Chapter 15
The Changing Landscape of Tobacco Control—Current Status and Future Directions

Introduction

This chapter addresses options for tobacco control in the United States moving forward after the 50 years of progress since the 1964 report. In this section, previous chapters have charted the course of the epidemic (see Chapter 13, "Patterns of Tobacco Use Among U.S. Youth, Young Adults, and Adults") and the state-of-knowledge related to tobacco control (see Chapter 14, "Current Status of Tobacco Control"). They have also documented the burden of tobacco-caused disease and premature death (see Chapter 12, "Smoking-Attributable Morbidity, Mortality, and Economic Costs"). This chapter summarizes the modeling that demonstrates this burden will persist well into the twenty-first century, absent the acceleration in the decline of cigarette smoking. Chapter 16, "A Vision for Ending the Tobacco Epidemic: Towards a Society Free of Tobacco-Caused Death and Disease," sets out a vision for the future, creating a society free of tobacco-related death and disease. This chapter addresses how that vision can be achieved, considers what we have learned and accomplished to date in tobacco control, and identifies challenges to accelerating the impact of tobacco control and to ending the tobacco epidemic. It considers what else we need to know through research and surveillance and what are the possible evidence-based paths toward the elimination of premature death, disease, and economic costs caused by tobacco use.

The target for future tobacco control initiatives is already well described in two key national reports: The Institute of Medicine's (IOM's) report, *Ending the Tobacco Problem: A Blueprint for the Nation* (Bonnie et al. 2007) and *Ending the Tobacco Epidemic: A Tobacco Control Strategic Action Plan for the U.S. Department of Health and Human Services* (*Strategic Action Plan*) (U.S. Department of Health and Human Services [USDHHS] 2010a). Potential future directions are examined in the context of today's rapidly changing tobacco control landscape, and plausible alternative strategies based on proven effective interventions and policies are discussed. Finally, proposed potential end game scenarios are reviewed. Some of these are potentially applicable in the United States, and others that are unlikely in the United States may be applicable elsewhere. They are presented to provide a starting point for exploring potential options that may profoundly reduce preventable disease and death as quickly as possible.

The Tobacco Control Landscape: Over a Hundred Years and Counting

This report's previous chapters have described the origins of the tobacco epidemic and its century-long course. As discussed in prior Surgeon General's reports (USDHHS 2000b, 2010b) and in Chapter 2, "Fifty Years of Change 1964–2014" of this report, tobacco has been grown and used in the Americas for many millennia, but widespread use of highly addictive cigarettes is relatively recent, beginning at the end of the nineteenth century. The massive cigarette-attributable disease epidemic we have faced since the middle of the twentieth century was precipitated by the emergence of the modern cigarette industry early in the twentieth century. The epidemic of morbidity and mortality in the United States has been largely driven by cigarette use, the most common form of tobacco use globally (with the exception of South Asia and parts of Africa) (USDHHS 2010b; Giovino et al. 2012).

Since tobacco consumption was first tracked in the 1880s, patterns of use of various combustible and noncombustible tobacco-derived nicotine products have varied over time, geographically, and among population groups in the United States (Figure 13.1); these various products also have potentially different levels of addiction and toxicity (see Chapter 13 and previous Surgeon General's reports for discussions of addiction and toxicity [USDHHS 1988, 2000b, 2010b, 2012b]). The rapidity of onset of the cigarette epidemic is notable; cigarette use increased tenfold in the United States between 1908–1925 (from 105 to 1,085 cigarettes per capita) (Figure 13.1) and by the 1940s cigarettes had almost replaced other forms of tobacco use in the United States (Centers for Disease Control and Prevention [CDC] 1999; Giovino 2002; Proctor 2011). This epidemic was fueled by the widespread marketing and dissemination of this product—a combustible, easily-inhaled mass-manufactured cigarette, instead of the less convenient pipes, cigars, and smokeless products widely used in earlier decades (USDHHS 2000b; Giovino 2002; World Health Organization [WHO] 2008; Proctor 2011).

Many factors are responsible for the rapid increase of cigarette smoking, but the tobacco industry was the central driver (see Chapter 2) through: (1) development of industrial technology enabling cigarette mass production, packaging, and distribution (USDHHS 2000b); (2) aggressive pricing and marketing combined with positive portrayals of cigarettes in movies—and endorsements by movie stars, sports idols, and even physicians (see Chapters 2 and 14) (USDHHS 2001, 2012b)—and including cigarettes in daily rations for soldiers in two World Wars (see Chapter 14, and Appendix 14.1 available online at www.surgeongeneral.gov); and (3) widespread industry actions throughout society to advance its interests, including lobbying and using tactics later found to constitute fraud and racketeering, such as misleading the public about the risks of smoking (see Chapter 14) (*United States v. Philip Morris 2006*).

The contemporary era of tobacco control, which originated in the 1950s and 1960s, was motivated by the recognition that tobacco smoking was having devastating and increasing consequences for public health. The rising numbers of cases of lung cancer reported by physicians in the 1920s became a well-documented epidemic of lung cancer deaths among men by the 1950s (see Chapter 4, "Advances in Knowledge of the Health Consequences of Smoking: From 1964–2014"; Figures 4.1 and 4.3). Early epidemiologic investigations readily found evidence that cigarette smoking had a primary role in this emerging lung cancer epidemic among men and also in the parallel epidemic of cardiovascular disease. Increasingly intense tobacco control over the last decades of the twentieth century brought success, considered one of the top public health achievements of the century (CDC 1999; Ward and Warren 2007). The prevalence of adult smoking was dramatically reduced from a high of 42.7% (1965) to 18.1% at present (2012) (see Chapter 13). Annual adult per capita cigarette consumption dropped by 72% from 4,345 cigarettes in 1963 to 1,196 in 2012 (see Figure 2.1). The many actions that drove this decline are described in Chapter 14 and in earlier Surgeon General's reports (see Chapter 14; online Appendices 14.1–14.5) (USDHHS 1989, 2000b).

Looking to the future, tobacco control needs to be shaped to address an increasingly heterogeneous pattern of use of tobacco products, including emerging noncombustible products (Chapter 13). Some of the highest prevalence rates are now among persons of lower socioeconomic status, some racial and ethnic minority groups, sexual minorities (including individuals who are gay, lesbian, bisexual and transgender, and individuals with same-sex relationships and/or attraction), high school dropouts (Fagan et al. 2007; Lee et al. 2009; Garrett et al. 2011; Substance Abuse and Mental Health Services Administration [SAMHSA] 2013b), persons with mental illness and alcohol and substance abuse disorders (Prochaska et al. 2008; Schroeder and Morris 2010; Villanti et al. 2012; CDC 2013), American Indians and Alaska Natives as well as recent immigrants from high-prevalence countries, and people with complex comorbid medical illnesses (e.g., HIV/AIDS and cardiovascular disease) (Crothers et al. 2009; Hoffman et al. 2009; Marshall et al. 2009; Vidrine 2009; Levine et al. 2010; Tesoriero et al. 2010; Pines et al. 2011; Rahmanian et al. 2011). There is also substantial geographic variation with the highest prevalence rate in Appalachia and the South (Pickle and Su 2002).

Smoking cessation needs increased attention. Although there has been significant progress during the last 50 years, there is a major gap between the current level of successful quit attempts and the level needed to achieve the *Healthy People 2020* goal (Levy et al. 2010c). While adolescents and adults want to quit (70% plan to, and more than 50% try each year), far too few have been successful in quitting (about 4–6% of the smoking population as a whole succeed annually) (Burns et al. 2000; CDC 2011b). Utilization of proven treatments remains low among those attempting to quit, and little has been done to improve the success rates of unassisted smoking cessation efforts (Chapman and MacKenzie 2010; Chapman and Wakefield 2013). Since these unaided quit attempts (e.g., called quitting "cold turkey," or described as quitting without seeking help from health care provider, program, or other cessation services) have historically accounted for up to 90% of those who quit each year, it has been suggested that price increases, smoke-free policies, media campaigns, and other factors that decrease the social acceptability of smoking could enhance the success of these unassisted smoking cessation efforts (Chapman and MacKenzie 2010; Chapman and Wakefield 2013).

