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Comprehensive Smoking Cessation Policy for All Smokers: Systems Integration to Save Lives and Money

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Abstract In terms of the end points for cessation policy, three outcomes will reduce overall smoking prevalence: (1) reach and motivate more current smokers to make more frequent quit attempts, especially reaching the underserved; (2) ensure quitters know about and use appropriate evidence-based programs; and (3) enact policy that guarantees continuity of delivery of effective services via a comprehensive system of care management for all smokers. Policies that achieve these three goals will save millions of smokers from premature death and the burden of disease and will also save billions of dollars in excess cost to our nation.

Research provides evidence that effective smoking cessation interventions exist, including behavioral and pharmacological programs able to reach smokers through many delivery channels. Using evidence-based programs significantly increases success, from almost double to as much as fourfold the cessation rate of quitting on one's own. Yet less than half of current smokers make serious quit attempts annually, and less than a quarter of those that do try will use proven interventions, and over 95 percent of self-quitters will relapse. Weak dissemination of unappealing cessation products relative to the tobacco industry's marketing, results in many smokers harboring misinformation about the safety and efficacy of treatments with smokers tending to simultaneously believe that new cigarette products may be less harmful.

Having effective cessation programs and services is necessary but not sufficient to reduce population prevalence. The last decade has disproved the adage "if you build it, they will come." Saving millions of lives and billions of dollars requires nothing short of aggressive, proactive, direct-to-consumer marketing of appealing cessation products. Strong political will is also critical; it is important to put into national policy what is known about effective ways to promote smoking cessation and to support the financial and other resources required to establish a unified delivery system of cessation care management for all smokers.

EXECUTIVE SUMMARY

For a smoker, it is long and arduous journey from starting to smoke to enjoying smoking in ones carefree youth to wanting to stop. For much of that journey, the smoker is not motivated to quit and does not make any quit attempts at all. Somewhere along the way the smoker may change, either suddenly or gradually over time. Smokers can move from being unmotivated and not making any quit attempts to wanting to quit (over 70 percent say they want to quit) and then

to making serious quit attempts (about 45 percent try seriously to quit each year). If at first a smoker is not successful at quitting (over 90 percent are not), the arduous journey continues with cycles of trying to quit but relapsing to trying again. Some smokers may give up and feel too exhausted or perhaps even a bit ashamed to keep trying or to risk admission of repeated failure to their family, friends, and relatives. All too often a smoker may use unproven treatments or will-power to quit (over 75 percent do that). There are other barriers that a smoker needs to overcome, such as the cost of formal treatment or a lack of ability to discern ineffective from evidence-based treatments. There is no Consumer Reports or Good Housekeeping Award to guide one's choice of cessation products and services. Perhaps a lucky smoker may eventually quit on his or her own or with the use of an effective cessation product or service. Finally, the journey ends when the smoker either quits for good or suffers and dies from a smoking related cause (about one third to one half of lifetime smokers will die of a smoking-related disease).

Now that research has helped us understand so much of this journey, the challenge is to put what we know into practice and policy, and there is not a moment to lose as over 430,000 of our friends and fellow U.S. citizens die prematurely each year from their smoking addiction (that equals three fully loaded jumbo jets crashing with no survivors every single day, including weekends and holidays).

There is substantial room to find more leverage points to improve the overall cessation outcome rate at every step of the way along a smoker's journey to freedom from their addiction. This opportunity can only be fully realized with strong political will to do the right thing by designing cessation policies that support a comprehensive, systems approach to cessation intervention. This approach should provide aggressive, direct-to-consumer marketing and education campaigns to improve smoker's health literacy about the dangers of smoking and the best tools for quitting. It should also cover the critical leverage points along the entire smokers' journey, from being a slave to smoking to eventual freedom from tobacco addiction, and should provide interventions tailored to the smoker's needs. This can be achieved through cessation policies that support a comprehensive care management network as well as cessation policies that ensure adequate resources and aligned financial incentives at federal, state, and local levels across both the delivery systems within the health care industry and across the broader public health system.

Effective cessation programs are available but greatly underutilized, despite the social climate that is making it more difficult to smoke (e.g., bans in worksites, higher taxes). Decades of research, clinical practice guidelines, and meta-analyses provide solid evidence of the efficacy and cost effectiveness of smoking cessation interventions. Interventions include behavioral and pharmacological options ranging in intensity and cost from minimal (e.g., self-help) to maximal (e.g., inpatient treatment).

Less than 50 percent of the over 45 million current U.S. smokers make a quit attempt each year. Of those that try to quit, over 75 percent do so on their own without evidence-based programs and, of those, over 95 percent relapse. Using even a minimal intensity/brief cessation program generally doubles the likelihood of success. There is also a dose-response relationship such that use of more intensive programs and use of combined pharmacological and behavioral programs can triple to quadruple the likelihood of success.

As indicated by the available scientific evidence and computer simulation modeling (see work of Levy, Appendix J, and Mendez, Appendix K), even a conservative increase in the reach (number or percentage of smokers out of all current smokers who make a quit attempt each year) and a modest improvement in effectiveness (percent of smokers who use evidence-based programs and thereby increase their chances of maintenance of cessation) can play a very significant

role in the mix of policy components that will reduce overall population prevalence. A more aggressive adoption and implementation of known best practices can make an even larger impact, using policies that reach those smokers who are not motivated to quit, those with the greatest health disparities, the highest smoking rates and those with comorbid complications that make treatment more difficult.

In terms of policy, an integrated approach is needed at individual and at systems levels that can capitalize on all the proven cessation components and provide a continuum of care that will address the following three goals:

(1) Proactively reach more smokers and create strong consumer knowledge, motivation and demand for cessation.

Having effective treatment programs is necessary but not sufficient to reduce population prevalence. The last decade has disproved the assumption “if you build it, they will come.” Different smokers’ knowledge and needs must be targeted using social marketing and other behavioral principles and financial incentives. Smokers have misperceptions and gaps in their health literacy about tobacco product safety and about the value, safety, and efficacy of using proven cessation methods. Innovations must be found to specifically target smokers who are hard to reach and hard to motivate (i.e., smokers at disproportionate risk because they are from lower Socioeconomic Status (SES) groups or minorities, are under- or uninsured, have comorbid psychiatric/substance abuse disorders, or are adolescent or young adult smokers). Bio-behavioral vulnerability, cognitive expectations, and emotional and socio-demographic characteristics at individual and aggregate (e.g., community) levels are some of the critical elements that must be considered to ensure more smokers become: (1.a) more health literate about why and how to quit, (1.b) more motivated to make more frequent quit attempts, and (1.c) more likely to use their knowledge to choose and use the appropriate evidence-based treatments when quitting.

(2) Make the full range of proven cessation treatments accessible and freely available in a coordinated, aligned delivery system of comprehensive care management.

It is essential to: (2.a) establish and enforce policies for universal financial coverage of evidence-based cessation treatments; and (2.b) ensure service capacity is flexible, accessible, and meets the diverse needs of different smokers to use the appropriate type, intensity, and mode of treatment. A comprehensive care management system means that each smoker will receive continuity of care based on screening and triage into a level and type of treatment that meets their needs to enable smokers to receive the appropriate treatment (e.g., a Stepped Care approach; see Abrams et al. 1993;1996;2003, for details). Treatments can range from minimal/brief intensity (e.g., over the counter nicotine replacement, self help, or Internet-based interventions), to medium intensity (e.g., proactive telephone/brief primary care/managed care-based interventions), to maximum intensity (e.g., outpatient and inpatient multi-session clinical care delivered by specialists trained to treat severe nicotine addiction and comorbid psychiatric/substance abuse disorders).

(3) Establish a coherent, unified national policy for the integration of all the effective components that enhance cessation into a comprehensive system of care management.

Systems integration is arguably the single most critical missing ingredient needed to maximize the as yet unrealized potential to significantly increase population cessation rates. Systems integration includes: (3.a) putting what is known into widespread practice and policy and overcoming the barriers to implementation at every level (national, state, and local) of organizational systems structure, (3.b.) achieving continuity of care delivery via the alignment of the organizational infrastructure and the financial incentives within which health care and public health services are delivered, and (3.c) using quality indicators to ensure fidelity in the adoption and implementation of best cessation practices and continuous quality improvement based on measurable indicators. Key indicators for improving the fidelity of care include: surveillance; program, process and outcomes tracking measures as well as use of public access “report cards” to enhance consumer choice and to improve accountability across providers and their health service delivery organizations.

Since smoking is an addiction (a chronic, refractory, relapsing condition), for many smokers effective intervention requires a proactive and coherent strategy of strong care management—the same kind of “chronic disease care management” model being adopted for other expensive life-threatening conditions like diabetes and hypertension. An integrated system of care management with appropriate and aligned financial incentives must become part of the fabric of health care, public health, and policy at local, state, and national levels. An adequately financed system of care must be put in place and must be sustained over decades to cumulatively accelerate the trajectory of smoking prevalence reduction in the entire population within our lifetime.

While much is known about each of the successful components that will increase cessation rates, what is lacking is the integration of all the components to support a continuum of care management services. In many respects the single most critical issue for increasing population cessation rates lies in a lack of full “systems integration” of cessation tools and services that are already well known to be effective. Systems integration implies using the integrated knowledge base that we already have to inform the establishment of an overarching policy or set of policies. These policies must, in turn, support a comprehensive, seamless system of intervention care management at every level of societal structure (i.e., governmental, private sector, state and local public health, health care stakeholders, and delivery systems).

A comprehensive system of care management will require policies that align incentives, resources and political will for the greater long range good of improving the nation’s health. Full implementation of a comprehensive, integrated “systems approach” to smoking cessation can significantly accelerate population prevalence reduction, saving lives and money. Policies are urgently needed that will result in increases in: (a) all smokers’ interest in and motivation to quit but particularly targeting the underserved and those with comorbid conditions; (b) smokers’ health literacy about the range of safe and effective treatments available and how best to use them; (c) smokers’ demand for and use of proven cessation interventions that are tailored and targeted to their specific profiles; (d) maintenance of cessation (reductions in relapse rates); and (e) access to affordable treatment by restructuring the health and health care delivery systems via aligned financial incentives and policies that support continuity of care as well as the screening and delivery of comprehensive services at federal, state, and local levels (a system of comprehensive care management).

The major components of cessation treatment products and services are based on solid scientific evidence. Saving millions of lives and billions of dollars requires nothing short of strong political will to put into national policy what is known about effective ways to promote smoking

cessation and to make the financial investment required to support a unified system of cessation care management for all smokers.

REVIEW OF EVIDENCE

This appendix is structured into five sections, which focus selectively on the following areas:

1. Overview and rationale for investing in smoking cessation.
2. Understanding of smoker characteristics to reach more smokers and increase demand for cessation.
3. Evidence for efficacy and effectiveness of cessation interventions.
4. Future directions in cessation research and implementation.
5. Systems integration to increase the cessation rate and the trajectory of reduced prevalence.

SECTION 1 OVERVIEW AND RATIONALE FOR INVESTING IN SMOKING CESSATION

There are still over 45 million smokers in the US, comprising about 23 percent of the population (CDC 2004b). It is estimated that as many as half the current smokers, over 20 million human beings, will die prematurely of a smoking caused disease (Camenga and Klein 2004). Among the possible investments in preventive or palliative health care services available and reimbursed (e.g., treatment for diabetes, hypertension, cancer), smoking cessation remains one of the most cost-effective interventions per quality-adjusted life year saved (Cromwell et al. 1997; Fiore et al. 2004). Tobacco related diseases are costing over \$150 billion each year (CDC 2002) and reduce life expectancy by about 14 years (CDC 2002).

While primary prevention of smoking initiation among future generations will have a long term societal benefit, for the immediate future an urgent, aggressive, and vigorous effort directed at helping all current smokers to achieve lifelong cessation will save many lives and much money. Levy and colleagues (2000b), using a simulation model, projected that even if 100 percent of smoking initiation by all youth under 18 years of age was prevented, it would still take decades to reduce smoking prevalence by 50 percent if cessation rates remained at current levels. In another simulation model, Mendez and colleagues (1998) reported that if adoption of smoking at age 18 years remained constant at rates of 20, 25, 30 or 35 percent, then overall population prevalence of smoking would reach a steady state by 2045 of 12.2 percent, 15 percent, 18.4 percent, and 21.5 percent respectively.

Another reason to increase cessation is that it will save millions from premature disability and save money. As already demonstrated in California, cancer rates, heart disease, and savings in health care expenditures can be achieved by reducing smoking prevalence (Fichtenberg and Glanz, 2000; Warner et al. 1995; 1999). Nationwide, the overall cancer death rate in the United States has begun to fall for the first time in recorded history, primarily because of reductions in incidence and prevalence of lung cancer. These reductions are a direct result of smoking rates having declined from over 45 percent in the 1960s to under 23 percent in 2003 (CDC 2004a; Cole and Rodu 1996). In fact, Thun and colleagues (2006) reported that about 40 percent of the contribution to overall cancer deaths comes from the dramatic reduction in smoking prevalence since the 1960s.

There are other direct and indirect benefits to increasing the cessation rate at the population level. The following benefits are briefly noted. Accelerating smoking cessation among adults

will, in turn, reduce the number of role models who smoke, the number of children at risk for taking up smoking, the damage to the unborn fetus from maternal smoking during pregnancy (Buka et al. 2003), the amount of second hand smoke exposure to nonsmokers of all ages but especially to children, the risks and damage caused by fires from cigarettes, losses in productivity and absenteeism at work, and other direct and indirect costs of smoking and of passive exposure in terms of health and well being.

SECTION 1 SUMMARY

Increasing cessation rates to dramatically reduce population prevalence of smoking is possible but challenging. If an aggressive and immediate investment is not made in cessation interventions and policy, the consequences are devastating in terms of lives lost prematurely, reduced quality of life, and hundreds of billions of dollars in unnecessary expenses. Thus much more must be done to increase cessation among current smokers if a dramatic reduction in population smoking prevalence is desired and if millions of current smokers' lives are to be saved. Failing to act now to implement a nationwide comprehensive smoking cessation system of care is an extraordinary opportunity lost, with devastating consequences.

SECTION 2

UNDERSTANDING OF SMOKER CHARACTERISTICS TO REACH MORE SMOKERS AND INCREASE DEMAND FOR CESSATION

As outlined above, from a systems perspective, full impact of cessation interventions on the intended target population is a product of the proportion of the population reached and the efficacy of the intervention delivered to them ($\text{Impact} = \text{Reach} \times \text{Efficacy}$; see Abrams et al. 1993; 1996; 2003 for details). There are several ways to improve reach and efficacy from both individual and systems levels of intervention. Glasgow and colleagues (1999; 2003; 2006a) have expanded the concept of impact in their RE-AIM (Reach, Efficacy, Adoption, Implementation, Maintenance) model to include the individual and systems level considerations that reflect the need to measure and improve the fidelity of adoption and implementation of interventions, using measures of key indicators of quality and integrity of program, process, and outcomes evaluation at both the individual level and the delivery system level (see Abrams et al. 1993; 1996; 2003; Dzewaltowski et al. 2004; Glasgow et al. 1999; 2003; 2006a for more details). This section is focused primarily on the issue of reaching diverse groups of smokers, designing programs and services that can anticipate their needs, and planning for the increased demand for resources assuming that we are able to reach more of them and increase their motivation to make quit attempts.

Individual Bio-Behavioral Vulnerabilities and Demographics

There are a number of important individual and aggregate (i.e., group or population level) smoker characteristics associated with differences in smoking prevalence, motivation to quit, and with some cessation outcomes. Some of these factors are important in considering how best to reach more smokers, motivate them to try to stop smoking—and encourage them to use the best interventions available to ensure success—such as to reduce the high rates of relapse after quit attempts. Selected factors are briefly reviewed here to support the major recommendations of this appendix. A comprehensive critical review is beyond the scope and space limitations of this report. Factors include gender, education, income, SES, racial and ethnic background, and age.

There are also differences among subgroups of smokers in bio-behavioral variables such as their susceptibility to and their level of dependence on nicotine; the pattern of smoking over the years that they smoked; their motivation to quit; and their knowledge about the risks and benefits of smoking, the value of using smoking cessation programs, as well as the types of treatments available and how best to use them.

Dependence is defined by the American Psychiatric Association's Diagnostic and Statistical Manual (DSM IV-R) (APA 1994) using a fixed set of symptoms. Depending on the number of symptoms used to define dependence (Piper et al. 2006) and the response bias in the population of smokers surveyed, the percentage of dependent smokers can be as high as 87 percent (Hale et al. 1993). Withdrawal symptoms are also related to severity of dependence, and these symptoms may increase temptations to smoke to alleviate the withdrawal, especially in the first 30 days after cessation. Although a "cut point" for dependent versus not dependent is useful for some purposes, it is widely accepted now that there is an underlying continuum of dependence, from mild to severe (Shiffman et al. 1998) among all smokers. Greater nicotine dependence is related to lower motivation to quit; increased difficulty in trying to quit smoking; failure to quit; increase in prevalence of psychiatric or substance abuse comorbidity (e.g., depression, alcoholism) and, in some studies, to better treatment outcome with nicotine replacement therapy (Hughes 1996; Shiffman et al. 1998). However, it is important to note that nicotine replacement, evidence-based behavioral treatments, and now other pharmacological aids (see later in this appendix) increase all smokers' chances of quitting, regardless of level of dependence. The PHS (public health service) guideline therefore recommends that all smokers be advised to use nicotine replacement therapy (NRT) and other evidence-based treatments when trying to quit, except when nicotine replacement is contraindicated, such as during pregnancy or immediately post myocardial infarction (Fiore et al. 2000).

A detailed review of gender and smoking is beyond the scope of this chapter. The U.S. Surgeon General (DHHS 2004b) reported that since 1980, 3 million women have died prematurely from smoking related disease. Women differ from men in their biological responses to nicotine (Perkins et al. 1999). Some studies support the hypothesis that women have more difficulty quitting than men while others do not (Killen et al. 2002; Wetter et al. 1999). Sex-specific variables such as concerns about weight gain, stress reduction, and the need for social support may also underlie differences between men and women smokers. Some research suggests physical activity may help women smokers quit (Marcus et al. 1999). A recent report calls for more research to clarify the differences between men and women to improve treatment of women smokers (DHHS 2004).

Differences in demographic characteristics are most evident in smoking rates among those at disproportionate risk due to comorbidity (e.g., psychiatric, alcohol/substance abuse), disparities in SES, and among some racial and ethnic minorities. Smoking is over four times more prevalent (43 percent) in adults with lower educational attainment such as a GED than in those with a graduate degree (8.9 percent). Smoking rates are 17.0 percent for Asian Pacific islanders versus 34.0 percent for Alaskan American natives; 11.6 percent for those with more than 16 years of education versus 35.4 percent for those who did not complete high school; 12 percent for those older than 65 versus 29 percent for those 44 years of age or younger (CDC 1998). Augustson and Marcus (2003) defined hardcore smokers as established smokers over age 25 years, smoking 15 or more cigarettes per day and reporting no recorded history of quit attempts. Hardcore smokers make up 17.6 percent of all smokers, are more likely to be male, unmarried, unemployed, and

have a lower level of education. This hardcore subgroup may be a significant public health challenge in terms of reaching and treating them (Augustson and Marcus 2003).

At the state level of aggregation, Utah has the lowest prevalence (12.7 percent) and Kentucky the highest (32.6 percent) an almost threefold difference. Smoking prevalence is also lower than the national average (23 percent) in those states with strong, visible, comprehensive, and sustained antismoking programs (e.g., 16.4 percent in California and 19 percent in Massachusetts) (CDC 2004a). One population-based study suggests that higher smoking prevalence within a state may be associated with lower motivational levels of readiness to quit, fewer quit attempts, and heavier smoking (Etter 2004).

Generally, over 80 percent of adult smokers become regular users before the age of 18 years (CDC 1998). There has been a 32 percent increase in youth adoption of smoking between 1991 and 1997 in the United States (CDC 1998) and a 28 percent increase among college students (Rigotti et al. 2000). A unique window of opportunity exists for early cessation intervention among youth and young adults. This younger cohort of smokers has not received attention. Young smokers are a target population that has “slipped through the cracks” between the prevention and the treatment models of intervention (see Appendix D by Flay and Appendixes by E through H by Halpern-Felsher).

The past decade has seen numerous studies document strong relationships between smoking and psychiatric comorbidities. Depression, alcohol and other substance abuse disorders, adult attention deficit/hyperactivity problems, psychotic disorders, and anxiety disorders are associated with increased prevalence of smoking (Hughes 1993). One recent population-based study estimated that 44 percent of persons suffering from current mental illness were smokers (Lasser et al. 2000). Smokers with a history of depression are more likely to be diagnosed as nicotine dependent and to progress to more severe levels of dependence than persons without a history, and are less likely to quit smoking (Glassman 1997; Patten et al. 1998). Smoking rates of over 85 percent are observed in alcoholics, opiate addicts, and poly-drug users (Fertig and Allen 1995).

More alcoholics die of tobacco-related causes than from their alcoholism (Hurt et al. 1994). Smokers with a history of alcoholism are more likely to be nicotine dependent. Moreover, psychiatric comorbidities, whether historical or current, appear to significantly impede efforts at smoking cessation (Hughes et al. 1995; 1996); conversely, quitting smoking may significantly increase risk of relapse to major depressive disorder, at least among those with such a prior history (Glassman et al. 2001). Studies have been conducted on some populations at disproportionate risk, including racial and ethnic minorities, women, older Americans and a limited number on adolescents and young adults (see Appendix P by Wallace).

Preventing relapse among smokers who currently make quit attempts will have a very important impact on reducing population prevalence, along with reaching more smokers and motivating them to try to quit. Those smokers with comorbid complications and bio-behavioral vulnerabilities, such as increased dependence, do tend to relapse more often whether they quit on their own or even in formal evidence-based treatment. Although use of evidence-based interventions improves cessation outcomes for all smokers across the board, smokers who do have comorbidity and smoke more heavily generally do not achieve cessation at the same rates as smokers without such additional risks. While there is little evidence in support of treatment “matching” of smoker characteristics to specific treatment components (e.g., depressed smokers do not generally benefit more from cognitive behavioral treatment for depression (Brown et al. 2001), smokers who are at higher risk due to certain bio-behavioral or socioeconomic vulnerabilities may in-

deed benefit from more intensive, longer, or specialized clinical interventions (see review below of treatment efficacy).

In summary, the full impact of cessation interventions on the intended target population is a product of the proportion of the population reached and the efficacy and fidelity of implementation of the intervention delivered (Impact = Reach x Efficacy; see Abrams et al. 1993; 1996; 2003; Glasgow et al. 2003; 2006a,b for details). Thus, in addition to trying to motivate more smokers to make quit attempts, there is an enormous opportunity to further increase cessation outcomes. The vast majority of smokers who do make quit attempts, as many as 85–98 percent in studies of brief and self-help interventions, will relapse. As reviewed below and in subsequent sections, few smokers know about treatment efficacy, few use any treatments at all, and those who do use an evidence-based program may not use or have access to the best programs to address their individual vulnerabilities. Consequently, overall cessation can be improved by increasing the interest and motivation of smokers to make more quit attempts and to use evidence-based interventions when quitting to improve the likelihood of cessation and to reduce the likelihood of relapse.

Increasing Demand for Cessation

One way to increase the overall impact of cessation at the population level is to increase the reach of current interventions using social marketing and other behavioral principles to enhance smokers' motivation and interest in cessation. The following material reviews some of the factors that, in concert with the socio-demographic and bio-behavioral characteristics of smokers presented above, might be considered in making a case for increasing consumer demand for smoking cessation products and services. Characteristics of smokers and patterns of smoking at individual and group levels need to be considered in any plan for marketing and communications strategies to reach more smokers and to increase their motivation to quit and their demand for use of evidence-based cessation.

There is an enormous opportunity for improvement in cessation outcomes by reaching and motivating many more smokers to make quit attempts each year, by encouraging the use of proven cessation programs when trying to quit, and by targeting those with disparities in smoking rates and comorbidities. Increasing smoker motivation to make more quit attempts requires a multi-pronged set of intervention strategies targeted at multiple levels: (1) at all nonsmoking individuals and at smokers (e.g., increasing their health literacy, correcting misperceptions about smoking, and disseminating the facts about the safety and efficacy of cessation programs); and (2) at multiple systems levels of social and environmental structures and policies that can make smoking behavior more difficult and quitting easier at the peer, neighborhood, community, state and national levels (e.g., homes, schools, workplace bans; mass media campaigns and free OTC-NRT [over-the-counter nicotine replacement therapy]; tax disincentives).

Individual Level

Social marketing principles include the tailoring and targeting of campaigns to specific audience characteristics. Social marketing approaches would conceptualize smoking cessation programs as an attractive line of “products” that must be appropriately priced, packaged, positioned, and promoted in a competitive marketplace. In addition to the socio-demographic and bio-behavioral characteristics of smokers reviewed above, a number of other considerations may be

useful to improve the marketing and the reach of existing smoking cessation programs and services.

Effective social marketing to increase consumer demand must be driven by solid and appropriate social marketing principles, theories, and evidence. The marketing approach includes a number of elements such as understanding of each target audience's needs, characteristics, and perceptions including, for example, the accuracies and inaccuracies in smokers' knowledge of tobacco use and cessation and various approaches to risk perception, motivational enhancement (see Emmons 2003), and economic incentives.

About 43 percent of smokers make a quit attempt per year (Hughes et al. 2003). Thus, although over 70 percent of smokers say they intend to quit, 57 percent do not do so in a given year. Of those that make a quit attempt, some studies report that less than 20 percent of quitters use proven treatments, and relapse after an unaided quit attempt is more than twice as high as when a proven treatment is used (Zhu et al. 2000). Moreover, of smokers motivated to quit, 78 percent believed they were just as likely to quit on their own as with cessation intervention assistance (Zhu et al. 2000). Those participants who did believe cessation methods were effective were more likely to intend to quit (OR 1.8), make a quit attempt (OR 1.8), and to use intervention assistance when quitting (OR 3.62). Zhu and colleagues (2000) also reported that smokers who used an intervention (self-help, counseling and/or NRT versus those who quit on their own were twice as likely to succeed (7 percent vs. 15.2 percent), abstinent at 12-month follow up) and that heavy smokers were more likely to use assistance than light smokers, women more than men, and older more than younger smokers. Thus, there is an enormous opportunity to increase population prevalence of smoking cessation by reaching and motivating the 57 percent of smokers who currently make no quit attempts per year. Among those who do make a quit attempt, their success rate could at least be doubled for those 80 percent who quit on their own if only they used an evidence-based intervention. Reaching and motivating more smokers to make quit attempts each year and having them use proven treatments when they do quit would dramatically increase population cessation rates nationwide.

Some smokers come into treatment due to pressure from others. Motivation is best when it is intrinsic (comes from the smoker him/herself) and is tied to a realistic evaluation of the benefits of stopping versus the benefits of continuing to smoke (Curry et al. 1991; Curry et al. 1997). When a smoker is not really ready to quit and lacks self-confidence to try, then it is neither surprising that he or she will fail to quit when asked to try nor that the treatment provider will become discouraged from advising him/her to quit again in the future. Both smokers and their providers often have unrealistic expectations (Abrams et al. 1991; 1993; 1996; 2003). The mismatch between smoker readiness (not ready) and provider enthusiasm (you should quit today) is most evident in settings that require a provider to proactively reach out to smokers who are not seeking treatment for their smoking. Such settings include non-volunteer populations such as all the smoking members of a managed care organization, a worksite, a hospital, or in a substance abuse rehabilitation program (Abrams and Biener 1992; Abrams et al. 1993; 1996; 2003).

The Stages of Change (SOC) model (Prochaska and Velicer 2004) lends itself to the development of interventions that are tailored to the smoker's motivational readiness to change. The SOC model also provide a useful roadmap for smokers in that it provides milestones (pre-contemplation, contemplation, preparation, action, maintenance) and guidelines for processes used at every phase of the journey from smoking initiation to various patterns of use to various efforts at cessation, relapse, and recycling to the ultimate success of permanent maintenance of cessation. Both smokers and the health delivery systems (public health and health care) can

therefore use metaphors such as the journey from smoking to cessation to develop interventions that take into account continuity of care and the need for a systematic and dynamic approach to management of the cessation process (chronic disease management model; see further in this appendix as well as Abrams et al. 2003). Population surveys show that only a small minority of current smokers (14–28 percent) is motivated to quit in the next 30 days (Abrams and Biener 1992; Velicer et al. 1995). Members of managed care groups such as Health Maintenance Organizations (HMOs) have higher levels of motivational readiness than the general population, with as many as 70 percent planning to quit within 6 months (Hollis et al. 1993).

Wewers and colleagues (2003) measured the distributions by readiness to change. Desire or intention to quit, using the Stages of Change measure, was examined from data collected in 3 Tobacco Use Surveys (1992–1993, 1995–1996, and 1998–1999). Results indicated a similar distribution across all three time points indicating very little movement in the stages of readiness to change in the U.S. population during the 1990s. The percent in each stage was 59.1 percent in pre-contemplation (not seriously thinking of stopping within the next 6 months), 33.2 percent in contemplation (planning to stop in the next 6 months but not in the next 30 days or planning to stop in the next 30 days but made no quit attempts in the past 12 months), and 7.7 percent in preparation (planning to stop in the next 30 days and made a quit attempt of at least 24 hours duration in the past 12 months) (Wewers et al. 2003). However, Etter (2004) reported that there was an association between smoking prevalence and stages of change in the United States across the 50 states, such that a higher prevalence of smoking was associated with lower motivation to quit, fewer quit attempts, and higher cigarette consumption.

Among youth 55 percent of middle school students and 61 percent of high school students said they wanted to stop smoking, and overall 59 percent of current smokers reported they had tried to stop smoking in the 12 months preceding a national Behavior Risk Factor Survey (CDC 2001). Among middle school students, 80 percent thought secondhand smoke was harmful to them while 89.8 percent of high school students thought secondhand smoke was harmful to them. Research also indicates that 24 percent of young girls aged 12–18 years believed that they could stop smoking whenever they wanted to even if they smoked regularly, and this myth was even more prevalent among girls who were already smokers (41 percent) (Portor Novelli Communication styles 2002).

The PHS clinical guide (Fiore et al. 2000) does recommend motivational enhancement interventions for individual smokers who are not motivated to quit (for more details on motivational factors see Emmons 2003). Moreover, the PHS guide (Fiore 2000) recommends that smoking status and then intervention (the five A's) be made a “vital sign” along with temperature and blood pressure in all encounters between patients and any aspect of the health care delivery system. Evidence is presented that such a system can increase identification of smokers from 38 percent to over 65 percent in a health care setting and that this, in turn, can also double the cessation rate among smokers from 3 to 6.4 percent. If these PHS guidelines were implemented nationwide by all health care providers and all health care organizations, it alone would dramatically increase the number of smokers reached and provide an opportunity to motivate them, educate them about the best ways to stop smoking, and provide them with evidence-based cessation interventions.

Smoking prevalence and patterns of uptake, use, and cessation are also strongly influenced by the advertising and targeted marketing of the tobacco industry. The tobacco industry in the United States spent over \$15.15 billion in 2003 on marketing its lethal products (FTC 2005). The tobacco industry continues to aggressively promote smoking with attractive new products, novel

incentives, and creative marketing strategies. Forces promoting smoking and future innovations in tobacco products include so-called “potentially reduced exposure products” (PREPs), discount prices, free samples, and desirable paraphernalia such as T-shirts and sports bags. The industry has been especially successful at targeting young adults and minority groups over the last decade. Media and marketing efforts to promote cessation or to increase demand and motivation for cessation programs pale in comparison to the myriad of forces used by the tobacco industry to encourage and sustain smoking behavior and their market share of specific brands and products. Recent concerns have been raised that tobacco industry-sponsored programs for prevention and cessation may be using interventions that either have not been evaluated or are relatively weak or ineffective, thereby competing with more effective programs and potentially diluting the impact of more powerful evidence-based programs in schools, communities, and on the Internet (Mandel et al. 2006).

Shiffman and colleagues (2001) examined the effects of counter-advertising messages on tobacco industry-created beliefs about the effects of “light” and “ultra light” on quitting beliefs and intent. Smokers of these cigarettes continue to believe they are less harmful than regular cigarettes, and debunking these myths may encourage cessation (Kozlowki et al. 2000). The study found that messages focused on the sensory perceptions that these cigarettes were less harsh resulted in the most positive changes in beliefs about safety, delivery, and intent to quit. The authors concluded that addressing sensory dimensions may be a promising strategy for changing smoker’s misperceptions about “light” and “ultra light” cigarettes and enhancing their intent to quit. In a follow up study, Shiffman and colleagues (2004) examined the effects of marketing PREPs on smoker beliefs. They concluded that reduced-risk tobacco product claims undermine adult cessation and youth prevention. PREPs appeal to smokers contemplating cessation and exposure to PREPs claims appears to undermine smokers’ readiness to quit, especially among young adults ages 18–25 years. Media campaigns that educate smokers about beliefs in the addictiveness of smoking, the dangers of secondhand smoke exposure, and the tobacco industries’ use of deceptive advertising are associated with smokers’ increased consideration of cessation, especially if there are children in the home (Netemeyer et al. 2005). A recent article outlined 12 common myths that undermine tobacco control methods. Some myths stem from misunderstanding, while others seem to be deliberately promulgated by the tobacco industry (Freiden and Blakeman 2005). Media counter-advertising to creative tobacco industry marketing is an important component in increasing smokers’ interest in cessation and neutralizing tobacco industry targeting of smokers and potential smokers to undermine their motivation to stop smoking or not start smoking.

McDonald (1999) reviewed the field of population-based recruitment to examine the use of potential communications strategies to encourage enrollment in smoking cessation. Recruitment (i.e., reach) was defined as the number of smokers who enrolled in a cessation program divided by the estimated total number of smokers in the target population. Over 30 studies reported the results of 40 recruitment campaigns and the median recruitment rate was 2 percent. Studies that used interactive recruitment methods (e.g., telephone, interpersonal communications) were 66.5 times more successful than those using passive recruitment (e.g., direct mailing). McDonald (1999) suggests more attention is paid in designing population-based recruitment strategies and the use of interpersonal channels of communication.

Hammond and colleagues (2004) examined smokers’ awareness and perceived effectiveness of cessation methods in a random digit dial survey of 616 smokers in Canada (76 percent response rate). 87 percent of respondents said they wanted additional information on where to get

help quitting, 86 percent wanted information about how to quit, 85 percent wanted information on the benefits of quitting, 70 percent wanted information about a toll free telephone quitline, and 68 percent wanted to see a website address. They reported poor recall of cessation intervention methods with recall percentages as follows: 11 percent cited counseling programs, 6 percent behavioral tools, 5 percent brief physician counseling, and only 43 percent OTC NRT, despite nicotine patch being so heavily advertised by the pharmaceutical industry.

Yong and colleagues (2005) reported that older smokers (>60 years of age) perceived themselves to be less vulnerable to the harmful effects of smoking (self-exempting beliefs), less concerned about the health effects of smoking, less confident about being able to quit (self-efficacy), and less willing to want to quit. However, price of cigarettes, health providers advice, cheap quitting medication, and health risk information were predictors of quitting intention, and cigarette price and cheap medication were also associated with more recent quit attempts. In an interesting study of the characteristics of smokers who want to quit but have not (dissonant smokers), Paretto-Watel (2003) reported five different profiles using a cluster analysis. The clusters included younger smokers who were not interested in cessation but were sensitive to price of cigarettes; two groups who were healthy, moderate smokers who had many failed quit attempts and who preferred cessation without any medical assistance and were not concerned about adverse health effects; and two groups who were highly addicted to nicotine and who preferred medical help with cessation—this group was in poorer health and afraid of smoking-related diseases. The study suggests that there are a variety of subtypes of smokers and that marketing strategies to reach, motivate, and help them with cessation efforts will need to be targeted and tailored to these characteristics. However, prospective controlled studies have not been done to show that such tailored strategies will significantly increase readiness to quit and use of proven interventions when quitting.

Cummings and colleagues (2004) investigated what smokers say about the impact of different population-based interventions to motivate them to think seriously about stopping smoking using a random digit dial cross-sectional telephone survey of adult current cigarette smokers. A total of 815 smokers were asked which of eight interventions would motivate them to think seriously about stopping smoking in the next 6 months. The offer of free nicotine patches or gum (53 percent) and cash incentives (49 percent) were the most frequently mentioned interventions that smokers said would get them to think seriously about stopping smoking. The degree of motivation to stop smoking was the most consistent and strongest predictor of how respondents answered the question about the influence of the various intervention options.

No two smokers are identical; smokers smoke and stop smoking for different reasons, and each smoker has a unique profile of genetic predisposition and environmental experiences individual difference characteristics. To accelerate movement along the journey from smokers who are not motivated to make quit attempts to those who successfully maintain cessation for the remainder of their lives requires intervention planners and policymakers to offer a wide array of interventions that are likely to appeal to different subgroups of smokers and individual smoker needs in order to have a population impact. A variety of targeted and tailored interventions need to be considered as well as the offering of incentives that reward smokers for making quit attempts and for maintenance of cessation.

Systems Level

There is an inexorable social movement across the developed nations to increase restrictions on smoking and to protect the general public from the harms of environmental tobacco smoke

(ETS) exposure. The typical sequence of implementation of restrictions in a nation includes first workplace bans (initially voluntary and later mandatory) then increasing restrictions in public places, on mass transport, in restaurants and in bars and clubs as well as recommending voluntary restrictions in private homes and cars.

About 69 percent of U.S. worksite are smoke-free (American Cancer Society 2003). Employees in workplaces with total smoking bans have higher rates of cessation and smoked fewer cigarettes (Longo et al. 2001). But meta-analyses suggest little direct impact of workplace restrictions on cessation (Moher et al. 2005). Workplace studies aimed at the workforce as a whole included 14 studies of smoking bans; meta-analyses supported the hypothesis that bans reduced consumption during the working day and possibly overall consumption and quit attempts but not overall cessation.

To study the effects of restrictions on smoking, Borland and colleagues (2004) and Hammond and colleagues (2006) surveyed smokers in four countries (Canada, United States, United Kingdom, and Australia). In general, results were similar across the four countries. For the United States results were as follows (weighted for age and sex and stratified for major geographic regions): 65.5 percent reported smoking was not permitted anywhere in their workplace; among those who went to a restaurant in the past 6 months, 19 percent reported total indoor bans and 11.9 percent said there were restrictions; 15 percent of smokers said they never allow smoking at home while 34 percent had some restrictions on smoking at home and 40 percent had no restrictions at home. Total bans in smokers' homes declined with age, cigarette consumption, and self-exempting beliefs and increased with education, income, reported bans in restaurants and bars, presence of a nonsmoker adult in the home, better reported health, and believing that ETS was harmful to others. Farkas and colleagues (2000) reported that adolescents ages 15 to 17 years who lived in homes with smoking restrictions were 74 percent as likely to be smokers as adolescents who households without smoking restrictions. Likewise, adolescents who worked in smoke-free environments were 68 percent as likely to smoke as those in workplaces with no smoking restrictions

Fong and colleagues (2006) reported on the impact of smoke-free workplace legislation on smokers in Ireland which, on March 29, 2004, became the first country in the world to implement comprehensive smoke-free legislation in all workplaces with few exemptions. Fong and colleagues (2006) used a quasi-experimental design and interviewed 1,000 randomly selected adult smokers from Ireland and 600 from the United Kingdom before the ban (December 2003–January 2004) and after the ban (December 2004–January 2005). As expected, reported smoking in bars and pubs dropped after the ban from 98 to 5 percent in Ireland and remained at near 98 percent in the United Kingdom. In restaurants, the smoking rate dropped from about 84 percent in both Ireland and the UK to 3 percent in Ireland and about 62 percent in the UK. In shopping malls the rate dropped from 30–40 percent in Ireland and United Kingdom to near zero in Ireland and 20 percent in United Kingdom. In worksites, the rate dropped from over 61 percent in Ireland and just under 40 percent in the United Kingdom to about 14 percent in Ireland and about 38 percent in the United Kingdom. Ninety-eight percent of Irish smokers reported there was less smoke in pubs than the prior year, while only 35 percent of UK smokers said there was less smoke in pubs than a year ago.

