tobacco smoking: a preliminary report. *JAMA* 143:336–38
24. Levy DT, Ellis JA, Mays D, Huang A-T. 2013. Smoking-related deaths averted due to three years of policy progress. *Bull. World Health Organ.* 91:509–18
25. Lopatto E. 2012. Mayor Bloomberg donates \$220 million to fight smoking abroad. *Bloomberg Business*, March 22. <http://www.bloomberg.com/news/2012-03-22/mayor-bloomberg-donates-220-million-to-fight-smoking-overseas.html>
26. Mackay J. 2003. The making of a convention on tobacco control. *Bull. World Health Organ.* 81:551
27. Mazur J, Woynarowska B, Kowalewska A. 2000. *Tobacco Smoking: Health of School-Aged Children in Poland*. Warsaw, Pol.: Fac. Psychol., Univ. Warsaw
28. NAAG (Nat. Assoc. Atty. Gen.) 1998. *The master settlement agreement*. NAAG, Washington, DC. <http://www.naag.org/assets/redesign/files/msa-tobacco/MSA.pdf>
29. Norr R, Herald C. 1952. Cancer by the carton. *The Reader's Digest*, Dec. <https://industrydocuments.library.ucsf.edu/tobacco/docs/#id=fgfg0003>
30. Ong EK, Glantz SA. 2001. Constructing “sound science” and “good epidemiology”: tobacco, lawyers, and public relations firms. *Am. J. Public Health* 91:1749–57

31. Peto R, Lopez AD. 2001. Future worldwide health effects of current smoking patterns. In *Critical Issues in Global Health*, ed. CE Koop, CE Pearson, MR Schwarz, pp. 154–61. San Francisco: Jossey-Bass
32. Philip Morris Int. 2010. *FTR Holdings SA (Switzerland), Philip Morris Products S.A. (Switzerland), and Abal Hermanos SA (Uruguay) v. Oriental Republic of Uruguay: Request for Arbitration* ARB/10/7. ICSID. <http://www.italaw.com/sites/default/files/case-documents/italaw1531.pdf>
33. Proctor R. 2012. *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition*. Berkeley: Univ. Calif. Press
34. R. Coll. Phys. 1962. *Smoking and Health*. London: Pitman
35. Robinson AA, Philip Morris (Asia) Limited. 2011. *Notice of arbitration: Australia/Hong Kong agreement for the promotion and protection of investments*. Sent to R McClelland, S Daley, Nov. 21. <http://www.italaw.com/sites/default/files/case-documents/ita0665.pdf>
36. Satpute A. 2014. Tobacco in Trans-Pacific Partnership (TPP) negotiations: implications on Indian laws. *Trade Law Anal.* July 28. <https://tradelawanalyst.wordpress.com/2014/07/28/tobacco-in-trans-pacific-partnership-tpp-negotiations-implications-on-indian-laws/>
37. Stillman FA, Wipfli H. 2005. New century: same challenges. *Br. J. Cancer* 92:1179–81
38. TIRC (Tob. Ind. Res. Comm.). 1954. *A frank statement to cigarette smokers*. Jan. 4. TIRC, New York. <http://archive.tobacco.org/History/540104frank.html>
39. Trichopoulos D, Kalandidi A, Sparros L, MacMahon B. 1981. Lung cancer and passive smoking. *Int. J. Cancer* 27:1–4
40. *United States v. Philip Morris USA I, et al.* Civil Action No. 99–2496 (GK), amend. final opin. (2006)
41. US DHEW (Dep. Health Educ. Welf.). 1964. *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, DC: US GPO
42. US DHHS (Dep. Health Hum. Serv.). 1986. *The Health Consequences of Involuntary Smoking: A Report of the Surgeon General*. Rep. DHHS Publ. No. 87–8398. Washington, DC: US DHHS, Public Health Serv., Off. Smok. Health
43. US DHHS (Dep. Health Hum. Serv.). 2004. *The Health Consequences of Smoking. A Report of the Surgeon General*. Atlanta, GA: US DHHS, Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health
44. US DHHS (Dep. Health Hum. Serv.). 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke. A Report of the Surgeon General*. Atlanta, GA: US DHHS, Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health
45. US DHHS (Dep. Health Hum. Serv.). 2014. *The Health Consequences of Smoking—50 Years of Progress. A Report of the Surgeon General*. Atlanta, GA: US DHHS, Cent. Dis. Control Prev., Natl. Cent. Chronic Dis. Prev. Health Promot., Off. Smok. Health
46. US EPA (Environ. Prot. Agency). 1992. *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders*. EPA Rep. 600/6–90/006F. Washington, DC: Off. Health Environ. Assess., Off. Res. Dev.
47. Warren CW, Lee J, Lea V, Goding A, O'Hara B, et al. 2009. Evolution of the Global Tobacco Surveillance System (GTSS) 1998–2008. *Glob. Health Promot.* 16:4–37
48. Warren CW, Riley LA, Asma S, Eriksen MP, Green LW, Yach D. 2000. Tobacco use by youth: a surveillance report from the Global Youth Tobacco Survey Project. *Bull. World Health Organ.* 78:868–76
49. Waxman HA. 2003. *Letter to the President from Henry A. Waxman*. Sent to Pres. GW Bush, Apr. 23. <http://archive.tobacco.org/resources/general/030429waxman.html>
50. WHO (World Health Organ.). 2011. *United Nations high-level meeting on noncommunicable disease prevention and control*. Presented at NCD Summit to Shape the International Agenda, Sept. 19–20, New York. http://www.who.int/nmh/events/un_ncd_summit2011/en/
51. Wipfli H. 2007. *Diffusion, Norms, and Governance: The Case of Tobacco Control*. Geneva: Univ. Genève
52. Wipfli H. 2015. *The Global War on Tobacco: Mapping the World's First Public Health Treaty*. Baltimore, MD: Johns Hopkins Univ. Press
53. WTO (World Trade Organ.). 2012. *Australia—Certain measures concerning trademarks and other plain packaging requirements applicable to tobacco products and packaging*. Request for the establishment of a panel by Ukraine. Dispute DS434, March 13. https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds434_e.htm

54. WTO (World Trade Organ.). 2012. *United States—Measures affecting the production and sale of clove cigarettes*. Dispute DS406, April 4. https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds406_e.htm
55. Wynder EL, Graham EA. 1950. Tobacco smoking as a possible etiologic factor in bronchiogenic carcinoma: a study of 684 proved cases. *JAMA* 143:329–36
56. Wynder EL, Graham EA, Croninger AB. 1953. Experimental production of carcinoma with cigarette tar. *Cancer Res.* 13:855–64
57. Yach D. 2014. The origins, development, effects, and future of the WHO Framework Convention on Tobacco Control: a personal perspective. *Lancet* 383:1771–79
58. Zatoński W. 2003. *A Nation's Recovery. Case Study of Poland's Experience in Tobacco Control*. Warsaw, Pol.: Health Promot. Found.