More aggressive prevention is also needed. Even after decades of using multiple, comprehensive strategies, each day more than 3,200 youth younger than 18 years of age smoke their first cigarette and another 2,100 youth and young adults who are occasional smokers go on to become daily smokers (SAMHSA 2013a). Nearly 9 out of 10 smokers experiment before 18 years of age, and 98% start smoking by 26 years of age (see Chapter 13, Table 13.2). Adolescents are highly vulnerable to tobacco industry marketing, smoking imagery in movies, and peer influence, and are not fully able to appreciate the health risks they face in the future (USDHHS 2012b). While progress has been made in reducing the prevalence of smoking among high school students, the rate of decline in recent years has slowed (see Chapter 13, Figure 13.8), and the number of youth and young adults who annually initiate smoking was significantly higher in 2012 (2.3 million) than it was in 2002 (1.9 million) (see Figure 13.26).

Although the 50 years of progress should be celebrated, modeling shows a large gap between what has been achieved in reducing the tobacco epidemic and what could have been achieved if smoking had been eliminated after the 1964 Surgeon General's report (Moolgavkar et al. 2012). In a recent analysis by the National Cancer Institute's Cancer Intervention and Surveillance Modeling Network, a consortium of six research groups provided an estimate of the cumulative impact of the changes in smoking behavior that started in the mid-1950s on lung cancer mortality in the United States during 1975–2000 (Moolgavkar et al. 2012). Approximately 800,000 lung cancer deaths were estimated to have been averted in the United States during 1975–2000, but this figure comprises only about 32% of the lung cancer deaths that could have been avoided if tobacco smoking had been completely eliminated after the 1964 Surgeon General's report.

For the future, tobacco control needs to more forcefully impact the burden of avoidable disease and premature death. About one-half of the 42.1 million smokers in the United States in 2012 (CDC 2013) who continue smoking into later decades of life will die prematurely of a tobacco-related disease, primarily from cigarette smoking (Jha et al. 2013). By 2015, tobacco use is expected to be responsible for 10% of all deaths globally (Mathers and Loncar 2006). Should such trends continue without any change in interventions and policy, the tobacco epidemic will be prolonged well into the twenty-first century. In fact, the scope of the epidemic may even increase if any of the tobacco control measures that are in place today are eroded (see Appendix 15.1 available online at www.surgeongeneral.gov); (Mendez et al. 1998; Mendez and Warner 2000, 2004, 2007, 2008; Levy et al. 2001).

The various patterns of using more than one type of combustible product raises additional concerns about our progress toward ending the epidemic of tobacco-related disease. Although the prevalence of current smoking among adults has declined in recent years (see Chapter 13, Figure 13.4 and Table 13.19), a high percentage of adolescent and young adult cigarette smokers report using more than one tobacco product (see Chapter 13, Tables 13.16 and 13.17). The prevalence of adults 18 years of age and older who report smoking cigarettes, cigars, or roll-your-own cigarettes using pipe tobacco presents a much less optimistic picture than looking at the prevalence of cigarette smoking only (see Chapter 13, Table 13.19). While the prevalence of using any of these smoked products has declined since 2002 (from 28.8%), 25.2% of adults reported current use in 2012 (see Table 13.19).

Given the urgency of reducing smoking and the only partial success of tobacco control to date, this chapter considers potential additions to what we are already doing. Given the growing awareness of the highly lethal and addictive nature of cigarettes, more dramatic restrictions on the manufacture, distribution, marketing, and sale of tobacco products are being proposed (Daynard 2009; Proctor 2013). The public health community has begun discussion of end game strategies, described subsequently in this chapter, that can be used to augment existing strategies. A further and emerging consideration is the role of the new products being introduced rapidly into the marketplace that can deliver aerosolized nicotine without the harmful products of combustion in cigarette smoke. Their availability and marketing could result in a significant fraction of smokers switching completely to them (Sumner 2003). However, there is also the potential for such products to have effects on youth initiation, to lead to a renormalization of public use of nicotine, and to result in sustained dual use of both aerosolized nicotine and cigarettes.

Modeling Plausible Futures: What Is Possible Using our Current Policy Tools?

In considering how to accelerate the end of the tobacco epidemic, models are an essential tool for projecting the potential consequences of tobacco control strategies. Models are used to project future patterns of tobacco use, given various scenarios of tobacco control measures. Appendix 15.1 provides an overview of tobacco control simulation models and how they have been applied to such scenarios. The results of modeling document the need for more aggressive action than the current level of implementation. Projections indicate that the prevalence of adult smoking could likely still be above the *Healthy People 2020* objective of 12% even by mid-century, if there is little change to current strategies (Figure 15.1) (Warner and Mendez 2010; Mendez et al. 2013). Further modeling shows that the goal of 12% prevalence cannot be reached by 2020 unless national initiation and cessation rates become similar to those observed in California in 2005, when California led the nation in declining smoking prevalence (Figure 15.2) (Mendez and Warner 2008). The success of the California comprehensive statewide tobacco control program (see Chapter 14) demonstrates that existing tobacco control strategies are effective when implemented on a sustained basis and argue for more robust and sustained implementation of these existing strategies nationally (see Appendix 15.1, Figure 15.1.13).

Models have been used to examine the impact of strengthening existing tobacco control policies (taxation, smokefree indoor air, and mass media campaigns), and the components of cessation interventions and their delivery

Figure 15.1   Predicted rates of smoking initiation and cessation for U.S. adults, University of Michigan Tobacco Prevalence and Health Effects Model
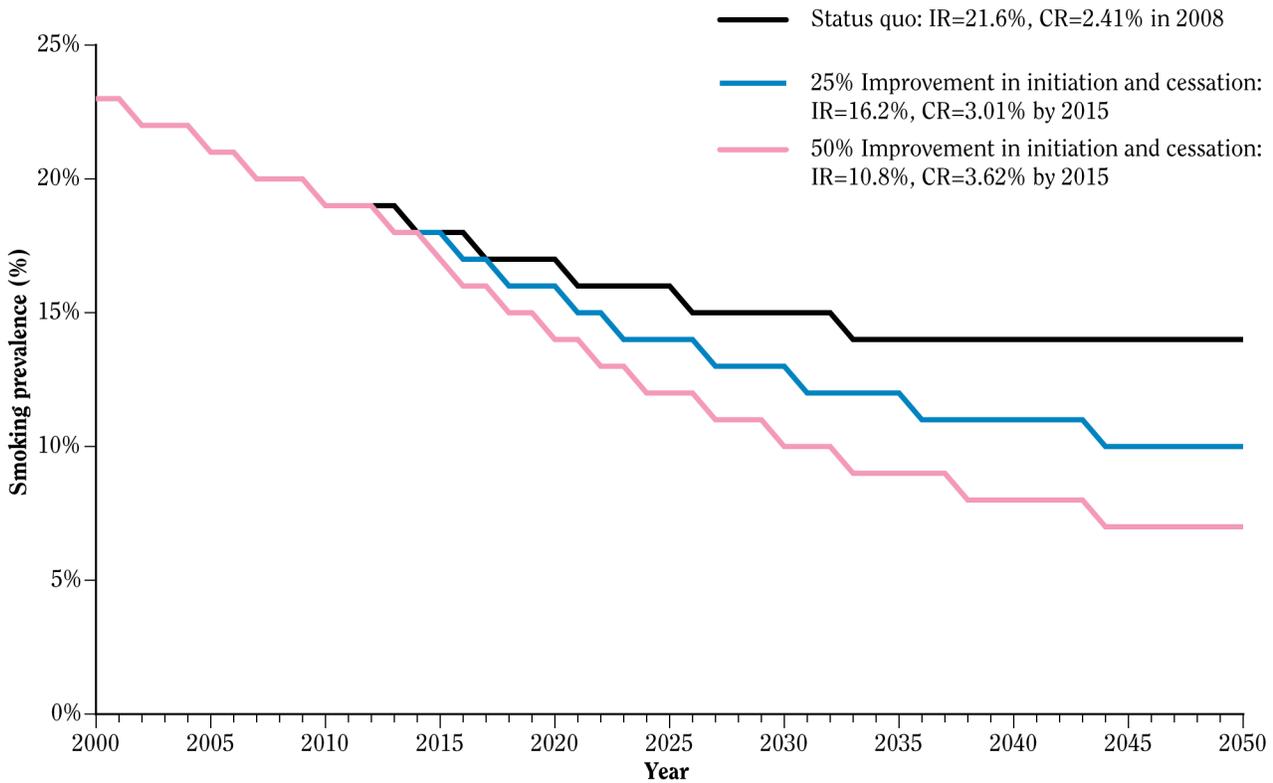
Source: University of Michigan, unpublished data.
Note: **CR** = cessation rate; **IR** = initiation rate.