In general, a barrier to policy change is the perception that smokers would not support a smoke-free law. Fong and colleagues (2006) examined these perceptions before and after the ban in Ireland compared with the United Kingdom and noted that the odds ratio (OR) was 6.38 (4.37–9.32) for the increase in support among Irish smokers for a total ban in pubs compared to

UK smokers. During the one year interval between the surveys, support increased from about 2–7 percent in the United Kingdom and Ireland before the Irish ban to over 40 percent in Ireland and about 10 percent in the United Kingdom. Significant differences in the same direction were noted in restaurants (OR 3.91 [2.89–5.30]) and workplaces (OR 2.78 [2.08–3.72]), as well as at fast food outlets, shopping malls, train stations, and in trains. Overall, 81 percent of Irish smokers reported that the smoke-free law was a good or very good thing, and the proportion of Irish homes with smoking bans also increased. After implementation of the law, 62 percent of Irish smokers supported the total ban in pubs compared with 26 percent of UK smokers. Moreover, 79 percent of Irish smokers who reported quitting smoking after the ban said that the smoke free law made them more likely to quit, and 90 percent stated the law helped them to avoid relapse. 46 percent of Irish smokers who were still smoking after the ban said the law made them more likely to quit and 59 percent of Irish smokers said the law made them cut down on the number of cigarettes they smoked.

The Irish smoke-free workplace law has been a public health success with very high compliance. It resulted in a dramatic reduction in ETS smoke; a substantial increase in support for the law among smokers; reports from smokers that the law has helped them to quit, try to quit, or cut down on the amount they smoke; and there is no evidence of shifting smoking to private venues. The pre-implementation campaign may have helped achieve these results.

Frieden and colleagues (2005) reported on the effectiveness of a large-scale distribution of free NRT patches in New York City. After increases in cigarette taxes and the implementation of smoke-free workplace legislation, a large-scale distribution of free NRT was undertaken and evaluated at 6-month follow up. An estimated 5 percent of all eligible New York City smokers of 10 or more cigarettes per day (34,090 smokers) who called a toll-free quitline were given a 6-week course of NRT and brief follow-up counseling was also attempted. Most (64 percent) were non-white, foreign born, and/or resided in a low-income neighborhood. Using a conservative intent to treat analysis (all non-respondents were smoking at 6-month follow-up), the cessation rate was 20 percent. Those who received counseling were also more likely to quit than those who did not (38 vs. 27 percent). They estimated the cost per quit was \$464. Easy access to free NRT cessation medication in diverse populations can help large numbers of smokers to quit.

In a related report, Frieden and colleagues (2005) examined the impact of the comprehensive tobacco control measures of increased excise taxes, legal action for smoke-free workplaces, and increased cessation services—including the free NRT patch program, education, and evaluation. The authors reported that from 2002 to 2003 smoking prevalence in New York City decreased by 11 percent from 21.6 to 19.2 percent, equivalent to about 140,000 fewer smokers. During that time, cigarette purchases outside of New York City doubled, effectively reducing the effective price increase by 33 percent. They concluded that concerted action can have an impact on sharply reducing local smoking rates in a defined population (New York City) but that further effectiveness will require a comprehensive and coordinated national plan to reduce evasion of the local tax increase.

The task force on Community Preventive Services (Hopkins et al. 2001) reviewed the evidence for making an impact on quitting of 15 tobacco control strategies and strongly recommended multi-faceted media campaigns (i.e., media combined with other tobacco control interventions). Fiore and colleagues (2004), as part of their recommendations to encourage an additional 5 million smokers to quit, recommended funding a \$1 billion national media campaign out of a \$2.00 a pack earmarked tax as well as a national proactive telephone quitline at a cost of \$3.2 billion per year. Media campaigns can encourage and increase cessation attempts and cessa-

tion across a variety of populations and can be tailored to address high-risk groups and disparities (Boyd et al. 1998; Siegel 2002).

Sociodemographic and selected behavioral and social environmental factors are also associated with facilitating cessation. For example, Saihpush and colleagues (2003) reported that knowing ETS exposure is harmful and smoking onset before age 14 was associated with greater likelihood of cessation. In addition, the odds of quitting were 4.5 times as likely for smokers living in homes where smoking was banned and 3.2 times greater for smokers reporting that few or none of their friends smoked. Their study suggests that it is difficult to quit smoking if the proximal environment is filled with smokers and thus interventions need to take the social context into consideration in smoking cessation programs.

Mass media campaigns can be effective at increasing interest in and motivation to quit when they are part of integrated community interventions, such as the comprehensive programs, monetary and other incentives (e.g., free NRT, tax disincentives, workplace bans), and interventions illustrated in the New York City and other case study and research trial examples reviewed above.

SECTION 2 SUMMARY

Current effective cessation programs exist but are greatly underutilized, despite the social climate that is making it more difficult to smoke (e.g., bans in worksites, higher taxes). The percent of all the 45 million current U.S. smokers who make a quit attempt each year is less than 45 percent. Of those that try to quit, over 75 percent do so on their own and over 95 percent of them fail to sustain abstinence. Using even minimal intensity or brief evidence-based cessation programs and services generally doubles the likelihood of success (see review below), and furthermore, there is a dose–response relationship such that more intensive programs and combined pharmacological and behavioral coaching programs can quadruple the likelihood of success. There is substantial room to improve the overall cessation outcome rate at every step of the journey from being an unmotivated current smoker who does not even make a quit attempt to reducing or preventing relapse among any smoker who makes a quit attempt.

The tobacco industry-sponsored marketing activities have also been shown to change smokers risk perceptions and expectations about safe cigarettes and motivation to quit. In short, they create myths and misinformation and undermine motivation to quit. Many smokers are also not aware of the safety and proven efficacy of formal treatment programs; for example, some smokers (as many as 67 percent) believe NRT may be as dangerous to one's health as smoking. Thus, there is a strong need for more aggressive campaigns directed at smoking consumers that will improve their health literacy about tobacco products and about the value and safety of using evidence-based interventions. Many smokers have significant gaps in their health literacy, lacking specific knowledge of cessation methods, success rates, and how best to use cessation resources.

The weak marketing of cessation products and services relative to the tobacco industry's capability results in many smokers harboring misinformation about the safety and efficacy of treatment, such as the misperception that PREPs are indeed relatively "safe." The countervailing tobacco industry forces undermine smokers' motivation to quit and weakens their health literacy about the health damaging effects of tobacco products and the beneficial effects of proven cessation products and services (e.g., Cummings et al. 2002; Cummings et al. 2004a; Cummings et al. 2004b). Having effective and efficient proven programs and services is necessary but not suffi-

cient to reduce population prevalence. The last decade has disproved the assumption “if you build it, they will come.” This supply side strategy of “if you build it, they will come” has not generated enough successful quitters to make a significant impact on reducing overall population smoking prevalence; both supply and demand strategies are needed.

In sharp contrast to the ongoing massive tobacco industry marketing campaigns, the financing in support of cessation and the marketing and promotion of information about cessation is miniscule. Herein lies a vast, largely unrealized, and untapped potential. Research studies illustrate the potential power of using financial incentives, mass media, and other strategies to motivate and support cessation (e.g., giving free NRT and telephone counseling in New York City). There are a number of other contextual and systems level factors that may discourage smoking and motivate smokers to quit: smoke-free laws and their enforcement (e.g., the workplace bans in Ireland and elsewhere), free state-supported proactive telephone quit lines, free OTC NRT, and low cost Internet-based cessation and relapse prevention (available 24/7/365 worldwide via the World Wide Web). Recent movement in the direction of increasing financial support for cessation includes the decision by the very influential federal Centers for Medicare and Medicaid Services (CMS) to reimburse for some of the proven cessation treatment services in their Medicare program as of March 2005. New generations of improved pharmacotherapies, behavioral counseling programs, and other innovations will also become available (see later sections in this appendix).

There are also large disparities in smoking rates with much higher prevalence among lower SES groups, some racial and ethnic minorities, and those with comorbid psychiatric/substance abuse conditions (see Wallace, Appendix P). Few smokers are fully informed consumers. The majority of smokers are relatively unaware of the differences in quality, content, safety, and efficacy of the various proven and unproven cessation interventions that are marketed to them. They neither know how to choose a program that best suits their needs nor what to do if they have difficulty quitting with a program and need a more intensive cessation care plan.

SECTION 2 RECOMMENDATIONS

The current smoker’s journey towards successful cessation needs a clear roadmap and milestones. This roadmap must be widely disseminated to educate and guide smokers through the phases from not being motivated to quit to making as many quit attempts as is needed (relapse and recycling) and learning how best to use the specific types of evidence-based programs that suite their unique individual profiles of patterns and needs until they can permanently maintain cessation.

There is a pressing need to focus on increasing consumer demand for cessation among smokers using well-established, theory-driven methods from social marketing and behavioral, social, and economic sciences. Creating strong consumer demand for quality programs requires greater emphasis on social marketing principles to address factors such as: product, providers, price, placement, promotion, and policy. Smokers must be educated that smoking is a journey from adoption to addiction to cessation.

A substantial investment must be made in research and in practice to determine what different smokers need and want, to clearly educate and communicate to them what is available to meet their needs, how to use the tools available for quitting, and what it is they should be doing

to improve their cessation success. Cessation products and services need to be made more attractive, accessible, and convenient.

Moreover, mass media and other channels of communication must be coordinated, aligned, and sustained in comprehensive, coordinated policy plans over time to motivate and promote cessation using key messages persistently and in novel ways.

Special emphasis must be placed on those smokers who are hard to reach, hard to motivate, hard to treat, and hard to maintain contact with. Surveillance and other modern epidemiological and geographic coding tools must be used to identify subpopulations of smokers based on socio-demographics, disparities, comorbidities and other factors in order to identify and target pockets of high smoking prevalence—those with low motivation to quit; little knowledge of cessation programs; and those communities and neighborhoods that lack the resources, the access, and the finances needed to provide proven cessation programs and services.

It is recommended that the federal government and health care delivery systems develop policies that mandate and implement a substantial, sustained, and effective marketing strategy to reach all smokers, with emphasis on hard-to-reach groups and communities with high pockets of prevalence. The campaign should deploy novel, persistent cues to action; should be designed to increase consumer awareness of the range of best practices available for cessation; should increase consumer ability to identify which programs meet best-practice guidelines; should motivate and provide strong incentives (e.g., contingent reward) for smokers to make quit attempts using evidence-based programs and services; and should help smokers understand the journey from smoking to cessation and the phases in the process of trying to quit—cessation, relapse and recycling—until permanent cessation success is achieved.

Among the areas to consider:

- Develop a credible “consumer report” and certification to identify for consumers those cessation treatments and services that meet evidence-based quality standards.
- Use social marketing principles and novel, persistent, and compelling cues to action to mount substantial and sustained mass media, direct-to-consumer marketing and other communication strategies and channels to reach all smokers with targeted messages addressing ways to increase consumer demand for cessation and encourage use of evidence-based intervention programs when quitting.
- Focus special social marketing strategies on the hard-to-reach and hard-to-motivate groups, such as those with the highest levels of smoking prevalence, greatest comorbidity, and those at largest disproportionate risk. Target “pockets of high risk prevalence”; in other words, the hardest to reach, hardest to motivate, and hardest to treat smokers (this means the 57 percent who make no quit attempt in a given year, those with comorbid psychiatric or substance abuse disorders, the uninsured, the unemployed, and those of lower SES and educational backgrounds who have the highest smoking prevalence rates are the least likely to be able to afford the more intensive and effective treatments and have poor or no access to health care settings).
- Increase consumer awareness of the processes involved in cessation, the range of best practices available for cessation, and provide realistic expectations of the commitment required for success.

- Use specific incentives to motivate smokers to make serious quit attempts (e.g., free NRT, full reimbursement for treatment services, quit and win contests).
- Increase enforcement and use of policies that restrict smoking and protect nonsmokers from secondhand smoke exposure, motivating smokers to consider cessation and reducing the number of proximal cues in the environment (other smokers) that tempt smoking and precipitate relapse.
- Health plans, insurers and public agencies—individually or collaboratively—should use specific incentives to motivate smokers to make serious quit attempts using proven behavioral strategies including monetary incentives (e.g., free NRT, full insurance reimbursement for cessation treatment services and medications).

In terms of outcomes, goals, and objectives, it is recommended that a national adequately funded and effective multi-media campaign be implemented to:

- educate smokers about the types of evidence-based interventions available and how they can choose and use these programs more appropriately and dispel the myths smokers have about cessation methods;
- reach and motivate many more smokers to increase the percentage of smokers who make quit attempts per year, especially the 57 percent of smokers not interested in making quit attempts, those at high risk, minorities, young adults 18–30 years of age, the uninsured, and smokers with health disparities; and
- encourage the smokers who do make a quit attempt each year to always use evidence-based programs when they try to quit (less than 30 percent do now), including educating them about smoking as a journey and informing them that they have the option to keep trying different cessation methods if at first they do not succeed at quitting. Specifically, educate smokers about a Stepped Care approach to cessation so that they can try less intensive and easily accessible programs (e.g., national or state telephone quit-lines, evidence-based internet programs with or without OTC NRT), as well as to consider the more intensive programs involving face-to-face contact, formal clinics, multi-session cognitive-behavioral treatments, prescription medications, and specialized services, especially if they have tried and failed to quit using less intensive methods, have psychiatric or substance abuse comorbidities, and are more heavily addicted to smoking.

The following outcome targets are recommended:

Goal #1: Increase consumer demand for evidence-based cessation programs and services.

Objective #1: Double the proportion of smokers who make quit attempts each year from the current rate of 40–45 percent per year to 60–70 percent within five years and 80–90 percent within 10 years).

- Mount a substantial and sustained mass media/social marketing strategy to reach all smokers (especially the hard-to-reach groups at disproportionate risk).

- Debunk the myths and misinformation that smoking consumers have and increase consumer demand and awareness of the realistic processes and the range of evidence-based cessation programs and practices available and how best to use them.
- Use specific incentives to motivate smokers to make quit attempts using proven behavioral strategies including monetary incentives and disincentives (e.g., free NRT giveaways as in New York City; full reimbursement for all evidence-based treatment services, contests, and worksite incentives).
- Lower the barriers to cessation and make the bar to try to quit so low that many more smokers will be tempted to try to quit and to try again more quickly if they do not succeed.
- Increase environmental restrictions on smoking and reduce secondhand smoke exposures and encourage nonsmokers and ex-smokers to support smokers in their efforts at reducing the harm of smoking to the smokers themselves and to those around them as a step towards cessation.

SECTION 3: EFFICACY AND EFFECTIVENESS OF CESSATION INTERVENTIONS

Efficacy Trials

Generally, there is broad consensus supported by a wealth of evidence from randomized controlled trials (RCTs), meta-analyses, and critical reviews showing that proven smoking cessation interventions (either behavioral or pharmacological) will roughly double the quit rates of users versus controls (see PHS Clinical Guide by Fiore et al. 2000 as well as Hughes et al. 1996 and Raw et al. 1998). Combined behavioral and pharmacological treatments can result in as much as a three to fourfold increase in cessation outcomes. Given the evidence and excellent consensus reports that have been published to date, a comprehensive review of the evidence supporting the best practice recommendations of the PHS report will not be covered in detail here (Fiore et al. 2000).

Although the empirical evidence for efficacy of cessation interventions (Fiore et al. 2000) is based on over 6,000 studies, with over 300 Randomized Controlled Trials (RCTs) meeting stringent criteria for inclusion in intensive meta-analyses, the RCTs are limited in generalizability to the relatively small samples of smokers recruited and treated under ideal conditions. Participants generally are motivated to quit, aged in their 40s, and tend to be of higher SES. Participants are self-selected volunteers; in other words, samples of convenience not representative of the diversity of smokers in the population at large). Participants in clinical RCTs represent less than 5 percent of smokers: those who are ready to quit in the next 30 days (Biener and Abrams 1991; Prochaska and Velicer 2004; Velicer et al. 1995).

In general, greater intensity of treatment (duration and number of contacts, more modalities of intervention) improves cessation outcomes. Although the following classification is an oversimplification, for many purposes, intervention intensity can be classified into three categories: (1) none to minimal, (2) low to moderate, and (3) maximal. Abstinence at a minimum of 6-month follow-up is related to the intensity of the intervention in a dose-response fashion. Abstinence rates range from: (1) about 2–10 percent for smokers quitting on their own, using self-help materials or when they are in the control condition of RCTs; (2) 10–20 percent for brief, low-to-moderate intensity interventions; (3) 20 to over 30 percent for maximally intensive individual or

combined pharmacological and behavioral interventions (see PHS Clinical Guidelines by Fiore et al. 2000 for summaries).

Some evidence supports the concept that tailoring of interventions to individual smoker characteristics or targeting of intervention to group characteristics (e.g., race or ethnic background, gender, age) improves outcomes and that smokers with comorbidity (e.g., psychiatric disorders, alcohol or substance abuse) perform more poorly, especially without using a proven treatment (Niaura and Abrams 2003). As intervention strategies shift from treating individuals in clinical settings to intervening on defined populations in communities, factors such as cost, training of providers, and the pragmatics of coordinated systems of delivery become paramount (i.e., moving from clinical to dissemination to policy research evidence). Interventions of different types and of varying intensity and quality can also target different “defined” populations based on geographic (e.g., neighborhood and community), socio-demographic (e.g., age, gender, race, ethnic and cultural background), pockets of high risk prevalence (low SES groups, the uninsured, alcohol and substance abusers, those with psychiatric comorbidity) or other defining criteria.

In general, RCT interventions, when targeted and tailored to specific defined populations such as African Americans, women, older smokers, and other groups have reported similar or lower outcome efficacy compared with clinical trials interventions reported in the PHS Guide (Fiore et al. 2000). Research targeting smokers with medical comorbidity, such as cardiac patients, generally have higher rates of cessation and maintenance of cessation than other groups reported in the PHS guide when treated as part of their acute medical conditions such as after heart attack or cancer diagnosis (DHHS 2004).

Smokers with psychiatric comorbidities, depression, and alcohol or substance abuse disorders also appear, in some studies, to be able to quit at reasonable rates compared with smokers without comorbid complications (Prochaska et al. 2004), but other studies suggest smokers with comorbidities have more difficulty with cessation and may be less inclined to seek or receive appropriate levels of specialized treatment that their comorbidities may require for ultimate success.

In general, the range of effect sizes and cessation rates reported in the meta-analyses of the PHS Guide (Fiore et al. 2000) can be used to estimate the impact of cessation interventions in clinical RCTs conducted in different settings with different subgroups of smokers. Effects are in the range of about 5 to over 30 percent abstinence rates as a function of the dose–response relationship between intervention program intensity (unaided, low, moderate, high) and outcomes (Fiore et al. 2000). When attempting to calculate population-level impact, however, the results are limited in generalizability because of the types of participants and recruitment methods used in clinical RCTs and lack of information regarding the denominators of the population they were recruited from (Glasgow et al. 2006a;b)

There is a positive dose response relationship between amount and intensity of intervention and outcomes suggesting that some type of Stepped Care model for intervention may be warranted with smokers who either fail at lesser levels of care (e.g., brief treatment) or who have comorbid complications known to diminish outcome efficacy (see Abrams et al. 1993; 1996; 2003; Orleans and Slade 1993 for details). For example, smokers may be assigned to one or the other of a two-tier intervention, either standard care (e.g., brief behavioral counseling and/or OTC NRT), or more intensive specialized care in an outpatient clinic staffed with specialists in addiction treatment, psychiatric comorbidity, and ability to review and provide prescription medications.

Dissemination Trials

Interventions that are translated from clinical to community settings to proactively reach more smokers in a cost-effective manner reveal considerable variability in outcome effectiveness as a function of more heterogeneous users or target group characteristics, program, provider, delivery system and other contextual or setting factors. In general, effectiveness is less than that reported in RCTs and effect sizes are more difficult to calculate with confidence.

Channels of intervention delivery must also be factored in, such as health care organizations and medical settings from hospitals to private practice, worksites, schools, telephone quit lines, the Internet, and other print and electronic media. Systems-level models are needed to address the diversity of channels and of populations of users. Models become more relevant such as Stepped Care, the tailoring of interventions to motivational readiness to quit (e.g., SOC model, motivational interviewing), and the targeting of interventions to channels or to population groups. The dose–response relationship between intervention intensity and cessation outcomes supported by the PHS guide meta-analyses (Fiore et al. 2000), provides some empirical support for a Stepped Care Model (Abrams et al. 2003). The guide also provides evidence that behavioral problem solving and social support enhances outcomes for those who are ready to quit. However, the PHS Clinical Guidelines (Fiore et al. 2000) reported there was insufficient evidence to endorse Stepped Care interventions or the SOC model at that time.

Quitlines

Telephone quit lines have been studied for almost two decades and provide a model for translating research into public health applications (Ossip-Klein and McIntosh 2003). Quit lines operate in more than half the states in the United States and in many other countries. Overall, when implemented appropriately quit lines can be viewed as effective and efficient brief interventions on their own. Quit lines can also be used in combination with other interventions. Quit lines can play an important role in reaching and motivating smokers to quit, and in providing flexible, convenient and low or no cost evidence-based programs for smokers. Generally, well-advertised quit lines can reach 1.1–5.9 percent of the adult smokers in the targeted area over a one year period. One challenge is to maintain a balance between promotion and utilization. Sufficient funds are needed to maintain a sufficiently high level of promotion to justify use of the service and employment of the trained counselors while at the same time not stimulating excessive demand that overwhelms the capacity of the service (Ossip-Klein and McIntosh 2003). Multiple individual studies and several meta-analyses report odds ratios in the 1.20 to 1.34 range (Stead et al. 2003). This efficacy is found when quitlines are used as the primary intervention. When quitlines are combined with other interventions, results are mixed. Significant effects were reported when quitlines were used to augment hospital-initiated interventions for cardiac patients, and in some studies were effective when combined with stages of change materials and NRT (Prochaska et al. 2001; Solomon et al. 2000) but not others (Lando 1997; Ockene 1991; Prochaska et al. 1993). Several studies are evaluating quit lines for cessation among adolescent and young adult smokers but no data are available as yet.

A number of studies have been published that explicitly focus on interventions designed for dissemination including tailored print and computer “expert systems”, telephone quit lines, Internet programs, and brief counseling in primary care and other settings. Space does not permit a comprehensive review of these studies but some exemplars and general trends can be noted. Zhu and colleagues (2002) reported on callers to the California quit line, randomized to receive self-help materials plus up to 7 proactive telephone calls (n = 1973) or to self-help and reactive

telephone support (i.e., only if they called back). A mean of 3 calls were delivered to 72.1 percent of callers in the proactive arm and 31.6 percent of reactive callers. The rates of abstinence at 6 and 12 months follow up were 12.8 and 9.1 percent in the proactive call arm and 8.6 percent and 6.9 percent in the reactive call arm. However the true denominator of all smokers who could have been in the defined population who could have called in but did not do so is unknown.

Fiore and colleagues (2004), based on a careful review of the evidence and the extensive deliberations of an expert panel, recommend funding a national telephone quit line (cost \$3.2 billion per year) along with an associated aggressive mass media marketing campaign (\$1 billion per year) to promote its use as a means of achieving an additional 5 million quitters per year and saving 3 million lives. In a more comprehensive integrated system of care, combinations of such a quitline, along with OTC-NRT, 24/7/365 Internet support for cessation and relapse prevention, and a system for determining how to deliver stepped-up intensive care for those with comorbid complications that require more intensive treatment than a quitline can provide, could all be considered to further improve outcomes (see also Abrams et al. 2003; Cobb et al. 2005; Strecher et al. 2005).

Pharmacotherapy

The U.S. Food and Drug Administration (FDA) approved prescription only (Rx) NRT in the form of chewing gum (2 milligrams) in 1984, a transdermal patch in 1991 and a 4 milligram gum in 1992. Both provide a temporary alternative source of nicotine, relieving withdrawal symptoms and helping smokers quit. The gum and patch were reclassified as OTC products in 1996. Other products were introduced as well: nasal spray (1996, Rx), inhaler (1997, Rx), and lozenge (2003, OTC). The non-nicotine product, Zyban®, was introduced after 1996.

Using data from the National Cancer Institute's (NCI) tobacco use supplement (TUS) to the current population survey (CPS), Shiffman and colleagues (1997; 2004) reported that in 1999 about 40 percent of smokers attempted to quit in the last year compared with about 35 percent in 1996 and 38 percent in 1993. The data are correlational but do seem to track the introduction of NRT and its going OTC: producing a spike in use in 1993, then declined as use of prescription only NRT reached a steady state in 1996 and then another spike in 1999 after NRT went OTC. Shiffman and colleagues (1997) also reported that sales of NRT increased 152 percent after the NRT's went OTC and estimated that this resulted in an additional 114,000 to 304,000 new quitters annually (Shiffman et al. 1997). In a 2000 study report by CDC, it was found that the largest increase in NRT use coincided with the switch of nicotine gum and patch to OTC and that the introduction of two newer forms of pharmacotherapy (nasal spray and oral inhaler) had almost no impact on use (CDC 2000). Longitudinal data from COMMIT (Community Intervention Trial for Smoking Cessation) indicated that annual NRT use doubled from 1993–1995 to 1997–2000 (Cummings and Hyland 2005).

In the mid-1980s, over 90 percent of former smokers reported stopping without use of any formal treatment or pharmacotherapy (Fiore et al. 1990). Studies evaluating commercial NRTs consistently report quit rate increases of 1.5 to 2-fold that of placebo (Silagay et al. 2002).

Should pharmacologic treatments be seen as adjuncts to behavioral treatments or stand-alone therapies? At least for NRT, it appears that the two work additively (Hughes et al. 1999b), although formal tests of this proposition are lacking, especially for combinations of behavioral treatments with the patch and behavioral treatments with non-NRT compounds. It is important, therefore, to know what kind of behavioral treatment components work best with pharmacologic agents and what format and delivery systems are best suited to each product and situation. Is

there dose-related incremental efficacy when intensity of behavioral treatment (components and/or contact) is increased and overlaid, for example, on use of the patch? Stated more simply, how much more can behavioral treatment add to patch efficacy?

Hughes (1995) also posed several hypotheses concerning the mechanisms by which behavioral and pharmacologic treatments might combine to increase treatment efficacy: (1) behavioral treatments improve skills necessary to achieve and maintain abstinence, whereas pharmacologic treatment improves withdrawal; (2) pharmacologic treatment provides relief of withdrawal early on and provides the necessary bridge through the most difficult period, whereas behavioral treatment provides skills necessary to prevent relapse subsequently; (3) behavioral skills may be specifically helpful for a subset of smokers, whereas pharmacologic treatment helps another subset; and (4) one treatment may increase compliance with the other (Hughes 1995). There have been no systematic investigations of these or other proposed mechanisms whereby behavioral and pharmacologic treatments may potentiate one another.

The issue of combining pharmacotherapies deserves additional attention. There is mixed evidence that combinations of NRT products boost efficacy compared with use of individual products (Blondal et al. 1999; Bohandana et al. 1999; Sutherland 1999). However, combined use of the patch and gum appears to alleviate withdrawal symptoms more than either product alone (Fagerstrom 1994), and there is no evidence for increased toxicity (Kornitzer et al. 1995). The combination of bupropion and the patch was also found to be efficacious, at least in the short term, with no evidence of increased adverse events for the combination (Jorenby et al. 1999). So the question remains: for which smokers are combinations of particular products useful?

The PHS Guideline (Fiore et al. 2000) makes it clear that several forms of NRT are efficacious: nicotine gum, the transdermal nicotine patch, the nicotine inhaler, and nicotine nasal spray. Two non-nicotine pharmacologic treatments, bupropion hydrochloride—an atypical antidepressant with noradrenergic and dopaminergic activity—and clonidine—a centrally acting antihypertensive agent—have also demonstrated efficacy since the 1996 Guideline and are recommended treatment options (Fiore et al. 2000; Hurt et al. 1997). Bupropion has received FDA approval for smoking cessation, whereas clonidine has not. Table A-1 depicts the 6-month abstinence estimated ORs and 95 percent confidence intervals (CI) for the different treatments relative to placebo. Overlapping CIs indicate that the treatments have statistically non-distinguishable effects. A recent head-to-head comparison of the nicotine patch, gum, inhaler, and spray showed no differential efficacy (Hajek et al. 1999). Despite some evidence that high-nicotine-dependent smokers may benefit more from nicotine gum (especially the 4 milligram gum) and nasal spray (Herrera et al. 1995; Sutherland et al. 1992), the majority of the evidence suggests that smokers in general benefit from all forms of demonstrated efficacious pharmacotherapies. Therefore, the choice of treatment should depend to a large degree on factors such as patient and provider preference, affordability, and side effects.

It is also clear that NRT works with little or no adjunctive behavioral treatment. This is not to say, however, that behavioral treatment is not important. Rather, it appears that the amount of behavioral treatment sets the base rate for quitting and that adding NRT doubles this quit rate (Hughes 1995; Hughes et al. 1999).

The FDA granted approval for OTC sales of the gum in 1995 and the patch in 1996. This decision was based on extensive clinical and safety experience (Shiffman et al. 1997), trials demonstrating efficacy in OTC-like environments, and the desire to increase smokers' access to proven effective therapies and thereby increase the likelihood that motivated smokers would use NRT and quit (Hughes et al. 1999). Some studies have suggested that the public health benefit of

OTC has been considerable (Shiffman et al. 1998). However, the efficacy of the gum and patch in this environment is less than that observed in controlled clinical trials and probably depends to a significant degree on factors such as under-dosing, ceasing use prematurely, using inappropriately, and having an (un)availability of supplemental behavioral treatment. For example, use of a program consisting of telephone support and tailored cessation materials boosted quit rates significantly for those OTC patch and gum users who availed themselves of this resource compared with patch users who did not (Shiffman et al. 2000; Shiffman et al. 2001).

For light versus heavy smokers, trials of NRT with treatment consistently indicate similar success rates for light versus heavy smokers, but trials of NRT without treatment (e.g., OTC NRT) suggest that heavy smokers do worse than light smokers when using NRT.

Community Dissemination and Implementation Trials

In moving from clinical trials to large-scale community dissemination research, intervention strategies shift from “reactively” treating highly motivated individuals to “proactively” reaching the vast majority of unmotivated smokers in broader, defined populations such as entire communities. Factors such as fidelity of implementation, cost-effectiveness (and efficiency), training of non-specialist (i.e., generalist) providers, and the pragmatics of “coordinated systems of delivery” become paramount. Interventions of different types, modes, methods, and channels of delivery are used to reach and target “defined” populations based on geography, demography (e.g., age gender, race, ethnicity), setting, or other criteria (e.g., low SES groups, the uninsured, alcohol and substance abusers, those with psychiatric comorbidity, and prison populations). Interventions can also vary in the degree of targeting or tailoring of program content to the individual difference characteristics of the subpopulations of smokers they are designed to reach (for details see Wallace Appendix P).

There are an increasing number of well-conducted dissemination studies of effectiveness and cost-effectiveness delivered through different channels and modalities. Such “real world” interventions range in intensity, duration, content, quality, reach, and cost (e.g., telephone quit lines, OTC-NRT, Internet cessation, health care providers in hospitals, clinics, primary care practice, managed care organizations [MCO], worksites, alcohol and substance abuse programs) (Cobb et al. 2005; Keller et al. 2005; Frieden et al. 2005; Hughes et al. 2003; Metzger et al. 2005; Ossip-Klein and McIntosh 2003; Shiffman et al. 1997; Solomon et al. 2005; Stead et al. 2003; Taylor and Curry 2004; Zhu et al. 2002). Dissemination trials report more variability in fidelity of implementation of best practices and mixed or weaker cessation outcomes than the results reported in clinical RCTs delivered under “ideal” conditions.

National Trials: National Health Plan Study in Great Britain

In a recently published evaluation of a national smoking cessation intervention supported by the British National Health Service, (Raw et al. 2005) reported that 28 percent of British smokers attempted to quit, 18 percent of all smokers used treatment (64 percent of the quitters); 9 percent (32 percent of quitters) bought Nicotine Replacement Therapy Over the Counter (NRT-OTC); 6 percent used prescription only pharmacotherapy (21 percent of quitters); and 3 percent used a cessation clinic (11 percent of quitters) and 5 percent quit without help (36 percent of quitters). Assuming success rates of 10 percent for NRT-OTC; 10 percent for Pharmacotherapy; 20 percent for Clinic Treatment; and 5 percent for unaided cessation, the percent of smokers who

stopped smoking was 2.6 percent. This study demonstrated making a national impact on the population of smokers in Great Britain.

There are limitations to the implementation of the British experience (Raw et al. 2005) that suggest the overall impact of their program could have been much greater. First, on the “demand side,” the program was poorly advertised and weakly marketed (i.e., there was little “buzz” and an inadequate effort to stimulate consumer demand or to reach and motivate all smokers in Great Britain). Second, on the “supply side,” the program relied entirely on the existing infrastructure of the health care system, providers were inadequately trained and only weakly supportive. Moreover, only traditional clinic-based cessation was offered—a serious limitation to access and usage in light of the possible brief, minimal, and community-based programs that could have been offered.

The British study may be seen as a lower limit to estimating the effectiveness of the potential impact of a cessation treatment plan that is supported and reimbursed by third party payers and implemented nationwide. Dissemination studies do reach a more representative and less motivated subset of the smoking population. However, even dissemination/implementation/community participatory research studies are limited in generalizability to the defined population that was targeted for the study. Moreover, because such studies do not successfully recruit the entire defined population (and oftentimes do not report on or use the true denominator in their calculations of cessation rates) the effect sizes of interventions delivered on a large scale to so called “real world” populations are less reliable and more variable. Results may also be difficult to interpret because the traditional randomized controlled trial may not be the best method to evaluate these studies and the time frames for expecting population level outcomes may be too short as in the ASSIST and COMMIT studies funded by the NCI in the 1990s (Cummings 1999; COMMIT Research Group 1995).

Prochaska and Velicer (2004) summarized a number of dissemination trials using tailored print materials based on the trans-theoretical SOC model. In one random digit dial study that proactively recruited 80 percent of the defined population, 23 percent cessation was reported at 18-month follow-up (Prochaska et al. 2001) using three rounds of tailored intervention over 6 months. In a defined population of smokers in an HMO, 85 percent of 4,653 were proactively recruited and yielded 23.2 percent cessation at 18 month follow up for three rounds of tailored print communications delivered over 6 months.

In contrast to the lower bound estimate of population impact on cessation prevalence derived from the National Health Plan Study in Great Britain (Raw et al. 2005—reviewed above), the Prochaska and colleagues (2001) study suggests an upper bound of reaching 80 percent of the total smoking population and obtaining a 23 percent effect size on cessation at 18-month follow-up.

Relapse and Recycling

Interventions for smoking typically consist of discreet periods of treatment leading to abstinence or relapse. The vast majority of quit attempts lead to relapse. Relapse is all too common: depending on the population sample, treatment intensity and type and the definitions of cessation between 65 and 95 percent of quit attempts end in relapse (Pierce and Gilpin 2003) with the greatest proportion of relapse (44 percent) occurring within 14 days of a serious quit attempt (Garvey et al. 1992). The relapse rates for those making unaided quit attempts in the general population is difficult to estimate but is likely to be even higher than 95 percent. The relapse curves for nicotine are similar to heroin and alcohol addiction (Hunt and Bespalec 1974).

It is not clear that encouraging rapid recycling will improve long-term cessation. Some studies have noted differences between groups encouraged to recycle or not, overall results have been discouraging. Lando and colleagues (1996) reported that a telephone support intervention significantly increased recycling but not long term abstinence. Tonneson and colleagues (1993b; 1996) found that introducing nicotine replacement after one year did not appreciably increase abstinence (6 percent for nasal spray and 0 percent for patch). These studies rely on small sample sizes of smokers motivated for treatment using the typical clinic trials or individual level model. It may be that the potential is much greater for using rapid recycling to improve overall cessation rates at the population level, among the 43 percent of all smokers (almost 20 million smokers) who make a quit attempt each year, most of whom do so on their own without any evidence-based intervention.

Relapse prevention and recycling is a huge public health opportunity but the research base to inform effective and efficient recycling/relapse prevention intervention is sparse. Several recent studies provide some direction for future research and for public policy. Brandon and colleagues (2003) suggest relapse prevention interventions be offered as a free standing intervention offered to all persons who have recently quit regardless of whether they used a formal treatment or not. They mailed a series of relapse prevention booklets to recent quitters and, in an initial efficacy trial, reported significantly reducing relapse rates. Among subjects who were abstinent less than 3 months after baseline, 88 percent of those who received the mailed materials were still abstinent at 12 months follow up versus only 65 percent in the no mail group. The intervention was also of minimal intensity and highly cost effective: the cost of keeping a smoker from relapsing at any time during the 12 months following their quit was \$174. The cost effectiveness of cessation treatments recommended by the PHS clinical practice guidelines range from \$2,186 for group counseling without NRT to \$8,962 for NRT with brief counseling (Cromwell et al. 1997).

Relapse should be regarded as part of the learning experience along the pathway to cessation. Just like learning to ride a bicycle for the first time, persistent effort, practice, and openness to the correction of past mistakes will lead to eventual mastery and success (Bandura 1997). If one falls off the bicycle, one has to get back up and try again to become proficient at negotiating the curves and the bumps in the road. Thus, the idea of recycling smokers who have slipped back into smoking is included in the treatment planning process.

Population Impact of Cessation Interventions in the Real World

The full impact of cessation interventions is a product of the proportion of the intended population reached and the efficacy of the interventions delivered to that population (Impact = Reach x Efficacy; see Abrams et al. 1993; 1996; 2003). Impact can be calculated under ideal conditions based on clinical trials data. Then the impact equation can be “discounted” or adjusted for the real world, for example by using an estimate of the degree to which the larger target population (proactively recruited) is harder to reach, harder to motivate, less likely to receive treatments of optimal quality and fidelity, less likely to adhere to treatment, and harder to follow up than the participants in the clinical trials under ideal circumstances.

SECTION 3 SUMMARY

In general, the outcome effectiveness of trials that can be widely adopted and disseminated remains in the moderate to good range. Dissemination studies and a number of meta-analyses provide reasonable and reliable data as a basis for projecting the impact on a population-wide

basis of the efficient implementation of best practices. Outcomes in various controlled and quasi-controlled trials can range from 1–30 percent quit at 6–12-month follow-up, in general somewhat lower than, but also able to approach, those of the more well documented clinical trials. For example, quit lines increase abstinence by as much as 30–50 percent over control conditions (Fiore et al. 2000). In a review of OTC NRT studies, Hughes and colleagues (2003) reported quit rates of 8–11 percent at 6-month follow-up in five studies; rates of 1 percent–6 percent in two other studies; and, in a meta-analysis of 4 trials, the odds ratio for OTC NRT versus placebo was 2.5 (95 percent CI 1.8–3.6).

Based on the growing evidence from dissemination research trials and the extensive deliberations of an expert panel, Fiore and colleagues (2004), recommended funding a national telephone quitline as a means of reaching more smokers and achieving an additional 5 million quitters per year as well as saving 3 million lives over the next two decades.

It is more difficult to estimate the effects of multi-level and multi-dimensional systems components (e.g., mass media campaigns, tax disincentives, and enforcement of bans/restrictions) that interact with intervention types, modes, and channels and with different smoker characteristics to produce an overall “impact” on cessation rates. It is likely a combination of multiple strategies that will ultimately translate into the high population prevalence rate reductions that are desired. More complex combinations of policies, delivery systems, programs, and individual characteristics can be examined using computer simulation modeling (e.g., Friend and Levy 2001; Levy and Friend 2002a,b; Levy et al. 2005; Mendez et al. 1998).

The following outcomes goals and objectives are recommended:

Goal #2: Increase the long term (>1 year) cessation success rate of smokers who make a serious quit attempt by encouraging greater use of evidence-based treatments when smokers make a quit attempt.

Objective # 2: Double the proportion of smokers who use a proven intervention when they do make a quit attempt from less than 25 percent now to over 50 percent within 5 years and over 70 percent within 10 years). This should increase the population cessation effectiveness rates from an average of 5–10 percent per year to 10–20 percent per year within 10 years.

- Ensure that smokers ready to quit have full knowledge of how to quit and what to expect and that they also have access to the full range of evidence-based cessation options documented in the Clinical Guidelines (OTC and Prescription pharmacotherapy as well as brief and more intensive behavioral counseling delivered via diverse intervention modes such as telephone, brief face to face individual or group support, clinic services, internet and others for motivation, cessation and relapse prevention).
- Reduce the rate of relapse among quitters who achieve initial cessation by providing support for cessation and reducing the time lag between consecutive quit attempts for those who relapse. Develop and make available specific new programs and services directly targeted at recent quitters and designed to either prevent relapse or encourage rapid recycling back into another cessation attempt if they have recently slipped back into smoking after a quit attempt. The Internet is an especially promising tool here given both preliminary data (Cobb et al. 2005), its 24/7/365 availability and ability to provide a variety of expert and peer social support networking).

- Provide clear guidelines and access to specialized, intensive, and Stepped Care (or stepped up care) for smokers who have known comorbid complications; those at highest risk for medical, psychiatric, alcohol/substance abuse complications; and those who have tried and failed to quit on their own or with brief or minimal intervention efforts (such as OTC medications alone or brief counseling alone).

SUMMARY OF SECTIONS 1–3 ESTIMATING THE POPULATION IMPACT OF CESSATION INTERVENTION POLICY

The full impact of cessation interventions is a product of the proportion of the intended population reached and the efficacy of the interventions delivered to that population (Impact = Reach x Efficacy; see Abrams et al. 1996; 2003). Impact can be calculated under ideal conditions based on clinical trials data. Then the impact equation can be “discounted” or adjusted for the real world, for example by using an estimate of the degree to which the larger target population (proactively recruited) is harder to reach, harder to motivate, less likely to receive treatments of optimal quality and fidelity, less likely to adhere to treatment, and harder to follow up than the participants in the clinical trials under ideal circumstances (see Abrams et al. 1993; 1996; Dzewaltowski et al. 2004; Glasgow et al. 2006a,b). The parameters that need to be considered when adjusting an efficacy metric downwards to convert it to an effectiveness estimate are consistent with the reporting of criteria in the “RE-AIM” model recommended by Glasgow and colleagues (Dzewaltowski et al. 2004; Glasgow et al. 1999; Glasgow et al. 2003; Glasgow et al. 2006a,b).

The committee commissioned a series of simulation models to estimate cessation’s overall impact on smoking prevalence outcomes over 20 years (presented in detail elsewhere; see appendixes by Levy and by Mendez and the full report). The simulation models provided a heuristic guide for projecting the potential increases in population cessation rates that might be expected over the next 2 decades, given parametric input assumptions. The simulation model to project the impact of smoking cessation interventions on population prevalence employed the SimSmoke algorithms developed by Levy, Friend, and colleagues (Friend and Levy 2001; Levy and Friend 2002a,b; Levy et al. 2004)

Based on the evidence from the reviews, meta-analyses of clinical (efficacy) and dissemination (effectiveness) trials, and guided in part by the simulation modeling, two primary goals emerged for significantly accelerating cessation rates to make an impact at the population level. The first goal addresses the reach dimension (reviewed in Section 2 above) and recommended a doubling of the number of smokers who make a quit attempt each year over a 10-year period. The second goal involved the efficacy to effectiveness dimension of implementing and using evidence-based treatments (reviewed in Section 3 above). Goal #2 recommended we enhance cessation rates and reduce relapse rates by doubling over 10 years the number of smokers who use evidence-based cessation treatments when they do make a quit attempt.

It is important to note that in setting the parameters for the algorithms in the simulation modeling (see appendix by Levy and by Mendez and the full report) it was decided to use measures of reach and efficacy that were anchored by more conservative and consistent evidence-based estimates. Therefore, the simulation modeling projections of the impact of cessation interventions on overall smoking prevalence are also relatively conservative. The computer simulation algorithms were tied to the lower to middle bounds of the reviews of the evidence for reach and effectiveness in Sections 2 and 3 above, rather than the more ambitious upper bounds recom-

mended in Goals #1 and #2. Thus there is room for an even stronger contribution of cessation to reducing overall population prevalence if the impact can be enhanced to achieve the ambitious but not impossible levels that are recommended in the 5- and 10-year goals and objectives for Goal #1 (reach), and Goal #2 (effectiveness).

SECTION 4: FUTURE DIRECTIONS IN CESSATION RESEARCH AND IMPLEMENTATION

Lowering the Bar to Cessation: Harm Minimization and Programs for Smokers Not Currently Motivated to Quit

Shiffman and colleagues (1998) have outlined principles that should guide a harm reduction philosophy and approach to tobacco control. Among these principles are the assumptions that: (1) the purpose of reducing exposure to tobacco toxins is to reduce the death and disease caused by tobacco; (2) the long-range goal should be to leave smokers both tobacco and nicotine free and should not reduce the likelihood of eventual cessation; (3) any method used to reduce exposure, especially pharmacologic agents such as NRT products, should pose no added safety risks; (4) exposure reduction therapies should not worsen an individual's level of nicotine dependence and should not lead to increased population prevalence of nicotine dependence or expansion of use beyond the smoking population; and (5) pharmacologic means, if used to reduce tobacco toxin exposure, should not appeal to adolescents. The degree to which pharmacologic interventions, and in particular NRT products, can result in acceptable, safe, and verifiable reductions in toxin exposure will be the target of considerable research and intervention efforts for some time to come.

Some smokers may not quit for a long time, and it is estimated that as many as 50 percent of smokers will never quit (Hughes et al. 1999a; Hughes et al. 1999b). Many smokers repeatedly fail after trying the very best interventions available. Since smoking at any level is harmful, it is hoped that continued engagement in treatment will eventually lead to longer periods of abstinence rather than a reduced level of smoking. For a subgroup who will not quit even with the highest levels of care, the treatment emphasis may have to change from abstinence to harm minimization (Baer et al. 1993; Hughes et al. 1999a; Marlatt 1998; Shiffman et al. 1998; Warner et al. 1997).

The pharmaceutical, public health, and sociobehavioral science communities as well as the tobacco industry are all converging on the need for innovative new approaches to reducing the huge amount of devastating and preventable death disability, disease burden, and cost of smoking on individuals' families and society. The not too distant future may contain a variety of new approaches to smoking cessation and reducing the harm caused to current smokers who will not or cannot stop smoking.

Hughes and colleagues (2004) suggests that interventions to reduce harm may ultimately encourage cessation. Smokers not currently interested in quitting (n = 616) were randomized to receive telephone-based: (1) reduction counseling plus nicotine replacement therapy (NRT) plus brief advice to quit, (2) motivational advice plus brief advice, or (3) no treatment. More smokers in the reduction (43 percent) and motivational (51 percent) conditions made a 24-hr quit attempt over 6 months than smokers in the no-treatment condition (16 percent), but the 2 active conditions did not differ. Similarly, 18, 23, and 4 percent of each condition were abstinent (7-day point

prevalence) at 6 months. Results indicate smoking reduction using NRT does not undermine cessation but rather increases the likelihood of quitting to a degree similar to motivational advice

Although new cessation products and services as well as harm minimization strategies will continue to be introduced into the marketplace in the coming years (by the tobacco industry, the pharmaceutical industry, service providers, social, and behavioral scientists) and although these innovations may improve outcome efficacy and/or reduce toxic exposures to some extent, it is unlikely to dramatically improve outcome efficacy in the near to medium term time frame of the next 5 to 10 years. However, immediate and potentially dramatic increases in population cessation rates can accrue from improving the utilization and reach of the current proven interventions and by reducing the risk of relapse following initial cessation

The Internet

The Internet can reach millions of smokers cost-effectively. Many cessation websites exist, but few have been evaluated and, of over 300 websites, less than 10 met criteria for having content outlined as effective in the PHS guideline (Bock et al. 2004). As a result, the potential impact of the Internet on smoking prevalence remains unknown. A preliminary, uncontrolled, large-scale evaluation of a broadly disseminated smoking cessation website used worldwide (QuitNet®) was recently reported (Cobb et al. 2005). Consecutive registrants (n = 1,501) were surveyed 3 months after they registered on the web site to assess 7-day point prevalence abstinence. Results must be interpreted cautiously as this is an uncontrolled study with a 25.6 percent response rate. Approximately 30 percent of those surveyed indicated they had already quit smoking at registration and were using the website for relapse prevention. Excluding these participants, an intention to treat (ITT) analysis yielded a 7 percent point prevalence abstinence (for the responders only, abstinence was 30 percent).

In a European study, 3,501 purchasers of a nicotine patch who proactively logged on to use a free Internet program and then consented to participate in a research study (76 percent) were randomly assigned to a tailored versus an untailored program (Strecher et al. 2005). To be eligible, the participant's target quit date had to be within 7 days of enrollment. At 3-month follow-up, using ITT analysis of continuous abstinence for 10 weeks, the tailored condition (22.8 percent) outperformed the untailored condition (18.1 percent). Although this study was a large randomized trial, it is unclear the degree to which results generalize to the broad population of smokers who seek cessation information and treatment on the Internet. Participants were restricted to those who could afford and did purchase a specific brand of patch and to those who chose to utilize an online support program. Collectively, these studies are a promising start in evaluating Web-based smoking cessation programs. However, more studies are needed.

Medication Development

Two other issues deserve comment: (1) Continued development of pharmacologic approaches to smoking cessation (what's in the product-development pipeline) and (2) the potential for long-term use of pharmacologic treatments to sustain cessation. New forms of NRT continue to be developed and evaluated. The nicotine lozenge and sublingual tablet are approved for use in Europe (Britton et al. 2000) and will probably be introduced to the U.S. consumer as prescription products in the near future. It is unclear whether these products confer a significant advantage over other NRT products.

Pharmacotherapy is an important adjunct to smoking cessation treatment. Currently marketed pharmacotherapies include nicotine replacement products (gum, patch, nasal spray, inhaler,

and lozenge) and bupropion. In clinical trials, existing pharmacotherapies on average double cessation rates compared to placebo. Limitations of the available pharmacotherapies are that the effectiveness is only modest (cessation rates 10–20 percent depending on the population of smokers and concomitant behavioral therapies) and the fact that many dependent smokers have already tried and failed these therapies. Most studies of retreatment with the same medication find very low cessation rates.

Thus it is imperative that new medications be developed to aid smoking cessation. Such medications might be more effective than existing medications, which is particularly important for highly dependent smokers. Even if new medications are not more effective than currently available medications, new medications would provide an alternative to current medications and would encourage more smokers who failed cessation in the past to consider quitting another quit attempt.

At this time, several new medications are under development and others hold great promise. Research on drugs that act on nicotinic cholinergic receptors have led to the discovery of varenicline, a nicotine receptor partial agonist. A partial agonist is a drug that stimulates a receptor, but at the same time blocks the actions of other receptor agonists. In this case, varenicline produces some direct nicotine-like effects on receptors, but blocks the effects of nicotine from tobacco. The promise of such a medication is that it would block the satisfaction from smoking a cigarette while at the same time producing nicotine-like effects to prevent withdrawal symptoms.

Varenicline, a novel pharmacotherapy, was approved by the FDA as an aid to smoking cessation treatment in May 2006 (FDA 2006). Varenicline is an $\alpha 4\beta 2$ nicotinic receptor partial agonist that is believed to aid smoking cessation by moderately increasing the release of dopamine in the mesolimbic system, thereby reducing abstinence-related craving and withdrawal (Coe et al. 2005). Varenicline also appears to reduce the rewarding effects of nicotine during smoking via this same mechanism. (Coe et al. 2005) The efficacy of varenicline has been assessed in six controlled clinical trials, of which 3 have been published (as of July 6, 2006). In one randomized controlled study involving 1,027 subjects, 23 percent of participants in the varenicline group (1 milligram twice per day for 12 weeks, starting 1 week before quitting smoking) were continuously abstinent during weeks 9 through 52 compared with 10.3 percent in the placebo group (OR, 2.66; 95 percent CI, 1.72–4.11; $P < .001$) and 14.6 percent in the bupropion SR group (OR, 1.77; 95 percent CI, 1.19–2.63; $P = .004$) (Jorenby et al. 2006). In a second double-blind study involving a total of 1,025 patients, continuous abstinence rates during weeks 9 through 52 were 21.9 percent for varenicline vs 8.4 percent for placebo (OR, 3.09; 95 percent CI, 1.95–4.91; $P < .001$) and vs 16.1 percent for bupropion SR (OR, 1.46; 95 percent CI, 0.99–2.17; $P = .057$) (Gonzales 2006). A third published study assessed the effect of an additional 12 weeks of therapy with varenicline on the likelihood of long-term abstinence. Patients were treated with open-label varenicline for 12 weeks, and patients who had stopped smoking by week 12 ($n = 1236$) were then randomized to double-blind treatment with either varenicline or placebo for an additional 12 weeks and then followed for 28 weeks post-treatment. The continuous abstinence rate was significantly higher for the varenicline group than for the placebo group for weeks 13 to 24 (70.5 percent vs. 49.6 percent; OR, 2.48; 95 percent CI, 1.95–3.16; $P < .001$) as well as for weeks 13 to 52 (43.6 percent vs. 36.9 percent; OR, 1.34; 95 percent CI, 1.06–1.69; $P = .02$) (Tonstad et al. 2006). Nearly 30 percent of participants in these three trials reported nausea, a rate significantly higher than with either bupropion or placebo (Klesges et al. 2006). Abnormal dreams were also common and much more likely in the varenicline groups. However, overall side effect rates were similar across the varenicline and bupropion conditions (Klesges et al.

2006). Varenicline was combined with counseling in all 3 studies. In summary, varenicline is an efficacious pharmacologic treatment for tobacco dependence that offers clinicians and patients a new powerful option for tobacco dependence treatment, though more experience is needed with this agent in real-world settings before its place among nicotine dependence treatments is fully understood (Klesges et al. 2006; Niaura et al. 2006).

Another drug under development is rimonabant, a cannabinoid-1 receptor antagonist. The cannabinoid receptor is the site of action of THC, the active constituent of marijuana. Cannabinoid receptors seem to be involved in a variety of appetitive behaviors, including drug use and food consumption. Clinical trials suggest that rimonabant might both facilitate smoking cessation and prevent bodyweight gain, which usually occurs after one quits smoking.

Another promising line of drug development is research on nicotine vaccines. Vaccination generates antibodies to nicotine that could block the reinforcing effects of nicotine. Nicotine vaccination is intended to prevent relapse to smoking after cessation. The idea is that if one relapses, the smoker would not find the cigarette rewarding and would not continue to smoke.

These three medications are currently in clinical trials, and their ultimate contribution to smoking cessation therapy has not yet been established. However, these examples demonstrate the potential of developing novel medications for smoking cessation.

The development of new medications to aid cessation for smoking cessation is a high priority, particularly for the treatment of the most highly dependent smokers. Basic science research on nicotinic receptors as well as agonists and antagonists that act on these receptors, and research on other neurotransmitter and receptor systems involved in the actions of nicotine, is likely to be the key to new medication development. Of particular importance is developing medications that will be useful in treating smokers with psychiatric comorbidity. Such medications might both aid smoking cessation and for example treat depression or other mental health disorders for which smoking may be perceived as beneficial.

Adolescent and Young Adults: An Important Opportunity and an Important Priority for Research

Children are exposed to nicotine early in life—over 80 percent of adult smokers become regular users before the age of 18 years (CDC 1998). But there has been a 32 percent increase in youth adoption of smoking between 1991 and 1997 in the United States (CDC 1998) and a 28 percent increase among college students (Rigotti et al. 2000).

Little is known regarding the smoking habits of young adults, as well as the feasibility of implementing intervention strategies (Backinger and Leishow 2001; Sussman et al. 1999; Sussman 2001). Lloyd-Richardson and colleagues (2001a,b) investigated characteristics among young adults attending technical school. A random sample of 784 students (response rate 82.5 percent) attending a large technical school completed a survey. They were primarily male (70 percent) and white (85 percent), with an average age of 26 years. Thirty-three percent were current smokers, smoking an average of 16 cigarettes per day, and 91 percent of smokers had tried to quit an average of 3 times in the past year, 78 percent endorsed at least a moderate level of motivation to quit smoking (i.e., “often think of quitting, but no plans yet”), with 50 percent interested in use of the nicotine patch and 43 percent interested in use of bupropion hydrochloride (Zyban®). These data suggest prevalence of smoking among technical school students is higher than among traditional 4-year college students (28 percent) (Wechsler et al. 1998) as well as among the general population of the United States (median 23 percent) (CDC 2004b).

Sussman and colleagues (1999) reviewed 34 studies conducted on adolescent regular tobacco users but employing both cessation and prevention interventions (see Flay in Appendix D). Of the 17 cessation-focused studies, there was great variability in their research designs, cessation programs, measures, and outcomes. Target populations and settings varied as well but were generally in the age range 14 to 22 years. Follow-up period also varied from 1 month to 24 months and was not reported in some studies. Sussman and colleagues (1999) reported that background (some studies were uncontrolled) or control group quit rates for this age group over 6 months varied from 0 to 11 percent and the average of the intervention's quit rates at follow up were approximately 13 percent. Younger smokers are difficult to recruit and difficult to motivate to use smoking cessation programs. Many programs were adapted from adult programs and are not tailored to younger smokers. Colby and colleagues (1998; 2005) reported on a promising preliminary study using motivational interviewing adapted from adult interventions with alcohol abusers to encourage adolescent smokers to stop.

Killen and colleagues (2004) randomized 211 adolescent smokers to nicotine patch plus bupropion SR or nicotine patch plus placebo. All participants also received group behavioral skills training and relapse prevention training weekly. At weeks 10 and 26 of follow up abstinence rates for the combined treatment versus placebo arms were 23 and 8 percent versus 28 and 7 percent, respectively. Compared to non African American teens, African Americans reported a 1 year later onset of smoking onset and a slower uptake trajectory to regular smoking. Rabinus and colleagues (2004) reported that among 3,500 callers to the ACS quitline, 12 percent (420) were smokers aged 18 to 22 years. All smokers were randomized to either self-help booklets by mail or up to 5 sessions of telephone counseling. Using intent to treat analysis, Rabinus and colleagues (2004) found 3-month cessation rates of 20 versus 9 percent for these younger smokers compared with 15 and 10 percent cessation rates for older smokers.

Finally, we note that there have been efforts to treat adolescent smokers with NRT (e.g., Moolchan et al. 2005). Despite evidence of safety, tolerability, and decreased withdrawal symptoms among adolescents treated with the nicotine patch, efficacy has not been demonstrated (Hurt et al. 2000). However disappointing, we must recognize that treatment of the adolescent smoker is still in its infancy. The use of NRT with teens and young adults is understudied (Benowitz 1998). This clearly reflects the gap in our knowledge base and points to the need for more research. One area about which we are particularly ignorant is at what point in the youth uptake trajectory (from initial use, experimentation, to regular use and progression to dependence) might it be helpful to prescribe NRT. Initiation and early smoking among youth is characterized by irregular patterns of use and long periods without exposure to nicotine. Even more regular users typically cannot smoke wherever and whenever they want to. Since there is upregulation of nicotinic brain receptors (see Dani and Heinemann 1996 and later in this appendix), a constant infusion of nicotine as delivered by NRT may increase abuse liability and withdrawal sensitivity especially in irregular smokers. Such potential problems, combined with the ethics involved with possibly exposing naive youth to nicotine for research purposes, are likely reasons why data are not available.

SECTION 4 SUMMARY

This area is beginning to receive the attention it deserves in recent years with several trials underway. The youth tobacco cessation collaborative (YTCC) was formed in 2003 to bring funders of youth cessation studies together and a monograph was published to help focus the field, share information and standardize measures and methods The YTCC recommended three goals:

1. Identify and advocate for policies and environments that support youth tobacco cessation.
2. Increase motivation in quitting and quitting attempts among young smokers and generate increased interest and participation in effective cessation programs
3. Increase advocacy and support for youth tobacco cessation among youth themselves and their peers, providers, decision makers, community gatekeepers, and the public.

Outcomes in adolescent cessation are disappointing. Smokers typically enter treatment in their 40s (based on trials). But quitting early multiplies benefits: risk accumulates with duration, even more than amount. More research is needed to improve the marketing to adolescents and motivation to use cessation interventions as well as to increase the utility, availability, tailoring, and effectiveness of adolescent smoking cessation interventions delivered in a variety of channels: high schools, work settings colleges, technical schools, pediatric and primary care practice and other locations where young adults are found.

This is a unique opportunity for early intervention and to bridge the gap between prevention (see Appendix D by Flay) and cessation treatment among those ages 10 to 30, a group that has “slipped through the cracks” between the prevention and the treatment research communities (Backinger and Leishow 2001; Moolchan et al. 2005; Sussman 2001).

SECTION 5 DELIVERY SYSTEMS AND INTEGRATION

A Coherent Unified Strategy for Care Management Based on the Chronic Disease Care Management Model

Ideally, delivery systems such as managed care organizations or mental health clinics should be designed to support and track the quality of care delivered over time and even by multiple providers (see Curry et al. 2005). For example, a managed health care organization may have a policy that requires all providers in all settings (e.g., emergency room, primary care, specialty care) to screen for smokers and develop, document, and implement an individualized treatment plan for each smoking member of the health plan. In medical, psychiatric, and substance abuse treatment settings, the Health Plan Employer Data and Information Set (HEDIS 3.0) report cards are designed to track the mandate of the National Committee for Quality Assurance (Davis 1998). Surveys that inform these report cards evaluate whether all providers are asking about tobacco abuse as a vital sign (along with taking temperature and blood pressure) at each and every contact with the health care system. A training and certification process is needed for treatment providers. A certification/license is awarded for qualified trained service providers at two levels: (1) counselors in smoking cessation and (2) specialists in treatment of nicotine addiction and comorbid conditions.

There is evidence of a substantial return of investment within 2–3 years for those institutions that invest in comprehensive smoking cessation (e.g., health care, worksites) (AHIP 2004). With direct and indirect costs of smoking estimated at over \$150 billion per year and with the aging “baby boomers” putting an enormous strain on the health care system in the coming two decades, a credible and convincing case can be made that the single biggest, fastest, and most cost-effective impact on reducing the escalating costs of health care and enhancing the overall health of Americans can come from helping more people quit smoking (Orleans and Alper 2000).

In recent years there has been significant improvement in third party, federal, and state insurance coverage for some components of evidence-based treatments recommended in the PHS clinical guidelines (Fiore et al. 2000). However, coverage remains spotty. If cessation treatment is covered, the programs typically invests in only the minimum recommended level of coverage, falling short of adopting the more effective, costly, and intensive components of the PHS Guide recommendations (Fiore et al. 2000).

In their role as employers, states purchase health insurance for over 5 million employees and retirees. A survey of state employees insurance plans was conducted in 2002–2003. Of the 45 states that responded to the survey, only 6 required cessation coverage that was fully consistent with the PHS Guideline recommendations for all employees (Fiore et al. 2000). These states required coverage for some form of group or individual counseling and one or more FDA approved medications for smoking cessation. 10 states required coverage for at least some employees and a total of 29 out of the 45 states required coverage for at least one PHS recommended treatment for at least some employees. The survey did not capture the degree to which costs were shared (copay/deductible). Insurance coverage remains variable and there is room for improvement.

A 2002 National survey (McPhillips-Tangum 2004) among managed care organizations (MCO's) found that 30 percent had no written policy on coverage and 42 percent provided no coverage for behavioral interventions. Of those that do provide behavioral coverage, it is often the least effective: 54 percent offered self help materials only and 51 percent offered brief telephone counseling. As part of their routine prescription benefits, 89 percent covered prescribed medication. Warner and colleagues (2004) suggest that these figures may underestimate the national availability of covered services.

Medicare announced as of March 2005 that it will cover up to two cessation attempts per year and each attempt may include four counseling sessions for a total of 8 sessions per year. They also plan to cover pharmacotherapy in the prescription benefit coverage. An estimated 9.3 percent of persons over age 65 smoke, and of the 440,000 smokers that die each year of smoking related causes, an estimated 300,000 of them are over age 65 (www.cms.hhs.gov/coverage).

In 1998, only half of the 5 million Medicaid recipients nationwide who were current smokers were covered for any type of smoking cessation treatment (Schauffler et al. 2001). Doescher and colleagues (2002) conducted a pilot study of enhanced tobacco cessation services for low income smokers. They included NRT and pharmacist delivered smoking cessation counseling as the benefit for low income managed Medicaid patients and a state insurance program. They concluded that such a program is feasible but there are significant implementation barriers, including low participation rates and rapid turnover of insured.

McMenamin (2004) examined physician and enrollee knowledge of Medicaid coverage for tobacco addiction treatment in two states with comprehensive coverage. Only 36 percent of enrolled smokers and 60 percent of physicians knew that their state program offered any cessation treatment coverage, and physicians were more than twice as likely to know about pharmacological coverage than coverage for counseling. Warner and colleagues (2004) simulated the financial impact and cost effectiveness of smoking cessation in a hypothetical managed care organization MCO using data from three large MCO's. Quitters gained an average of 7.1 years of life with a direct coverage cost of \$3,416 for each life year saved. The net cost to the MCO plan was \$0.41 per patient per month (PMPM).

Tobacco use cessation programs, including appropriate use of pharmacotherapy, should be covered by all insurance, managed care, and employee benefit plans, in-

cluding Medicaid and Medicare. This coverage should be a lifetime benefit. A specified percentage of revenues from tobacco excise taxes, or payments made by tobacco companies under court orders or litigation settlements, should be allocated specifically to a fund with the sole purpose of supporting marketing, dissemination and use of cessation programs for tobacco users. This fund should be managed and distributed by an independent private entity. First priority should be given to funding cessation services for persons not covered by insurance.

Fiore and colleagues (2004) point out that extending tobacco treatment to all individuals with federal coverage (including all Medicare and Medicaid recipients nationwide, department of defense beneficiaries, federal employees, and all federally supported clinics) will ensure that 100 million families will have comprehensive insurance coverage for cessation interventions and it will address health disparities in that it will support interventions for the socio-economically disadvantaged and those that suffer disproportionately such as veterans and Medicaid beneficiaries.

Health plans, insurers and public health agencies—individually and collaboratively—should implement a comprehensive, coordinated, and integrated system of care management for smoking cessation at the local, state, and national levels.

- **Delivery infrastructure and financial incentives should be aligned to enable and encourage service providers to provide—and smokers to receive—evidence-based assistance.**
- **All smokers should be identified and contacted, be motivated to quit, and receive appropriate levels of intervention or referral and Stepped Up care in intensity if needed.**
- **Services should be provided continuously rather than episodically and should support the smoker for as long as necessary to achieve sustained abstinence.**
- **A performance based surveillance, quality assurance, tracking, and report card system should be implemented to monitor key indicators of progress at the systems level to produce timely summaries of individual group and systems aggregate performance and to permit self correction and continuous quality improvement among those falling behind performance benchmarks and best practice criteria.**

Surveillance Report Cards

Thus, above and beyond the current surveillance programs in place to measure smoking patterns in largely cross-sectional national surveys (e.g., NHIS, CPS; YBRFS), more specific national, state, and local monitoring and surveillance systems must be put in place to track key indicators of progress being made in reaching and enabling increased cessation rates. Key indicators must include individual and aggregate or “systems” level measures (Glasgow’s RE-AIM model; see Dzewaltowski et al. 2004; Glasgow et al. 1999; 2003; 2006a for details) of intermediate and final outcomes. Performance standards and “report cards” must be developed (e.g., using enhanced JACHO and HEDIS guidelines) to track progress towards goals, identify laggards, and motivate improvements.

Goal # 3: Implement a comprehensive, coordinated, and seamlessly integrated system of care management for smoking cessation.

Intervention should be offered and delivered at every opportunity in which there is contact between a smoker and the health care, public health, and other organizational systems such as schools, worksites, and community organizations. The system of care management must embrace the concepts of: (1) identifying and tracking all smokers (smoking as a vital sign and proactive follow up once identified); (2) providing for continuity of care and tailored interventions as appropriate to the smokers level of motivation and needs) at every contact with the system (e.g., following the four A's for cessation and four R's for motivation to quit (i.e., proactive care management), and (3) using algorithms for targeted and tailored interventions and for Stepped Care as needed (smokers are stepped up to more specialized and intensive intervention programs if they have comorbid complications and/or a cessation history of failure to quit on their own or at lower levels of intensity of intervention. To do so will require that health systems:

- 3.a.) Align financial incentives at every level to contingently reinforce the recommendations of the evidence-based practice guidelines and enable the care management system to manage tobacco addiction as a chronic refractory, including eliminating out of pocket costs for smokers to quit when they use evidence-based cessation interventions.
- 3.b.) Provide a care management system to smokers and implement it in all managed care and other health service delivery systems nationwide. (e.g., through electronic medical records and an Internet-based system of access [confidential and secure for intervention providers and smokers]).
- 3.c) Register and track all smokers. The “smoker registry” is used as a confidential medical record to ensure all current smokers in the United States are properly cared for. Smokers will then have a delivery system in place to receive (1) timely health care checkups and specific screenings for early detection of the chronic conditions for which smoking produces excessively high risk (cancers, especially lung, cardiovascular disease, pulmonary diseases, and other conditions and comorbidities associated with smoking such as psychiatric, alcohol, and substance abuse disorders; (2) timely feedback on their health status at every checkup, coupled with either (for those not motivated to quit) (3) motivational enhancement counseling (motivational interviewing) to consider smoking cessation and education/information about smoking cessation interventions tailored to their needs and characteristics; or (4) (for smokers already motivated and ready to quit) a brief or a more intensive smoking cessation and relapse prevention intervention or direct referral to intervention resources with recommendations for the type, mode and level of treatment needed using evidence-based triage algorithms for Stepped Care and tailored treatment based on the past history and current status.

Objective # 3a: within 5 years, 100 percent of health services, public health programs, and third party insurers across the nation will implement a system that has aligned incentives and that supports at every level the ability for service providers to give and smokers to receive evidence-based care.

All smokers should be proactively contacted, be motivated to quit, and should receive appropriate levels of intervention or referral to smoking cessation counselors or to specialists in treating smokers with comorbidity complications; these interventions can be stepped-up in intensity

and complexity of interventions if previous interventions have been used and have not been successful. They must be supported for as long as is necessary to achieve sustained abstinence.

Objective # 3b: At every contact with the health care system, 90 percent of health care providers will identify and intervene with smokers providing the five R's (motivational enhancement) for those not ready to quit and the five A's to those ready to quit).

Objective # 3c. Implement a performance based surveillance, quality assurance, tracking, and report card system to monitor key indicators of progress at the systems level, to produce timely summaries of individual group and systems aggregate performance, and to permit self correction and continuous quality improvement among those falling behind performance benchmarks and best practice criteria. Expand and adapt the current JACHO and HEDIS required tracking systems.

The monitoring system can provide timely feedback and benchmark comparisons about goals and targets met as well as about normative group comparisons (e.g., report cards to individual providers indicating their performance on key indicators, such as the five A's, and the average performance of similar offices in the local, state, or national data base) to motivate and encourage continuous quality improvement towards best practice goals.

CONCLUSION

For a smoker, it is long and arduous journey from starting to smoke to enjoying smoking in ones carefree youth to wanting to stop. For much of that journey the smoker is not motivated to quit and does not make any quit attempts at all. Somewhere along the way the smoker may change, either suddenly or gradually over time. Smokers can move from being unmotivated and not making any quit attempts to wanting to quit (over 70 percent say they want to quit) and then to making serious quit attempts (about 45 percent try seriously to quit each year). If at first a smoker is not successful at quitting (over 90 percent are not), the arduous journey continues from cycles of trying to quit but relapsing to trying again. Some smokers may give up trying to quit and withdraw out of fear of failure, shame or embarrassment. Sometimes the smoker may use unproven treatments or will power to quit (over 75 percent do that) and perhaps the smoker may use an effective product or service. Finally, the journey ends when the smoker either quits for good or suffers and dies from a smoking related cause (about a third to a half of lifetime smokers will die of a smoking related disease). Now that research has helped us understand so much of this journey the challenge is to put what we know into practice and policy. And there is not a moment to lose as over 400,000 of our friends and fellow U.S citizens die prematurely each year from their smoking addiction (that equals three fully loaded jumbo jets crashing with no survivors every single day including weekends and holidays). There is substantial room to find more leverage points to improve the overall cessation outcome rate at every step of the way along our fellow smokers journey to freedom from their addiction. This opportunity can only be fully realized with strong political will to do the right thing and by designing cessation policies that support a comprehensive, systems approach to cessation intervention. An approach that provides aggressive, direct-to-consumer marketing and education campaigns to improve their health literacy about the dangers of smoking and the best tools for quitting. An approach that covers the en-

tire smoker's journey and provides interventions tailored to the smokers' needs. This can be achieved through cessation policies that support a comprehensive care management network with aligned financial incentives at federal state and local levels across both the health care industry and the public health system.

Table A-1 Odds Ratios (95 percent Confidence Intervals) for Efficacious Smoking Treatments Relative to Placebo

Gum	Patch	Spray	Inhaler	Bupropion	Clonidine
1.5 (1.3–1.8)	1.9 (1.7–2.2)	2.7 (1.8–4.1)	2.5 (1.7–3.6)	2.1 (1.5–3.0)	2.1 (1.4–3.2)

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B

Clean Air Laws

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INTRODUCTION

In 1992, the Environmental Protection Agency (EPA) released a report that concluded that secondhand smoke (also called environmental tobacco smoke [ETS]) causes lung cancer in adult nonsmokers and impairs the respiratory health of children (EPA 1992). Furthermore, this EPA report classified secondhand smoke as a Group A carcinogen. Secondhand smoke has been shown in studies to cause cancer at typical environmental levels.

For more than three decades, federal, state, and local regulations and ordinances have created an increasing number of smoke-free environments. Smoking has been eliminated or restricted at many worksites, restaurants and bars, childcare agencies, and other public places, as well as in airports, on airline flights, and in government offices. The movement toward creating smoke-free environments has been significantly motivated by substantial evidence of the harms of ETS to nonsmokers (NCI 1999). However, the implementation of smoking restrictions to eliminate secondhand smoke exposure not only reduces exposure to nonsmokers of environmental tobacco, but also has proven to be a powerful intervention to enhance cessation and to reduce consumption among smokers (IOM 1998).

This appendix examines evidence of the effectiveness of existing policies that restrict tobacco use on levels of exposure of nonsmokers to ETS and on smoking initiation, consumption, and cessation in the United States. The policy levers currently in use, their outcome measures, and what is known about the effectiveness of these policies are discussed. Additionally, a brief description of the implementation and enforcement of policies is presented. Finally, future trends in the implementation of smoking bans or restrictions are considered.

This section is important because tobacco-use regulations have had a significant impact on tobacco use by limiting the opportunities for smokers to smoke. Regulations have influenced the number of smokers who have quit and decreased the quantity of cigarettes smoked. Additionally, smoking bans have influenced social norms regarding tobacco use, thus influencing the number of individuals who initiate smoking. Finally, tobacco bans decrease the number of individuals involuntarily exposed to secondhand smoke.

CLEAN AIR LAWS

While federal regulations have limited exposure of nonsmokers to ETS by instituting smoking bans on airline flights, in federal buildings, the White House, and childcare facilities that receive federal funds (Brownson 1998), the majority of legislation restricting smoking has occurred at the local and state levels (a current listing of state laws restricting smoking can be accessed on the American Lung Association website at www.slati.lungusa.org). An early leader in tobacco control, Minnesota enacted its Clean Indoor Air Act in 1975, which required the creation of nonsmoking sections at both public and private worksites (Emont et al. 1992; Tsoukalas

and Glantz 2003). In the same year, 14 other states passed new or amended clean indoor air laws (Emont et al. 1992).

As of July 1, 2006, 17 states have laws in effect that require 100 percent smoke-free workplaces and/or restaurants and/or bars (ANRF 2005a). Overall, 6,845 municipalities are covered by state or local laws requiring workplaces and/or restaurants and/or bars, to be 100 percent smoke-free, protecting 44.5 percent of the United States population (ANRF 2005b). Notably, 140 municipalities in the United States require workplaces, restaurants, and bars to be 100 percent smoke-free (ANRF 2005a). Additionally, many sites have voluntarily become smoke-free (Jacobson and Wasserman 1997).

A review by Serra and colleagues (2004) of interventions that prevent tobacco smoking in public places found that carefully planned and resourced, multicomponent strategies to implement policies banning smoking effectively reduce smoking in public places (Serra et al. 2004). Not surprisingly, less comprehensive strategies, such as posted warnings and educational material, were less effective.

Furthermore, the Centers for Disease Control and Prevention (CDC) Task Force conducted a systematic review of tobacco intervention studies ($n = 10$) and concluded that smoking bans or limits on tobacco smoking in workplaces and public areas are strongly recommended to reduce exposure to ETS based on the following key findings (CDC 2000b): First, smoking bans and restrictions effectively reduce workplace exposure to ETS in several different settings and populations. Second, following the implementation of smoking bans, decreases in daily tobacco consumption among smokers and increased rates of cessation were identified.