systems, which are all well-grounded in scientific evidence (Figure 15.3) (Abrams et al. 2010; Levy et al. 2010a,b,c). Model results suggest that boosting quit attempts, treatment use, and treatment effectiveness by 100% would lead to moderate to dramatic reductions in the prevalence of adult smoking, by as early as 2020, to national levels ranging as low as 6.3–11.5% (Levy et al. 2010a). Building on the model of cessation treatments (Levy et al. 2010a), a broader simulation model explored the effects of implementing a comprehensive tobacco control strategy with four components directed at reducing the prevalence of smoking in the population: (1) price increases including those that result from cigarette tax increases, (2) smoke-free indoor air laws, (3) mass media/educational policies, and (4) evidence-based and promising new cessation treatment policies (Levy et al. 2010c). The goal of the models was to examine the relative effectiveness of the four policies and their potential combined contributions towards meeting the *Healthy People 2010* goal of 12% smoking prevalence. The modeling showed that implementing all four policies simultaneously at optimal levels in 2008,

without considering other potentially limiting factors, would increase the population quit rate by about 300% by 2013 (Levy et al. 2010c). Such aggressive efforts over a short period would have been needed to lower the prevalence from 20.1% in 2008 to the 12% *Healthy People 2010* goal by 2013. In actuality, in 2012, the prevalence was well above the *Healthy People 2010* goal (Figure 15.4).

Although a scenario with implementation of all four tobacco control policies at optimal levels at the same time was shown to produce a more optimistic projection, the projected increase of the population quit rate to about 300% would require significantly more effort than at present. Nevertheless, this simulation model illustrates the outcome of one scenario which produces higher impact estimates, involving the full suite of approaches currently known to be effective and implementing them with aggressive strategies, for example, improving the amount of reimbursement for the mandated insurance coverage of, and access to, evidence-based prevention and cessation services (Abrams 2007; Orleans et al. 2010).

The implications of the modeling carried out by Mendez and Warner (2007, 2010) are similar. Using a model that has forecast the prevalence of smoking in the United States quite accurately over a decade, Mendez and Warner (2007, 2010) demonstrated that if smoking initiation and cessation rates remain unchanged, the prevalence of adult smoking will stabilize at about 13.5% by the middle of the present century, a level of smoking that would exceed the *Healthy People 2020* goal of 12% and would still be higher than the percentage already achieved in California (Figure 15.2). Their analysis demonstrated that if the smoking initiation rate could be quickly brought down by 25% at the same time that cessation rates increased by 25%, the prevalence of smoking would fall to an estimated 10% by 2050. If initiation dropped by 50% and cessation rates increased by 50%, prevalence would drop to 6.7% by 2050. For 2020, the model predicts a smoking prevalence of 16.7% with status quo initiation and cessation rates, 15.5% with initiation and cessation improving by 25%, and 14.3% with initiation and cessation each improving by 50%. Even the most optimistic of these scenarios suggests that the *Healthy People 2020* target of 12% prevalence of adult smoking will not be achieved in 2020 (USDHHS 2012a). Even if this prevalence rate were achieved, one-eighth of adults would remain smokers, ensuring an annual mortality toll caused by smoking that would remain at hundreds of thousands of Americans for decades.

Simulation models are useful, but the projections are only as valid as their underlying assumptions and their input and transitional probability parameters, which are generally based on available data and sensitivity analysis (see Appendix 15.1). Nevertheless, there is utility in using simulation modeling to ask complex questions about future possibilities and then to suggest possible leverage points that could provide more efficient ways to reduce tobacco use. The results of simulation models also illustrate the potential population impact of systems integration of all intervention and policy elements, as recommended in IOM's report and the *Strategic Action Plan* (Bonnie et al. 2007; USDHHS 2010a). Systems-level modeling will remain a needed tool for continually revising tobacco control strategies, reflecting the dynamic nature of the tobacco epidemic and its drivers (see Figure 15.3).

Figure 15.2   Projection of U.S. adult smoking prevalence rates under status quo scenario and California rate scenarios, 2005–2020
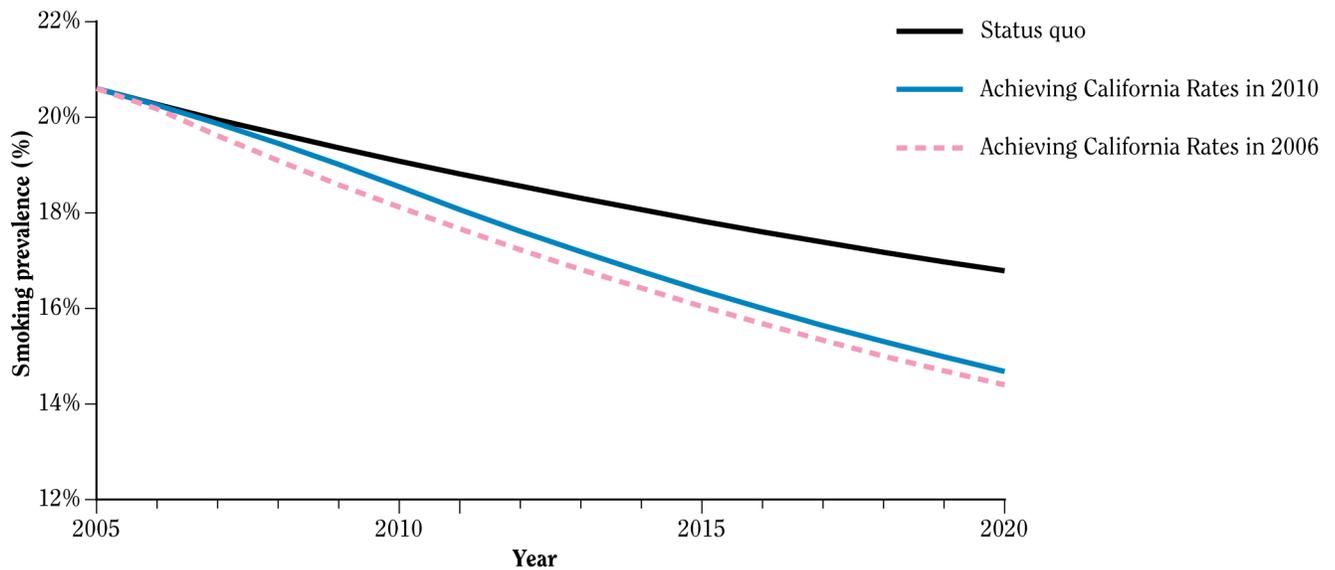
Source: Mendez and Warner 2008. Reprinted with permission from The Sheridan Press, © 2008.
Note: The bottom two lines depict corresponding scenarios assuming that the United States as a whole achieves California's 2005 rates (20% initiation rate and 3.33% cessation rate). The dotted line reflects the assumption that such rates are attained instantaneously (in 2006), whereas the solid line reflects the more plausible scenario that such rates will be achieved gradually (by 2010). The status quo initiation rate is 25%, and the cessation rate is 2.59%.