More stringent clean indoor air laws are associated with decreased smoking prevalence and cigarette consumption and a higher proportion of quitters. For example, Emont and colleagues (1992) found that the average smoking prevalence was 28 percent in states without clean indoor air laws and 24 percent in states with extensive clean indoor air laws ($J^* = 3.33$, $p < .001$). Additionally, average cigarette consumption per head was about 119 packets in states without laws and 105 in states with laws ($J^* = 2.79$, $p < .005$). Finally, the average proportion of quitters in states without laws was 44 percent and in states with laws was 50 percent ($J^* = 3.96$, $p < .00005$) (Emont et al. 1992).

Comprehensive public clean air laws have the potential to reduce prevalence and consumption rates of the entire population (including nonworking and non-indoor-working smokers) by about 10 percent (Levy and Friend 2003). Additionally, clean air regulations may contribute to a changing social norm with regard to smoking by altering the perceived social acceptability of smoking (CDC 2000c). Because of changes in social attitudes and the need to smoke in less hospitable places, smokers may be induced to attempt to quit or not initiate (Levy and Friend 2001a).

Workplace

Workplace smoking restrictions are likely to have the greatest impact on both ETS and smoking habits because of the number of hours that workers are subject to these restrictions. Worksite bans may include a total prohibition of smoking onsite, less stringent bans that limit smoking to separate ventilated areas, or smoking in designated areas only. A 1994 report by the EPA estimated that the net benefit of a nationwide, comprehensive clean indoor air law would exceed the estimated costs by \$39 billion to \$72 billion (EPA 1994). Cost savings to employers include an estimate \$4 billion to \$8 billion annually in operational and maintenance costs of buildings (EPA 1994).

Research has verified that the institution of smoke-free workplaces effectively reduces non-smokers' exposure to ETS (CDC 2000c). Stillman and colleagues (1990) evaluated the effectiveness of efforts to institute a complete institutional ban on smoking in all areas of the Johns Hopkins Medical Institutions in Baltimore (about 8,700 employees) (Stillman et al. 1990). The implementation plan of the ban included health-oriented information campaigns, free screening and smoking cessation treatment, training for managers and supervisors, educational programs, and posted signs. Participants included employees and visitors to the medical institutions. This prospective study found significant reductions in nicotine vapor concentrations in all areas except restrooms. Additionally, the reported consumption of cigarettes by employees who continued to smoke and the total number of cigarettes smoked at work decreased by an average of 25 percent. Finally, significant reductions were noted in the level of smoking observed and the amount of cigarette remnants.

Many other studies have also demonstrated the effects of smoking bans on the prevalence and consumption of tobacco. Totally smoke-free workplaces had about twice the effect on consumption and prevalence as policies that allowed smoking in some areas (Farrelly et al. 1999; Fichtenberg and Glantz 2002; Glasgow et al. 1997).

Using data from two large, nationally representative samples, Evans and colleagues (1999) concluded that workplace bans reduce smoking prevalence by 5 percent and average daily consumption among smokers by 10 percent (Evans et al. 1999).

Farrelly and colleagues (1999) analyzed responses from a total of 97,882 indoor workers who completed supplemental tobacco questionnaires regarding their smoking behavior and the smoking policies at their place of work in a series of national surveys conducted between September 1992 and May 1993. Researchers found that a 100 percent smoke-free workplace reduced smoking prevalence by 5.7 percent and average daily cigarette consumption among smokers by 14 percent relative to workplaces with weak or no smoking restrictions. These results were found to be true for all demographic groups and nearly all industries (Farrelly et al. 1999).

A study by Evans and colleagues (1999) also investigated the effects of work area smoking bans on smoking behavior. Data from the 1991 and 1993 National Health Interview Surveys were used to obtain data for more than 18,000 workers. Researchers found that workplace smoking bans are associated with a 5 to 6 percent decline in smoking prevalence and an average reduction in cigarette consumption of 2.3 cigarettes per smoker per day (Evans et al. 1999).

Fichtenberg and Glantz (2002) investigated the effects of smoke-free workplaces on smoking prevalence and cigarette consumption. Twenty-six studies on workplaces in the United States, Australia, Canada, and Germany were subjected to a process of systematic review and meta-analysis. Entirely smoke-free workplaces were associated with a 3.8 percent reduction in smoking prevalence and 3.1 fewer cigarettes per day per smoker. The combined effects of reduced prevalence and lower consumption corresponded to a 29 percent relative reduction in tobacco use among all employees. Based on these findings, the authors concluded that if all workplaces became smoke-free, consumption per capita in the entire population would drop by 4.5 percent in the United States (Fichtenberg and Glantz 2002).

Levy and Friend (2003) also concluded that studies on private worksite regulations suggest that strong worksite restrictions have the potential to reduce the smoking prevalence rate of the entire population by about 6 percent over the long term and the quantity smoked by continuing smokers by 2 to 8 percent, depending on the length of time after the ban was implemented (Levy and Friend 2003). The authors indicate that the effects appear to erode over time, since those who

most reduce their quantity may quit and are no longer represented as smokers with reduced quantities smoked.

Further, Farkas and colleagues (2000) found that workplace smoking restrictions can significantly reduce smoking rates among young adults. Using data from the Current Population Surveys from 1992–1993 and 1995–1996, researchers surveyed 17,185 adolescents between the ages of 15 and 17. Adolescents who worked in a smoke-free workplace were found to be 68 percent as likely to smoke than adolescents who worked in a workplace with no smoking restrictions (Farkas et al. 2000).

Workplace smoking restrictions have demonstrated an effect on the quit rates of smokers as well. Findings from COMMIT, a population-based survey of 8,271 employed adult smokers who completed surveys in 1988 and 1993, found that employees who worked in a smoke-free worksite were over 25 percent more likely to make a serious quit attempt between 1988 and 1993, and over 25 percent more likely to achieve cessation than those who worked in a worksite that permitted smoking. Among continuing smokers, employees in smoke-free worksites consumed an average of 2.75 fewer cigarettes per day than those who worked in places with a nonrestrictive smoking policy (Glasgow et al. 1997).

Using data from the 1990 California Tobacco Survey—which collected information about 4,680 adult indoor smokers—Moskowitz and colleagues (2000) investigated the effects of local workplace smoking laws on smoking cessation. The results of the study revealed that smoke-free ordinances significantly increased the rate of smoking cessation and did so along a “dose-response” relationship—the stronger the ordinance, the higher the rate of cessation. While there was only a 19.1 percent cessation rate in areas with no ordinance, there was a 24.6 percent cessation rate in areas with weak ordinances, and a 26.4 percent cessation rate in areas with strong ordinances. Overall, researchers found that smokers who worked in communities with strong ordinances were 38 percent more likely to quit smoking than smokers in communities with no ordinances (Moskowitz et al. 2000).

Longo and colleagues (2001) conducted a prospective investigation of the impact of smoking bans on tobacco cessation and relapse. The researchers concluded that employees in workplaces with smoking bans have higher rates of smoking cessation than employees in workplaces where smoking is permitted (however, relapse rates were similar between these two groups). Quit rates were higher and the time it took to quit smoking was shorter among employees with smoking bans (Longo et al. 2001).

Hospitals, Medical Campuses, and Nursing Homes

In 1992, the Joint Commission on Accreditation of Healthcare Organizations mandated that hospitals must be smoke-free. Many studies have shown the benefit of smoking restrictions on employees (e.g., Stillman et al. 1990). Various studies have also considered the effects of a hospital-wide smoking ban on patients, particularly in the psychiatric unit of hospitals. Researchers consistently concluded that the smoking bans were implemented with minimal or no adverse effects (Rauter et al. 1997; Ryabik et al. 1994; Smith et al. 1999; Thorward and Birnbaum 1989). Additionally, smoking bans were found to have a significant impact on ETS exposure (Rauter et al. 1997).

In 1998, the Kaiser Permanente (KP) Northern California Region initiated the multifaceted Tobacco Dependence Program. A critical component of this program—whose goal was to reduce tobacco use among its members—was the establishment of smoke-free campuses. Before 1998, no KP campus was completely smoke-free, whereas 16 campuses had become smoke-free as of

August 2004. The remaining campuses also restricted smoking to minimal outdoor areas or to a single outdoor shelter. KP also implemented a policy mandating that all KP campuses opening in 2003 and thereafter be smoke-free (Goldstein et al. 2005).

According to Bergman (2003), most state laws allow nursing homes some discretion regarding smoking, but require some form of designated smoking area if smoking is permitted. Federal laws also allow smoking in nursing homes, although federal and most state laws permit nursing homes to be totally smoke-free. Bergman also found that, among current policies at nursing homes, 64 percent do not permit any smoking inside while the remaining 36 percent allowing smoking only in designated smoking areas (Bergman 2003).

Restaurants and Bars

As of July 1, 2006, 15 states had laws requiring 100 percent smoke-free restaurants and 11 states had laws eliminating smoking in bars. Two additional states and the Commonwealth of Puerto Rico have laws enacted, but not yet in effect, that eliminate smoking in restaurants, bars, or both. Additionally, there are 305 municipal ordinances mandating 100 percent smoke-free restaurants and 222 municipal ordinances creating smoke-free bars (ANRF 2005a). Restaurant and bar ordinances reduce exposure of nonsmokers to ETS. For smokers, although the actual number of hours spent in a restaurant or bar is small, eating, drinking, and smoking often are linked activities (Levy and Friend 2001b). Therefore, bans on smoking in restaurants and bars also have the potential to decrease tobacco use among smokers.

According to a study by Albers and colleagues (2004), strong local clean indoor air regulations are associated with lower levels of reported exposure to ETS in restaurants and bars. Researchers sampled 6,739 adults in Massachusetts households to examine the association of local restaurant and bar regulations with self-reported exposure to ETS among adults. Compared to adults from towns with no restaurant smoking restrictions, those from towns with strong regulations were more than twice as likely to report no exposure to ETS (Odds Ratio [OR] = 2.74; 95 percent Confidence Interval [CI] = 1.97, 3.80), and those from towns with some restrictions were 1.62 times as likely to report no exposure to ETS (OR = 1.62; 95 percent CI = 1.29, 2.02). Bar smoking bans had even greater effects on exposure (Albers et al. 2004).

Eliminating smoking in these environments has been controversial, and the tobacco industry as well as many restaurant and bar proprietors have argued that restrictions on smoking in such establishments would be detrimental to business. However, a review of the literature by Scollo and Lal (2004) concluded that there was “no negative economic impact from the introduction of smoke-free policies in restaurant and bars indicated by 21 studies where findings are based on an objective measure such as taxable sales receipts, where data points several years before and after the introduction of smoke-free policies were examined, where changes in economic conditions are appropriately controlled for, and where appropriate statistical tests are used to control for underlying trends and fluctuations in data” (Scollo and Lal 2004).

For example, Glantz and Smith (1997) compiled sales tax data for 15 cities with smoke-free restaurant ordinances as well as 5 cities and 2 counties with smoke-free bar ordinances, and matched comparison locations. Data were analyzed by multiple regression, including time and a dummy variable for the ordinance. The results indicated that the ordinances did not adversely affect either restaurant or bar sales (Glantz and Smith 1997).

Scollo and Lal (2004) further indicate that studies concluding a negative economic impact have based findings primarily on outcomes predicted before the introduction of policies. on subjective impression or estimates of changes rather than actual, objective, verified, or audited data

(Scollo and Lal 2004). Additionally, these studies were funded predominantly by the tobacco industry or organizations allied with the tobacco industry.

Schools, Colleges, and Commercial Day Care Centers

By 1993, all schools had classrooms bans through federal and state laws (Levy et al. 2001). Almost two-thirds of schools (62.8 percent) had smoke-free building policies in 1994, but fewer (36.5 percent) reported such policies that included the entire school environment (CDC 2000c). Wakefield and colleagues (2000) conducted a cross-sectional survey of 17,287 high school students to study the effects of restrictions on smoking—at home, at school, and in public places—on teenage smoking. Researchers found that the existence of a school ban was not associated with a reduction in smoking uptake (interestingly, it was associated with an increase in the likelihood of transition from an advanced experimenter to established smoker); however, enforced school bans were associated with 11 percent reductions in uptake of smoking across all stages of uptake ($p < .05$) (CDC 2000c; Wakefield et al. 2000).

As of July 1, 2006, 29 colleges and universities in the United States had smoke-free policies for the entire campus, both indoors and out (ANRF 2004). More than 225 additional colleges and universities had smoke-free policies for all residential housing. Using a nationally representative sample of approximately 15,699 respondents to the 1997 Harvard School of Public Health College Alcohol Study, Czart and colleagues (2001) found that complete smoking bans on college campuses are associated with decreased consumption among current smokers but have no significant impact on smoking prevalence (Czart et al. 2001).

As of December 31, 2005, 17 states had laws preventing smoking or requiring separate ventilation at commercial daycare centers, 13 states did not allow smoking when children are on premises, and 6 states required or allowed a designated smoking area. Thirteen states had no restrictions (CDC 2005).

Airlines and Airports

As early as 1970, the Federal Aviation Administration (FAA) initiated an in-depth study to determine to what extent tobacco smoke was harmful to nonsmokers. In May 1973, the Civil Aeronautics Board required airlines to provide separate sections for smokers and nonsmokers for reasons of consumer comfort and protection. In August 1986, the National Academy of Sciences issued a report on airliner cabin air quality and related safety issues, which recommended a smoking ban on all domestic commercial flights. The authors cited four major reasons for the recommendation: (1) to lessen discomfort of passengers and crew, (2) to reduce potential health hazards to cabin crewmembers from environmental tobacco smoke, (3) to eliminate possible fires, and (4) to align cabin air quality with standards for other closed environments. Effective April 23, 1988, the FAA placed a 2-year ban on smoking on all domestic scheduled airline flights of 2 hours or less, and on February 25, 1990, prohibition of smoking went into effect on virtually all scheduled U.S. domestic airline flights. In 2000, the U.S. Department of Transportation banned smoking on all U.S. international flights.

A cross-sectional telephone survey of personnel at primary commercial-service airports found that only 61.9 percent of airports reported being smoke-free in 2002 and that larger airports, which account for the majority of passenger boardings, were less likely than smaller airports to have a smoke-free policy. The researchers concluded that increased adoption and enforcement of smoke-free policies were needed to protect the health of workers and travelers at U.S. airports (CDC 2004).

Prison Restrictions

According to a 2002 survey conducted by the American Correctional Association, at least 38 of 50 state correctional departments reported that they either are smoke-free or have partial smoking bans. Recent additions to that list includes California, whose governor signed a bill to amend the state's penal code to bar tobacco products from prisons and youth correctional facilities, effective July 1, 2005. In addition, on July 15, 2004, the Federal Bureau of Prisons instituted a policy establishing a near-total ban on smoking for both employees and inmates at 105 prisons.

Other Public Places

A leader in tobacco control, California has the nation's longest running comprehensive anti-tobacco program, a significant element of which is workplace bans. In November 1988, Proposition 99, the landmark Tobacco Tax and Health Protection Act, was approved by California voters and instituted a 25-cent tax on cigarettes and earmarked 5 cents of every cigarette pack sold to fund the California Tobacco Control Program. California's smoke-free workplace law took effect in 1995.

A recent California Department of Health and Human Services report indicates that the state's smoke-free workplace law has had a major impact on smoking behavior and cessation efforts, and that the majority of Californians support the law. According to the 2004 Field Poll (CDHS 2005), 58 percent of smokers who quit in the past 10 years said that having smoke-free public places made it easier for them to quit smoking. 69 percent of current smokers who attempted to quit in the past 10 years said that smoke-free public places helped them reduce the number of cigarettes they smoke. Additionally 90 percent of Californians surveyed, including the majority of smokers, said they approve of the smoke-free workplace law. A study by Burns (2002) also indicates that California has higher rates of cessation activity and cessation success compared to other states (Burns 2002).

Perhaps reflective of the strong support for smoke-free environments, many local communities within the state have recently enacted strong restrictions on smoking. In November 2003, Solana Beach in California became the first municipality in the United States to institute a local ordinance banning cigarette smoking on the beach. Since this time, several additional California cities have also implemented bans. The impetus for these ordinances was not only to reduce the amount of ETS to which nonsmokers are exposed, but also to decrease litter and reduce chemical leaching from cigarette butts.

Effective January 1, 2004, Californians were further protected from ETS by Assembly Bill 846, which expanded smoke-free zones around public buildings. The bill prohibits smoking within 20 feet of main entrances, exits, and operable windows of all city, county, and state buildings as well as buildings on the campuses of the University of California system, California state universities, and community colleges (California Legislature 2004).

Legislators in San Francisco city voted to ban smoking in public parks on January 25, 2005. California state law currently prohibits smoking or disposing of any tobacco-related products within 25 feet of a playground or tot lot sandbox area. Eleven other cities in California had previously enacted additional restrictions on outdoor smoking. However, San Francisco's smoking ban is a "curb-to-curb" prohibition of smoking in city parks, plazas, piers, gardens, and recreational fields, making San Francisco the first county in the state with such an expansive ban (Van de Water 2004).

Household Bans

Established by at least one individual in a home, household smoking restrictions have repeatedly been found to be effective at influencing smoking levels of individuals. Using data from three current population surveys with a supplement on tobacco use, Farkas and colleagues (1999) considered the effects of household and workplace smoking restrictions on quitting behaviors. Smokers who lived or worked under a total smoking ban were more likely to report a quit attempt in the previous year. Among those who made an attempt, those who lived or worked under a total smoking ban were more likely to be in cessation for at least 6 months. Current daily smokers who lived or worked under a total smoking ban were more likely to be light smokers. Household bans are even more effective than workplace bans (Farkas et al. 1999).

Farkas and colleagues (2000) also found that household smoking restrictions were found to significantly reduce adolescent cigarette consumption. Adolescents who lived in households with smoking restrictions were 26 percent less likely to be smokers than adolescents who lived in households with no smoking restrictions. Household smoking restrictions also had positive effects on cessation rates—adolescents were 1.80 times more likely to be former smokers if they lived in smoke-free homes (95 percent CI, 1.23, 2.65) (Farkas et al. 2000). Smoke-free homes have a greater association with lower rates of smoking prevalence than smoke-free workplaces do and are associated with an increased likelihood of smoking cessation by adolescent smokers. Adoption of a smoke-free home policy sends a message to family members that smoking is not condoned, while the lack of such a policy may send the opposite message.

Wakefield and colleagues (2000) found that more restrictive arrangements on smoking at home were associated with a greater likelihood of being in an earlier stage of smoking uptake ($p < .05$) and a lower 30-day prevalence (OR = 0.79; 95 percent CI = 0.67, 0.91, $p < .001$) (Wakefield et al. 2000).

IMPLEMENTATION AND ENFORCEMENT

Compliance with both voluntary restrictions and regulations on smoking in public places varies substantially. Compliance is high where changes have occurred through a combination of legislation and changes in public attitudes. Success of bans and their effect on smoking is dependent on efforts to increase compliance. For effective implementation, strict bans may require publicity and enforcement in areas without strong antismoking norms. Secondhand smoke issues may mobilize political support for other programs, but there may likely be opposition from the tobacco industry and some other businesses (Levy et al. 2004).

The enforcement of smoking bans relates to potential sanctions included in state legislation or local ordinances, such as license removal, fines, or other penalties resulting from specific law enforcement activity. A review of implementation and enforcement of state clean indoor air laws concluded that the laws are typically self-enforcing and are not systematically enforced by state or local authorities (Jacobson and Wasserman 1997). People voluntarily comply with the law in the absence of proactive enforcement. Nevertheless, greater government enforcement and media publicity may increase compliance with the law (Levy and Friend 2001a).

SUMMARY

Clean air laws effectively reduce exposure to ETS. Additionally, the more stringent the policy, the greater the impact on decreasing smoking prevalence, decreasing consumption, and en-

hancing cessation. Furthermore, smoking restrictions may positively influence social norms by decreasing the number of people observed smoking and decreasing opportunities to smoke.

State and local governments continue to expand regulations limiting smoking. In 2006, both Arkansas and Louisiana enacted legislation that prohibits smoking in all motor vehicles in which a child is restrained in a child passenger safety seat (Arkansas Legislative Information 2006; Louisiana Legislative Information 2006). Similar legislation is being considered in both California and New York.

In March 2006, Calabasas, California, a small Los Angeles suburb, implemented a Comprehensive Secondhand Smoke Control Ordinance to limit public exposure to secondhand smoke in both indoor and outdoor public areas within the city. The law prohibits smoking in “all public places in the City of Calabasas where other persons can be exposed to second-hand smoke.” Places where smoking is prohibited include indoor and outdoor businesses, hotels, parks, apartment common areas, restaurants and bars where people can be “reasonably expected to congregate or meet”(City of Calabasas, California 2006).

Given the success of home smoking bans at decreasing smoking consumption and initiation, and increasing quit rates, an important area to consider for new public policy is the role of government in supporting the institution of home smoking bans. For example, some hospitals voluntarily distribute information to new parents on the health effects of secondhand smoke on children and the importance of establishing a smoke-free home. Perhaps a state or local government could approve legislation, requiring that all hospitals provide this information and ask parents to sign a pledge to establish a smoke-free home.

McMillen and colleagues (2003) found that the majority of adults, both smokers and non-smokers, support smoking bans in a wide variety of places (McMillen et al. 2003). Ultimately, most studies have concluded that even among smokers, support for smoking restrictions and smoke-free environments is high (CDC 2000a).

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Warning Labels and Packaging

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INTRODUCTION

Cigarette packages are an important medium for communicating with smokers, both for the tobacco industry and for governments seeking to convey the health risks of smoking. As restrictions have increasingly reduced or eliminated traditional forms of tobacco advertising, the importance of the package as a marketing vehicle has increased. At the same time, governments have begun to exert more control over tobacco labeling, including the introduction of more prominent health warning messages. This appendix reviews the effectiveness of tobacco labeling policies and health warnings on cigarette packages.

THE CIGARETTE PACKAGE AS A MARKETING TOOL

Packaging is an important component in the overall marketing strategy of consumer goods (Shapiro et al. 1999). Packaging helps to establish brand identity in competitive markets and serves as an effective form of promotion both at the point of purchase and while the product is being used (Slade 1997). Packaging is particularly important for consumer products such as cigarettes, which have a high degree of social visibility (Pollay 2001). Unlike many other consumer products, cigarette packages are displayed each time the product is used and are often left in public view between uses (Wakefield and Letcher 2002). As John Digianni, a former cigarette package designer noted: “A cigarette package is unique because the consumer carries it around with him all day . . . It’s a part of a smoker’s clothing, and when he saunters into a bar and plunks it down, he makes a statement about himself” (Koten 1980). As a result, the package serves as a “badge product” and an important form of advertising in its own right (Pollay 2001).

Cigarette packages also serve as an important link to other forms of tobacco advertising (Wakefield et al. 2002a). Package designs help to reinforce brand imagery that is communicated through other media and play a central role in point-of-purchase marketing, which now accounts for a majority of the industry’s promotional spending in Canada and the United States (Dewhirst 2004). Indeed, cigarette “power walls”—rows of cigarette packages prominently displayed be-

hind retail counters—have been shown to be an effective form of marketing, particularly among youth and young adults (Wakefield et al. 2002a). Moreover, marketing value of the cigarette package increases as other forms of marketing are restricted (Celebucki and Diskin 2002; Wakefield et al. 2002b). The following quote from a Phillip Morris executive highlights the importance of the package under increasingly restrictive advertising environments: “Our final communication vehicle with our smoker is the pack itself. In the absence of any other marketing messages, our packaging . . . is the sole communicator of our brand essence. Put another way—when you don’t have anything else—our packaging is our marketing” (Hulit 1994).¹ Internal documents from British American Tobacco also indicate that packages have been designed to compensate for restricted forms of advertising: “Given the consequences of a total ban on advertising, a pack should be designed to give the product visual impact as well as brand imagery . . . the pack itself can be designed so that it achieves more visual impact in the point of sale environment than its competitors” (Miller 1986).

Beyond the retail environment, packages also help to increase the reach of “below-the-line” marketing activities (Carter 2003). For example, cigarette packages in Malaysia contain specific references to the sponsorship of Formula 1 racing series, while packs in other countries carry images and information for concert and nightclub promotions. As Pollay (2001) noted, “The package is the last and most critical link in an integrated chain of promotional communications” (Pollay 2001). Overall, the cigarette package is the cornerstone of tobacco marketing strategy and an effective means of targeting key subgroups of smokers, including young adults and women (Carpenter et al. 2005; Chapman and Carter 2003; Chapman and Carter 2003; Cummings et al. 2002; Pollay 2001).

WARNING LABELS

Background

In addition to serving as a marketing vehicle for the tobacco industry, cigarette packages also provide governments with a direct means of communicating with smokers. Warning labels are primarily intended to communicate the health risks of smoking and to fulfill the government’s responsibility as regulators to warn consumers about these hazardous products. To date, warnings labels have been introduced on cigarette packages in virtually every jurisdiction; the size and general strength of these warnings, however, vary considerably (Aftab et al. 1999). In most countries, the first warnings to appear on packages were introduced by tobacco manufacturers in response to growing pressure from health authorities and in an attempt to avoid liability for their products (Chapman and Carter 2003). By 1974, government-mandated warnings were required on packages in several countries, including Canada, Costa Rica, Ecuador, Ireland, New Zealand, Japan, Panama, Peru, the United Kingdom, the United States, and some areas of Australia. In the United States, health warnings were first included on cigarette packages in 1966 and in advertisements in 1972. Since 1984, U.S. cigarette packages have carried one of four government-mandated text warnings on the side panels of packages.

The United States is one of the few countries in the developed world that has not updated its warnings in the past 20 years. In contrast, most countries have increased the size, number, and general prominence of package warning labels. Most notably, several countries have introduced pictorial warnings labels. Canada was the first country to require pictorial warnings when they

¹ Originally cited by (Alechnowicz and Chapman 2004).

were implemented in 2000. The top 50 percent of each main panel on the package features one of 16 warnings. Each includes a photograph or other illustration, a marker word (“Warning”) and a short summary statement. Inside each pack, one of 16 text messages provides additional information on the health risks of smoking, as well as cessation-related information.

Since 2000, Brazil, Singapore, Thailand, and Venezuela have also introduced pictorial warnings. Australia is set to do so in 2006, and the European Union (EU) has developed a standard set of pictorial warnings for EU member states to consider. Several other countries, including Bangladesh, India, Hong Kong, Malaysia, New Zealand, South Africa, and Taiwan are also considering implementing pictorial warnings on packages. Indeed, the coming years promise an unprecedented degree of change in labeling policies as countries prepare to meet the standards set out in the Framework Convention for Tobacco Control (FCTC). Article 11 of the FCTC requires that warnings: (1) be approved by the competent national authority; (2) be rotating; (3) be large, clear, visible, and legible; (4) should be 50 percent or more of the principal display areas and no less than 30 percent of the principal display areas; and (5) may be in the form of or include pictures or pictograms. Given that the FCTC recommends—but does not require—pictorial warnings, policy makers in a number of countries will be forced to choose between the minimal and the recommended standards. The following section reviews the evidence on the effectiveness of text and pictorial warning labels that should guide these policy decisions.

Evidence

Saliency of Package Warning Labels

Package warnings are unique among tobacco control interventions in that they are delivered at the time of smoking and have a high frequency of exposure that increases with the number of cigarettes per day. Nevertheless, warning labels must be noticed to be effective, and the extent to which smokers attend to warnings depends upon various content and design features. The saliency of warnings is enhanced when information is presented in a vivid manner that evokes an emotional reaction (Strahan et al. 2002). Specific, unambiguous warnings (e.g., “cigarettes cause lung cancer”) are also more likely to be noticed and less likely to be discounted than vague, equivocal warnings (e.g., “cigarettes are hazardous to your health”) (Linthwaite 1985; Loken and Howard-Pitney 1988; Wegrzyn 1992). Warnings that are attributed to a specific source (e.g., the Surgeon General) have also been shown to be more credible than unattributed warnings (Guttman and Peleg 2003; Wogalter et al. 1999). In addition, text-based warnings should also target an appropriate literacy level (CREATEC Market Studies 2003). The United States warnings, for example, require a college reading level and may be inappropriate for youth and Americans with poor reading abilities (Malouff et al. 1992). This is particularly important considering that, in most countries, smokers report lower levels of education than the general public.

Several design features are also associated with greater saliency, including the size and position of the warning on the package (Fong 2005; Willemsen 2005). For example, smokers are more likely to recall larger warnings, as well as warnings that appear on the front of packages as opposed to on the sides (AGB Spectrum Research Ltd. 1987; Health Canada 2005b; Linthwaite 1985; Strahan et al. 2002; Wegrzyn 1992). Several studies indicate that the U.S. text warnings on the side of packages demonstrate low levels of saliency among smokers (Crawford et al. 2002; Fischer et al. 1989; Fox et al. 1994). In a comparative study of students in Canada and the United States carried out in 1995, at a time when Canadian packages carried text warnings on the front

of packages, 83 percent of Canadian students mentioned health warnings in a recall test of cigarette packages, compared to only 7 percent of U.S. students (Northrup and Pollard, 1995). A Phillip Morris document also highlights the importance of positioning on the front of packages: "Government required warnings placed on the largest packaging panel, often called the front and/or back, are the biggest marketing threat to all of us in Asia . . ." (Hulit 1994). Smokers have also been found to equate the size of the warning with the magnitude of the risk (Cragg Ross & Dawson Ltd. 1990). Support for these findings comes from a series of 56 focus groups, conducted across seven European countries, which explored reactions to more prominent warnings in the E.U. (Devlin et al. 2005).

Features that distinguish the warning messages from the package design have also been found to increase the salience and recall of warnings (Laugesen 1990). Messages with black lettering on a white background are the easiest to read, whereas the legibility of silver or gold text messages is comparatively poor (Nilsson 1991; Wegrzyn 1992). Warnings that include pictures or graphics are also more noticeable and more likely to be recalled than text messages (Health Canada 1999). This is consistent with research demonstrating that viewers perceive a greater likelihood of occurrence when presented with graphic depictions of disease (Laugesen 1990).

The salience of warnings labels is not constant over time. Rather, the effectiveness of health communications decreases with repeated exposures (Bornstein 1989; Henderson 2000), and the salience of tobacco warnings has been found to lessen as smokers become desensitized to the warnings over time (Health Canada 1999). For example, more than half of Canadians surveyed in 1999 agreed that warnings introduced in 1994 were "worn out" and had lost their effectiveness (Mahood 1999). It is important therefore to ensure that warnings are revised on a regular basis. Short of introducing new labels, any feature that enhances the vividness of the warnings should prolong their effectiveness (Strahan et al. 2002). In other words, color warnings, pictures, and increases in the number of rotating warnings should delay the wear-out of warnings. Indeed, approximately 4 years after their introduction, Canadian youth and adult smokers report only a moderate decrease in the frequency of reading the labels, with little or no decrease in reports of their effectiveness (Health Canada 2005a; Health Canada 2005b), and 95 percent of youth smokers reported that pictorial warning labels provided them with important information about the health effects of smoking. In addition, a comparative study of smokers in Canada and the United Kingdom found that the 4-year-old pictorial warnings in Canada were more likely to be rated as effective than the large text warnings that were introduced in the United Kingdom in 2003, only months prior to the survey (Fong et al. 2004).

Impact on Health Knowledge

Cigarette warning labels have been shown to have a significant impact on smokers' understanding of the risks of tobacco use. Several studies have demonstrated that large text-based warnings are associated with increased perceptions of risk. Cross-sectional surveys conducted in Canada during the 1990s found that the majority of smokers reported that package warning labels are an important source of health information and have increased their awareness of the risks of smoking (Health Canada 2005a; Health Canada 2005b; Tandemar Research 1996). In Australia, Borland and Hill (1997) found that relative to nonsmokers, smokers demonstrated an increase in their knowledge of the main constituents of tobacco smoke and identified significantly more disease groups following the introduction of new Australian warning labels in 1995 (Borland and Hill 1997). At least two studies have evaluated the effects of the 2003 E.U. directive (2001/37/EC), which mandated that warnings in all E.U. countries meet size standards

equivalent to the FCTC minimal requirement. First, a study of Spanish university students concluded that text warnings based upon the E.U. directive significantly increased perceptions of risk (Portillo and Antonanzas 2002). These findings were consistent with results from the International Tobacco Control (ITC) Policy Evaluation Survey—a cohort survey of a representative sample of more than 8,000 adult smokers from Canada, Australia, the United States, and the United Kingdom. This quasi-experimental evaluation examined the changes in perceptions and reactions to warnings among adult smokers in the United Kingdom, compared to those in the other three countries, where no changes in warnings had occurred (Fong et al. 2004). The findings indicated that the enhancement in labels led to significant increases in the United Kingdom—relative to the other three countries—in: (1) salience and noticeability of the warnings, (2) thinking about the health risks of smoking, and (3) forgoing a cigarette due to the label.

There is also a growing evidence base on the effectiveness of pictorial warnings in communicating risk. Since Canada was the first country to introduce pictorial warnings, all of this evidence derives from Canadian smokers. A study conducted with Canadian smokers in 2001 found that more than half reported that the pictorial warnings have made them more likely to think about the health risks of smoking (Hammond et al. 2004). National surveys conducted on behalf of Health Canada also indicate that approximately 95 percent of youth smokers and 75 percent of adult smokers report that the pictorial warnings have been effective in providing them with important health information (Health Canada 2005a; Health Canada 2005b). Findings from the ITC Survey also provide evidence of the effectiveness of pictorial warnings. When asked to cite sources of health information, approximately two-thirds of all smokers cited cigarette packages—more than radio, print, and electronic sources—and the second most common source after television (Hammond et al. 2006). However, the results varied substantially by country: respondents living in countries with more comprehensive warnings were more likely to cite packages as a source of health information. For example, 85 percent of Canadian respondents cited packages as a source of health information, in contrast to only 47 percent of U.S. smokers. In addition, specific health warnings were associated with knowledge of specific diseases. In Canada, where package warnings include information about the risks of impotence, smokers were more than twice as likely to agree that smoking causes impotence compared to smokers from the other three countries (United States, United Kingdom, and Australia). Overall, the study found that warnings that are graphic, larger, and more comprehensive in content were associated with greater health knowledge.

There is also evidence that pictorial warnings may be effective in communicating health risks to nonsmokers. For example, approximately two-thirds of youth nonsmokers in Canada recently reported looking at the pictorial warnings at least once per week, and 95 percent agreed that the warnings have been effective in providing them with important information about the health effects of smoking (Health Canada 2005b).

Finally, there is evidence that smokers with less education are less likely to recall health information in text-based messages (Millar 1996). Given the inverse association between smoking and educational status, pictorial warnings may be particularly important for communicating with those most at risk. Indeed, there is preliminary evidence to suggest that countries with pictorial warnings demonstrate fewer disparities in health knowledge across educational levels (Yong et al. 2005). Pictorial warnings may also be particularly effective in developing countries with low literacy rates, as well as regions with numerous languages and dialects.

Impact on Behavior

Few studies have examined the impact of warning labels on smoking behavior; however, those that have suggest a beneficial effect on consumption and cessation. Borland and Hill (1997) found that new text warnings introduced in Australia encouraged some smokers to delay smoking or smoke less of a cigarette (Borland and Hill 1997). Willemsen (2005) looked at the impact of new text warnings on motivation to quit and smoking behavior using data from the Dutch Continuous Survey of Smoking Habits. Among smokers, 14 percent said they were less likely to buy cigarettes as a result of the new warnings, 32 percent said they preferred to buy packages without the warnings, 18 percent said the warnings made them more motivated to quit, and 10 percent said they smoked less because of the warnings. Those who intended to quit within 6 months were five to six times as likely to report smoking less due to the warnings than those who did not plan to quit. In fact, smokers not motivated to quit said their motivation decreased as a result of the warnings. However, since they were not planning to quit before the warnings came into effect, it is not clear that this response represented a meaningful decrease in intent (Willemsen 2005).

In a series of papers, Hammond and colleagues have examined the impact of Canadian graphic warning labels on smoking behavior. Smokers who had read, thought about, and discussed the new labels were more likely to have quit, tried to quit, or reduced their smoking at 3-month follow-up, after adjusting for intention to quit and smoking status at baseline (Hammond et al. 2004). One-fifth of Canadian smokers said they smoked less because of the labels, whereas only 1 percent said they smoked more, and one-third said they were more likely to quit because of the warnings. In addition, former smokers identified the pictorial warnings as important factors in their quitting and in subsequently maintaining abstinence (Hammond et al. 2004). Results from the ITC Policy Evaluation Survey are consistent with these findings: at least one-quarter of respondents from Canada, Australia, the United Kingdom, and the United States reported that package warnings have made them more likely to quit, although Canadian smokers were significantly more likely to report cessation benefits from the warnings than smokers in the other three countries that have text-only warnings (Fong et al. 2004).

Finally, internal documents from the tobacco industry also provide some indication of the effectiveness of pictorial warning labels. For example, research conducted by Rothmans Benson & Hedges in Canada on the pictorial warnings that were introduced in 2000 concluded that "the impact of the new warnings is colossal" (Pollay 2001).

Public Support and Credibility of Warning Labels

Tobacco labeling policies have received strong endorsement from both smokers and non-smokers. In a 1992 survey, 89 percent of Canadians expressed support for government-mandated warnings, while 83 percent were in favor of more detailed warnings than the text-based messages that were on packages at the time of the survey (Insight Canada 1992). Warning labels have also received strong public support in countries such as Australia (Borland and Hill 1997) and the United States (Jordan 1993). Graphic pictorial warnings have also received public backing. A 1999 national survey of Canadians found that 74 percent of the general public and 59 percent of daily smokers were in favor of regulations requiring warning messages to include pictures and to occupy 60 percent of the front and back of each pack (Environics 2000). High levels of support have also been found in subpopulations, such as young adults (Koval et al. 2005). Focus group testing of the current Canadian warnings found that all participants, regardless of age or smoking status, felt that stronger warnings are more effective in discouraging smoking (Health Canada

2000). A majority of smokers supported the pictorial warnings even after their introduction: in 2001, only 27 percent of smokers reported that the Canadian warnings contained “too much” health information, whereas 23 percent reported the warnings contain “about the right amount of information,” and 50 percent of smokers wanted to see even more health information on packages (Hammond et al. 2004).

Research also indicates that package warnings are perceived to be a credible source of health information. For example, 97 percent of Canadian youth reported that they “believed” the 1994 text-only labels (Enviro-nics Research Group 1996), while 86 percent of adult Canadian smokers agreed that the 1994 labels were accurate (Health Canada, 2000). Findings from Australia and the United States also indicate that both smokers and nonsmokers perceive warning labels to be credible sources of information (Beltramini 1988; Cecil et al. 1996; Health Canada 2005b). Graphic pictorial warnings also enjoy high credibility ratings from smokers: in 2002, 87 percent of Canadian smokers reported that the graphic warnings accurately depicted the health risks of smoking (Hammond et al. 2004). A separate survey conducted with youth smokers found that 90 percent agreed that the messages communicated in the pictorial warnings are accurate (Health Canada 2005b).

Cessation-Related Information

In addition to warning about the risks of smoking, cigarette packages can also be used as a vehicle for communicating cessation-related information. In fact, research on public health communications indicates that health warnings are most effective when they are paired with efficacy-related information (Strahan et al. 2002; Witte and Allen 2000). In other words, cigarette warning labels that include information on the benefits of quitting and specific quit methods are most likely to result in behavior change. The Canadian warnings, which include general messages of support, as well as concrete information on ways to quit smoking, are consistent with this literature. The pictorial warnings that have been proposed by the EU include even stronger efficacy information on the outside of packs. Telephone quitline numbers appear to be a particularly important addition to recent warnings. Quitline information already appears on packs in several countries, including Holland, where calls to a national quitline increased dramatically after the number appeared on packages (Willemsen et al. 2002). Website addresses have also been printed on packages in countries such as Canada and represent another means of communicating cessation resources directly to smokers.

Labeling of Constituents

In many countries, tar, nicotine, and other mainstream smoke constituents are required by law to appear on cigarette packages. These cigarette “yields” are determined under the International Standards Organization (ISO) machine testing protocol, which is widely acknowledged to be seriously flawed. The ISO testing protocol is based upon unrealistic smoking parameters that lead to deceptively low yields and exaggerate differences between cigarette brands. Most importantly, ISO cigarette yields are not associated with individual exposure or with health risk (Shopland et al. 2001).

Nevertheless, in most countries, the ISO yields are the only source of constituent information printed on cigarette packages. Not surprisingly, a considerable proportion of smokers use the tar yields when choosing cigarette brands, under the mistaken belief that lower-tar cigarette reduce the risks of smoking (Cohen 1996; Enviro-nics Research Group Limited 2003). As a consequence, there is a growing consensus that the ISO yields should be removed from all cigarette

packages, as will shortly be the case in Australia (WHO 2000). Although the ISO machine testing parameters used to generate the cigarette yields are currently under revision, there is no indication that the revised parameters will generate yields that are more closely associated with individual risk. Until there is persuasive evidence to indicate that the differences in cigarette yields, measured under the ISO protocol or any other protocol, reflect meaningful differences in health risk, there is no benefit to presenting them directly to consumers, who will inevitably interpret lower-yield products as less hazardous.

There is some evidence that nonnumerical constituent information may be more useful in communicating risk to consumers (Enviro-nics Research Group Limited 2003). For example, in the place of the cigarette yields, Brazil, Venezuela, and Australia have adopted more “descriptive” approaches to communicating constituents. This includes statements about the health effects of specific chemicals, as well as statements about the overall number of chemicals in tobacco smoke. Additional research is required to determine the most effective means of labeling constituent information on cigarette packages.

Brand Descriptors on Packages

One of the most important functions of packaging is to communicate sensory properties of a brand, such as its “taste” or “lightness.” As Wakefield and colleagues (2004) have noted, package design can help to shape perceptions of a product’s performance and its sensory attributes, even among experienced smokers (Wakefield et al. 2004). This phenomenon is best illustrated by the use of brand descriptors and colors to promote perceptions of a safer product. Tobacco manufacturers commonly pair brand descriptors such as “light” and “mild” with cigarettes that generate low ISO tar yields under the machine testing protocols. Although the industry has argued that these terms refer only to the “taste” of a product, these descriptors help to promote these brands as “healthier” products (Pollay 2001; Pollay and Dewhirst 2002). Indeed, surveys of smokers in the United States and Canada indicate that a substantial proportion of “light” smokers believe that their cigarettes are less hazardous (Elton-Marshall et al.; Kozlowski et al. 1998; Shiffman et al. 2001). Ashley et al. (2000) report that in Ontario in 1996, one in five smokers of “lights” believed that smoking “light” and “mild” cigarettes lowered the risk of cancer and heart disease (Ashley et al. 2000). In 2000, 27 percent of Ontario smokers said they smoked “lights” to reduce health risks, 40 percent said they used them as a step toward quitting, and 41 percent said they would be more likely to quit if they knew that “light” cigarettes provided the same amount of tar and nicotine as regular cigarettes (Ashley et al. 2001). In a study of smokers’ response to advertisements for potentially reduced-exposure tobacco products, “light” cigarettes, and regular cigarettes, Hamilton and colleagues (2004) found that respondents perceived “lights” as having significantly lower health risks and carcinogen levels than regular cigarettes. Adolescents have also been found to have similar misconceptions that “light” cigarettes are less hazardous.

Article 11 of the FCTC calls for the removal of any brand descriptor that “directly or indirectly creates the false impression that a particular tobacco product is less harmful than other tobacco products,” including terms such as “low-tar,” “light,” or “mild.” Several jurisdictions have already banned deceptive descriptors. For example, in September 2003, the European Union banned the use of a number of brand descriptors, such as “low-tar,” “light,” “ultra-light,” and “mild,” in accordance with Directive 2001/37/EC. Findings from the International Tobacco Control Policy Evaluation Survey suggest that this ban has been effective in reducing misconceptions about the health benefits of “light” and “mild” brands (Fong 2005). However, as the United Kingdom experience has demonstrated, tobacco manufacturers have proven adept at substituting

colors and numbers for the banned descriptors. For example, pale blue or the number “one” are used to indicate a “light” or “mild” cigarette. In Brazil and the United Kingdom, manufacturers openly provided translation guides for this substitution.

Plain Packaging

Plain packaging, devoid of brand logos and images, may be the only way of removing deceptive labeling from packages. Although plain packaging has yet to be mandated in any jurisdiction, it would effectively strip the industry of a critical marketing tool. Two separate studies also indicate that plain packaging would help to increase the salience of health warnings. Goldberg and colleagues (1999) found that plain packaging increased the recall of health warning messages in two of three cases (Goldberg et al. 1999). Short, simple messages appeared to be more effective on plain packages, whereas a longer technical message showed no improvement on a plain package. Beede and Lawson (1992) also found that presenting health warnings on plain packages without brand imagery resulted in a significantly greater recall rate (Beede and Lawson 1992).

Government Regulation and Industry Opposition

The tobacco industry has vigorously opposed comprehensive tobacco labeling policies, especially in the case of pictorial labels (Chapman and Carter 2003). For example, as Alechnowicz and Chapman (2004) have noted, in 1995, package warnings were identified by British American Tobacco (BAT) as one of the key issues facing the company. Protecting the pack design and “neutralizing” the controversy over pack warning labels were among the priorities listed in the document (BAT 1995). The same document goes on to state that “pictorial warnings, and those occupying a major pack face or faces (front and back) or a disproportionately large area of advertising space, should be restricted, as should moves to plain or generic packs. Every effort should be made to protect the integrity of the company's packs and trade marks” (Alechnowicz and Chapman 2004; BAT 1995).

In public, tobacco manufacturers have argued that large comprehensive warnings are not only unnecessary, but are less effective than more obscure text messages (Chapman and Carter 2003). For example, Martin Broughton, the former chairman of BAT, recently stated that “the growing use of graphic image health warnings . . . can offend and harass consumers—yet in fact give them no more information than print warnings” (Hearn 2004). Tobacco manufacturers have also argued that comprehensive warnings constitute an unreasonable and illegal expropriation of cigarette packaging (Pollay 2001).

To date, courts of law have disagreed. For example, in response to a legal challenge of the Canadian Tobacco Act, the court found that the tobacco companies’ right to advertise their products could not be given the same legitimacy as the federal government’s duty to protect public health (Pollay 2001). In short, the courts have ruled that even graphic warnings are warranted considering the societal costs of smoking.

RECOMMENDATIONS

The cigarette package is a key component of tobacco marketing strategy, particularly under increasing regulation of advertising and other forms of promotion. As a consequence, restrictions on package labeling are critical to reducing tobacco use and ensuring that smokers are adequately

informed about the risks of smoking. Indeed, prominent health warnings on packages are among the most cost-effective forms of public health education available.

To achieve these dual objectives, we recommend the following:

- Large graphic health warnings are now used or proposed in many countries and should be adopted for cigarettes in the United States.
- Misleading brand descriptors such as “light” and “mild” should be eliminated. Consideration should be given to limiting the use of colors and numbers that suggest “light” and “mild” attributes.
- Misleading constituent information, such as the ISO cigarette yields, should be eliminated from packaging.
- Information on the benefits of quitting, as well as concrete cessation advice and sources of support, should be provided on cigarette packages. In particular, telephone quitline numbers should be included on all packages. This information should be displayed on the outside panels of the package, although more detailed information can also be included on the inside of the package or on an insert.
- The regulation of cigarette package labeling requires a more formal regulatory structure.
- Specific package markings can be used to indicate that federal or provincial taxes have been paid. This is particularly useful for identifying packages of cigarettes that have not been taxed and may be sold illegally.

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D

The Long-Term Promise of Effective School-Based Smoking Prevention Programs

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Researchers and others have developed many school-based tobacco prevention programs over the past 30 years. Several reviews (Best et al. 1988; Burns 1992; DHHS 2000; Flay 1985; Glasgow and McCaul 1985; Goldstein et al. 1997; IOM 1994; Lantz et al. 2000; Skara and Sussman 2003) and meta-analyses (Black et al. 1998; Bruvold 1993; Rooney and Murray 1996; Rundall and Bruvold 1988; Tingle et al. 2003; Tobler 1986; Tobler 1992; Tobler et al. 2000; Tobler and Stratton 1997) have established that some programs and strategies, particularly those based on the social influences approach (educating youth about social norms and influences and providing skills for resisting such influences) were effective, although for some programs effects were often limited or did not last (Ellickson and Bell 1990; Flay et al. 1989; Murray et al. 1989).

Meta-analyses of school-based prevention programs have used various criteria and so have varied in scope, from including 74 smoking prevention studies among 207 substance prevention studies (Tobler et al. 2000) to including only 8 studies with grade 12 (or age 18) outcome data (Wiehe et al. 2005). The result has been a confusing array of findings, ranging from precise effect sizes for some type of programs to a conclusion that most school-based prevention programs do not work (Glantz and Mandel 2005; Wiehe et al. 2005).

Several studies (Black et al. 1998; Tobler 1986; Tobler 1992; Tobler and Stratton 1997) suggest that programs that use interactive learning strategies and involve same- or similar-age peers as leaders or facilitators are most effective. Consistent with earlier meta-analyses, Tobler and colleagues (2000) found that smoking prevention programs produced an average effect size of 0.16, with “interactive” programs producing a significantly larger effect size than noninteractive programs (0.17 versus 0.05) (Tobler et al. 2000). Even after adjusting for intraclass correlations (which many earlier analyses had not done), Rooney and Murray (1996) found that social influence programs produced reductions in smoking of between 5 and 30 percent (Rooney and Murray 1996). Tobler and colleagues (2000) found that programs that address multiple substances were not significantly less effective at reducing tobacco use than programs that targeted only tobacco—and they had the added benefit of reducing alcohol and other substance use as well (Tobler et al. 2000). Tobler (1986) also found program effects to be larger in schools with predominantly special or high-risk populations (minorities, high levels of absenteeism or drop-outs, poor academic records) (Tobler 1986).

The purpose of this review is to determine what long-term (by age 25) effects the nation might expect if the best school-based smoking prevention programs were to be adopted nationwide. Recent findings have raised questions about the medium-term (high school) effects of school-based smoking prevention programs. Wiehe and colleagues (2005) conducted a meta-analysis of eight studies with results reported at grade 12 or age 18 (Wiehe et al. 2005). These included evaluations of programs of known ineffectiveness from prior studies and even from

multiple prior studies and a meta-analysis (e.g., Drug Awareness and Resistance Education), which are discussed further below.

The Hutchinson project (conducted at the Fred Hutchinson Cancer Center, University of Washington) was designed to be a multiyear (grades 3–10) social influences tobacco prevention program. A large randomized trial (20 school groups per condition) produced no significant effects at the end of grade 12 or 2 years later (Peterson et al. 2000). These findings are impossible to interpret, because the investigators have not reported what effects there were or were not at any other time, including prior to entering high school (when most other programs report short-term results) or at the end of the program (grade 10). Certainly, one cannot use these results to conclude that the social influences approach to smoking prevention is ineffective in the long-term deterrence of smoking among youth (Peterson et al. 2000). These results must be interpreted in the context of many other studies on the social influences approach in the literature (Botvin et al. 2001; Botvin et al. 2001; Sussman et al. 2001).

The DARE (Drug Awareness and Resistance Education) Program was developed by the Los Angeles Police Department (LAPD) and the Los Angeles Unified School District (LAUSD) in the early 1980s. They essentially took the two variants of Project SMART (Self Management and Resistance Training) that were being tested with 7th grade students in LAUSD schools at the time (Graham et al. 1990), combined them, and added a great deal of information about drugs for police officers to deliver to 5th and 6th grade students. The results of a randomized trial of the two SMART variants found that the resistance skills program was effective, albeit with small effects, and that the self-management program actually led to increased drug use relative to control group students (Graham et al. 1990; Hansen et al. 1988a). These results, combined with our knowledge that information does not often greatly influence behavior and that the police officers who used are not usually highly skilled teachers, make it no great surprise that DARE was not be effective. Although early nonrandomized studies suggested that DARE sometimes had small effects for elementary school students, multiple randomized trials have shown that DARE has little or no impact on drug use in the short term and no impact in the long term (Clayton et al. 1925; Dukes et al. 1996; Ennett et al. 1994a; Lynam et al. 1999; Rosenbaum et al. 1994; Rosenbaum and Hanson 1998). For a summary, see the meta-analysis by Ennett and colleagues (1994b). In response, DARE has developed programs for junior and senior high school students; the junior high program also has been shown not to be effective (Perry et al. 2003).

Another program that has been promoted as being an effective prevention program, but that has no medium-term effects on smoking is the Michigan Health Education Model. It consists of 30 lessons taught during grades 5–8, some of which include resistance skills training. Although it produced an 82 percent relative reduction (RR) in ever smoking at the end of the program (Shope et al. 1996), no significant effects on smoking behavior remained by the end of grade 12—indeed, boys became more likely to smoke (Shope et al. 1998). It seems that the prevention content of this program was not intensive or long enough to produce permanent effects, that additional programming might have been needed when the students were adolescents, or that some content may even have had a negative effect as some older informational programs did (Goodstadt 1978).

Other studies included in the Wiehe and colleagues (2005) meta-analysis were early studies of the social influences approach (Flay et al. 1989; Shean et al. 1994)¹ that, in retrospect, one should never have expected to have long-term—or even medium-term—effects (Wiehe et al.

¹ A similar study that reported 12th grade data, but was not included by Wiehe and colleagues (2005), was the early Minnesota smoking prevention program that many others were modeled after (Murray et al. 1989).

2005). These programs were initial small-scale experimental tests of the social influences approach that included only 5 to 10 sessions in one or two grades without any boosters or programming in high school. Another was Project ALERT, which consisted of only eight sessions in 7th grade and three booster sessions in 8th grade (Ellickson et al. 1993). Clearly, programs need to include more sessions, preferably with some in high school, in order to be effective in the long-term.

Of the studies reviewed by Wiehe and colleagues (2005), only the Life Skills Program, which is an interactive program of 15 sessions in 7th grade, 10 in 9th grade, and 5 in 10th grade that incorporates the social influences approach as well as other general personal and social skills, was effective at medium-term follow-up, concluded that “there is little evidence to suggest that existing programs produce medium-term decreases in smoking prevalence” (Wiehe et al. 2005, p. 168). In an editorial comment, Glantz and Mandel (2005) misleadingly stated that the Wiehe and colleagues (2005) review of medium-term trials “convincingly shows that they are not effective” (Glantz and Mandel 2005, p. 157). They then discount the Life Skills Program evaluation because of the use of one-tailed t-tests and the failure to take multiple comparisons into account. However, it is perfectly appropriate to use one-tailed t-tests when a clear hypothesis is stated, and adjusting for multiple comparisons would not have eliminated the significant effects. In addition, the short-term effects of Life Skills Training (LST) have been replicated in multiple studies (see below). Glantz and Mandel (2005) suggest that all aspects of smoking education should be integrated into regular core curriculum classes. However, this approach has not been shown to be effective. Furthermore, it is not likely to happen in the near future because of the current demands on schools, nor is it likely to be effective because one would expect much less adherence to the program components if the program was delivered by multiple teachers (Glantz and Mandel 2005).

Skara and Sussman (2003) reviewed medium-term studies (at least 24 months) of 25 tobacco and other drug prevention programs. They found that 18 of the 25 studies reported significant short-term effects and that 15 of the 25 reported significant medium-term effects. Of 17 studies with pretest and posttest data, 11 (65 percent) reported significant medium-term effects, with an average reduction in the percentage of baseline nonusers who initiated smoking in the program condition relative to control conditions of 11.4 percent (range 9 to 14.2 percent). Of the studies with significant short-term effects, 72 percent (13 of 18) were found to have significant medium-term effects. Results also indicated that program effects were less likely to decay for programs with extended programming or booster sessions (Skara and Sussman 2003).

In summary, findings from various reviews and meta-analyses suggest that school-based smoking prevention programs can have significant long-term effects if they: (1) are interactive social influences or social skills programs; (2) involve 15 or more sessions, including some up to at least ninth grade; (3) produce substantial short-term effects. These findings also suggest that many more programs that have reported short-term effects might also have medium- and long-term effects if they were evaluated. Unfortunately, long-term studies are relatively rare, mostly due to lack of funding.

METHODS

For the purposes of this report, the Institute of Medicine’s Committee on Reducing Tobacco Use: Strategies, Barriers, and Opportunities wanted to develop an estimate of the size of the effect that the best programs could produce if widely implemented. This required a focus on studies of programs that both were successful in reducing smoking in the short term and also in-

cluded follow-up data into high school (grades 10–12). Few studies have included follow-up beyond high school, but for those that did, the reported effects are of interest. Since the purpose was to determine the size of the effects that could be obtained by the best programs that have been tested, the decision was made, based on past reviews, to limit this review to programs that included 15 or more sessions (preferably including some in high school) and that had demonstrated effects at both short term and medium term. Only three school-based programs and four school-plus-community programs fulfilled these criteria.² For each of these programs, Table D-1 shows the research design, the number of sessions, the duration, the grade levels of the program, the grade of the last follow-up, and the short- and medium-term program effects. These two sets of studies are labeled Category I studies of school-based and school-plus-community or mass media programs, respectively.³

Given the small number of Category I studies, evaluations of other programs with the promise of medium- and long-term effectiveness are also reviewed. Category II studies consist of school-based and school-plus-community or mass media programs that had large effects and were of a large enough scope and sequence to suggest likely medium- and long-term effects. Four school-based programs and one school-plus-community program met these criteria.

Percent relative reduction (RR) is used as the indicator of effect size for two reasons. First, it is readily available for all programs, whereas the detailed statistics needed to calculate an effect size are sometimes incompletely reported. Second, RR is readily understood and utilized in cost and benefit calculations. For randomized trials, pretest levels of smoking should be the same in both program and control groups, and RR would be the difference between posttest control (C) and program (P) groups divided by the control group level [i.e., (C - P)/C]. However, pretest levels were not always the same, and these should be adjusted for; thus, in cases where pretest data were reported, RR is the posttest difference between groups minus the pretest difference between groups, divided by the control group posttest level, that is [(Post C - Post P) - (Pre C - Pre P)] / Post C, expressed as a percentage.

Another complication in determining effect sizes is that different studies report different levels of smoking as their outcome variable. For both short- and medium-term effects, the most commonly used outcomes were ever (lifetime) use, use in the past month, or use in the past week. When studies report more than one of these, all are reported. While relatively few studies reported more than one outcome measure, the RRs were remarkably consistent across outcomes when they were reported. On the assumption that investigators reporting only one outcome may have chosen to report the outcome with the largest effect size, the estimates are likely to be on the generous side.

REVIEW OF CATEGORY I STUDIES AND FINDINGS

Category I School-Based Programs

² This review is not limited to randomized trials.

³ All seven Category I programs were included in the 25 studies with at least 2 years of follow-up reviewed by Skara and Sussman (2003) (Skara and Sussman 2003). The other studies in their review did not meet one or more of the criteria for inclusion. For many, the last follow-up was earlier than grade 10 (and some of these are in my Category II). For some, there were no demonstrable short-term program effects (e.g., Peterson et al. 2003).

The Tobacco and Alcohol Prevention Project

The Tobacco and Alcohol Prevention Project (TAPP) (Hansen et al. 1988b) was a 15-session social influences-oriented program developed at the University of California, Los Angeles, in the early 1980s. The core components of the social influences approach have been employed in many evaluated programs, including those reviewed here. Hansen (1988) provides a good description of the theory and content of this approach. It has two main core elements: (1) resistance skills training to teach skills to resist the specific and general social pressures to smoke and (2) normative education to correct student misperceptions of prevalence and acceptability of use. Programs using this approach also often involve active learning or the use of the Socratic or dialectic teaching approaches, open discussion, the use of peers or older admired youth as instructors, and behavioral rehearsals to ensure that skills are learned well (Hansen 1988a). TAPP included the above core elements plus inoculation against mass media messages, information about parental influences, information about the consequences of use, and the making of a public commitment not to smoke. Peer opinion leaders were used to assist teachers with program delivery.

TAPP was evaluated in two cohorts of 7th grade classes in a nonrandomized study in Los Angeles County. Only cohort 1, conducted in two moderately-sized school districts, was followed into grade 10. Health education and social studies teachers received 2 days of training prior to delivering the program. As shown in Table D-1, by the end of 7th grade the RR in past-month smoking was 26.2 percent. By the end of 10th grade there was a 19.1 percent RR in past-month smoking and an 18.3 percent RR in ever smoking. In a secondary analysis of only those students present at all waves of the study, the RR in past-month smoking was 43 percent.

This was an early study of the social influences approach, and it demonstrated that the approach can be very effective. The use of peer leaders probably enhanced what program effects would have occurred with teacher-only delivery (Klepp et al. 1986; Tobler 1992). The whole-sample result is preferred as the initial estimate of program effects because it provides a more realistic assessment of what would happen under real-world conditions; however, note that the larger effect obtained for students present throughout the study could be obtained if all schools were to implement the program.

Life Skills Training

Life Skills Training (LST) is one of the most researched school-based smoking prevention or any other kind of substance use prevention program. Developed by Botvin and Eng (1982), originally at the American Health Foundation and then at Cornell University, LST consists of 30 classroom sessions with 15 delivered in 7th grade, 10 in 8th grade and 5 in 9th grade (usually the first year of high school)⁴ (Botvin and Eng 1982). The program was designed to teach students a wide array of personal and social skills. These include content similar to other smoking prevention programs that focus on social influences (Glynn 1989; Hansen 1988b), including learning and practicing refusal and other assertion skills, information about the short- and long-term consequences of smoking, correction of misperceptions of the prevalence of use by same-age peers, and information about the decreasing acceptability of smoking in society. Other generic program content addresses the development of communication skills and ways to develop personal relationships.

⁴ This is the number of lessons for the version tested in the studies reported here. Different versions of the program have different numbers of lessons per grade.

Multiple studies over 25 years have demonstrated the effectiveness of the program when delivered by different providers, in different kinds of schools, and for different kinds of students (see Botvin 2000 and Botvin and Griffin 2002 for reviews). Only one study has included medium-term follow-up through high school (Botvin et al. 1995). This was a follow-up of the largest single trial, conducted in 56 suburban and rural schools serving largely white students (91 percent) in three geographical regions of New York State (Botvin et al. 1990). Schools were assigned randomly to two experimental conditions (one day or video-taped teacher training) or a control condition. Level of implementation ranged from 27 to 97 percent by teacher reports, with about 75 percent of the students receiving 60 percent or more of the intervention. Six program schools and 18 percent of the students were excluded from the analysis of program effects because of poor implementation.

As shown in Table D-1, at the end of 9th grade the RR was a relatively small 8.9 percent (1.63 percent vs. 1.48 percent) for weekly smoking, reflecting the low prevalence of weekly smoking at this age. At the end of 12th grade, the RRs were 19.7 percent (33 percent versus 26.5 percent) and 20.4 percent (27 percent versus 22 percent) for monthly and weekly smoking, respectively.⁵ For the high-implementation group, the medium-term RRs were both 28 percent. However, the RRs for the (almost) complete sample provide the most appropriate estimate of what effects could be obtained under real-world conditions—indeed, they may still be an overestimate of the effects that might be obtained when the program developer is not involved—although larger effects might be obtained with full, high-quality implementation.

Independent evaluations of LST have found similar or larger short-term effects. In a nonrandomized trial in Spain, where the program was delivered by teachers to 9th grade students, a 21 percent RR in average monthly smoking at the end of grade 10 reduced to 11 percent by the end of grade 12 (Fraguela et al. 2003). Independent evaluations of LST in Midwestern states found a short-term RR of 22 percent in a randomized trial in rural Iowa (Spath et al. 2002; Trudeau et al. 2003) and short-term RRs of 43 percent in current smoking and 9 percent in ever-use in Indianapolis (Zollinger et al. 2003). Another small-scale (three schools per condition) randomized evaluation in Pennsylvania found small immediate effects for girls only, and these had decayed by the end of grade 7 and were no longer apparent by the end of grades 8–10 (Smith et al. 2004). In a nonrandomized trial of a German adaptation of the life skills approach in 106 German-speaking elementary schools in Austria, Denmark, Luxembourg, and Germany, a 10 percent RR in ever smoking and less than 1 percent RR in past-month smoking were reported (Hanewinkel and Asshauer 2004).

Project SHOUT

Project SHOUT (Students Understanding Others Understand Tobacco) (Eckhardt et al. 1997; Elder et al. 1993) used trained college undergraduates to teach 18 sessions to 7th and 8th graders that included information on the health consequences of smoking, celebrity endorsements on nonuse, the antecedents and social consequences of tobacco use, decision making, resistance skills advocacy (writing letters to tobacco companies, magazines, and film producers; participating in community action projects designed to mobilize them as antitobacco activists), a public commitment to not use tobacco, and positive approaches to encouraging others to avoid tobacco or quit. In 9th grade, five newsletters were mailed to students and two to their parents, and each

⁵ Note that the RR of 21 percent [(33 - 27)/33] reported by Skara and Sussman was based on the method that used only posttest results. Our RR is based on the method that includes pretest results (Skara and Sussman 2003).

student received four phone calls from trained undergraduate counselors that were individually tailored to their tobacco use status at the end of 8th grade or the prior phone call. During 11th grade, approximately half of the students received two more newsletters that focused on tobacco company tactics to recruit new smokers; information on recent city, state, or national legislation regarding tobacco; cessation advice and information on second-hand smoke; and one phone call that focused on eliminating smoking in restaurants and other public places as well as information concerning the rights of customers and employees in those places affected by the potential ban.

The program was evaluated in 22 schools with ethnically diverse populations in the San Diego area, some suburban and some rural. Schools were assigned randomly to program and control conditions after matching on pretest levels of tobacco use. Effects observed at the end of 8th grade (14.6 percent versus 10.8 percent, RR = 22 percent) were not statistically significant. However, as shown in Table D-1, by the end of 9th grade the intervention produced a relative reduction in tobacco use in the past month of 30.3 percent (19.8 percent versus 13.2 percent). By the 11th grade, the average RR was 44.1 percent (12.6 percent versus 7 percent). For the group that did not receive the 11th grade intervention, the RR decayed to only 9.5 percent.

The pattern of effects observed for this study suggest that much of the medium-term effect was due to personal attention via newsletters and phone calls in grades 9 and 11. Indeed, one has to wonder if the personal attention set up a response bias among respondents such that those who received personalized newsletters and phone calls were motivated to tell the researchers what they wanted to hear. Lack of a differential response rate to the surveys by condition speaks against this, however, at least in part. Considerable research suggests that the power of similar-age peers and the power of college-age counselors for high school students should not be underestimated. Although the cost of the intervention as studied was kept down by the use of volunteer students, it is not clear how easily this model can be disseminated. The results also strongly suggest, however, that even a brief intervention during high school was enough to actually increase the effect observed at the end of grade 9.

Summary of Findings From Category I School-Based Programs

Results from three social influence and social competence programs with 15 or more sessions over 2–4 years, preferably with some content in high school, had significant medium-term effects (i.e., at grades 10–12): an average of a 27.6 percent (range 18.7–44.1) RR in smoking. The extraordinary effects of Project SHOUT may have been due to the added content on tobacco industry activities, the teaching and encouragement of advocacy skills, and the personal attention. These results need to be replicated. The medium-term effects suggest that a minimal personal contact intervention of this kind in high school could increase the effects of any other program delivered in middle school.

Category I School-Plus-Community Programs

The North Karelia Project

Vartiainen and colleagues (Vartiainen et al. 1983; Vartiainen et al. 1986; Vartiainen et al. 1990; Vartiainen et al. 1998) tested a 10-session social influences program delivered by trained health education teachers and peer leaders in the province of North Karelia, Finland. A community-wide heart disease prevention program and mass media campaign modeled on the Stanford three-cities project (Farquhar et al. 1977) was going on throughout North Karelia at the same

time. Two schools received the 10-session program from the project health educator and trained peer leaders and two schools received a 5-session version from regular teachers. Two schools from another province, where there was no prevention program, were used as controls. As shown in Table D-1, at the end of grade 9 the RR (average of lifetime, monthly, and weekly) was 44.6 percent for both program conditions, which decayed to 38.7 percent by grade 11. By 3 years beyond the end of high school, the RR had decayed to 22.9 percent in the health educator condition and 37.3 percent in the teacher condition. By 10 years beyond high school, the average RR was 20 percent with the two conditions not significantly different.

The results reported here can only be interpreted as the joint effects of the school-based smoking prevention program and the community-wide heart disease prevention campaign (which had a reduction of smoking as one of its targets). Thus, these results suggest effects that are larger than those of the school-based programs reviewed above. The larger effects obtained by regular teachers suggests that programs might be more effective when delivered by regular classroom teachers than when delivered by visitors to classrooms, possibly because of the ongoing relationships that teachers establish with students. However, the long-term effects were no different.

The Class of 1989 Study

This project was another in which a school-based prevention curriculum was tested in the context of a community-wide heart disease prevention program (Perry et al. 1989). The community program consisted of community education, including mass media and organization activities as well as screening, cessation clinics, and workplace education designed to reduce three cardiovascular risk factors: smoking, cholesterol levels, and blood pressure (Luepker et al. 1994; Mittelmark et al. 1986). The school-based smoking prevention program (Perry et al. 1992; Perry et al. 1994) was based on the Minnesota Smoking Prevention Program (Arkin et al. 1981; Murray et al. 1994), one of the early social influences programs, and included material on diet and exercise as well as tobacco. Seven sessions on smoking prevention were delivered by peer leaders assisted by teachers in 7th grade. In 8th and 9th grades an additional 10 sessions concerning tobacco use were delivered by teachers. The classroom components were supplemented by the development of health councils through which students participated in other cardiovascular risk reduction projects.

The smoking prevention program was evaluated with a design in which students in all of the schools in one community received both the community-wide cardiovascular intervention and the school-based smoking prevention program and students in all the schools in another community did not. All students in one cohort were surveyed every year from 6th to 12th grade. As in all school-based studies, attrition occurred continuously over the 6 years, and by 12th grade only 45 percent of the original participants were surveyed. There were no differences in smoking rates at 6th grade. By the end of 7th grade, after the core smoking prevention content had been delivered, weekly smoking prevalence was about 40 percent lower in the program condition, and this effect was maintained through 12th grade, 3 years after the end of direct smoking prevention instruction and a year after the end of general community education (Table D-1).

Like the North Karelia project, this study demonstrates that school-plus-community programming can have substantial effects that are maintained to a large extent through the end of high school.

Midwestern Prevention Project

The Midwestern Prevention Project (MPP; also known as Project STAR [Students Taught Awareness and Resistance]) tested a school-plus-community (and mass media) version of the social influences approach in eight communities in the Kansas City metropolitan area. The school-based component consisted of 10 sessions delivered by classroom teachers to 6th or 7th grade students (depending on the year of transition to middle school) and 5 sessions delivered the following year (when a parent involvement component was also implemented). Of these schools, 8 were assigned randomly to conditions, 24 other schools elected to deliver the program, and 18 others elected to wait till after the project. Mass media programming was available to all communities every year. Other community-based programming started in the third year and likewise was available in all communities.

At the 2-year follow-up, the RR was 37.5 percent (Table D-1) (Pentz et al. 1989). By grades 9–10, it was 18 percent (Table D-1) (Johnson et al. 1990). These results are difficult to interpret because all students were exposed to the mass media and community components. The mass media programming, in particular, would be expected to reduce the difference between groups because the control group would no longer be a real control and it might have reduced students' rate of onset relative to if they had not been exposed to the community program. This might explain the relatively fast decay.

Vermont Mass Media Project

The Vermont project tested the effectiveness of a mass media social influences smoking prevention program when delivered in the context of a school-based program. Worden and colleagues (1988) undertook a careful development process to develop television and radio spots that would discourage cigarette smoking by adolescents. They randomly assigned two communities to the program condition (mass media plus school) and two matched communities to a school-only condition. There was no true control group. In the program communities, they purchased the time for airing the spots (734 TV spots in year 1 decreasing to 348 by year 4, and 248 radio spots in year 1 increasing to 450 by year 4) and provided schools with the school-based program (four sessions in each of 5th through 8th grades and three sessions in both 9th and 10th grades—each student in the study cohort was exposed to 4 years of program during 5th through 8th grades, 6th through 9th grades, or 7th through 10th grades) and teacher training to deliver them. Neither schools nor students were told about the media programming, and the mass media programming never mentioned the school program. Thus, as far as students were concerned, there was no linkage between the two programs (Worden et al. 1988).

As shown in Table D-1, the RRs in weekly smoking among the school plus mass media program group compared to the school-only program group were 36.6 percent (14.8 percent versus 9.1 percent) at the end of the program (grades 9–11) and 28.8 percent 2 years later at grades 10–12 (Flynn et al. 1992; Flynn et al. 1994; Flynn et al. 1995). Larger effects were observed for daily smoking—44 percent RR at the end of the program and 36 percent a year later. It is difficult to estimate what the effects of the school-only program might have been and therefore it was difficult to estimate the relative contributions of the school and mass media programming. Nevertheless, this study demonstrates that well-designed media programming can produce large effects above those of the school-only program, about 80 percent of which are maintained for at least 2 years.

Summary of Findings from Category I School-Plus-Community Programs

The school-plus-community studies produced short-term RRs of about 40 percent, almost twice as good as the school-only programs. These effects decayed an average of 22 percent to about 31 percent. Because the effects of school-only programs tended to increase rather than decay over time, the medium-term effects of school-plus-community or mass media programs were only about 12 percent better than school-only programs. Note, however, that program effects were maintained at a higher level (almost 40 percent, or 31 percent better than school-only programs) for those programs that included a high school component (North Karelia and Class of 1989 Studies), reinforcing the conclusion above that high school programming reduces the decay of effects. Despite this latter result, we conclude conservatively that ongoing school plus mass media or community programs can produce a medium-term RR of between 31 and 40 percent.

The use of multiple delivery modalities increases effectiveness over those obtained from school-only programs (Flay 2000). This is consistent with theories about the influences on behavior existing across multiple domains of life (Bronfenbrenner 1979; Bronfenbrenner 1986; Flay and Petraitis 1994; Flay et al. 1995). It helps if students receive consistent messages across community contexts and over time.

CATEGORY II PROGRAMS

This section provides a brief review of several programs that show exceptional promise or provide other important insights to help estimate the potential and likely relative reduction in smoking onset if prevention programs were widely implemented. These programs are summarized in Table D-2.

Category II School-Only Programs

The Adolescent Alcohol Prevention Trial

Hansen and Graham (1991) tested two variants of early social influences program (nine sessions delivered to 7th grade students) targeted to alcohol use (Hansen and Graham 1991). They contrasted information plus resistance skill training, information plus normative education alone, or both of these combined. Schools were assigned randomly to one of these three conditions or to a control. Although the program focused mostly on alcohol, it did produce effects on cigarette smoking. The normative education and combined programs produced the largest effects. As shown in Table D-2, the RRs at the end of the program were 21.4 percent for lifetime smoking and 26.2 percent for monthly smoking. At 11th grade follow-up, the RR in lifetime smoking was 13.9 percent (Taylor et al. 2000). Although this program focused mostly on alcohol, it also produced effects for cigarette smoking. These effects were not too different in magnitude from those reported earlier from TAPP (developed by the same principal investigator), although, as might be expected because the program was not focused on smoking, these effects were not maintained as well.

Towards No Tobacco

Sussman and colleagues (1993a; 1993b; 1996) developed the Towards No Tobacco (TNT) program as a more intensive approach to tobacco prevention that incorporated the social influ-

ences approach and new approaches to altering normative beliefs and social skills training. In a large randomized trial, they found RRs in ever smoking of 34 percent at the end of the program (grade 8) and 30 percent at grade 9, and RRs in weekly smoking of 64 percent at the end of the program and 56 percent at the end of grade 9. These effects are larger than those found in other programs, so one would expect that the medium-term effects might also be larger (Dent et al. 1995; Sussman et al. 1993a; Sussman et al. 1993b; Sussman et al. 1995).

Know Your Body

Investigators at the American Health Foundation developed the Know Your Body (KYB) program in the early 1980s as a comprehensive health education program that included social influences and competence prevention components. It consisted of 384 lessons delivered during 4th through 9th grades. In a randomized trial, Walter and colleagues (Walter et al. 1988; Walter and Wynder 1989) found an 11.5 percent RR in thiocyanate (a biological marker of smoking) at grade 8 and a 73.3 percent RR in lifetime smoking at the end of grade 9. This is an exceptionally large effect. Without long-term follow-up data we cannot be sure how well it would have been maintained, but this study shows that strong prevention effects can be obtained by comprehensive health education programs that also include proven approaches to prevention.

The Good Behavior Game

Kellam and Anthony (1998) applied the Good Behavior Game (GBG) (Barrish et al. 1969) to improving elementary student behavior in the expectation that it would prevent subsequent adolescent problem behavior (Kellam and Anthony 1998; Storr et al. 2002). In a trial where 1st grade students were assigned randomly to control classrooms and classrooms or teachers were assigned randomly to the GBG, another intervention, or control conditions, students received three 10-minute sessions per day at the beginning of 1st grade, increasing in frequency and duration during 1st through 2nd grades. Jalongo and colleagues (1999) found a 24 percent RR in problem behavior at the end of grade 2 (Jalongo et al. 1999) while Furr-Holden and colleagues (2004) reported a 26.3 percent RR in lifetime smoking 8th grade (Furr-Holden et al. 2004). These studies demonstrate that important changes in life course trajectories of behavior brought about early in life can lead to important changes in adolescent behavior, including smoking.

Other school-based programs that improve elementary school children's behavior also have this kind of potential, for example, the Fast Track (Conduct Problems Prevention Research Group 2002) and Positive Action programs (Flay et al. 2001; Flay and Allred 2003). Some non-school interventions that improve the behavioral trajectory of young children—for example, pre-school maternal counseling (Cullen and Cullen 1996) and home nursing visitation (Olds 2002)—also have this potential.