Figure 15.3 Simplified dynamic model of protobacco and antitobacco forces on patterns of tobacco use
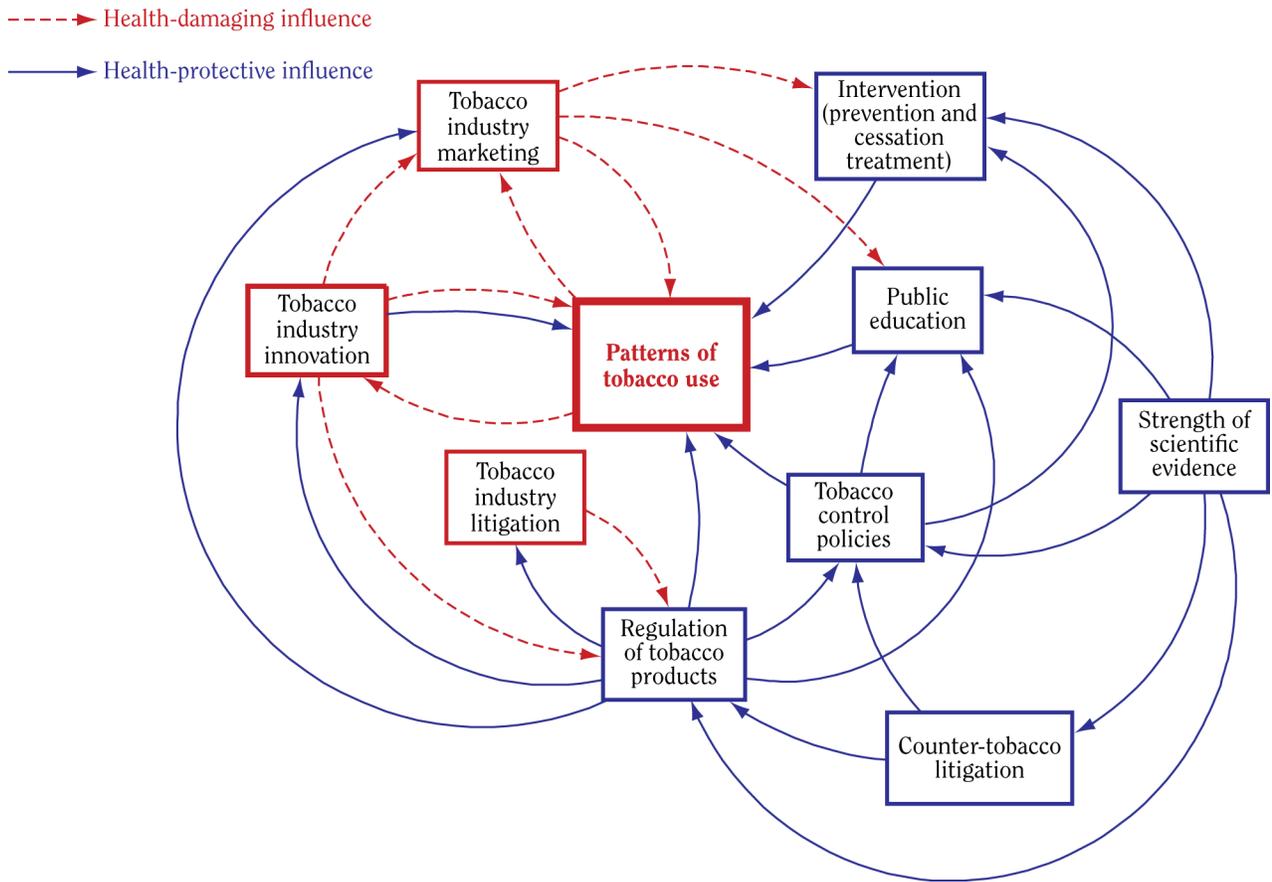
Source: Created by A. Villanti and D. Abrams for this Surgeon General's Report.

Figure 15.4 Effects of a 100% reduction in the quit attempt rate, treatment use, and treatment effectiveness on smoking prevalence, 2008–2020
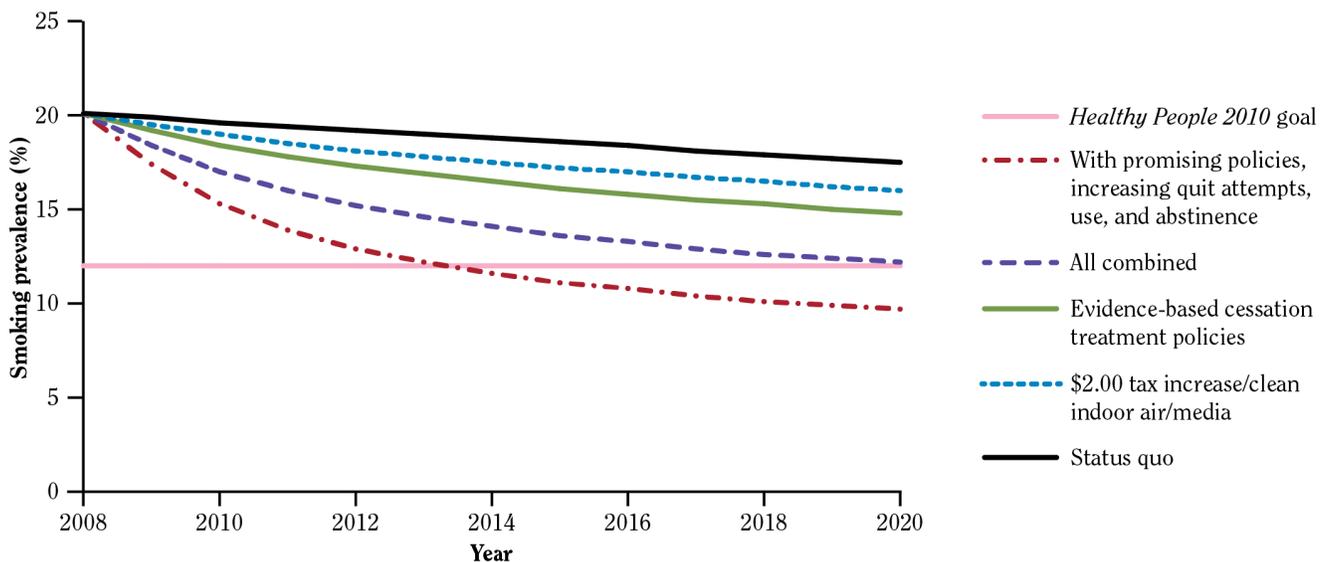
Source: Levy et al. 2010b.

Since the simulation models reviewed were completed, several additional years of survey data have been released, as reviewed in Chapter 13. As shown in Figure 13.4, the 2012 National Health Interview Survey estimate for the prevalence of current smoking among adults 18 years of age and older has declined to 18.1% and the trend downward from 2009 (20.6%) shows a more optimistic pattern than the data showing little change from 2005 (20.8%) to 2009, which were the basis for several of the simulation models reported above. However, other survey data from the National Survey on Drug Use and Health (see Table 13.19) show a small decline in the prevalence of current cigarette smoking among adults 18 years of age and older from 23% in 2009 to 22% in 2012, but almost no decline in the prevalence of adult current smoking between 2011 (21.7%) and 2012. Additional simulation models using these more recent data are needed to help provide further perspectives on progress toward meeting the *Healthy People 2020* objective of reducing the prevalence of adult smoking to 12% or less by 2020.

Looking to the Future

As noted above, the favorable impact of increasingly intense tobacco control efforts in the last decades of the twentieth century is considered one of the top public health achievements of the century (CDC 1999; Ward and Warren 2007). Nevertheless, the results from the models reviewed above exploring future scenarios of tobacco control indicate that the projected decline in tobacco use over coming decades will not be sufficiently rapid to meet the *Healthy People 2020* objective of 12% for adult smoking prevalence. A review of the effectiveness of evidence-based tobacco control interventions concluded that "further reductions in smoking in those developed countries that have achieved the most tobacco control success are likely to come frustratingly slowly; as well, smoking prevalence could level out at a rate far higher than anyone in tobacco control wants to contemplate" (Warner and Mendez 2010, p. 884). This observation by Warner and Mendez (2010) and the results of the models reviewed above suggest that without an acceleration in the rate of decline in the prevalence of smoking in the United States, the burden of tobacco-caused disease and premature deaths will persist well into the twenty-first century. Hence, the goal of ending the tragic burden of avoidable disease and premature death appears elusive for the near-term.