Summary of Findings from Category II School-Based Programs

Although these programs are not strictly comparable, the average effect size of these four projects was 27.2 percent for short-term effects and 39.1 percent for medium-term effects (usually 8th or 9th grades), but with large variation (12 to 49 percent for short term and 26 to 73 percent for medium term). Given that Category I programs actually had increased effects over time, these results suggest that it may be possible to have medium-term effects considerably higher

than the estimates derived from Category I programs with more comprehensive or newer school-based programs.

The results of the GBG and other elementary school and preschool programs are particularly intriguing because they demonstrate the power of changing the trajectories of behavior early in life. A relatively nonintensive prevention program provided to these students in middle and high school might have much larger medium- and long-term effects on smoking and other health-related behaviors.

Category II School-Plus-Community Program

Project 16

Project 16 (Biglan and Ary 2000) was a randomized, multiple cross-sectional design to test the effects of a comprehensive community-based intervention designed to reduce smoking by 7th and 9th graders. Sixteen communities were assigned randomly to two conditions: a five-session social influences school-based program and the school plus the community program. The community program included media advocacy, youth antitobacco activities, family communications about tobacco use, and reduction of youth access to tobacco. At the end of 2 years of intervention, the covariate adjusted prevalence of smoking among 7th and 9th graders in the community program communities had increased 0.9 percent (from 10.7 percent to 11.6 percent) while prevalence had increased 3.3 percent (from 8.1 percent to 11.4 percent) in the school-based only communities—an RR of 21.1 percent (Table D-2). One year later, the parallel rates were 5.9 percent (from 7.9 percent to 13.8 percent) and 2.1 percent (from 10.3 to 12.4 percent), respectively, or a RR of 27.5 percent (Table D-2). The RRs obtained by this intervention suggest that well-designed community-based interventions can have effects that seem likely to be maintained at substantial levels. The lack of a true control group makes estimating the true effect difficult. However, the results of this study suggests that significant medium- and long-term effects can be expected from well-designed and implemented school-plus-community programs.

Summary of Category II Programs

The findings from both the school-only and the school-plus-community programs in this section suggest that programs can be developed and implemented that will be as effective or more so in the medium- or long-term as the Category I programs reviewed above.

Summary of Findings and Conclusions

School-Only Programs

This review suggests that interactive social influences or social competence smoking prevention programs that provide 15 or more lessons, start in upper elementary or middle school, and continue into high school can produce solid medium-term effects. Other conditions that appear to improve the effectiveness of school-only programs relate to content (social influences and general social competence are of critical importance), how well they are delivered (related to how well teachers are motivated and trained), and the involvement of older peers (see Tobler et al. 2000 for elaboration of the 13 components of effective programs).

Results from three social influence and social competence programs with 15 or more sessions over 2–4 years, preferably with some content in high school, had significant short-term effects of about 22 percent RR in monthly or weekly smoking that increased during high school in two of the studies to an estimated average of 28 percent RR. Some other programs (Category II) provided further evidence that: (1) the social influence approach can affect tobacco use even when alcohol use was the main focus; (2) comprehensive health education programs that include strong social influence content can be effective, possibly even more effective than stand-alone social influence programs; and (3) programs early in life can alter developmental pathways for the better, including less tobacco use in adolescence.

Based on an average of the medium-term effects of Category I studies and supported by the estimated medium-term effects of Category II studies, the possible medium-term effects of a national program of well-implemented, school-based smoking prevention programs of proven effectiveness are estimated to be 28 percent.

School-Plus-Community and/or Mass Media Programs

The four Category I school-plus-community studies produced short-term RRs of about 42 percent, decaying to medium-term effects of about 31 percent. Findings from one Category II community-based program implemented with a school-based program support this estimate of effect size. Thus, the possible medium-term effects of a national program of well-implemented school-plus-community and/or mass media smoking prevention programs of proven effectiveness are estimated to be 31 percent.

Expected Effects into Young Adulthood

Program effects are likely to decay beyond high school. Unfortunately, few studies are available to guide us in how large or small this decay might be. However, national U.S. data may allow for an estimate. A U.S. National Household survey on Drug Abuse data suggests that about 3.012 percent (average for 1989–1999, range = 2.63–3.46) of 18 year-olds who are not smoking daily become daily smokers by the time they are 25 (Giovino 2004). The Monitoring the Future 2003 data provide a national estimate of the percentage of 12th grade students that smoke daily at 15.8 percent, meaning that 84.2 percent of 12th graders were not smoking daily. For school-only programs, this would represent a 23.3 percent RR in daily smoking by age 25 (see Table D-3 for calculations) or a decay in RR of $(28 - 23.3)/28 = 17$ percent. The decay of school-only programs might be greater than this estimate, maybe 20 percent, and the decay of school plus ongoing community or mass media programs might be less, maybe 15 percent because the messages remain in the larger environment to influence or reinforce behavior.

Expected Effects Under Real-World Conditions

There are at least two other factors that could reduce the effects of even the best programs in real-world implementations: (1) rate of adoption by schools and communities and (2) level and quality of implementation or delivery.

Less-than-complete adoption clearly would reduce the expected national-level effect size. Getting effective prevention programs adopted by schools is not easy (DHHS 2000; Ennett et al. 2003; Ringwalt et al. 2002). Estimates of effects often come from efficacy trials where adoption is not as large an issue because only those schools or communities willing to adopt the program have been entered into the study, and also where implementation quantity and quality may not be

major issues because the implementers are trained and monitored by the researchers. Nevertheless, it would be helpful to have an estimate of the proportion of schools that would be willing to implement an effective tobacco prevention program; however, we know of few such estimates. The Conduct Problems Prevention Research Group (2002) reported that seven of eight school districts that were offered the fast track program accepted, and 52 of the 54 schools asked agreed to participate.

In actuality, not even all schools entered into studies always carry through with their willingness to implement the program. For example, Battistich and colleagues (2000) reported that only 5 of 12 schools recruited into the program arm of a nonrandomized project based on faculty interest and perceived likelihood of being able to implement the program actually implemented the program moderately well to very well during the 3-year study (Battistich et al. 2000).

In these days of high demands on schools, they are not going to address prevention unless they have to (or unless it can be shown to improve achievement) and they are not going to adopt a program unless they have the funding for it. Adoption probably would not be 100 percent even with a clear mandate and earmarked funding, although it might increase over time following the S-shaped adoption curve, as successes are publicized. A clear mandate to include tobacco prevention in the curriculum, together with earmarked funding and monitoring of adoption, should help obtain rates of adoption of evidence-based school-based programs of 75 percent or more.

Getting comprehensive programs implemented fully and with integrity, even when they are adopted with full information and commitments, is also no small task, and the level and quality of implementation are clearly related to program effectiveness (Kam et al. 2003). Factors believed to influence program implementation have been identified and they are related not only to the program itself (e.g., program complexity, provision of technical assistance, user-friendly materials) but also to the environment in which the program is implemented (i.e., district, school, teacher, and participant characteristics) (Durlak 1998).

For some programs with high levels of monitoring, levels of implementation might be high. For example, the Conduct Problems Prevention Research Group (2002) reported that participating teachers taught an average of 85 percent of the lessons in the first year of the program, 91 percent of parents participated in the program, and 79 percent of them attended at least 50 percent of the parent sessions.

Without ongoing monitoring, implementation might be much more uneven. Uneven implementation of a national program could reduce the effect size substantially—but by how much? The effect sizes reported for LST already took incomplete implementation into account. The authors reported that about 76 percent of the students received 60 percent or more of the program from trained teachers in schools who had signed onto the study (Botvin et al. 1995). The 20 percent medium-term RR reported was for the whole sample (for the high-fidelity sample, the medium-term RR was 28 percent). Independent evaluations of the LST program have reported a wide range of effects. None of these studies provided data on levels or integrity of implementation.

The tobacco industry has sponsored adoption, implementation, and evaluation of LST (Interactive Inc. 2000; Interactive Inc. 2001).⁶ During the first 2 years, teachers who provided implementation data (73 percent) taught 80 percent of the units, met 75 percent of the objectives, and covered at least 69 percent of the activities. If one assumes that the 27 percent who did not provide implementation reports did not teach LST, then the average implementation level would

⁶ Unfortunately, the design of this evaluation (unmatched control group, for which data are not reported) does not allow for any interpretation regarding program effectiveness.

be between 50 and 60 percent. Some teachers noted that the only reason they implemented LST at all, especially in year 2, was because it was being monitored or evaluated. Thus, one could conclude that under conditions of ongoing monitoring or evaluation a high level of implementation (60 percent or more) could be achieved.

There may be less compromise in the delivery of a mass media campaign than of school programs because they are of larger scale. As long as campaigns are well designed and fully funded (including purchase of time on television and radio), a 75 percent implementation might be a reasonable expectation.

DISCUSSION

There are a number of limitations to the studies that met the criteria for this review. First, the most appropriate design is the school-based randomized trial, where schools are assigned to conditions and data are analyzed taking into account the nesting of students in schools (Flay and Collins 2005; Murray 1998). Many prevention studies—including some of those reviewed here—did not use randomization, but instead used matched controls or other designs. Some so-called quasi-experimental designs (Shadish et al. 2002) may be acceptable under certain conditions (Flay et al. 2005; Flay et al. in press). Second, although more than one program has reported significant medium-term effects, none of the individual programs has more than one evaluation of medium-term effects. Thus, although we can conclude that comprehensive, interactive programs with 15 or more sessions, including in high school, can have medium-term effects, we do not yet know whether the medium-term effects of any one of the programs meeting these criteria can be replicated.

Third, there is a reliance on self-report measures of tobacco use. For many years, the validity of self-reports of sensitive behaviors was questioned. After a series of studies of the use of biochemical validation or the collection of biochemical samples for use in a “bogus pipeline” procedure (Aguinis et al. 1993; Presti et al. 1992; Roese and Jamieson 1993), methods for surveying adolescents that ensure confidentiality were developed that seem to ensure the validity of self-reports of sensitive behaviors (Graham et al. 1984; Murray and Perry 1987; Patrick et al. 1994; Stacy et al. 1990). Although multiple studies suggest that students do report their substance use honestly when asked under conditions of confidentiality, these studies were limited to middle school students, so it would be wise to have some studies use biochemical verification with high school students and young adults.

Fourth, the available long-term evaluations do not allow determination of the relative effectiveness of these programs for different populations. However, indications from meta-analyses that these types of programs have larger effects in schools with a predominantly special or high-risk (minority, high absenteeism or dropout, poor academic records) populations are promising.

Fifth, the last time of data collection in most of these studies was while youth were still in high schools (hence, “medium-term”). We need many more truly long-term studies of the ongoing effects of smoking prevention programs, preferably up to age 25.

Sixth, there is great variability in the way researchers and evaluators assess outcomes. Researchers have used ever smoking, smoking in the past month or week, and other indicators of youth smoking. Fortunately, there was reasonable consistency in estimates of prevention effectiveness across measures in most of the reviewed studies. Nevertheless, it would help future reviewers if researchers could settle on consistent measures. In addition, however, future research needs to include assessment of multiple short-term effects (or mediating variables) in addition to tobacco use. For example, programs are designed to improve knowledge of the influences on be-

havior (including tobacco industry promotions); knowledge of the physical, economic, environmental and social consequences of tobacco use; perceptions of risk; normative estimates or beliefs; decision-making, peer pressure resistance, and coping skills; and possibly student's activism against smoking in their environment. All of these need to be measured in future research, and their mediating effects on tobacco use behavior demonstrated.

Seventh, there was large variation across studies in program content, which affects the validity of some prior reviews of this literature. Conducting meta-analyses of these studies seems like comparing apples with oranges, or even with yams (instead of comparing multiple crops of Gala apples or even different breeds of apples). The variation makes it difficult to compare programs. In other disciplines, one would not conduct a meta-analysis or review of such different kinds of programs and draw a conclusion for all programs as a group. One would not, for example, conduct a meta-analysis of all treatments for breast cancer and conclude that breast cancer treatment does not work. Rather, one would attempt to determine which kinds of treatments work the best (and for whom and under what conditions), and then adopt the best treatment as the standard of practice. Unfortunately, some meta-analysts of various smoking prevention programs have treated them as a homogeneous group and concluded that they do not have medium- or long-term effects. It would be more appropriate to try to find which kinds of programs produce significant effects, or the largest effects (as well as for which kinds of people and under what conditions), as Tobler and colleagues as well as this author have attempted.

Finally, program developers were involved in all of the evaluations reported. It is quite probable that the effect sizes reported by program developers are larger than those that will be obtained under other conditions. The field is urgently in need of independent replications of the findings summarized in this paper (Flay et al. in press).

Despite, or maybe because of, the above limitations, there are multiple reasons to suspect that estimates of effect sizes derived from the small number of studies reviewed here might be conservative (underestimates). First, some of the effect sizes reported were derived from studies that already included less than optimal implementation. Second, if a program was implemented nationwide for multiple years, there might be increasing effects over time as new generations of students passed through the program. For example, as fewer young adults become smokers, there will be less social support for smoking and fewer adolescents will be tempted to try smoking. Third, the possibility of larger effect sizes were suggested by the larger short-term effects of the TNT and KYB projects, the promising effects of general behavior improvement programs such as the GBG and the Positive Action program, and the extraordinarily large effects of Project SHOUT with minimal high school boosters.

Summary Statements and Recommendations

The summary statements and recommendations derived from this review apply only to the specific programs reviewed and cannot be extended to other programs, even programs similar to those reviewed. The specific programs are those developed by Hansen (TAPP and AAPT), Botvin (Life Skills Training), and others who have demonstrated that their adaptation and/or extension of similar strategies was effective (Project SHOUT, TNT). Even the community or mass media programs reviewed here used adaptations of the social influences approach (North Karelia, Class of 1989 Studies, Midwestern Prevention Project, Vermont, Project 16). However, one cannot assume that every adaptation or extension of this approach will be effective. Examples of the ineffectiveness of the DARE and Hutchinson programs provide vivid examples of the danger of such extrapolation.

Summary Statement Regarding Effects of School-Based Programs

Based on the studies reviewed, decay post high-school will erode the medium-term effect sizes of school-based programs by about 20 percent relative to the literature's evaluations through the end of high school. Thus, with complete adoption and implementation, the nation's schools could produce a long-term (by age 25) reduction in smoking initiation of more than 22 percent [$0.28 \times (1 - 0.2)$]. However, scaled-up replication of model school-based prevention programs might yield effect sizes less than half as large (45 percent) as those reported in the research literature because of incomplete adoption (75 percent) and less than optimal fidelity (quantity and quality) of delivery (60 percent). Hence, a suggested effect size for realistic long-term effects of school-based programs might be about 10 percent [$0.28 \times (1 - 0.2) \times 0.75 \times 0.60$].

Summary Statement Regarding Effects of School-plus-Community and/or Mass Media Programs

Based on the studies reviewed, decay post-high school will erode the medium-term effect sizes of school-plus-community or media programs by about 15 percent. Thus, with full implementation, comprehensive school-plus-community and mass media programming might reduce smoking initiation by age 25 by as much as 26 percent [$0.31 \times (1 - 0.15)$]. However, scaled-up replication of model school-plus-community or mass media programs might yield effect sizes only about 75 percent as large as those reported in the literature. Hence, a suggested effect size for realistic long-term (by age 25) effects of school-plus-community and/or mass media programs is about 20 percent [$0.31 \times (1 - 0.15) \times 0.75$].

Given that school-based prevention could produce significant and practical reductions in youth and young adult smoking levels, the following recommendations seem appropriate.

Recommendation 1: Every middle and high school should implement an evidence-based smoking prevention program (or a similar substance abuse prevention program that has been shown to reduce smoking) at all grade levels. As a corollary, they should be discouraged from using programs for which there is evidence of ineffectiveness (e.g., DARE)

Effective prevention programs might cost up to \$50 per student for the first year and as much as \$10 per student thereafter for program materials and training. However, the savings due to the benefits of preventing significant numbers of students from starting to smoke and delaying the start date (and therefore the lifetime consumption) for others are significant. Caulkins and colleagues (2004), for example, estimate the social benefits of smoking prevention alone to be about \$300 per student and the social benefits of substance abuse prevention to be about \$840 per student (Caulkins et al. 2004). The social benefits of even broader behavior improvement programs could be considerably greater (Aos et al. 2004). Clearly, from a societal perspective, the costs of effective prevention are well worth it both to the individual students and to society as a whole.

We still lack consistency and continuity across developmental stages (preschool through college), and this clearly is an area where continued research is desirable. At the preschool and elementary school levels, implementation of more general and promising approaches such as the GBG or the Positive Action program should be used to prepare students to adopt tobacco-free lifestyles. Increasing evidence suggests that behavior improvement or positive youth development programs can have pervasive effects on behavior, including reducing tobacco use, and also can improve school performance. However, the lack of replicated findings regarding specific ef-

fects on tobacco use to date suggests that they should be accompanied by rigorous evaluations. Such evaluations will contribute to the knowledge base of prevention and positive youth development.

Recommendation 2: Governments, communities, or school districts should provide funding for evidence-based programs for every school in their jurisdiction.

The current environment, with such a high focus on student achievement, is not very conducive to implementation of this recommendation. However, there is increasing evidence that effective behavior improvement programs also improve student achievement. This likely occurs because better behaved classrooms give teachers more time to teach and well-behaved students are more likely to learn.

The current climate might be more supportive of general substance abuse prevention programs or more general behavior improvement programs than tobacco-specific programs. However, smoking prevention programs can also lead to lower levels of initiation of alcohol and other drugs. Accordingly, they are eligible for Safe and Drug Free Schools and Communities (SDFS) funding. Given the availability of evidence-based smoking and substance abuse prevention programs, SDFS funds should be maintained, or even increased, to support comprehensive school-based prevention programming.

Increasing evidence suggests that more general behavior improvement programs not only have more effects, but have larger effects on each of the behaviors and these effects are more likely to be maintained because they support each other. More general programs also are more likely to include elements that change the climate of entire schools (or other locations in which they are implemented), thus providing more generalized support for the positive behaviors encouraged by the programs (Catalano et al. 2004; Eccles and Gootman 2002; Flay 2002).

Recommendation 3: Governments, communities, or schools also should provide funding to develop and deliver comprehensive community or mass media programs that complement school-based programs.

School-plus-community or mass media programs have been shown to have effects that are 10–20 percent larger than school-only programs. Conversely, school-based programs can provide the normative change that is needed to support community programs or policy changes regarding smoking in public places or the pricing of tobacco in the community.

Recommendation 4: Schools and communities must take steps to ensure that adopted programs are implemented with high fidelity.

Programs implemented with higher fidelity produce larger effects, and larger effects are more likely to be maintained through high school and into adulthood. Schools will need to provide the resources and support for every teacher and staff person to be trained in proper implementation. This also requires ongoing monitoring of implementation as well as ultimate effects on student behavior.

Recommendation 5: Prevention programs must be sustained over time.

It is not sufficient to deliver a prevention program, whether school only, community only, mass media only, or school plus mass media or community, for only a few years. Any program must be sustained for a meaningful length of time (a generation) to be effective at the population

level in the long term. Sustained programs may have greater effects in the long term; however, effects over an extended period are hard to estimate. Rather than just reducing young adult smoking by 10–20 percent for the first cohort, a sustained program could potentially cut the population prevalence of smoking in half in about two decades.

Recommendation 6: The nation should find the funding to make the above recommendations a reality.

SDFS funds are one source of funding (\$437 million in 2005). Others might include excise taxes on tobacco, extension of the Master Settlement Agreement, and penalizing the tobacco industry for every new smoker under the age of 21. The maximum costs of the above recommendations would be \$2.5 billion for the first year of implementation (based on approximately 50 million pre-K through 12th grade students [NCES 2003] at \$50 per student). This represents about 13.2 cents per pack of cigarettes sold in the United States (more than 19 billion packs in 2001 [FTC 2003]). Subsequent years would cost as little as one-fifth of these amounts, about \$500 million, only a little more than current SDFS funding, or about 2.6 cents per pack of cigarettes sold. An alternative approach might be to amortize the costs over 5–10 years at about \$600 million per year.

CONCLUSION

It is time for the nation to face up to the fact that preventing as many children and youth as possible from starting to smoke cigarettes is feasible and worthwhile, both economically for the nation and in terms of improved health of the population.

Table D-1 Short- and Medium-Term Effects of Seven Selected Social Influence Programs with Follow-up into High School

Investigator	Project Name	Design ^a	Number of Classes	Time (years)	Modality ^b	Grade(s)	Grade at Last Follow-up	Short-Term Effect Size (%) ^c				Medium-Term Effect Size (%) ^c			
								Ever	Month	Week	Average ES	Ever	Month	Week	Average ES
School-only programs															
Hansen ^d	TAPP (Cohort 1)	NR-S	15	1	S	7	10	26.2		26.2		18.3	19.1		18.7
Botvin ^e	Life Skills Training	R-S	30	3	S	7-9	12		8.9	8.9		19.7	20.4		20.0
Elder ^f	Project SHOUT	R-S	18+	3	S+	7-9+	11		30.3	30.3		44.1			44.1
MEANS for school programs									28.2	8.9	21.8	18.3	27.6	20.4	27.6
School-plus-community or mass media programs															
Vartiainen ^g	North Karelia	NR-C	10+	2 yrs	S+C	7-8	12	44.8	43.7	45.3	44.6	40.3	39.2	36.7	38.7
Perry	Minnesota Class of 89	NR-C	17+		S+C	6-10	12		40.0	40.0			39.4	39.4	
Pentz Flynn ^h	MPP Vermont	PR-S R-C	15+ 22+	2 yrs 3 yrs	S+C S+M	6-7/7-8 5-8, 6-9 or 7-10	9-10 10-12	40.9	34.1	37.5		18.0		28.8	18.0 28.8
MEANS for School + Community or Media Programs								44.8	42.3	39.0	39.7	40.3	28.6	35.0	31.2
OVERALL MEANS for all programs								44.8	35.3	33.0	32.0	29.3	28.0	31.3	29.7

MPP = The Midwestern Prevention Project

SHOUT = Project SHOUT (Students Understanding Others Understand Tobacco)

TAPP = The Tobacco and Alcohol Prevention Project

^a R = random, NR = nonrandom, PR = partial random, S = school, C = community.

^b S = school only, S+ = school plus small media or family outreach, M = mass media, C = community.

^c As either $(\% \text{ change in C} - \% \text{ change in P})/\% \text{ C}$ or $(\% \text{ C} - \% \text{ P})/\% \text{ C}$, where P = program condition and C = control. Short-term effects are generally at the end of grade 8 or 9.

^d The medium-term effect for smoking in the past month is larger (42.9%) for students present at all waves of the study.

^e Randomization was originally complete, but six program schools were dropped from the analysis because of low implementation. The RR for high-implementation students at grade 12 was 37%.

^f Reported effect is with half the high school students receiving a high school booster (two newsletters and one phone call during grade 1); effect size decreases to 9.5% when no students receive the booster.

^g At 3 years post-high school the effect was 23% for the health educator (HE) condition and 37% for the teacher condition; at 10 years post-high school the effect was 20% for both the HE and the teacher conditions.

^h This study tested the difference between school plus mass media and school-only (there was no control group).

Table D-2 Short- and Medium-Term Effects of Seven Category II Programs

Investigator	Project Name	Design ^a	N classes	Time (years)	Modality ^b	Grade(s)	Grade at Last Follow-up	Short-Term Effect Size (%) ^c				Medium-Term Effect Size (%) ^c		
								Life	Month	Week	Average ES	Life	Week	Average ES
School-only programs														
Graham and Hansen ^d	AAPT	NR-S	9		S	7	11	21.4	26.2		23.8	13.9	13.9	
Sussman ^e	TNT	R-S	12	2	S	7-8	9	34.4		64.3	49.3	30.4	55.5	43.0
Walter ^f	KYB	R-S	384	6	S+	4-9	9				11.5	73.3		73.3
Kellam ^g	GBG	R-K	120a	2	S	1-2	8				24.4	26.3		26.3
MEANS for school programs								27.9	26.2	64.3	27.2	36.0	55.6	39.1
School- plus-community programs														
Biglan ^h	Project 16	R-C	5+	2 yrs	S+C	7-9	7-9	21.1			21.1	27.5		27.5
OVERALL MEANS								25.6	26.2	64.3	26.0	34.3	55.6	36.8

^a R = random, NR = nonrandom, PR = partial random, S = school, C = community.

^b S = school only, S+ = school plus small media or family outreach, M = mass media, C = community.

^c As either (% change in C - % change in P)/%C or (%C - %P)/%C, where P = program condition and C = control. Short-term effects are generally at the end of grade 8 or 9.

^d Adolescent Alcohol Prevention Trial.

^e Towards No Tobacco Use.

^f Know Your Body Included parent communications. Short-term effects are for thiocyanate, an biological indicator of tobacco use.

^g Good Behavior Game Initially three 10-minute classes per week in grade 1, increasing in duration and frequency during grades 1 and 2. Short-term effects are for "problem behavior" at the end of grade 2.

^h Multiple cross-sectional design, where successive cohorts of seventh and ninth grade students were surveyed.

TABLE D-3 Calculation of Decay in Prevention Effects by Age 25

Type	Decay (%)
Average school-only RR	28.00
Average school + community or media RR	31.00
Without the prevention	
Average proportion not smoking in high school who will start by age 25 (SAMHSA Household Survey 1989-99)	3.12
Average high school daily smoking without intervention (Monitoring the Future)	15.80
Therefore, proportion of new smokers by age 25	2.63
Therefore, total proportion smoking by age 25	18.43
With school-based prevention	
Proportion smoking after school-based prevention	11.38
Therefore, proportion not smoking	88.62
Therefore, proportion new smokers by age 25	2.77
Therefore, total proportion smoking by age 25	14.14
Therefore, new RR	23.62
Decay in RR	16.93
With school + community or media prevention	
Proportion smoking after school-based prevention	10.90
Therefore, proportion not smoking	89.10
Therefore, proportion new smokers by age 25	2.78
Therefore, total proportion smoking by age 25	13.68
Therefore, new RR	25.75
Decay in RR	16.93

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Adolescents' and Young Adults' Perceptions of Tobacco Use: A Review and Critique of the Current Literature

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INTRODUCTION

Explanations of individuals' engagement in risk behavior, including tobacco use, often make reference to one's inability to judge risk and belief in one's invulnerability to harm. Judgments about risk are viewed as a fundamental element of most theoretical models of health behavior, including Social Cognitive Theory (Bandura 1994), the Health Belief Model (Rosenstock 1974), the Theory of Reasoned Action (Fishbein and Ajzen 1975), the Theory of Planned Behavior (Ajzen 1985), Self-Regulation Theory (Kanfer 1970), and Subjective Culture and Interpersonal Relations Theory (Triandis 1977). These theories posit individuals' perceptions about the consequences of their actions, and perceptions of vulnerability to those consequences play a key role in behavior.

The relationship between risk perceptions and risk behavior has been applied particularly to adolescents, as descriptions of adolescent risk taking almost invariably make reference to adolescents' beliefs in their own invulnerability to harm. The theoretical basis for the assertion of adolescent invulnerability can be traced to Elkind (Elkind 1967; Elkind 1978), who argued that when young adolescents first enter into formal operations, they become cognitively egocentric. Due to this egocentrism, the adolescent is hypothesized to hold an exaggerated sense of uniqueness and to believe in a "personal fable"—that one is special and in some way immune to the natural laws that pertain to others. The belief in this personal fable is thought to be the origin of adolescents' tendencies to view themselves as invulnerable to harm, and therefore to engage in behaviors considered risky by others.

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The concept of adolescent “invulnerability” remains pervasive in both scientific and lay circles, is used to explain adolescents’ decisions to engage in potentially harmful behavior, and is incorporated into many tobacco-related prevention and intervention programs (Weinstein 1983; Weisenberg et al. 1980; see also Reyna and Farley 2006). We turn to a review and critique of the empirical literature on the relationship between risk judgments and adolescent tobacco use.

EMPIRICAL TESTS OF THE RISK PERCEPTION AND TOBACCO USE LINK

The majority of studies testing the relationship between perceptions of risk and tobacco use have compared perceptions of tobacco-related risks between those who have and have not smoked. Although some studies find that adolescents who have smoked perceive greater smoking-related risks than those who have not smoked, others found that smokers perceive less risk. For example, Halpern-Felsher and colleagues (2004) found that adolescent smokers and those who intend to smoke estimated their chance of experiencing a smoking-related negative outcome as less likely than did nonsmokers and non-intenders. A study by Johnson and colleagues (2002) also revealed that for both high school (aged 16–18 years) and college students (aged 18–22 years), smokers saw their outcome risk as higher than that of nonsmokers.

Similar findings in a study conducted by Weinstein and colleagues (2005) concluded that adult smokers underestimated their relative risk compared to other smokers and to nonsmokers. A national survey of 6,369 people (1,245 current smokers) examined beliefs about the risks of smoking. Key questions separated samples of smokers who were asked either about their own risk or about the risk of the average smoker. More than half of current smokers thought that their own risk was only twice as high or less as that of nonsmokers. The data clearly indicate that smokers underestimate the extent to which smoking elevates lung cancer risk above that of nonsmokers (Weinstein et al. 2005). Arnett (2000) found greater optimistic bias among smokers than among nonsmokers for both adolescents and adults. Another set of studies has found that smokers, both adolescents and adults, believe that the health risks of smoking are lower for themselves than for other, same-age smokers (Weinstein 1998; Hansen and Malotte 1986; McCoy et al. 1992), but higher compared to nonsmokers (Arnett 2000).

There are six salient problems with the literature base on the relationship between risk perceptions and tobacco use. First, Slovic and colleagues (2001; 2004) have argued that studies on tobacco-related risk perception fail to consider the affective components that surround decision making (e.g., Slovic 2001; Slovic et al. 2004). In brief, the affect heuristic is thought to play a role in decisions in part through its influence on perceptions of risks and benefits. For example, if one feels good about engaging in a particular behavior, one might judge risks to be lower and in turn be more inclined toward engagement. With regard to cigarette smoking, Slovic (2004) extends this argument by stating that adolescents might not be weighing the risks and benefits in their decisions to smoke, but instead are driven by affective impulses such as enjoying the new experience or having fun with friends (Slovic et al. 2004). We discuss more about the affect heuristic later in this appendix.

A second problem with the literature base is the lack of consideration of whether smokers have or have not experienced a related positive or negative outcome. Studies focusing on the role of outcome experience in risk judgments have shown that individuals who have personally experienced a negative outcome linked to an event or risk behavior perceive the same or similar outcome as more likely to happen than do individuals without such outcome experience (e.g., Gochman 1997; Greening et al. 1996; Roe-Berning and Straker 1997; Vaughan 1993; Weinstein

1989). Evidence also suggests that early experiences with tobacco, especially physical responses to nicotine, may be precursors of later regular cigarette smoking and nicotine dependence (Eissenberg and Balster 2000; Pomerleau et al. 1998). Pomerleau and colleagues' (1998) work on early experiences with tobacco use reveals that physical reactions to nicotine predict adult smoking status and that people who become highly dependent on cigarettes appear to have more pleasurable sensations, such as a pleasurable rush or buzz and relaxation, at their initial exposure to tobacco than those who do not become regular smokers (Pomerleau et al. 1998). Unpleasant reactions to the first cigarette such as nausea and cough do not seem to protect against subsequent smoking (Pomerleau et al. 1998). Thus, when examining the role of behavioral experience in risk judgments, it is important to also examine the effects of outcome experience either statistically or by limiting the samples to those with or without such outcome experience. It is also critical to understand the extent to which such outcome experiences lead to increased or decreased cigarette use among older adolescents and young adults.

Third, most studies have elicited general judgments about the likelihood of a given outcome occurring (e.g., what is the chance that you will get lung cancer?) without making the judgment conditional on a behavioral antecedent. It is not surprising that studies using these unconditional risk assessments yield a positive relationship between risk perception and behavior since individuals who are engaging in a risk behavior are truly more likely to experience a negative outcome than are non-engagers. Similarly, non-engagers rate their risk of experiencing the negative outcome as lower than do engagers because they are not engaging in the risk behavior. Instead, one must use conditional risk assessments in which the behavior or event linked to the outcome is specified (e.g., what is the chance that you will get lung cancer if you smoke?) (Halpern-Felsher et al. 2001; Ronis 1992; Van der Velde and Hooykaas 1996). Conditional risk assessments are more closely related to factors incorporated in models of health behavior and have been better predictors of behavior than unconditional risk assessments (Ronis 1992; Van der Velde and Hooykaas 1996).

Fourth, although studies have identified factors associated with tobacco use among multiethnic youth (e.g., Gritz et al. 2003), few studies on adolescent risk perception have included demographic variables such as gender, race or ethnicity, or socioeconomic status, and no study has explored whether these variables moderate the risk perception–tobacco use link. It is possible that the level of perceived risk (and benefit) may differ across groups of individuals, possibly as a factor of culture, socioeconomic status, or differences in exposure to behavior-related outcomes, for example. Alternatively, groups of adolescents or young adults might perceive the same level of risk, but these perceptions might have different implications for their smoking, in part due to differences in perceived control, risk-reducing strategies used, or the value placed on the negative outcome (e.g., bad breath or trouble breathing) compared to the value placed on the benefit (e.g., looking cool) of smoking.

Fifth, the majority of studies assessing the link between risk perceptions and tobacco use have employed a cross-sectional design. Therefore, the direction of influence between behavioral experiences and risk perceptions is not discernible. Although perceptions of risk are theorized to motivate behavior, it is plausible to suggest that risk perceptions are reflective of behavioral experiences (e.g., Gerrard et al. 1996; Halpern-Felsher et al. 2001). Further, the nature of the relationship is likely to change over time, depending on factors such as experience, which are known to bias judgment (Weinstein and Nicolich 1993).

Finally, many studies examining the relationship between risk perceptions and tobacco use have focused on the onset of tobacco use and have thus included younger adolescent samples.

Few studies have examined the relationship between risk perceptions and behavior in older adolescence or adulthood, nor have studies determined whether such a relationship is predictive of changes in tobacco use over time. A notable exception is the study by Chassin and colleagues (2000), in which less positive beliefs about smoking were found for adolescent abstainers and later onsetters, as well as among adults who never became established regular smokers. Tucker and colleagues (2003) found no relationship between risk perceptions and tobacco use over time.

ADOLESCENTS' UNDERSTANDING OF THE INHERENT RISKS OF TOBACCO USE

In addition to examining the extent to which risk perceptions play an important role in one's decisions to smoke, a number of studies have examined adolescents' understanding of tobacco-related risks, including an understanding of actual risks, long- versus short-term risks, health versus social consequences, perceived risk for different types of cigarettes, and cumulative risk of tobacco use over time. These studies are reviewed next.

Understanding of Actual Tobacco-Related Risks

A number of studies have examined whether adolescents and adults understand the actual risk of tobacco use, compared to epidemiological data. Some studies show that smokers either overestimate or underestimate (e.g., Borland 1997; Halpern-Felsher et al. 2004; Kristiansen et al. 1983; Schoenbrun 1997; Viscusi 1990; 1991; 1992; Viscusi et al. 2000; see also Slovic 2001) the risks of smoking. Jamieson and Romer (2001) found that 14–22 year olds vary in their sensitivity to risk associated with smoking mortality compared to other risk behaviors. Their results noted that 70 percent of smokers and 79 percent of nonsmokers overestimated the risk of lung cancer. Although their beliefs about the likelihood of dying from a smoking-related cause were more accurate (34 percent of smokers and 41 percent of nonsmokers overestimated the death rate from smoking), 41 percent of smokers and 27 percent of nonsmokers either underestimated or did not know this rate. Many study participants (26 percent of nonsmokers and 21 percent of smokers) also underestimated years of life lost due to smoking and inaccurately perceived more deaths caused by gunshots, car accidents, alcohol, and other drug use than by smoking cigarettes.

Perceived Short- Versus Long-Term Tobacco-Related Risks

Historically, studies have focused primarily on long-term health risks such as heart attack and lung cancer. More recently, there has been an emphasis on short-term risks that are more salient to adolescents, such as the smell of cigarettes, the yellowing of teeth, and the possibility of getting into trouble (Gritz et al. 2003; Halpern-Felsher et al. 2004; Prokhorov et al. 2002). There is also good evidence to suggest that there are other aspects of tobacco risks not fully understood by adolescents and young adults. Slovic (e.g. Slovic 1998; 2001; Arnett 2000; Leventhal et al. 1987) argued that although adolescents in general might be aware of the health and long-term risks of smoking, they are much less aware of the addictive nature of smoking. In fact, studies suggest that adolescent smokers might be less worried about the long-term risks of smoking in part because they believe that they can quit smoking easily and at any time (Arnett 2000; Halpern-Felsher et al. 2004; Slovic 1998). We discuss adolescents' perceptions of addiction in greater depth later in this appendix.

Perceived Risk Varies by Type of Cigarettes Smoked

Despite evidence that “light” cigarettes are not a safe alternative to smoking, adults harbor misperceptions about the health risks associated with smoking light and ultralight cigarettes, with a large proportion of adult smokers believing that such cigarettes deliver less tar and nicotine, produce milder sensations, reduce the health risks associated with smoking, and assist with smoking cessation. Some smokers have switched to “low-yield” cigarettes in an attempt to reduce the health consequences of smoking (Slovic 2001). When smoking lower-yield cigarettes, smokers puff more frequently or more intensely than when smoking higher-yield cigarettes, presumably to obtain their usual specific level of nicotine from each cigarette. In switching from high-yield to low-yield cigarettes, smokers consume more nicotine from a low-yield cigarette than predicted from high-yield cigarettes (Slovic 2001).

A study by Shiffman and colleagues (2001) presented results of a survey of more than 2,120 adults aged 18 or over who were daily smokers. Most smokers in the study believed that lights and ultralights were less harsh and delivered less tar and nicotine compared to regular cigarettes. In fact, all three types of smokers (i.e., of regulars, lights, and ultralights) believed that ultralight cigarettes were less hazardous than lights. Although most smokers thought that smoking lights or ultralights was closer in risk to smoking regular cigarettes than to not smoking at all, 8.7 percent thought that light cigarettes were closer in risk to not smoking, while 20.9 percent believed that the risk of ultralight cigarettes was closer to that of not smoking. Among smokers of ultralights, 27.1 percent believed the risk of smoking ultralights was closer to that of not smoking at all than that of smoking regulars; this was also true of 22.1 percent of the smokers of light cigarettes.

Data presented by Etter and colleagues (2003) support the findings by Shiffman and colleagues (2001) that the risk of lung cancer was perceived to be lower in smokers of light cigarettes than in smokers of regular cigarettes. In a sample that included 2,000 people aged 18–70 years, 27 percent of participants answered that the risk of lung cancer was lower in smokers of light cigarettes than in smokers of regular cigarettes; 60 percent said that the risk was the same, and 7 percent said that the risk was higher. For ultralight cigarettes, the corresponding figures were 32, 55, and 6 percent, respectively (Etter et al. 2003). In addition, participants thought that one would have to smoke two light cigarettes or four ultralight cigarettes in order to inhale the same amount of nicotine as that from one regular cigarette. Many smokers choose light cigarettes because they think that such cigarettes are safer or less addictive (Etter et al. 2003).

A study conducted by Cummings and colleagues (2004) examined the extent to which smokers of Marlboro Lights perceived lower health risks associated with using a low-tar cigarettes and the extent to which they were aware of filter vents in their cigarettes. In a large-sized sample of adult current cigarette smokers ($n = 1,046$), 68 percent of Marlboro Lights smokers were unaware that the filters on their cigarettes were ventilated. Many Marlboro Lights smokers also expressed the belief that low-tar and filtered cigarettes are safer than full-flavored cigarettes (Cummings et al. 2004). In addition, a substantial minority of participants (one in four) answered that smokers of light cigarettes were at lower risk of developing lung cancer than smokers of regular cigarettes (Cummings et al. 2004).

Fewer studies on perceptions of light cigarettes have been conducted with adolescent samples. A notable exception is a study conducted by Kropp and Halpern-Felsher (2004) in which participants perceived that they would be significantly less likely to get lung cancer, have a heart attack, die from a smoking-related disease, get a bad cough, have trouble breathing, and get wrinkles from smoking light cigarettes than from smoking regular cigarettes for the rest of their lives. Furthermore, when participants were asked how long it would take to become addicted to

the two cigarette types, they thought it would take significantly longer to become addicted to light versus regular cigarettes. In addition, participants also thought that their chances of being able to quit smoking were higher with light cigarettes than with regular cigarettes. They also agreed or strongly agreed that regular cigarettes deliver more tar than light cigarettes and that light cigarettes deliver less nicotine than regular cigarettes. Although some of the adolescents in this study were aware of the health risks and addictive properties associated with light cigarettes, the data clearly showed that 22 percent of the adolescents were uncertain regarding the differences between regular and light cigarettes and between 25 percent and 35 percent of the adolescents thought that health risks were more likely with regular cigarettes use than with light cigarettes.

These studies confirm that adults and adolescents, as well as smokers and nonsmokers, harbor misconceptions about so-called light cigarettes. Such perceptions are likely the result, in part, of the tobacco industry's marketing of light cigarettes as the healthier smoking choice, a safer alternative to cessation, and a first step toward quitting smoking altogether.

Understanding of Cumulative Risk

Another small set of studies has examined whether adolescents recognize and acknowledge another aspect of tobacco risk: cumulative risk. Cumulative risk is exposure to a hazard occurring repeatedly over time. A study conducted by Slovic (2000) showed that young smokers, as cumulative risk takers, believe they can get away with some amount of smoking before the risks take hold. Many young smokers tend to believe that smoking the "very next cigarette" poses little or no risk to their health or that smoking for only a few years poses negligible risk (Slovic 2000). Denial about the short-term risks of smoking is higher among adolescent smokers compared to nonsmokers (Slovic 2000).

Among adults, the light—that is, the occasional smoker—is in general less addicted than are daily smokers of more than five cigarettes per day (Shiffman 1989). The use of tobacco in response to withdrawal symptoms is less of a factor in such tobacco users. Among adults, light or occasional smokers are relatively uncommon (less than 10 percent of adult smokers); they have greater success in smoking cessation than do heavier smokers, although not all light smokers are able to quit (Benowitz 2001). In contrast, many more adolescents than adults are light or occasional smokers. However, light smoking by adolescents is often not a stable pattern; rather, it represents a state in escalation to daily smoking (Benowitz 2001).

Successful smoking cessation may also be affected by the motives for smoking behavior (Rose et al. 1996). For example, Pomerleau and colleagues (1978) reported that those who smoked for affect regulation reasons were less likely to quit, and this may also be true for those who report higher levels of perceived addiction as motivating their smoking behavior.

Data collected from two surveys (Robert Wood Johnson, [RWJ], and Annenberg School of Communication, [ANN]) found that 69 percent of RWJ and 45 percent of ANN participants rated their own difficulty of quitting as lower than that of other smokers' (Weinstein et al. 2004). Figures were lower among the adult cohort from these two surveys.

ADOLESCENTS AND NICOTINE ADDICTION

Understanding adolescents' perspectives of nicotine addiction is important since more than 90 percent of addicted smokers began smoking during adolescence (Bottorff et al. 2004; Benowitz 2001; Colby et al. 2000; Epstein et al. 2000), making tobacco use and addiction one of

the greatest public health concerns in the United States and worldwide (Quintero and Davis 2002; Rugkasa et al. 2001). Nicotine dependence (ND) is defined as the compulsive use of cigarettes to achieve pleasurable and other effects and to avoid withdrawal symptoms (Fagerstrom and Schneider 1989; Rojas et al. 1998). This type of dependence consists of both nicotine seeking (compulsive use for positive reinforcement) and avoidance of nicotine withdrawal symptoms (compulsive use for negative reinforcement), such as a strong compulsion to smoke, irritability, and restlessness (Prokhorov et al. 1996). DiFranza, Savageau, Rigotti and colleagues (2002) showed that approximately 20 percent of adolescents ($n = 679$) reported nicotine dependence symptoms within a month of initiating monthly smoking. Many smokers report that smoking enhances performance and mood (Benowitz 2001). However, the extent to which the enhanced performance and mood after smoking are due to the relief of symptoms of abstinence or to an intrinsic enhancement effect on the brain is unclear (Benowitz 2001). Thus, nicotine dependence has origins that are both psychologic and biologic, both of which are intimately related.

Adolescents' Perceptions of Addiction

There are few studies conducted specifically on the topic of children's, adolescents', and young adults' perceptions of nicotine addiction. In a quantitative study of almost 400 adolescents, Halpern-Felsher and colleagues (2004) showed that adolescents who have smoked believe that they are significantly less likely to become addicted than are adolescents who reported no smoking experience. Similar results were found between adolescents who intend to smoke in the near future and adolescents with no intentions to smoke.

Rubinstein and colleagues (2003) examined whether and how adolescents discriminate among categories of smokers and how these discriminations engender different smoking-related perceptions. Five hundred fifty 9th graders who reported never smoking tobacco completed a self-administered survey concerning smoking attitudes and beliefs. The results indicated that adolescents discriminated significantly among nonsmokers, casual smokers, smokers, and addicted smokers, based on both frequency of smoking and the number of cigarettes smoked. Addicted smokers were perceived as having the greatest chance of experiencing negative outcomes, followed by smokers, casual smokers, and last, nonsmokers. Finally, adolescents ascribed a far greater chance of quitting smoking to casual smokers than they did to either regular or addicted smokers.

Other studies' use of both structured and unstructured interviews has motivated our need for further understanding of nicotine dependence among this population. Although a wide range of reasons to smoke were cited among various studies, some of the most common values to emerge included mood management, peer influences, addiction, and image maintenance (Bottorff et al. 2004; Moffat and Johnson 2001; Quintero and Davis 2002). For example, a multi-phase qualitative study conducted by Johnson and colleagues (2003) found that social, pleasure, emotional, and empowerment aspects all played a role in adolescents' perspectives on the need to smoke. Study participants gave explanations such as "needing to smoke" or being "controlled by cigarettes," while others described using cigarettes to "feel calm" and the need "to connect" with their peers (Johnson et al. 2003).

Another qualitative study conducted among children also had emergent themes similar to those found in studies among young adults. Rugkasa and colleagues (2001) conducted 85 focused interviews among children 10–11 years of age. The study data implied that children's conceptualizations of nicotine addiction are linked to the notion that tobacco consumption is something that symbolically belongs to the world of adults (Porcellato et al. 1999). Whereas adult

smokers are perceived as dependent on nicotine, child smokers are perceived in terms of social relations, such as “young people smoke to appear ‘cool,’ ‘hard,’ and ‘grown up’” (Rugkasa et al. 2001). Young children’s ideas of addiction were frequently conflated with “getting used to it” or even simply being able to “handle it” as well as “liking” or “enjoying the taste of cigarettes” when referring to experienced child smoking (Rugkasa et al. 2001; Wang et al. 2004).

Johnson and colleagues (2003) found that dependence for adolescents extends beyond nicotine and can be defined by tobacco fulfilling emotional needs (i.e., avoiding unpleasant feelings), social needs (i.e. connecting with others), pleasure-seeking needs, and individuality development. Rugkasa and colleagues (2001) concluded that youth perceive dependence risks to be associated only with adult smoking because of their view of adults smoking to cope with everyday life while youth thought their smoking for social reasons was safe. Physical responses to first smoking experience, such as relaxation and dizziness, are associated with the development of nicotine dependence (DiFranza et al. 2004).

A narrative inquiry conducted by Moffat and Johnson (2001) found three narratives that emerged among adolescent female participants: invincibility, giving, and unanticipated addiction. Two subnarratives that came about were needing to quit and repeating history (Moffat and Johnson 2001). The authors concluded that semantics and identity issues were key to understanding adolescents’ perceptions. Further studies of both qualitative and quantitative design are needed to add to our understanding of children’s and young adults’ perception of nicotine dependence in order to better inform future intervention programs.

Adolescents’ Perceptions of Ability to Quit Smoking

Belief in the short-term safety of smoking may combine insidiously with a tendency of young smokers to underestimate or be uninformed about the difficulty of stopping smoking (Slovic 1998). A longitudinal survey conducted as part of the University of Michigan’s Monitoring the Future Study found that 85 percent of high school seniors predicted that they probably or definitely would not be smoking in 5 years, as did 32 percent of those who smoked one or more packs of cigarettes per day. In a follow-up study conducted 5 to 6 years later, of those who had smoked at least one pack per day as seniors, only 13 percent had quit and 72 percent still smoked one pack or more per day (Slovic 1998).

A study conducted by Weinstein and colleagues (2004) explored what smokers believe about the difficulty of quitting smoking and the nature of addiction. With data collected in two nationwide surveys ($n = 361$ and $n = 788$), an overwhelming proportion (96 percent) of both youth and adult smokers agreed with the statement, “The longer you smoke, the harder it is to quit.” Most also agreed that signs of addiction appear very quickly if a teenager starts smoking half a pack of cigarettes a day: 80 percent of youth and 79 percent of adults said that signs appeared in a few months or less. Although respondents did not appear to be reluctant to say that they were addicted, many smokers, especially youth, tended to claim they were less addicted than the average smoker (Weinstein et al. 2004).

Jamieson and Romer (2001) found smokers to hold relatively optimistic beliefs about the meaning of tobacco addiction. Although 82 percent agreed that “a chemical in cigarettes makes smoking addictive,” nearly 60 percent of these smokers still said that they believed quitting is either very easy or possible for most people if they really try (Jamieson and Romer 2001). Similar findings were shown by Weinstein and colleagues (2004) when both youth and adult smokers who want to quit greatly overestimate the likelihood that they will succeed in the coming year.

When asked about their perceptions of the ease of quitting smoking, adolescents with smoking experience believed that they were more likely to quit smoking and would find it easier to quit smoking than did adolescents with no smoking experience (Halpern-Felsher et al. 2004). Quitting intention has been shown to be modestly related to beliefs about the use of “light” and “ultralight” cigarettes (Etter et al. 2003). Smokers of light cigarettes had the greatest interest in quitting, significantly greater than that of ultralight smokers, while regular smokers achieved only an intermediate quit index score that was significantly different from that of light smokers. Light and ultralight smokers who believed their cigarettes were safer, milder, or delivered less tar and nicotine were currently less interested in quitting, but only very slightly so. Interest in quitting was lowest among those who either denied or strongly endorsed the belief that light and ultralight cigarettes were less harsh (Shiffman et al. 2001a). Kropp and Halpern-Felsher (2004) reported that adolescents believed it would be easier to quit smoking light compared to regular cigarettes.

Arnett (2000) assessed the optimistic bias in relation to smoking among both adolescents (aged 12–17 years) and adults (aged 30–50 years). A questionnaire about smoking behavior, attitudes, and smoking risk perceptions was completed to address whether the optimistic bias related to smoking risks was greater for adolescents than for adults. Nearly 60 percent of adolescents and 48 percent of adults believed that “I could smoke for a few years and then quit if I want to,” which shows that many adolescent smokers hold an optimistic bias that the addictiveness of smoking that applies to “most people” does not apply to themselves (Arnett 2000).

Weinstein and colleagues (2005) found that people who planned to quit judged their absolute risk of lung cancer as higher than did people who did not plan to quit. People who planned to quit also judged their relative risk of lung cancer higher, and among those not planning to quit, 57.3 percent said that their risk was “the same” as or “a little higher” than nonsmokers. People who did not plan to quit were also more likely to believe that genes primarily determine lung cancer.

Perceptions of Secondhand Smoke

Despite numerous studies on adolescents’ recognition of the medical risks of primary smoke, and conclusive evidence and public health messages concerning the risks of secondhand smoke, there have been surprisingly few investigations of how adolescents perceive the risks associated with exposure to secondhand smoke. Glantz and Jamieson (2000) asked adolescents whether “thousands of nonsmokers die from breathing other people’s smoke” and found that nonsmoking youth endorsed this statement more than youth who have smoked. They also showed that awareness of the effects of secondhand smoke was related to adolescents’ plans to quit smoking. Romer and Jamieson (2001) found that knowledge of the dangers of secondhand smoke was indirectly related to intentions to quit, through its relationship with perceived risk of smoking overall. In their study of elementary, middle, and high school African American students, Kurtz and colleagues (1996) showed that students with smoking experience had less knowledge about and less negative attitudes toward secondhand smoke and they made fewer efforts to prevent exposure to secondhand smoke than did students without smoking experience.

Halpern-Felsher and Rubinstein (2005) explored adolescents’ perceptions of secondhand smoke. Recent literature has suggested that adolescents’ perceptions of the effects of secondhand smoke might serve to deter them from smoking. To address this issue, Halpern-Felsher and Rubinstein (2005) examined: (1) how adolescents perceive the risks associated with primary tobacco exposure compared to secondary exposure, (2) whether adolescents’ perceptions of the

risks from secondhand smoke vary by whether the adolescent has smoked or not, and (3) whether adolescents' perceived risks of secondhand smoke varies based on who is producing the secondhand smoke. They found that while adolescents perceived the risk from primary smoke to be greater than that from secondhand smoke, they were still aware of the serious risks posed by exposure to secondhand smoke. Adolescents who have smoked were more likely to perceive the risks from exposure to secondhand smoke as lower than did adolescents who had never smoked. According to adolescents, the greatest risks from secondhand smoke are those from exposure to parental smoking, then from exposure to an officemate's smoke, and then from smoke from a similar-aged friend. The finding that adolescents are acutely aware of the risks from secondhand smoke may provide another method of approaching smoking prevention and cessation among both teens and their parents. In particular, it may be prudent to include the risks from secondhand smoke exposure in antismoking messages as a further means of discouraging smoking.

Perceptions of Tobacco-Related Benefits

In order to understand how perceived benefits motivate individuals to smoke, compared with how perceived risks deter smoking, one must integrate these lines of research into one coherent theoretical model, which necessitates examining both sets of perceptions. The Decisional Balance Inventory, a construct of the Transtheoretical Model (Prochaska et al. 1992; Prochaska and Velicer 1992), incorporates a weighing of both the benefits (pros) and the risks (cons) in predicting behavior and behavior change. Applied to smoking, the model encompasses three factors: social pros (e.g., kids who smoke have more friends), coping pros (e.g., smoking relieves tension), and cons (e.g., smoking smells). This construct includes a number of social and short-term outcomes rather than relying solely on long-term health outcomes that are less salient to adolescents and young adults. Tobacco use among adolescents may hinge on their perceptions not only of risks (Slovic 2000), but of benefits as well. Using this inventory, Prokhorov and colleagues (2002) found that scores on the smoking pros scale increased and con scores decreased as adolescents' susceptibility to smoking increased. Similarly, Pallonen and colleagues (1998) showed a positive relationship between perceived smoking benefits and nonsmokers' likelihood of tobacco onset, whereas the cons of smoking were less predictive of smoking acquisition.

Pallonen and colleagues (1998) found that adolescent nonsmokers were more likely to start smoking or to try smoking if they believe smoking is useful in helping one cope. Halpern-Felsher and colleagues (2004) and Goldberg and colleagues (2002) found that participants who have smoked perceived benefits to be more likely to occur, and risks less likely to occur, than did adolescents who have not smoked.

The competence enhancement approach has been used in many smoking prevention programs. Epstein and colleagues (2000) conducted a study in which a sample of 1,459 middle and junior high school students self-reported to test whether a deficiency in competence (poor decision-making skills, low personal efficacy) is linked to acquiring beliefs in the perceived benefits of smoking and whether these perceived benefits are then related to subsequent smoking. The authors of the study found that adolescents with deficiencies in personal competence were more likely to believe that smoking offers social benefits such as looking cool, having more friends, and being better liked. Consequently, adolescents holding these beliefs in the 1-year follow-up were more likely to engage in the 2-year follow-up assessment (Epstein et al. 2000).

Gender Differences in Perceived Benefits

Previous studies have found limited gender-specific differences among smokers with regards to perceived benefits of smoking. Although the research is currently limited to adult cohorts, these findings may point to possible gender differences in adolescents as well. Pirie and colleagues (1991) reported that women were more likely than men to be concerned about post-cessation weight gain. Swan and colleagues (1993) found that women identified weight gain as the cause for relapse to smoking and women who were more concerned about post-cessation weight gain were less likely to be motivated to quit smoking (Weekley et al. 1992). Females reported more ND symptoms than males, even though levels of cigarette consumption were similar (O'Loughlin et al. 2003). McKee and colleagues (2005) conducted a study with 93 adult participants and found that females indicated greater likelihood ratings of perceived risk and benefits than males, although the magnitude of these differences was small. Perceived benefits were positively associated with motivation for men and women, although the authors did not find any gender-specific effects for this relationship. There was also no significant interaction between perceived benefits and gender, predicting pretreatment motivation. Women are less likely to acknowledge the health benefits of smoking cessation (Sorensen and Pachacek 1987) and less likely to be motivated to quit to gain health benefits than men (Curry et al. 1997). Similar studies conducted among the adolescent cohort would be valuable in understanding why females have poorer smoking cessation outcomes compared to males (Perkins 2001). Further studies are needed with adolescents to determine if these gender differences exist in younger cohorts.

Adolescents' Reasons for Smoking

Qualitative studies have used methodology such as focus groups or one-on-one interviewing to understand the motivations for teen smoking. Vuckovic and colleagues (2003) found that reasons for smoking included to relieve stress and boredom, because parents smoke, to fit in with peers, to decrease appetite, and to increase the high from alcohol and drugs. Similar reasons for teen smoking were cited in Nichter and colleagues (1997) study with female adolescents. Other studies suggest that adolescents form perceptions of smoking images, such as nonsmokers being more mature (Lloyd et al. 1997), and adolescents recognize that different types of smoking identities beyond the usual categories of nonsmokers, experimenters, and smokers exist for adolescents (Johnson et al. 2003).

Smoking initiation or first-time use of tobacco has specifically been addressed in qualitative studies. Curiosity as a reason to try smoking is a prominent theme in several qualitative studies (Kegler et al. 2000; Plano et al. 2002; Dunn and Johnson 2001), as well as peer influences as wanting to fit in (Gittelshon et al. 2001).

Other studies have identified peer and social influences as main reasons that teens continue to smoke after initiation. Kegler and colleagues (2001) discovered that the adolescents' most recent smoking events were for more social reasons such as peer inclusion and to alleviate boredom. Qualitative studies comment on peers as reinforcers of smoking behavior by expecting smoking within the peer group (Plano et al. 2002; Gittelsohn et al. 2001; Kegler et al. 2000).

The Affect Heuristic

Risk perception is typically conceptualized as a cognitive construct—that is, an estimate of the likelihood of a negative event happening—rather than as an affective construct (Gerrard et al. 2003). Although it has been found in many studies that the relationships between these percep-

tions and intentions are more analytical, thoughtful, and planned (Gerrard et al. 2003), it has been argued that the vast majority of risk decisions are motivated by affect rather than by analysis of quantitative statistical facts (Slovic 2003). This is especially relevant to adolescents. Risk feelings are instinctive reactions in which one evaluates risk. Affect is defined as a subtle form of emotion typically defined by positive (like) or negative (dislike) evaluative feelings toward an external stimulus (Slovic 2003). The reliance on affect and emotion that is thought to happen automatically and reactively is called “experiential thinking.” This type of risk analysis is characterized as the affect heuristic and is argued to guide information-processing and judgment (Slovic et al. 2004). The reliance of experiential thinking comes from the act of doing something of habit and allows the performance of activities to happen quickly without the need to think through each step. The fields of marketing and advertising have exploited this type of thinking in order to promote positive imagery and affect toward smoking. Affective cues emanating from the social environment are also powerful influences on smoking behavior (Slovic 2003). Examples of this include healthy and beautiful people smoking and enjoying cigarettes among the company of friends. Unfortunately, experiential thinking does not appreciate the cumulative risk of smoking and nicotine addiction (Slovic 2003). It does, however, play a role in how risks and benefits are perceived and evaluated. This, in turn, has an effect on decision-making abilities, especially with regard to smoking.

The importance of affect evaluation is considered to be a part of the overall decision-making process. Since adolescence is a pivotal developmental period in which difficult decisions are made that can have lasting consequences, it is imperative to consider risk feelings as they pertain to overall decision-making abilities. An inverse relationship between perceived risk and perceived benefit of an activity was linked to the strength of positive or negative affect associated with that activity (Alhakami and Slovic 1994; Slovic et al. 2004). In the model of affect heuristic as described in Slovic and colleagues (2004), people base their judgments of an activity or a technology not only on what they think about it but also on how they feel about it. If their feelings toward an activity are favorable, they are moved toward judging the risks as low and the benefits as high. In contrast, if their feelings toward it are unfavorable, they tend to judge the opposite—high risk and low benefit (Slovic et al. 2004). Thus, under this model, affect comes prior to, and directs, judgments of risk and benefit (Slovic et al. 2004). Affective thinking is one mode of thinking; the other is the “rational” or analytic. While both need to be considered in the decision-making process, the affective or “experiential” mode is thought to play an active role in motivating risk behaviors. Thus, in Slovic’s (2004) view, affect contributes to the perception of benefits that promotes smoking behavior.

SUMMARY

Studies have indicated that, in general, adolescents understand that there are risks associated with smoking (Leventhal et al. 1987; Viscusi 1992; Jamieson and Romer 2001; Arnett 2000). However, there has been debate about how adolescents understand the nature of smoking risks and to what extent their understanding or knowledge about these risks either hinders or promotes their decision to smoke. One viewpoint is that smokers are “informed consumers” making rational choices, and not only are people well aware of the risks associated with smoking, including the risks of getting lung cancer and the mortality and life expectancy rates associated with smoking, but smokers are overestimating these risks (Viscusi 1992). This view includes adolescents within a rational learning model as consumers who respond appropriately to information and make trade-offs between the costs and benefits of smoking. Another viewpoint argues that

such analyses fail to consider vital aspects of risk such as the influence of optimistic bias, cumulative risk, and youth misperception of addiction (Benowitz 2001; Slovic 2001). Thus, it is important to take into account to what extent adolescents are truly aware of the full extent to which smoking is harmful, including the relative risks of smoking versus other risks, their misperceptions of addiction, and how this judgment process motivates their decision-making behavior. The review provided in this appendix suggests that adolescents and young adults are aware of some of the risks involved in tobacco use, especially those consequences most stressed by public health campaigns. That is, they are aware that smoking involves a significant risk of lung cancer, heart attack, and other health outcomes. However, adolescents are not aware of the full extent to which smoking is harmful, including the relative risk of smoking versus other risks such as alcohol use, getting hit by a car, and so on. In addition, they are not as aware of the cumulative risk of tobacco use or the years of life lost due to tobacco use. Importantly, adolescents are less aware and have less of an understanding of the addictive nature of tobacco use. That is in part because they simply do not understand the risks of addiction and the cumulative nature of tobacco risks, and in part because they believe they can quit at any time and therefore avoid addiction. This is particularly important because adolescents believe that they can negate the risks of smoking by altering the amount they smoke, when they smoke (e.g., only on weekends, only every few days), or what they smoke (e.g., “light” versus regular cigarettes). Similarly, they are less likely to believe that the risk of addiction and related health consequences apply to them because they believe they have control over their tobacco use and its consequences. The literature also strongly suggests that adolescents’ decisions to smoke are not just based on a consideration of long-term health risks. Clearly, social risks (e.g., getting into trouble, smelling bad) play an important role in their behavioral decision making. Additionally, perceived benefits are weighed heavily among adolescents, because they are very much aware that smoking can reduce stress and increase concentration. These findings suggest that efforts to prevent or reduce tobacco use among adolescents might be more effective if they not only focus on long-term health risks but address all of adolescents’ perceptions, and misperceptions, about tobacco use, including the social consequences, benefits, cumulative risk, and addiction.

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F

Interventions for Children and Youth in the Health Care Setting

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INTRODUCTION

In addition to providing primary health care for children and adolescents, an annual health care visit provides a potentially pivotal opportunity for physicians to provide clinical preventive services that can prevent and reduce children's and adolescents' engagement in health risk behaviors, including tobacco use. As such, a number of national guidelines concerning physicians' provision of preventive services have been developed (e.g., DHHS 1998; Elster and Kuznets 1994; Green and Palfrey 2002; Levenberg and Elster 1995; Stein 1997; U.S. Preventive Services Task Force 2004). In general, these guidelines recommend that all children and adolescents have an annual health care visit during which time all patients should receive confidential preventive services, including being screened, educated, and counseled on a number of biomedical, emotional, and sociobehavioral areas including health risk behaviors such as alcohol and tobacco use, sexual behavior, violence, and safety. Furthermore, guidelines, including those outlined by the American Academy of Pediatrics, recommend that pediatricians discuss substance use as part of routine health care for the prenatal visit, as a home assessment, and for youth (Kulig 2005). With regard to tobacco use, guidelines suggest that in addition to inquiring about tobacco use in general, physicians should specifically query youth about the extent to which tobacco is used, the settings in which tobacco is used, and whether tobacco use has had a negative impact on social, educational or vocational activities (Kulig 2005). Further, physicians need to inquire about tobacco use in the child's home, including use by parents, siblings, and other family members (Kulig 2005). Health care providers need to encourage smoke-free homes, and provide guidance and assistance to parents and youth on means to smoking cessation, including counseling and use of pharmacological agents.

Despite these guidelines, research shows that physicians' rates of screening, educating, and counseling around tobacco use are less than optimal. In this paper, we briefly review the literature describing rates of delivery of clinical preventive services to youth. We also describe physicians' reported barriers to the provision of preventive services and review interventions aiming to increase clinical services, including effects of training healthcare providers to screen, educate, and counsel youth as well as the effects of such training on youth outcomes. We also review the limited literature on providers' use of pharmacological agents to assist adolescents in tobacco cessation. We conclude with a set of recommendations to improve tobacco-related clinical preventive services for youth.

Provision of Clinical Preventive Services to Youth

Low rates of delivery of preventive services have been found among physicians in private practice, community-based practices, and managed care settings. For example, studies have shown that fewer than 60 percent of adolescents are provided guidance about smoking (Marks et al. 1990), and only 1 percent of adolescent office visits included advice about smoking cessation (Igra and Millstein 1993). Halpern-Felsher and colleagues (2000) showed that 77 percent of adolescents in a managed care setting were screened for tobacco use (Halpern-Felsher et al. 2000). Among those who reported tobacco use, more than three-quarters were screened further about the amount they smoked, and 84 percent were educated about the risks of smoking. Halpern-Felsher and colleagues (2002) also found that 43 percent of the adolescent patients' parents were told about the need to monitor their adolescents' behaviors for risk behaviors, including substance use. In a study of almost 1,000 pediatricians randomly selected from a national sample, Galuska and colleagues (2002) reported that 29 percent of the pediatricians reported always counseling younger children (age 6–12) about tobacco use, and 69 percent always counseled about tobacco use among 13–18 year old patients. However, fewer than half of the pediatricians counseled about tobacco use by others in the home. In a large survey of family practitioners, pediatricians, internists, and obstetricians/gynecologists, Ewing and colleagues (1999) found that fewer than half of the providers routinely inquired about smoking. In another survey of pediatricians and family physicians, Klein and colleagues (2001a) showed that providers reported asking over 90 percent of their adolescent patients about smoking, and discussed tobacco-related health risks with more than 75 percent of their patients (Klein et al. 2001a). Inquiries about parental smoking, peer smoking, and use of smokeless tobacco were lower, ranging from 54 to 32 percent. While greater than 80 percent of the providers promoted smoking abstinence among their nonsmoking patients and assessed cessation motivation among smoking patients, fewer than half of the providers followed up with cessation materials or referrals.

Rates of screening adolescents for tobacco use and other risk behaviors vary by physician characteristics, including age, gender, year of graduation, practice setting, and subspecialty. For example, Galuska and colleagues (2002) (see also Klein et al. 2001a) found that rates of counseling for tobacco use and other preventive services was greater among female providers and pediatricians who were able to spend more time with their patients. Ewing and colleagues (1999) showed that younger providers were more likely to provide tobacco-related clinical preventive services. Blum and colleagues (1996) showed that provision of clinical services was lowest among non-teen-focused practice settings, net of patient age or gender. Halpern-Felsher and colleagues (2000) showed greater provision of services among female physicians, recent graduates from medical school, and providers with a greater number of older adolescent patients (Halpern-Felsher et al. 2000).

Provision of Pharmacological Agents

Given that adolescent smokers who are trying to quit experience similar withdrawal symptoms to adults, it has been suggested that adolescents might benefit from the use of pharmacological agents (i.e., nicotine replacement therapy [NRT]) to aid in cessation. Despite evidence that nicotine replacement therapy, coupled with counseling, has been effective with adults, few health care providers have used NRTs with their adolescent patients and even fewer controlled clinical trials have been published. A study conducted by Hurt and colleagues (Hurt et al. 2000) examined the efficacy of NRT in adolescent smokers. The intervention consisted of 6 weeks of nicotine patch therapy plus a minimal behavioral intervention. Despite adolescent participants' moti-

vation to quit, the authors reported only a 5 percent smoking abstinence rate over the 6-month study period, which is a rate no greater than abstinence rates among adolescents quitting on their own. More recently, Killen and colleagues (2004) published their results of a study on the efficacy of smoking cessation treatment for adolescents that combined nicotine patch treatment with bupropion, an aminoketone antidepressant that has been successful in aiding adults to quit smoking. Adolescents were randomized into two groups for a 26-week assessment period: nicotine patch plus bupropion or nicotine patch plus placebo. Both groups also received group-based skills training. Results indicated that the addition of bupropion was not an added benefit to the use of nicotine replacement alone on smoking abstinence. After 10 weeks of assessment, adolescents' rates of smoking abstinence were 23 percent and 28 percent for the patch plus bupropion and the patch plus placebo, respectively. After 26 weeks, these rates fell to 8 percent and 7 percent, respectively. Although bupropion did not provide added value, it was clear that the use of nicotine replacement plus the skills training was at least partly effective, suggesting that further research on the use of NRT in adolescents is encouraging.

Barriers to Provision of Clinical Preventive Services to Youth

Physicians cite a number of barriers to their provision of clinical preventive services, including: (1) a large number of patients which results in time constraints per patient, (2) inadequate reimbursement relative to the time and effort required to provide such services, (3) fear of alienating patients and families, (4) insufficient education and training, (5) lack of dissemination to physicians of research supporting positive treatment outcomes and negative effects of failure to intervene, and (6) lack of information about how to access referral and treatment resources (Kulig 2005; Cheng et al. 1999). Research also suggests that physicians' self-efficacy to screen adolescents about tobacco use is related to their delivery of preventive services (Cheng et al. 1999; Ozer et al. 2004).

Clinical Preventive Services: Effects on Youth Smoking

Physicians' role in preventing or reducing tobacco use among children and adolescents may be either direct or indirect. Directly, physicians can screen and educate youth about tobacco use and refer youth who do smoke to cessation programs. Indirectly, physicians can encourage parents to monitor their children's behavior and set firm expectations about not smoking. Unfortunately, little research exists to determine whether increased rates of screening, counseling, and education by physicians actually result in lower rates of tobacco use and higher rates of cessation, nor have studies determined mechanisms by which physician interventions might be most effective (Christakis et al. 2003). One study did investigate whether implementing an office systems approach would prevent or delay adolescents' drinking and smoking behaviors (Stevens et al. 2002). The idea of the office systems approach is that not only does the primary care physician provide anticipatory guidance and screening, but also the entire office staff endorses the prevention messages and prevention materials are provided in the office. Stevens and colleagues (2002) found that, despite evidence that their intervention was implemented successfully, it had no significant impact on adolescents' tobacco use. The authors suggested that their program might have been ineffective in part because it focused on increasing parent-child communication rather than targeting the adolescents' behaviors per se. More recently, Ozer and colleagues (2004) presented preliminary results that compared to adolescents in comparison sites, adolescents participating in clinical preventive services in managed care settings were less likely to increase their tobacco use over a one-year period (Ozer et al. 2004). However, the effects on to-

bacco use initiation were not reported. Three other studies, using randomized controlled trials of smoking prevention interventions in medical settings, found that preventive services had no effect on youth smoking (Kentala et al. 1999). Fidler and Lambert (2001) found a small but significant difference in smoking rates between youth in the intervention and control group (Fidler and Lambert 2001). Curry and colleagues (2003) implemented and evaluated a randomized trial of a family-based smoking prevention program in a managed care setting (Curry et al. 2003). The intervention included a smoking prevention kit mailed to parents, parent newsletters, follow-up telephone calls by health educators, materials for the children, and information placed in medical records and charts as reminders to the physician to deliver prevention messages. Despite their careful design and implementation of the intervention, evaluation results showed no program effects. Although the intervention had small but significant effects on increasing parent-child communication about tobacco, no differences between the intervention and control groups were found in rates of susceptibility to smoking, experimentation with smoking, or monthly smoking rates.

INTERVENTIONS AIMED AT INCREASING CLINICAL PREVENTIVE SERVICES

A number of different types of interventions (e.g., physician training, charting forms, and electronic prompts) have been developed and tested to improve the preventive services of primary care physicians, yielding small to moderate effects on clinical service provision. These various interventions are reviewed next.

Physician Training

Training sessions to increase physicians' screening and counseling during routine medical visits have been implemented and evaluated, with mixed results depending on the type and intensity of training. Overall, however, the research shows that physicians' rates of screening and educating about tobacco use can be increased through training in which physicians are provided with knowledge, attitudes, and skills that are necessary for behavior change (Lustig et al. 2001; Ozer et al. 2005). For example, Lustig and colleagues (2001) showed that the average percentage of adolescents screened for tobacco use went from 64 percent pre-training to 76 percent post-training (Lustig et al. 2001). Similarly, the average percentage of adolescent patients who received brief counseling concerning tobacco use also increased, from 60 to 69 percent. Physicians were also more likely to discuss confidentiality with adolescent patients following skills-based training (Lustig et al. 2001). This later finding is important given research indicating that adolescents are more likely to disclose their engagement in risk behaviors if they believe their discussions with their physicians will be kept confidential (Ford et al. 1997). This adolescent concern emphasizes the need to query youth about their tobacco use and other risk behaviors in a private office space with parents and other authority figures not proximal to these conversations (Kulig 2005). Klein and colleagues (2001b) conducted in-depth training of the American Medical Association Guidelines for Adolescent Preventive Services (GAPS) guidelines in 5 community health centers (Klein et al. 2001b). Their evaluation showed significant increases in the process of delivery of care, with a greater number of adolescents receiving comprehensive screening and counseling and more health education materials that were in accord with the GAPS guidelines.

Charting Tools and Reminders

Even with successful skills-based training, research suggests that physicians need charting tools and reminders in order to continue their preventive services. Further, physicians' screening and counseling rates for tobacco use can be improved through training, introduction of charting forms concerning screening and counseling, and with the addition of an on-site health educator (e.g., Klein et al. 2001b). The addition of screening tools as well as the addition of resources from a health educator in the clinic also significantly increase the likelihood that an adolescent will be screened and counseled about their alcohol use (Ozer et al. 2001; see also Sims et al. 2004). Similarly, Gadowski and colleagues showed that integrating the GAPS questionnaire into routine medical care significantly increased the documentation of risk behaviors, although no changes in referral rates of follow-up visits were noted (Gadowski et al. 2003).

Use of Electronic Prompts and Electronic Patient Records

The use of Electronic Medical Records (EMRs) is an additional tool used to improve rates and quality of preventive care to youth. EMRs can improve access to patient data, provide more efficient means of documenting services, provide prompts to healthcare professionals, and provide key data and instructional information for patients (Adams et al. 2003). Despite recent development and implementation of EMRs, their use in a pediatric setting is not widespread; and few studies have examined their effectiveness at increasing provision of preventive services. Adams and colleagues (2003) conducted one of the only studies on the use of comprehensive EMRs by pediatricians and nurse practitioners (Adams et al. 2003). The authors developed a pediatric EMR that resembled traditional paper-and-pencil forms but provided healthcare professionals with prompts and areas of inquiry as to whether the service was provided. Computers containing these EMRs were located in each examination room and, through the clinic, allowed for documentation of each patient visit. Using a pre-post intervention design, the authors found that the delivery of primary care was enhanced with the implementation of the EMRs over the more traditional paper-and-pencil documentation forms in all areas, and especially for the area of risk assessment, including asking about smoking in the home. In addition to providing the pediatrician prompts for assessment areas, the computers allowed for enhanced anticipatory guidance and the provision of educational materials that could be easily printed, in multiple languages, for the patient and their family. Finally, the study showed that healthcare providers and their patients were positive about the use of the EMRs, reporting that quality of care and guidance was improved. However, the providers noted that direct eye contact with patients was reduced through the use of the EMRs. Nevertheless, all providers recommended continued use of the EMRs.

In a pilot study, Toth-Pal and colleagues (2004) developed, implemented, and evaluated the use of a computer-generated on-screen reminder for physicians caring for elderly patients (Toth-Pal et al. 2004). Their pilot data indicated that both laboratory and manual screening tests, as well as emergence of new diagnoses and treatment, increased among general practitioners in the computer-generated prompt group, compared to control.

Schellhase and colleagues (2003) conducted a survey of 51 primary care providers—including providers in family medicine, internal medicine, and pediatrics—to discern providers' use of and attitudes toward reminder systems embedded within EMRs (Schellhase et al. 2003). The authors found that 75 percent of the clinicians liked or loved the EMR system, nearly half felt that the automatic reminders improved care, and the majority of respondents did not feel that the reminder system was intrusive on their decision-making autonomy. Despite these favorable attitudes, the health maintenance reminder system was under-utilized, with the overwhelming

majority of clinicians reporting that they never or seldom looked for the reminder alert and that they typically ignored the alert when they did notice it. EMRs also provide opportunities to assess quality of preventive care, improving upon assessment methods utilizing surveys or chart reviews (Vogt et al. 2004).

Studies have suggested that computer-based and computer-generated clinical reminders are an efficient and effective strategy for increasing provision of clinical services (see Shea et al. 1996 and Austin et al. 1994 for a review and meta-analysis; see also Morris et al. 2004 and Schellhase et al. 2003). Nevertheless, adherence to recommendations for clinical preventive service remains even in clinics utilizing such reminder prompts (Schellhase et al. 2003).