The 2007 IOM report (Bonnie et al. 2007) and the *Strategic Action Plan* (USDHHS 2010a) suggest that the rate of decline in youth and adult rates of smoking and tobacco use could be accelerated if the most effective tobacco control interventions were more fully imple-

mented simultaneously and the implementation was sustained. This report is also written at a time when legislation has brought new possibilities for strengthening tobacco control (see Chapter 14). Passage of the *Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act),* Public Law 111-13, *U.S. Statutes at Large* 123 (2009):1776, which provides the U.S. Food and Drug Administration (FDA) the authority to regulate tobacco products; the *Health Information Technology Economic and Clinical Health Act,* Public Laws 111-5, *U.S. Statutes at Large* 123 (2009):227, which will facilitate screening for tobacco use behaviors and implementation by health care providers of cessation services; and the 2010 *Patient Protection and Affordable Care Act,* Public Law 111-148, U.S. Statutes at Large 124 (2010):119, in combination with investment in tobacco control and prevention through the 2009 *American Recovery and Reinvestment Act,* Public Law 111-5, *U.S. Statutes at Large* 123 (2009):115, have resulted in substantial support for the implementation of evidence-based policies and programs to reduce tobacco use in recent years. Chapter 14 and Appendices 14.1–14.5 review the current status of tobacco control interventions that are known to be effective and could reach all the critical priority populations of at-risk youth and young adults, as well as those who are at greatest risk of dying in the short-term from a smoking-caused disease—adult smokers who have smoked for decades. Many have suggested that with full implementation of these strategies, far fewer youth and young adults would become smokers, and more smokers would successfully quit (USDHHS 2000b, 2012b; Abrams et al. 2010; Levy et al. 2010a,b; Orleans et al. 2010). The evidence reviewed in this and many previous reports document the benefits of smoking cessation. Additionally, the modeling results reviewed above show that increased access to evidence-based cessation treatments and aggressive promotion for all population groups would increase rates of successful cessation and thus reduce the consequences of smoking. With this imperative, and the opportunities provided by the *Affordable Care Act,* all groups of health care providers and systems should examine how they can establish a strong standard of care for smoking cessation for all (see Chapter 14). Additionally, the 2012 Surgeon General's report stated that "we have evidence-based strategies and tools that can rapidly drop youth initiation and prevalence rates down into the single digits" (USDHHS 2012b, p. 856). Although increased application of comprehensive tobacco control strategies recommended in that report could be highly effective, the current levels of implementation of these key strategies are far below the most effective levels.

Additional concerns about achieving more rapid progress have been raised. It has been suggested that some of these evidence-based policies and programs could be

less effective or less likely to be implemented in the future (Warner and Mendez 2010; Warner 2013). Evidence shows that large tax and, hence, price increases will decrease tobacco use each time they are implemented. But legislative willingness to substantially increase taxes would need to increase dramatically. Similarly, mass media campaigns can be very effective (McAfee et al. 2013); however, to produce large declines in the prevalence of adult smoking at the national level, these campaigns need to be implemented on a sustained basis with updated content (USD-HHS 2012b). The impact of smokefree policies, and other factors affecting social norms, has increased dramatically during the last 50 years (see Chapters 2 and 14). However, since fewer states have implemented new comprehensive smokefree policies in the last few years, the pace of social norm change may have slowed. The pace of social norm change could be slowed by the recent increase in the level of tobacco depictions in top-grossing U.S. movies (see Chapter 14, Figures 14.3A and 14.3B) and the aggressive marketing and promotions for electronic cigarette brands (U.S. House of Representatives 2013).

Although the *Strategic Action Plan* provides a critical framework to guide and coordinate the implementation of comprehensive tobacco control policies and programs (USDHHS 2010a), we need to assure implementation of these evidence-based policies and programs on a sustained basis with strong intensity. For example, despite strong evidence of the efficacy of comprehensive state-wide tobacco control programs in reducing the initiation, prevalence, and intensity of smoking among youth and young adults (USDHHS 2012b), in 2010 the states were appropriating only 2.4% of their tobacco revenues for tobacco control (CDC 2012). Further, it has been noted that reaching CDC's recommended funding level would have required an additional 13% of tobacco revenues, or $3.1 billion of the $24 billion collected from the industry, yet the annual total state funding level has declined from the high in fiscal year 2003 and has declined even more sharply in several states where the efficacy of the programs was being demonstrated (CDC 2012) (see Chapter 14, Figure 14.7 and Table 14.5). Since the current levels of implementation of the evidence-based policies and programs need to be substantially increased and much more rapid declines in youth and adult rates of tobacco use are needed to end the tobacco epidemic, the academic and policy communities have proposed additional approaches that augment existing strategies to more quickly bring the tobacco epidemic to an end (Smith 2013; van der Eijk 2013). Some of these nascent strategies may eventually provide further possibilities for the United States, particularly as they are implemented and evaluated in international contexts. Others that may be impractical or inappropriate in the United States may have relevance in other countries.

Potential End Game Strategies

Faced with the challenge of achieving a vision of a society free of tobacco-related death and disease, a discussion has begun within the field of tobacco control about what has come to be called the tobacco "end game" in the published literature. This literature considers strategies that could be used, in addition to the expanded implementation of the proven tobacco control interventions, to accelerate declines in the use of cigarettes and other combusted tobacco products and end the epidemic of disease and premature death caused by tobacco. Scholars and the policy community have proposed interventions that could dramatically reduce the use of tobacco products, especially cigarettes (Benowitz and Henningfield 1994; Borland 2003; Callard et al. 2005a; Daynard 2009; Khoo et al. 2010; Proctor 2011; Thomson et al. 2010; Smith 2013). The editor of *Tobacco Control* has called for a robust discussion of the concept (Malone 2010); meetings of prominent tobacco control professionals have focused on individual proposals or on the concept more broadly (Smith 2013); and sessions of both international and national tobacco control meetings have presented and debated the central ideas (2012 National Conference on Tobacco or Health, 2012 World Conference on Tobacco or Health, 2013 Annual Meeting of the Society for Research on Nicotine and Tobacco). This section briefly reviews what underlies the emergence of this discussion, considers the myriad ends toward which an end game might be oriented, and describes the principal end game proposals developed and discussed in the literature to date. Although some of these proposals are likely more potentially relevant to the U.S. situation than others, the consideration and potential implementation of less likely proposals elsewhere across the globe may eventually provide insights and evidence applicable for the United States as well. For example, decreases in morbidity and mortality resulting from rapid drops in cigarette use will be relevant regardless of the particular form of end game strategy applied. The principal approaches are summarized in Table 15.1.

Table 15.1. End game strategies discussed in the scientific literature

Proposal	Description	Source
Reducing nicotine yields	Gradual reduction of cigarette nicotine content to nonaddicting levels through government action	Benowitz and Henningfield 1994, 2013; Hatsukami et al. 2012, 2013
Reducing product toxicity	Implementation of product regulatory standards to require manufacture of tobacco products with very low toxicity	Hatsukami et al. 2010, 2013; Benowitz and Henningfield 2013
Gradual supply reduction	Phasing out tobacco use on a timetable by gradual reduction of supply to zero or some minimal level	Thomson et al. 2010; Wilson et al. 2013
Prohibiting sales to future generations	Implementing a ban on sales for people born after a particular date, so that smokefree cohorts are created that progressively increase in coverage and size	Khoo et al. 2010; Berrick 2013
Banning cigarettes and/or cigarettes plus additional tobacco products	Ban on the production and sale of cigarettes and/or cigarettes and additional tobacco products	Daynard 2009; Proctor 2011, 2013
Selling tobacco through a not-for-profit agency	To avoid the profit motive, transfer control of supply and sales to a not-for-profit agency that has the goal of reducing consumption	Borland 2003, 2013; Callard et al. 2005b; Callard and Collishaw 2013

One of the first such proposals was made in a 1994 article by Benowitz and Henningfield (1994), who described a policy approach of gradually reducing the nicotine in cigarettes to nonaddicting levels. Nearly a decade later, Borland (2003) advocated a "Regulated Market Model" for tobacco that would end direct-to-consumer marketing through the creation of a distribution agency with a harm reduction mandate. A subsequent paper by Callard and colleagues (2005b) also called for the removal of the profit incentive by transferring the tobacco market to a nonprofit entity. Only in the past 4 years, however, has the explicit notion of seeking an end game for cigarette smoking found its way into the scholarly literature (Malone 2010). Additional ideas range from a "sinking lid on supply" approach (Thomson et al. 2010; Wilson et al. 2013), to prohibiting the supply of cigarettes to people born in 2000 or later (Khoo et al. 2010; Berrick 2013), to outright abolition or banning of the sale and manufacture of cigarettes (Daynard 2009; Proctor 2011, 2013).

For this country, the feasibility and applicability of these various proposals range from possible (reducing the nicotine in cigarettes to nonaddicting levels) to almost certainly infeasible (transferring the tobacco product market to a nonprofit entity). Considering the weaknesses and limitations of several of these potential end game proposals, any application of them should come as an integrated national tobacco control strategy which is based on a foundation of enhanced implementation of the proven strategies: taxation, smokefree areas, increased cessation support, warning labels, public health campaigns, and restrictions on advertising, promotions, and sponsorship (van der Eijk 2013). Although more aggressive use of those evidence-based policies and programs (reviewed in Chapter 14) is an essential starting point, the simulation modeling results reviewed above suggest that new strategies may be needed to more rapidly reduce rates of smoking.

Ironically, the end game debate has arisen before there was any consensus on how the end related to tobacco should be defined, although there is recognition that the overriding objective is to maximize health (Smith 2013). There is no consensus to date, however, as to how that objective can best be achieved with regard to tobacco control. Some have focused on the complete elimination of all tobacco use as well as the use of any nicotine-containing product. Others counter that this target is unattainable and unnecessary to achieve dramatic reductions in morbidity and mortality, since eliminating (or nearly eliminating) the use of combusted tobacco products is more feasible and would come close to achieving the overall goal of maximizing health.

In perhaps the first end game proposal, Benowitz and Henningfield (1994) raised the possibility of greatly reducing cigarette smoking by requiring the reduction, over a number of years, of cigarette nicotine content to nonaddicting levels. This proposal has received greater attention in this country following passage of the *Tobacco Control Act* in 2009. The *Tobacco Control Act* gives FDA a number of powerful tools to regulate cigarettes and smokeless tobacco products, both extant and new. Among

its authorities is the ability to establish product standards. One such standard might include reducing maximal nicotine content to levels so low that they would be insufficient to cause or sustain nicotine addiction. The *Tobacco Control Act* specifically forbids FDA from requiring the complete (100%) removal of nicotine. The *Tobacco Control Act* also gives FDA the authority to address product toxicity, offering another avenue to reduce the harm from cigarettes.

Relevant research studies have been completed or are in progress, addressing questions such as whether and how much smokers might compensate (e.g., by smoking more cigarettes or inhaling more deeply) as nicotine content is reduced and how quickly smokers can transition from their regular higher nicotine cigarettes to extremely low nicotine cigarettes (Benowitz et al. 2012; Benowitz and Henningfield 2013). Of all the end game proposals, nicotine reduction is the one that appears to have created the most interest within the U.S. scientific and policy research communities, in part because the regulatory structure needed to implement it is already in place (Hatsukami et al. 2010, 2013). A parallel regulatory approach to reducing product toxicity can also be envisioned (Hatsukami 2013), although not considered in the original proposal from Benowitz and Henningfield (1994). This might include regulations that would further decrease the already lower toxicity of noncombustible products that may be substituted for nonaddictive cigarettes.

The Benowitz and Henningfield (1994) proposal was also made long before the current wave of noncombustible nicotine-containing products, such as those shown in Table 14.1. The rapid growth and development of emerging products, which may closely mimic the pharmacologic product characteristics of cigarettes while potentially minimizing harm, may make this approach even more appealing and potentially achievable. The availability of an acceptable substitute nicotine delivery system could mitigate some of the arguments that may be raised regarding reduction of nicotine content of cigarettes. A substitute delivery system may allow for a more rapid reduction, rather than the original plan of phasing in the reduction over a decade or more. Reduction of nicotine in cigarettes could thus provide smokers with the option of cessation, a switch to less harmful products such as nicotine replacement therapies or some noncombustible tobacco products, or continuing to smoke nonaddictive but deadly cigarettes.

The technical, social, medical, and regulatory feasibility of this concept continues to grow quickly (Hatsukami et al. 2010, 2013; Benowitz and Henningfield 2013). Reducing the addictiveness of cigarettes is increasingly viewed as a possible approach to prevent children from becoming smokers and to provide smokers with assistance to stop smoking. Additionally, the role of regulatory product standards by which tobacco companies could be required to manufacture and market noncombustible products with very low toxicity has been discussed (Hatsukami 2013). The *Tobacco Control Act* empowers FDA to issue product standards to control the allowable levels of chemicals or chemical compounds, or ingredients in tobacco products or smoke for the protection of public health. In addition to a product standard reducing the nicotine in tobacco products, strict standards for levels of toxicants in tobacco products could be established, as well as standards to make some or all tobacco products less appealing.

Several of the other end game proposals relate to reducing the supply of tobacco products. However the *Tobacco Control Act* specifically forbids FDA from banning cigarette sales. Nevertheless, as discussed in the section above, the *Tobacco Control Act* does authorize FDA to set standards for tobacco products which could significantly impact regulated tobacco products marketed (Hatsukami 2013). Additionally, the prohibition of FDA banning categories of products in the *Tobacco Control Act* does not apply to states or localities. It has been noted that every state (and municipality) in the United States has the power to ban the sale of cigarettes, a power upheld by the U.S. Supreme Court in Austin vs. The State of Tennessee (Proctor 2011). However, while states generally may have the capability, other factors including states' constitutions or other state laws, could preempt some municipalities from enacting such measures.

The following proposals, while certainly not feasible for implementation in the United States are reviewed to provide a description of options under discussion internationally. Borland (2003, 2013), Callard and colleagues (2005a,b), and Callard and Collishaw (2013) have observed that the tobacco industry's objective—maximizing profits (or maximizing shareholder value)—is fundamentally antithetical to reducing tobacco use. As such, the researchers argued, moving toward the end of tobacco-produced harms requires that control over the supply of tobacco products be transferred from the for-profit sector to a not-for-profit agency (either governmental or governmentally supervised) with a public health mandate to reduce tobacco use. Tobacco farmers would continue to produce tobacco, and product manufacturers would continue to produce cigarettes and other tobacco products. However, the agency (Borland calls it the "Tobacco Products Agency") would determine how many products would be acquired for sale to the public, and how it would control the conditions of sale (when, where, to whom, at what price, and with what packaging). Driven by its directive to

reduce the population harm caused by tobacco, the goal of the agency would be to reduce tobacco consumption, especially consumption of cigarettes. Some have argued that the development of noncombustible aerosolized forms of nicotine delivery could enable tobacco companies, with firm regulatory oversight and pressure on combustibles, to mobilize the profit motive to speed up the conversion of the population to much lower-risk products, while still retaining shareholder value.

Diverse challenges can be anticipated in the implementation of an integrated strategy that includes any of the proposed end game policies (Isett 2013; Rabe 2013; Thomas and Gostin 2013). The challenges will likely come from two constituencies: those with a financial stake in the survival and continuing economic success of cigarette (and other tobacco products) sales; and some smokers and others who would be opposed to any policy that significantly threatened the availability of cigarettes in their current form, and the ability of adults to choose to consume them. Another challenge will be the tobacco industry's attempts to influence decision makers to oppose effective strategies (Rabe 2013). Legal issues would be raised as well (Thomas and Gostin 2013).

Additional Concepts that Complement National Tobacco Control Efforts

There are additional approaches that embody the evidence-based interventions that have defined the success of the first 50 years of tobacco control. They represent extensions of measures that have been used, but with changing the application of empirical and theory-based measures.

Beginning with Canada in 2000, the new generation of larger graphic warning labels has been implemented in nearly 50 countries. Research has demonstrated that the new labels attract the attention of smokers and lead them to report that the labels have motivated them to consider quitting (Hammond 2011). To date, direct effects of such warnings on quitting are still being evaluated (Borland et al. 2009a,b; Partos et al. 2013). For example, a recent analysis of the Canadian pack warnings that disentangled the effects of concomitant price increases found the graphic warning labels resulted in a decline in smoking prevalence of 2.9–4.7%, a relative reduction of 12.1–19.6% (Huang et al. 2013). Many of the laws initially implemented require labels to occupy 50% of the front and back of cigarette packs, but even larger warnings are now emerging. At least 2 countries have far more substantial requirements:

Uruguay has required that 80% of the front and back of packs bear graphic warning labels; Australia implemented a law requiring that 75% of the front of the pack and 100% of the back be devoted to warning labels (WHO 2013). As the fraction of pack coverage changes, researchers will face a moving target in their evaluation of the effectiveness of graphic warning labels.

Another new approach is plain packaging, adopted by Australia in early 2013. The health ministries of several other countries are now considering implementing this strategy (Freeman et al. 2008; Quit, Cancer Council Victoria 2011; Moodie et al. n.d.). Plain packaging requires the use of a uniform, standard pack color (for that portion of the pack not bearing the warning label) with the brand name printed in a uniform, standard, same-sized font. Increasing evidence indicates that plain packaging has the potential to decrease smoking (Hammond and Parkinson 2009; Hoek et al. 2011; Gallopel-Morvan et al. 2012; Hammond et al. 2013; Wakefield et al. 2013). In Australia, the process by which the pack color was chosen involved a great deal of scientific investigation, including extensive use of focus groups (Wakefield 2012).

Other unlikely but potentially complementary policies exist only in concept at present. Glantz (2012) recently reintroduced the concept that the government impose large fines on tobacco companies based on the quantity of their products consumed by minors with the fines needing to be substantially larger than the revenues gained from sales. This approach would create an economic incentive for the industry to work hard to avoid illegal sale or distribution to children. Another example is Chapman's (2012) notion of licensing smokers. The ability to buy cigarettes, in a specific daily quantity, would require possession of an annual license purchased from the state by the smoker. If the smoker decided to quit, he or she could get the license expenses refunded, but with the provision that this would be a one-time only incentive. Given the novelty of these concepts, there is every reason to expect the development of other new ideas that could be useful in the search for ways to end the disease toll caused by tobacco.

End game strategies might be aided by future approaches and devices for nicotine delivery that better substitute for the cigarette. As discussed in Chapter 14, various new products are increasingly being introduced into the market. In 2012 Lorillard acquired Blu Electronic Cigarettes, in 2013 R.J. Reynolds Tobacco Company introduced Vuse electronic cigarettes in limited markets, and Altria announced that it will introduce an electronic cigarette in 2014 (Esterl 2013; Lorillard 2013; Reynolds American 2013; Wells Fargo Securities Research 2013). Additionally, other electronic nicotine delivery systems have been developed and marketed by companies

with little or no experience in developing and marketing traditional tobacco products (WHO 2009; Henningfield and Zaatari 2010; Cobb and Abrams 2011). Warner (2013) suggests that the introduction and marketing of new products like these could complement an end game strategy. However, the potential risks of continuing the use of addictive levels of nicotine on the population would need careful consideration (see Chapter 5, "Nicotine") if users completely switch from traditional (or conventional) combusted cigarettes to noncombusted products which continue to deliver high levels of nicotine. Also, as noted in Chapter 13, given the rapid increase in electronic cigarette use among both adults and adolescents, rigorous surveillance of these products is particularly important, including their impact on the initiation and cessation of conventional tobacco use and concurrent use with other conventional tobacco products.

Ending the Tobacco Epidemic in the United States

The *Strategic Action Plan* provides a framework for achieving a society free of tobacco-related death and disease by emphasizing the implementation of proven tobacco control strategies (USDHHS 2010a). This chapter makes the case for dramatically increasing and sustaining the level of this implementation. This chapter also discusses various new "end game" strategies; the feasibility and applicability are reviewed above. It has been suggested that an integrated national tobacco control strategy should be considered—based on a foundation of enhanced implementation of the proven strategies (taxation, smoke-free areas, increased barrier-free cessation support, warning labels, public health campaigns, and restrictions on advertising, promotions, and sponsorship) into which the most feasible end game strategies are included (van der Eijk 2013). Thus, a more aggressive use of those evidence-based policies and programs reviewed in Chapter 14 would strengthen current tobacco control measures and create a climate that enhances the feasibility of the implementation of end game strategies (van der Eijk 2013). Examples of end game options which could complement the proven interventions in accomplishing our overall goal of a society free of tobacco-related death and disease include but are not limited to:

(1) reducing the nicotine content to make cigarettes less addictive (Benowitz and Henningfield 2013), and

(2) greater restrictions on sales, particularly at the local level, including bans on entire categories of tobacco products (Berrick 2013; Malone 2013).

In November 2010, HHS released its *Strategic Action Plan*—the first enunciation of a national plan in the United States to curb the tobacco-produced disease epidemic. The plan focuses on a number of interventions that, collectively, could significantly diminish the toll of tobacco (USDHHS 2010a). The plan, which came 3 years after IOM's report *Ending the Tobacco Problem: A Blueprint for the Nation* was issued (Bonnie et al. 2007), announced that ending the epidemic is in fact a national goal. The IOM report also developed a strategy that, if fully implemented, would significantly decrease tobacco use and its burden. To successfully implement both the IOM blueprint and the *Strategic Action Plan* will require vigorous action at the federal, state, and local levels, as well as by the private sector.

Frustration with the slowness of recent progress in tobacco control that motivates the end game discussion reflects, in part, heightened expectations due to how much success has been achieved in the last 50 years. To date, tobacco control strategies have cut the prevalence of cigarette smoking by nearly 60%, per capita consumption is one-fourth of what it was at the dawn of the anti-smoking era, and relative to the size of the population, the disease toll of tobacco in the United States has declined substantially. It has been estimated that this decline in smoking since 1964 was associated with the avoidance of 8 million premature smoking-attributable deaths, with 157 million life years saved (Holford et al. in press). The analysis also demonstrated that tobacco control since 1964 had an important impact on the life expectancy of U.S. adults, contributing an increase of 2.3 years for males and 1.6 years for females, or about 30% of the overall national increase in life expectancy over the period 1964–2012 (Holford et al in press). More background on this analysis and findings in this paper are provided in Appendix 15.1

Despite this success, the authors note that over the half century since 1964, for each of the 8 million premature smoking-attributable deaths averted, two deaths were

caused by smoking (Holford et al. in press). They further correctly observe that "no other behavior comes close to contributing so heavily to the nation's mortality burden" (Holford et al. in press). The evidence reviewed in this chapter emphasize that making more rapid progress toward eliminating the remaining burden of tobacco will be more challenging, but history teaches that the obstacles to success are not invariably insurmountable.

Chapter Summary

Since the first Surgeon General's report in 1964, significant progress has been made in mitigating the tobacco-caused epidemic of disease and premature death. This progress has been accomplished through the implementation of effective tobacco control programs and policies focused on prevention and cessation. This chapter discussed the current status of tobacco control efforts in relation to two key national reports: IOM's *Ending the Tobacco Problem: A Blueprint for the Nation* (Bonnie et al. 2007) and *Ending the Tobacco Epidemic: A Tobacco Control Strategic Action Plan for the U.S. Department of Health and Human Services* (USDHHS 2010a). Potential future directions are examined in the context of today's rapidly changing tobacco control landscape, and plausible alternatives based on proven effective interventions and policies are discussed. Finally, proposed potential end game scenarios are reviewed.

The evidence is clear—we know what works. Chapter 14 and Appendices 14.1–14.5 review the current status of tobacco control interventions that are known to be effective and could reach all the critical priority populations of at-risk youth and young adults, as well as those who are at greatest risk of dying in the short-term from a smoking-caused disease—older adult smokers who have smoked for decades. Many have suggested that with full implementation of these strategies, far fewer youth and young adults would become smokers, and more smokers would successfully quit (Abrams et al. 2010; Levy et al. 2010a,b; Orleans et al. 2010; USDHHS 2000b, 2012b). Health care policies following from the *Health Information Technology Economic and Clinical Health Act* and the *Affordable Care Act* should increase screening for tobacco use and offering cessation counseling in health care settings. The 2007 IOM report (Bonnie et al. 2007) and *the Strategic Action Plan* (USDHHS 2010a) suggest that the rate of decline in youth and adult levels of smoking and tobacco use could be accelerated if the most effective tobacco control interventions were more fully implemented simultaneously and this implementation was sustained. However, the current levels of implementation of these key strategies are far below the most effec-

tive levels. In 2000, Surgeon General Dr. David Satcher stated the challenge we face, namely, "Our lack of greater progress in tobacco control is more the result of failure to implement proven strategies than it is the lack of knowledge about what to do" (USDHHS 2000a).

Looking to the future, tobacco control needs to be shaped to address an increasingly heterogeneous pattern of use of tobacco products, including emerging noncombustible products, and changing demographics of users of these tobacco products (Chapter 13). Some of the highest prevalence rates of smoking are now among persons of lower socioeconomic status, some racial and ethnic minority groups, sexual minorities (including individuals who are gay, lesbian, bisexual and transgender, and individuals with same-sex relationships and/or attraction), high school dropouts (Fagan et al. 2007; Lee et al. 2009; Garrett et al. 2011; SAMHSA 2013b), persons with mental illness and alcohol and substance abuse disorders (Prochaska et al. 2008; Schroeder and Morris 2010; Villanti et al. 2012; CDC 2013), American Indians and Alaska Natives as well as recent immigrants from high-prevalence countries, and people with complex comorbid medical illness (e.g., HIV/AIDS and cardiovascular disease) (Crothers et al. 2009; Hoffman et al. 2009; Marshall et al. 2009; Vidrine 2009; Levine et al. 2010; Tesoriero et al. 2010; Pines et al. 2011; Rahmanian et al. 2011). There is also substantial geographic variation with the highest prevalence rates in Appalachia and the South (Pickle and Su 2002). The patterns of using more than one type of smoked tobacco product raises additional concerns about our progress toward ending the epidemic of tobacco-related disease. Chapter 14 discusses several of the strategies that are in current use to address these disparities. Comprehensive statewide tobacco control programs have been leading innovators in implementing culturally appropriate interventions which effectively reach and impact diverse populations with the highest prevalence of tobacco use. Also, nationwide campaigns and health communication interventions can successfully reach diverse populations with high impact messages. CDC's Tips from Former Smokers campaign and the proposed FDA prevention campaigns are examples

of such interventions. As reviewed in Appendix 14.4, integrating tobacco use cessation treatment with treatment for substance use disorders increases the efficacy of both efforts. More forceful implementation of these and other current initiatives presented in the *Strategic Action Plan* (USDHHS 2010a) can help to eliminate these disparities in tobacco use.

This report is also written at a time when legislation has brought new possibilities for strengthening tobacco control. Passage of the 2009 *Tobacco Control Act,* which provides FDA the authority to regulate tobacco products, and the 2010 *Affordable Care Act*, in combination with investment in tobacco control and prevention through the 2009 *American Recovery and Reinvestment Act*, have resulted in substantial support for the implementation of evidence-based policies and programs to reduce tobacco use in recent years. The global and U.S. tobacco industries have indicated in various ways that they plan to undergo a major paradigm shift toward making and marketing a wider range of tobacco-derived nicotine delivery products with a purported reduced harm goal (Calantzopoulous 2012; Delen 2012). The *Tobacco Control Act* gives FDA a number of powerful tools to regulate cigarettes and smokeless tobacco products, both extant and new. Among its authorities is the ability to establish product standards.

Much more rapid declines in youth and adult rates of tobacco use are needed to end the epidemic of tobacco-caused disease and death, but the current levels of implementation of the evidence-based policies and programs are below the most effective levels. Academic and policy communities have proposed untested approaches that could be combined with more robust implementation of existing strategies to more quickly bring the tobacco epidemic to an end (Smith 2013; van der Eijk 2013). Some of these still untested strategies may eventually provide further possibilities for the United States, particularly as they are implemented and evaluated in international contexts. Others that may be impractical or inappropriate in the United States may have relevance in other countries. Examples of end game options which could complement the proven interventions in accomplishing this nation's overall goal of a society free of tobacco-related death and disease include but are not limited to:

(1) reducing the nicotine content to make cigarettes less addictive (Benowitz and Henningfield 2013), and

(2) greater restrictions on sales, particularly at the local level, including bans on entire categories of tobacco products (Berrick 2013; Malone 2013).

It is important to remember that many policy innovations in tobacco control, once thought inconceivable, have now become the law of the land. Just a decade ago, few if any, public health experts would have envisioned that 26 U.S. states and more than 30 entire countries would have legally mandated smokefree workplaces (including all restaurants and bars) in 2014. The history of tobacco control suggests that it would be unwise not to contemplate the end game. New developments will continue to occur, and the public health community will be far better positioned to address them if the community has thought seriously about them.

Conclusions

1. Together, experience since 1964 and results from models exploring future scenarios of tobacco control indicate that the decline in tobacco use over coming decades will not be sufficiently rapid to meet targets. The goal of ending the tragic burden of avoidable disease and premature death will not be met quickly enough without additional action.

2. Evidence-based tobacco control interventions that are effective continue to be underutilized and implemented at far below funding levels recommended by the Centers for Disease Control and Prevention. Implementing tobacco control policies and programs as recommended by *Ending the Tobacco Epidemic: A Tobacco Control Strategic Plan* by the U.S. Depart-

ment of Health and Human Services and the *Ending the Tobacco Problem: A Blueprint for the Nation* by the Institute of Medicine on a sustained basis at high intensity would accelerate the decline of tobacco use in youth and adults, and also accelerate progress toward the goal of ending the tobacco epidemic.

3. New "end game" strategies have been proposed with the goal of eliminating tobacco smoking. Some of these strategies may prove useful for the United States, particularly reduction of the nicotine content of tobacco products and greater restrictions on sales (including bans on entire categories of tobacco products).

Implications for Ending the Tobacco Epidemic

Ending the Tobacco Epidemic: A Tobacco Control Strategic Plan (USDHHS 2010a) and the E*nding the Tobacco Problem: A Blueprint for the Nation* (Bonnie et al. 2007) set out a vision for the future, calling for ending the epidemic of tobacco smoking as rapidly as possible. This chapter addresses how that vision can be achieved, considers what we have learned and accomplished to date in tobacco control, and identifies challenges to accelerating the impact of tobacco control and to ending the tobacco epidemic. The evidence makes clear that we need to fully implement and sustain the most effective tobacco control interventions as well as fully realizing the potential of FDA's tobacco product regulation. The evidence also emphasizes the need for more rapid progress in reducing tobacco use among youth and adults. If smoking persists at the current rate among young adults in this country, 5.6 million of today's Americans younger than 18 years of age are projected to die prematurely from a smoking-related illness (see Chapters 12 and 13).

In today's changing landscape, there are multiple factors influencing the state of the tobacco epidemic and how it changes. First, the clear mandate of the new FDA authority is to employ science-based rulemaking to reduce the impact of tobacco products at the population level, taking into account both users and nonusers who may become users. FDA has broad new authority to regulate existing and new tobacco products and can educate the public in order to reduce the death, disease, and other costs associated with use of tobacco products. Second, although rates of use of cigarettes have declined modestly in the past decade, alternative, noncigarette forms of tobacco and the dual use of combustible and noncombustible tobacco products are being aggressively promoted. A variety of unregulated noncombustible products with potential modified risk or reduced harm are being developed and aggressively marketed. This shift in patterns of tobacco use could have a number of potential impacts, ranging from the positive effect of accelerating the rate at which smokers quit smoking cigarettes completely to a negative effect of slowing down the decrease in the use of all tobacco products, especially cigarettes. Availability of these products may reduce or increase harm to the population.

New regulatory actions described as end game strategies may offer tremendous opportunities to address these challenges and transform approaches to ending the tobacco epidemic. In addition to a product standard reducing the nicotine content to make cigarettes less addictive, FDA has the authority to establish strict standards for levels of toxicants in tobacco products, as well as standards to make some or all tobacco products less appealing (see "The influence of the design of tobacco products on the use of tobacco by young people," Chapter 5, pages 535-541, USDHHS 2012). The impact of the noncombustible aerosolized forms of nicotine delivery on population health is much more likely to be beneficial in an environment where the appeal, accessibility, promotion, and use of cigarettes and other combusted tobacco products are being rapidly reduced, especially among youth and young adults. For example, other end game strategies which could involve greater restrictions on sales, particularly at the local level, including bans on entire categories of tobacco products, could significantly alter the strategic environment for tobacco control.

These conclusions show that we have still under-utilized approaches for reducing use of tobacco products. Together, they indicate a need for coordination within the federal government and across the local, state, and national levels. A strategic framework is available, and recent legislation has brought new approaches for tobacco control. As potential future directions are examined in the context of today's rapidly changing tobacco control landscape, sustained implementation of evidence-based tobacco control interventions at high intensity would accelerate the decline of tobacco use in youth and adults, and also accelerate progress toward the goal of ending the tobacco epidemic.

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