SUMMARY AND RECOMMENDATIONS

Given that most adolescents attend an annual health care visit, physicians have the opportunity to provide adolescents with confidential screening, education, and counseling concerning their engagement in risk behaviors, including tobacco use. Despite national guidelines, research clearly shows that physicians' rates of screening, educating, and counseling their adolescent patients about tobacco use and cessation are far below recommended levels. While such delivery of preventive services has been below levels suggested by national guidelines, research clearly shows that rates of screening and anticipatory guidance can increase through skills-based training, inclusion of screening and charting tools, and resources such as health educators in the clinic. Unfortunately, there is a dearth of literature examining whether the successful implementation of preventive services actually reduces adolescent tobacco use. However, preliminary studies suggest a positive relationship between training and delivery of preventive services around tobacco use. Further, we lack information on the mechanisms by which physician screening and education effects tobacco use. Such information is critical if we are to be able to provide specific recommendations concerning the implementation of clinical preventive services as a successful route to tobacco use prevention or intervention. Thus, additional research on the implementation and evaluation of preventive services are needed to determine whether and how physician training leads to increased services and reduced tobacco use.

Given the literature and promising results thus far, we recommend that every youth coming to any health care provider (including annual visits, urgent care, and ER visits as well as sports physicals and camp physicals) should be screened and counseled about tobacco use. This screening and education should include regular cigarettes, light cigarettes, bidis, loose tobacco, and so on. Youth who screen positive for tobacco use should be referred to cessation programs.

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G

Reducing and Preventing Tobacco Use Among Pregnant Women, Parents, and Families

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REDUCING AND PREVENTING TOBACCO USE AMONG PREGNANT WOMEN, PARENTS, AND FAMILIES

Parent smoking poses health risks to children in utero and beyond. This risk may actually increase over time when one considers the cumulative effects of risk to the fetus from maternal smoking during pregnancy, exposure to household environmental smoke, and the fact that parent smoking predicts child smoking. Parents rightly represent a prime target for tobacco cessation interventions.

In this appendix, we provide an overview of the risks to children of maternal smoking during pregnancy, of exposure to household environmental smoke, and of becoming a smoker if parents and/or siblings smoke. We also identify factors associated with parent smoking versus parent cessation. An understanding of these factors can be useful in guiding the design and implementation of more effective interventions. Throughout, we provide a review of intervention efforts aimed at preventing or reducing tobacco use. We conclude with a set of recommendations for future prevention and intervention efforts.

SMOKING DURING PREGNANCY

Despite known risk factors, rates of smoking among pregnant women remain alarmingly high. Data from the United States Vital Statistics shows that approximately 13 percent of women smoke during pregnancy (Ventura et al. 2000). Analysis of data from the Centers for Disease Control and Prevention's Pregnancy Risk Assessment Monitoring System (PRAMS) for 1993 through 1999 showed that rates of smoking among pregnant women declined from 15.8 percent in 1993 to 12.3 percent in 1999 (Colman and Joyce 2003). The data also indicated that, on average, 26 percent of women smoked 3 months prior to pregnancy during the 1993–1999 period of data collection. Data from the 1998 National Health Interview Survey (NHIS) indicated that 19 percent of the women reported smoking at the beginning of their last pregnancy, and almost 12 percent smoked at some point during their pregnancy (Yu et al. 2002).

Rates of tobacco use during pregnancy vary by women's age, ethnicity, socioeconomic status (SES), and region of residence (Pickett et al. 2003; Ventura et al. 2000; Yu et al. 2002). Most tobacco use among pregnant women occurs in white women, women of low SES and/or educa-

tional level, and women who initiated smoking during their adolescent years (DiClemente et al. 2000; Goldenberg et al. 2000; Pickett et al. 2003; Yu et al. 2002). Tobacco use among pregnant women also occurs at greater rates among women who engage in other harmful health behaviors, are most heavily addicted to tobacco, and have the fewest psychosocial resources to overcome the addictive behavior (e.g., DiClemente et al. 2000; Goldenberg et al. 2000). It is perhaps important to recognize that these women represent a population subgroup that may be most resistant to cessation efforts given that they appear to have opted to smoke despite prevailing anti-smoking social norms and messages concerning the harm of smoking in general and during pregnancy (DiClemente et al. 2000).

Maternal smoking remains the single most important modifiable cause of poor pregnancy outcome in the United States, accounting for a significant proportion of babies with low birth weight, pre-term births, and perinatal deaths such as sudden infant death syndrome (SIDS) (Orleans et al. 2000). Such negative effects have been shown to occur even at moderate levels of smoking (e.g., less than eight cigarettes per day). Further, studies have shown that maternal smoking during pregnancy contributes to a range of health and developmental complications for children, including changes in fetal brain and nervous system development, respiratory illnesses, ear infections, language delays, higher activity, increased tantrums, and lower social competence (e.g., Anderson and Cook 1997; Ashmead 2003; DiFranza and Lew 1995; Faden et al. 2000; Slotkin 1998; Wisborg et al. 1999). These risks related to maternal smoking prompted the *Healthy People 2010* objective to reduce smoking rates among pregnant women to no more than 2 percent (DHHS 2000).

Smoking Cessation During Pregnancy

Many women quit smoking at some point during their pregnancy, with most cessation attempts occurring upon first learning about their pregnancy status (e.g., Pickett et al. 2003). Cessation efforts may be permanent, limited to the duration of their pregnancy, or sporadic during pregnancy, while other women simply reduce their amount of smoking. Data from the PRAMS study showed that an average of 42.5 percent of the women quit smoking at some point during their pregnancy, with quit rates increasing from 1993 through 1999 (Colman and Joyce 2003). Data from the NHIS 1991 Pregnancy and Smoking Supplement showed that while almost 40 percent of the pregnant women quit smoking for at least 1 week, almost half of these women resumed smoking at some point during their pregnancy (Pickett et al. 2003; see also Yu et al. 2002). Quit attempts were most prevalent in the first trimester, although attempts at smoking cessation occurred throughout the pregnancy.

Quit rates among pregnant women vary by demographic factors, with cessation more likely among adolescents, older women, women at first pregnancy, more educated women, Hispanic women, women with lower nicotine dependence, and women who smoke fewer than 10 cigarettes per day (Colman and Joyce 2003; Pickett et al. 2003; Yu et al. 2002). Low SES also appears to be a primary characteristic that distinguishes women who quit from women who continue smoking during pregnancy (e.g., Panjari et al. 1997; Quinn et al. 1991). Importantly, these women are subject to the cumulative stress of the range of physical and psychosocial conditions that are associated with lower SES. They are known to have more emotional problems, less social support, fewer financial resources, and residential instability (Paarlberg et al. 1999; Panjari et al. 1997). Too often, the pregnancy may have been unplanned, possibly resulting in the woman viewing her pregnancy as an additional stressor. Tobacco use may represent, in effect, a way of coping with stress.

Unfortunately, there are few intervention efforts aimed at getting pregnant women to stop smoking. Most of these efforts are brief, office-based interventions incorporated into prenatal care visits and have been shown to have minimal effect (Orleans et al. 2000). Despite guidelines emphasizing the need for clinicians to treat tobacco use during pregnancy through repeated screening, counseling, and treatment, few clinicians even inquire as to whether a pregnant woman is smoking, and inquiries are generally limited to the first visit, with follow-up inquiries rarely occurring (e.g., Pickett et al. 2003; Orleans et al. 2000). Studies show, at best, moderate rates of provider delivery of tobacco screening and counseling services, with services declining dramatically over the course of pregnancy and postpartum. Orleans and colleagues' (2000) review showed that less than one-half of medical providers routinely screened and advised their patients about smoking, and less than one-third discussed smoking cessation with their patients who smoked (Orleans et al. 2000). Pbert and colleagues (2004) found that whereas 52 percent of patients reported that their obstetric clinician intervened at the baseline prenatal visit, only 19 percent reported intervention at the 9-month prenatal visit, while 13 and 15 percent, respectively, reported intervention by their pediatric clinician at the 3-month and 6-month postpartum visits. Given very high postpartum relapse rates (Carmichael and Ahluwalia 2000; Fingerhut et al. 1990; see more information below), it is clearly not enough to intervene only once and only early during pregnancy. Even when clinical providers do inquire about smoking, a significant proportion of pregnant smokers do not accurately disclose their smoking status to their obstetric providers, so no intervention is ever attempted. Estimates go as high as 15 to 20 percent, prompting calls to include cotinine screening as part of routine prenatal screening procedures (Walsh et al. 1996; see also Owen and McNeill 2001). Even when the best clinical practices are implemented, studies indicate that fewer than 20 percent of addicted smokers succeed in quitting (Orleans et al. 2000).

One recent intervention study found that for the most at-risk population of low income pregnant and postpartum women, a relatively low level of social support from a nonsmoking friend or acquaintance identified by the women and modest financial incentives donated by local health care organizations were effective in smoking cessation (Donatelle et al. 2000). Thus, interventions that work in the context of these women's lives to reduce stress appear to be of benefit. It is further suggested that these women may benefit from learning more adaptive ways of coping and receiving interventions that focus also on the development of a sense of self-efficacy, which is likely to be necessary for smoking cessation.

Quit Together was a randomized controlled trial of a smoking cessation intervention aimed at getting low-income pregnant women to quit smoking during pregnancy and to maintain smoking cessation postpartum (Ma et al. 2005; see also Pbert et al. 2004). In the intervention, health care providers were trained to implement national clinical preventive service guidelines based on the pregnant woman's readiness for change. Services included routine screening; reminders to providers to provide services; distribution of materials to the patients; follow-ups; and coordination among providers in obstetrics, pediatrics, and the Women, Infants, and Children (WIC) program (Ma et al. 2005). Controlling for demographic characteristics related to smoking cessation (e.g., age, ethnicity), women in the intervention group were more likely to quit smoking during pregnancy and to be abstinent at time of delivery than were women receiving usual care.

Tobacco cessation efforts have also been found to be subpar at the institutional level. An evaluation of 76 federally funded programs to reduce infant mortality rates among high-risk women shows that these programs fail to identify tobacco cessation activities as a high priority,

are poorly funded, have inadequately trained staff, and have few intervention materials (Klerman et al. 2000).

Taken together, the high rates of smoking among pregnant women as well as the low rates of sustained smoking cessation during pregnancy, along with the lack of effective interventions, present an important call to action. These findings speak to the need for the development of more clinical preventive guidelines for the continual screening, education, and treatment of tobacco use among pregnant women throughout the entire pregnancy. Moreover, the results strongly suggest the need for clinician training and education in implementing the clinical guidelines. Finally, it is clear that in addition to health professionals providing clinical preventive services, cessation tools should be made readily available to the pregnant woman directly.

Rates of Smoking Relapse Postpartum

For women who quit smoking during pregnancy, postpartum relapse rates are alarmingly high. It is estimated that up to 70 percent of women resume smoking within 6 months of giving birth. Data from the PRAMS study indicated that more than half of the women who quit smoking during pregnancy went on to smoke again between 2 and 6 months postpartum (Colman and Joyce 2003). Relapse rates were highest among adolescents, less educated women, women who smoked more than 10 cigarettes prior to pregnancy, and low-SES women (Mullen et al. 1997). Concern over such high rates of postpartum relapse stem not only from the continued harm to the mother, but from the effect of secondhand smoke on the child and the entire family (see below).

Probable explanations for such rates of postpartum relapse are based in the transtheoretical Stages of Change Model (Prochaska and DiClemente 1992) and in the theory of extrinsic versus intrinsic motivation and behavior (DiClemente 1999). There is evidence to suggest that the primary motivation for spontaneously quitting smoking during pregnancy is centered on the health and well-being of the fetus, and not necessarily the health of the mother or the improvement in the overall household environment (e.g., McBride and Pirie 1990). Similarly, one primary thrust of tobacco cessation efforts aimed at expectant mothers is the reduction of fetal risk. The birth of the baby essentially obviates this extrinsic motivating factor, and the mother (who is adjusting to the stress of a new baby) can rationalize both smoking resumption and protection of her child by not smoking in the presence of the baby, (e.g., going outdoors). Of note also is that pregnant women who spontaneously quit smoking during pregnancy exhibit process-of-change characteristics that suggest that they are not deciding to quit smoking but to suspend smoking temporarily. These women appear more akin to nonpregnant women in the contemplation or preparation stages of change than they are to nonpregnant women who are in the action stage of quitting smoking. It would appear that a focus on the range of benefits that accrue from quitting, which include intrinsic benefits to the mothers, may be more effective in relapse prevention.

Interestingly, although the Quit Together intervention described above, in which the specific delivery of the intervention was based on the patients' age and level of addiction, did have success in terms of the cessation rates during pregnancy and at time of delivery, participants in the intervention group were no more likely than patients receiving usual care to maintain smoking abstinence postpartum (Ma et al. 2005). Results from their process evaluation suggested that the lack of intervention effect on postpartum smoking rates was due largely to lack of continued intervention as well as limited focus on postpartum support to continue smoking cessation. Their results strongly suggest the need to create a system of continued support and clinical guidelines for smoking cessation postpartum.

A potent influence on smoking during pregnancy and risk for relapse after pregnancy is having a partner who smokes. Expectant mothers whose partners are smokers report less support to quit and less likelihood of quitting than expectant mothers whose partners were nonsmokers (e.g., Ko and Schulken 1998; McBride et al. 1998). Evidently, partners must be included within the purview of tobacco cessation efforts. In fact, Project PANDA, an intervention consisting of videos and newsletters mailed to women during the final weeks of pregnancy and the first 6 weeks postpartum, included such a component, also mailing intervention materials geared to the male perspective. This intervention showed significant success with the women through the 12-month follow-up. Compared to controls, men were significantly more likely to be abstinent at the 3-month follow-up, though not at later follow-up (Mullen et al. 2000).

REDUCING EXPOSURE TO SECONDHAND SMOKE

Not surprisingly, the most important source of environmental tobacco smoke exposure of young children is parental smoking (Jordaan et al. 1999). National data indicate that almost 40 percent of U.S. children under the age of 5 live with at least one parent or guardian who smokes. Children who are regularly exposed to environmental tobacco smoke are at greater risk for a variety of respiratory ailments including asthma, bronchitis, and pneumonia (AAP 1986; Di Franza and Lew 1996; Etzel 1997; Gortmaker et al. 1982; Mannino et al. 1996). These children also miss more days of school due to illness than children of nonsmokers (Mannino et al. 1996).

To date, there have been few attempts to reduce children's passive smoke exposure. In fact, Emmons and colleagues (2001) identified only four such interventions. These interventions tended to target new mothers, were delivered by pediatric clinicians, and consisted of self-help written materials. They were not effective. Objective measures of children's exposure to tobacco smoke showed that the interventions had no significant outcomes. More success was observed with Project KISS (Keeping Infants Safe from Smoke). This project compared a motivational intervention with a self-help intervention. The motivation intervention targeted parents of children younger than 3 years old, was delivered to parents in the home by a health educator, and consisted of a 30 to 45-minute motivational interviewing session and four follow-up telephone counseling calls. The self-help intervention consisted of a mailed smoking cessation manual, tip-sheet, and resource guide (Emmons et al. 2001). Nicotine levels were significantly lower at 3- and 6-month follow-up for parents participating in the motivational intervention. No decrease in nicotine levels was observed in the parents in the self-help condition.

Despite the lack of formal interventions aimed at increasing smoke-free homes, studies have examined the extent to which parents are placing restrictions on smoking in their homes. Across studies, findings indicate fewer than 40 percent of the homes studied were smoke-free. Household smoking bans were more likely to occur in houses in which there were children and when at least one parent was a nonsmoker (Ashley et al. 1998; Okah et al. 2002; Pizacani et al. 2002). Clearly, more work is needed through public health messages as well as through health care providers to educate adults and children about the effects of secondhand smoke and to encourage smoking bans in all households.

PARENT SMOKING AND PARENTING BEHAVIOR AS A PREDICTOR OF YOUTH SMOKING

Despite theories in the lay and scientific arenas suggesting that peers wield the greatest influence on children's and adolescents' behavior, the scientific evidence indicates that parents in fact

remain a very important influence on adolescent development and behavior (e.g., Collins et al. 2000; Kerr et al. 1999). This may be the case in part because friendship groups change over time whereas parents generally remain a stable entity and force in adolescents' lives.

Studies have consistently demonstrated an association between parent smoking and adolescent smoking (e.g., Chassin et al. 1996; Flay et al. 1998; Fagan et al. 2005; Jackson and Henriksen 1997; Simons-Morton et al. 2004; Tilson et al. 2004). Chassin and colleagues (2005) have found that general parenting style with regard to parental behavioral control and acceptance prospectively and uniquely predicts adolescent smoking. Specifically, engaged parents relative to disengaged parents were less likely to initiate smoking. Interestingly, this effect was not explained by parents' smoking-specific practices (Chassin et al. 2005). As these researchers point out, the results suggest that parenting interventions may be more effective if broadened beyond a focus on smoking-specific practices.

The primary parenting mechanisms that have emerged as related to adolescent smoking are parent role modeling and parent monitoring. The thrust of both parent modeling and monitoring is centered in parents' explicit and implicit communication of antismoking socialization of their children. Moreover, Bauman and colleagues (1990) found that parent lifetime smoking is actually more strongly related to adolescent smoking than parent current smoking, suggesting that the association cannot be explained simply as the child imitating the parents (Bauman et al. 1990). As Bandura (1986) has noted, however, ". . . modeling (is) one of the most powerful means of transmitting values, attitudes, and patterns of thought and behavior" (Bandura 1986, p. 47). Indeed, parents with a history of smoking tend to hold and communicate weaker antismoking beliefs to their offspring, to be less likely to have household smoking rules (Kodl and Mermelstein, 2004), to see themselves as less influential in their children's decision to smoke, and to be more likely to see adolescent tobacco use as inevitable (Clark et al. 1999). In addition, it is important to note that the risk rates for children of former smokers are similar to the risk rates for children of current smokers, suggesting that parent modeling effects may be resistant to parents' quitting smoking. As pointed out by Jackson and Henriksen (1997), this may be the case either because parent's behavior change is not accompanied by similar change in their fundamental smoking beliefs or because parents do not use their behavior change as an opportunity to convey strong antismoking messages to their children. An extremely relevant finding is that children are less likely to smoke when parents engage in antismoking socialization even when parents are current smokers (Jackson and Henriksen 1997).

Parental monitoring, as recently reconceptualized and illuminated by Kerr and Stattin (2000) and Kerr and colleagues (2000), is based squarely within the domain of quality of the parent-adolescent relationship and parent-adolescent communication. It encompasses a range of knowledge about the adolescent that necessarily comes from the adolescent him- or herself through either voluntary sharing of information; active parent solicitation of information concerning his or her experiences, activities, and whereabouts; or knowing the adolescent's friends and peers. Clearly, the extent of mutual warmth and trust is directly related to the quality of parent-adolescent communication, particularly as it pertains to risk behaviors (Kerr et al. 1999; Kerr and Stattin 2000). Part of this process includes parental setting of expectations that are clear and age-appropriate with consequences that are fair, affirming, and useful (Connell et al. 1995; Connell and Halpern-Felsher 1995; Halpern-Felsher et al. 1997; Lee and Halpern-Felsher 2001; Kerr and Stattin 2000; Simons-Morton et al. 2004; Stattin and Kerr 2000). Parental monitoring also serves to prevent or reduce adolescents' health-compromising behaviors through the setting of curfews, awareness of and participation in afterschool and weekend activities, and prevention of adoles-

cents' association with risk-taking peers (Cohen et al. 1994; Kerr and Stattin 2000; Stattin and Kerr 2000; Steinberg et al. 1994). Research on parental monitoring has consistently and convincingly shown that it is a critical protective factor with regard to children's and adolescents' tobacco use (e.g., Andersen et al. 2004; Clark et al. 1999; O'Byrne et al. 2002).

Sibling Effects on Adolescent Tobacco Use

Siblings as a source of influence on adolescent tobacco use have received far less empirical attention than other potential interpersonal sources of influence, such as parents and peers. Notably, however, the available research points to the possibility that older sibling smoking may actually exert a greater influence on adolescent smoking than parent smoking does (e.g., Avenevoli and Merikangas 2003; Boyle et al. 2001), with older siblings influencing not only the level of younger sibling smoking but also their rate of use over time (Duncan and Aber 1997). Even more remarkably, classic twin studies have consistently suggested that initiation and rate of tobacco use may be influenced more strongly by shared environmental factors—social factors that promote sibling similarity—than by genetic factors (e.g., Li et al. 2003). Most recently, Slomkowski and colleagues (2005) utilized the Add Health sample of sibling pairs, representing the range of genetic relatedness, to disentangle genetic from nongenetic effects and to elucidate the sibling relationship dynamics that underlie any social processes (Slomkowski 2005). Both genetic and shared environment were found to contribute independently to adolescent smoking, with social connectedness between siblings moderating the effects of the shared environmental factors. Thus, sibling influence must be recognized as a social risk factor. Prevention and intervention programs aimed at reducing adolescent tobacco use would benefit from research to provide detail on the mechanisms that underlie the sibling effects on adolescent smoking.

Parent- and Family-Focused Interventions to Reduce Adolescent Tobacco Use

Despite compelling evidence showing associations between parent smoking and adolescent smoking, few adolescent tobacco cessation interventions include a parental component. Even less common is research to evaluate the effects of these interventions. Moreover, the intervention studies that have been conducted have serious methodological limitations, including small sample sizes, already-motivated parents, little likelihood of faithful replicability, and assessment of only short-term outcomes.

Focus on Kids (FOK) is a risk reduction intervention that focuses on “naturally occurring” peer groups rather than groups determined by the intervention or investigators. Although this intervention showed some positive short-term effects, its impact decreased over time. The addition of a parental-monitoring component to the intervention, Informed Parents and Children Together (ImPACT), was shown to increase parent–youth communication and adolescent perceptions of parental monitoring; however, ImPACT itself did not have a significant, unique effect on adolescent engagement in risk behavior.

In an extension of this intervention, Stanton and colleagues (2004) conducted a randomized, longitudinal trial in which one group of adolescents received FOK and their parents received a control training, while another group received FOK and parents received ImPACT, and the third group received FOK, ImPACT, and boosters. Results showed that adolescents who received FOK and whose parents received ImPACT were significantly less likely to smoke cigarettes than adolescents exposed only to FOK, indicating that teaching parents to communicate with their

teens and to provide more supervision of adolescents' behaviors can have a positive effect on adolescent behaviors.

Perry and colleagues (1990) were successful at encouraging parents to conduct antitobacco activities with their children in grades 4 through 6, but the effect of these activities on tobacco use was not evaluated (Perry et al. 1990). Biglan and colleagues (1996) examined the influence of two components of a community intervention on tobacco use. One component involved mobilizing peers, and the other mobilizing parents (Biglan et al. 1996). Results showed positive effects of communication activities geared toward increasing knowledge about and more negative attitudes toward tobacco use. Youth exposed to the antitobacco information were more knowledgeable about tobacco and had more negative attitudes toward tobacco use, reporting lower intentions to use tobacco. The effects on long-term intentions and actual tobacco use were not assessed.

Bauman and colleagues (2000; 2001) evaluated the effect of the Family Matters Program, an adolescent tobacco and alcohol prevention program in which four mailings of booklets were made to families, with each mailing followed by a telephone discussion with a health educator. The program evaluation consisted of telephone interviews at 3 and 12 months post-intervention. Results showed a 25 percent reduction in smoking onset for non-Hispanic white adolescents, with no statistically significant effects for the other ethnic groups. In a subsequent study, Bauman and colleagues (2002) showed that the Family Matters Program had a significant effect on reducing the prevalence rates of adolescent smoking, with effect sizes of 0.19 and 0.17 sizes at the 3-month and 12-month follow-up (Bauman et al. 2000; 2001).

Cohen and Rice (1995) found that asking parents to control risk factors, such as limiting adolescents' associations with peers who were smokers, had no significant effects on adolescent substance use. This research suggested that relative to risk factors, a focus on protective factors (e.g., parent monitoring of adolescents' whereabouts, a respectful parent-adolescent relationship with good rapport) might be most beneficial (Cohen and Rice 1995).

Curry and colleagues (2003) implemented and evaluated a randomized trial of a family-based smoking prevention program in a managed care setting. The intervention targeted parents and children aged 10–12 years. In this intervention, a smoking prevention kit was mailed to parents, followed by parent newsletters, telephone calls by health educators, materials for the children, and information placed in medical records and charts as reminders to the physician to deliver prevention messages (Curry et al. 2003). Children were 11 to 14 years old at follow-up. Despite their careful design and implementation of the intervention, evaluation results showed no program effects. Although the intervention had small but significant effects on increasing parent-child communication about tobacco, no differences between the intervention and control groups were found in susceptibility to smoking, experimentation with smoking, or monthly smoking rates. As Curry and colleagues (2003) point out, families in this study were of relatively low risk, and almost all of the parents indicated at baseline that they had talked to their children about smoking. They also admitted that their attempt to engage providers was minimal and, according to patient reports, may largely have failed to follow up. This study suggests that interventions may need to be more intensive to be effective.

SUMMARY AND RECOMMENDATIONS

Reducing tobacco use among pregnant women, parents, and within the family environment will yield dramatic social, physical, and economic benefits. Maternal smoking during pregnancy has been directly linked to low birth weight babies, preterm births, perinatal deaths including

SIDS, and changes in the development of the fetal brain and nervous system. Continued smoking within the home environment also has grave consequences to children as well as adults, including asthma, infections and illness to the ear and lung, and respiratory functioning (see Orleans et al. 2000 for a review).

Recommendations for Prepartum and Postpartum Interventions

Prior to and during pregnancy provides a potentially optimal period for smoking intervention. Not only are women often willing to quit smoking, at least for the sake of their unborn child, but women are also most likely to be encouraged and supported by their family, peers, and medical providers to quit smoking. Unfortunately, current interventions targeting smoking cessation among pregnant women are not optimal, in part due to: (1) the lack of well-developed, effective programs that are ready for mass dissemination; (2) limited adherence to clinical preventive service guidelines; (3) pregnant women not disclosing their smoking status during medical exams; and (4) inadequate programs to address postpartum relapse (Orleans et al. 2000).

Based on the evidence reviewed above, it is clear that early primary prevention of smoking among young women represents our best effort. As such, female smokers should be the target of cessation intervention efforts before, at the beginning of, and throughout pregnancy, as well as postpartum. Not only should obstetric clinicians provide such prevention or intervention services, but pediatric providers should also be mobilized in the delivery of preventive and intervention services. Importantly, cessation programs and services must be sustained even after delivery so as to reduce the likelihood of postpartum relapse. Finally, the expectant mother's close social support network, especially her partner, should be recruited into the cessation efforts. As such, we recommend the development of more clinical preventive guidelines for the continual screening, education, and treatment of tobacco use among pregnant women throughout the entire pregnancy. In addition, every pregnant woman should be told about the harms of smoking while pregnant and screened for tobacco use. Pregnant women who smoked should be referred to a smoking cessation program, and continual follow-ups concerning maternal smoking status should occur.

Recommendations for Reducing Household Environmental Tobacco Smoke Exposure

There is clear evidence that secondhand smoke is harmful and that many children and youth are at great risk of exposure to secondhand smoke in the home. As such, efforts to eliminate or at the very least reduce such home exposure should be made, with an eye toward making all homes smoke-free. Pediatric providers can and should play an important role in the lives of young children who have no control over their exposure to household environmental smoke. At every medical visit, providers should screen, counsel, and educate parents and children about the harmful effects of secondhand smoke and should discuss with parents the importance of keeping a smoke-free home.

Recommendations for Parenting Behaviors

Research shows a direct link between parenting behaviors and children and youth smoking in two critical ways. First, extensive evidence shows that youth reared in homes in which parents have authoritative parenting styles, including warmth and involvement coupled with clear and firm boundaries, as well as active monitoring of their behavior, are less likely to engage in health risk behaviors, including tobacco use. Second, research shows that youth are more likely to

smoke if their parents or others in the household smoke. These two sets of literature suggest that intervention efforts aimed at reducing youth smoking should contain a parent component in which parents are encouraged: (1) not to smoke, (2) to communicate with their children about tobacco use and convey strong antismoking message to them, and (3) to closely monitor their child's behavior. Further, pediatricians, obstetricians, and other health care providers should discuss with parents the importance of discussing tobacco use with their children, including conveying expectations that the child will not smoke and the importance of monitoring their children with regards to tobacco use.

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Smoking in the Movies: Its Impact on Youth and Youth Smoking

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INTRODUCTION

Smoking in the movies doubled in the 1990s, bringing exposure rates closer to those observed in the 1950s (Glantz et al. 2004). While recent data suggest that depictions of smoking in the movies have declined from 2000–2004 (Worth et al. 2006), youth exposure to smoking in the movies remains high. In addition to its inclusion in R-rated movies, smoking can be observed readily in many youth-rated movies, including movies rated G, PG, and PG-13 (Charlesworth and Glantz 2005). Studies employing content analysis have documented that smoking is portrayed in approximately 87 percent of movies produced from 1988 to 1997 (Dalton et al. 2002b), in 77 percent of movies in 2004 (Worth et al. 2006) and in more than 66 percent of children’s animated movies released between 1937 and 1997 (Goldstein et al. 1999). Health professionals and tobacco control advocates are concerned that youth exposure to smoking in the movies will have an impact on adolescents’ attitudes toward smoking as well as smoking behavior itself (Charlesworth and Glantz 2005; Sargent 2005; Worth et al. 2006). These concerns are consistent with social cognitive theory indicating that adolescents are especially vulnerable to social modeling influences on behavior, including risky behavior such as tobacco and other drug use (Akers and Lee 1996; Bandura 1986).

It has been shown that the tobacco industry has done extensive research to determine how and when to best influence older adolescents’ and young adults’ initiation and continuation of tobacco use (Ling and Glantz 2002). Clearly, there is a strong relationship between exposure to pro-tobacco campaigns and tobacco advertising and adolescent uptake of smoking and age of initiation of smoking (Biener and Siegel 2000; Biener and Siegel 2001; Pierce et al. 1998; Pierce et al. 1999; Pierce et al. 2002). Pierce and colleagues (1998) found that adolescents in California who were able to describe a favorite tobacco advertisement were twice as likely to start smoking, and adolescents who used a tobacco-promotional product were three times as likely to begin. Sargent and colleagues (2000) also found that smoking uptake is more likely among adolescents who possess tobacco-promotional items, such as a T-shirt (Sargent et al. 2000; see also Pierce et al. 1999). Longitudinal research indicates that approximately 34 percent of all new tobacco ex-

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perimentation occurs as a result of tobacco advertising and promotions (Pierce et al. 1999). Emery and colleagues (1999) estimated that each year, tobacco-marketing efforts generate approximately 193,000 additional adult smokers who began smoking as adolescents because of such marketing (Emery et al. 1999). The influence of these pro-tobacco campaigns has been shown to be stronger than the presence of antismoking messages (Straub et al. 2003).

The body of research linking pro-tobacco campaigns to the initiation of youth smoking is alarming, especially given studies indicating that approximately one-third of adolescents who initiate smoking progress into addicted smoking (Anthony et al. 1994; Choi et al. 1997). It is thus important to explore whether and to what extent exposure to smoking in movies has a similar influence on adolescent tobacco use and whether such influence varies by age, gender, and parental influences. In this appendix, we provide a comprehensive review of empirical research investigating the relationship between exposure to smoking depictions in movies, adolescent smoking-related attitudes, and adolescent smoking behavior. We begin with some theoretical bases underlying the links between exposure to tobacco use in the movies and youth behavior.

THEORIES OF MOVIES AS SOCIAL MODELING INFLUENCES ON ADOLESCENT TOBACCO USE

The theoretical basis for the important role of social constructs in shaping smoking behaviors stems largely from Social Cognitive Theory (e.g., Akers and Lee 1996; Bandura 1986), Social Norms Theory, and Social Marketing Theory, which are also the basis for much of the health research investigating the relationship between exposure to smoking in movies and adolescent smoking behavior. These theories posit that social modeling (observing others perform a behavior and reaping the rewards of that behavior [Bandura 1986]) and social norms (believing that a given behavior is normative and frequent [Wakefield et al. 2003]) are powerful influences on teaching adolescents about behavior in social contexts and are strongly related to adolescents' behavior. Applied to smoking, depictions of smoking in the movies often serve to influence or change youth's attitudes about smoking, in part by glamorizing smoking and the smoker him or herself. Often the smoker is portrayed positively—attractive, slim, wealthy, and sexy. Smokers are often shown reaping smoking-related benefits (e.g., coping, relaxation), yet rarely are they seen experiencing any harm or negative stigma from smoking. Depictions of smoking in the movies are also expected to increase the perception that smoking is normative.

Current opinion about adolescent smoking largely considers social factors to be the main set of variables influencing experimental smoking (Lynch and Bonnie 1994; Sargent 2005), including peers and family, which are also key influences on the development of social norms. Adolescents are particularly cued into the social context around them, including media influences on depictions of various behaviors and related positive and negative outcomes. Parallel with physical and cognitive maturation, important social changes take place in adolescence that shift the focus of affiliation gradually from parents to peers and from group relations to intimate relations with individuals outside the family. These expanding social relationships from adolescence through young adulthood broaden adolescents' sense of extrafamilial reality and reinforce their increasing sense of individuality and need for autonomy. Adolescents' newly acquired ability to think abstractly and to take a third person's perspective is an important prerequisite for successful socialization and is tied to new responsibilities and freedom, including trying new and risky behavior such as drinking alcohol, having sex, and smoking cigarettes (e.g., Steinberg and Cauffman 1996). This sets the stage for a variety of social factors to influence adolescents' attitudes and beliefs for numerous behaviors, including movies and television depictions of behav-

ior, and since adolescents have increased power over their own choices about what media and movies they expose themselves to, the extent to which these media influence their socialization is worthy of attention (Arnett 1995).

RESEARCH ON SMOKING IN THE MOVIES AND YOUTH PERCEPTIONS AND BEHAVIOR

Research investigating the impact of youth exposure to smoking in movies has yielded three important findings: (1) exposure to smoking depictions in movies influences perceptions of smoking, (2) exposure to smoking in movies increases the risk for smoking initiation, and (3) the increased risk for smoking initiation from exposure to smoking in movies can be reduced by antismoking advertisements and parental restriction of movies. A review of the scientific evidence for these three findings is summarized next (see also Tables H-1, H-2, and H-3). The current review includes only published scientific research articles specifically investigating the relationship between smoking in the movies and adolescent attitudes and tobacco use (see also Charlesworth and Glantz 2005; Worth et al. 2006).

Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking

A small set of literature has addressed the extent to which youth are exposed to smoking in the movies and whether such exposure has an effect on youth perceptions of smoking images (Table H-1). Sargent and colleagues (2003) provided evidence for a dose effect between access to movies and increased exposure to smoking in movies (Sargent et al. 2003). Access to cable movie channels and videotapes and number of movie outings per month were strongly associated with adolescents' increased exposure to smoking in the movies ($F = 63.4$, adjusted $R^2 = .34$). Exposure to smoking increased by 10 percent (150 occurrences) for each additional movie channel and video watched per week. Movie theater outings more than once a month were associated with a 20 percent (300 occurrences) increase in movie smoking exposure.

A qualitative study conducted by Watson and colleagues (2003) sheds light on the content of media attended to by adolescents. This study examined perceptions of smoking images in television, movies, newspapers, and magazines to gauge the extent to which adolescents notice smoking in the media and how they interpret social acceptability of smoking through visual cues. Their findings showed that 78 percent of their sample noticed and commented on the smoking images unprompted by the facilitator and 64 percent of responses were positive for social acceptability, especially the social benefits of smoking. Negative physical health responses were 46 percent, and positive ratings were 33 percent, but there was rarely sufficient information to rate the media item on physical health effects. Alarming, 65 percent of mood ratings were positive, especially issues of stress relief and emotional control, 39 percent of ratings were positive and 44 percent were negative for appearance effects. Most positive ratings were from depictions of physically attractive persons. Finally, 52 percent of the sample rated smoking as a good thing to do, whereas 48 percent rated it as a bad thing (Watson et al. 2003). Clearly adolescents are aware of the conflicting messages conveyed through the media; alarmingly, these results indicate that the social desirability effects are also functioning. Unfortunately, these results were not linked to behavior or intentions to smoke.

McCool and colleagues (2004) have conducted a number of studies examining adolescent perceptions and smoking depictions in film. McCool and colleagues (2004) also found support

that image concerns influence adolescent perceptions of smoking in films and that these perceptions differed by gender (McCool et al. 2004). Further, “sexy” and “stylish” were stereotypes significantly associated with smoking susceptibility ($p < .01$) for both female and male smokers in films. However, a serious limitation of this study was that the measure of stereotypes was linguistically trait-based with matching from a generalized question rather than based on specific actors or viewed images. Thus, although these results point to general adolescent perceptions of male and female smokers on film, they do not capture information about the specific actors that are viewed most favorably by adolescents themselves and thus might have a more profound impact on adolescents’ attitudes and perceptions of smoking.

In their 2001 and 2003 studies utilizing focus groups, McCool and colleagues (2001; 2003) examined how smoking depictions are related to adolescent smoking perceptions. McCool and colleagues (2001) showed that young adolescents from New Zealand perceived smoking depictions in movies as very prevalent and recognizable and they regarded these depictions as a reflection of reality. The adolescents had nonchalant attitudes toward inclusion of smoking depictions in movies, and these attitudes were linked to the perception that smoking prevalence is high among peers and adults (McCool et al. 2001). The authors suggest that smoking imagery in film may reinforce perceptions of smoking as a way to reduce stress and to develop self-image, and to serve as a marker of adult independence. In their study with older adolescents, McCool and colleagues (2003) showed that adolescents were receptive to smoking depictions when used in a credible way to portray an emotional state, subculture affiliation, and life-style. Experience as a smoker appeared to inflate credibility of depictions of smoking, particularly in gritty realism or drama. Stereotypical images were readily recalled and appeared to support misconceptions of smoking, and recall of images was associated with stress, anxiety, drug use, and seduction (McCool et al. 2003). The results suggest that pervasive and credible smoking scenes may offer support and reassurance to smokers or teens who are ambivalent about smoking.

Taken together, these studies demonstrate that youth are exposed to a vast amount of smoking in the movies and that such depictions are associated with more favorable attitudes toward smoking and smoking characters. These positive views are particularly prevalent among youth who themselves smoke.

Exposure to Smoking Depictions in Movies Increases Risk for Smoking Initiation

As the above section demonstrates, there is little doubt that youth are being exposed to smoking in the media—including through movies, television, magazines, and newspapers—and that such exposure influences smoking-related perceptions. The question then becomes whether such exposure creates a heightened risk for youth’s own smoking. A number of studies employing different methodology have addressed this concern (see Table H-2). These studies, reviewed next, suggest a relationship between exposure to smoking in the movies and smoking initiation. However, studies have not yet been conducted to determine whether such a relationship between viewing smoking in the movies and tobacco use continues after initial tobacco use.

Favorite Movie Stars’ Use of Tobacco in Movies

Several studies have examined whether and to what extent viewing movies in which popular or favorite movie stars smoke on-screen has an effect on youth smoking. After controlling for other variables associated with adolescent smoking (e.g., parent and friend smoking, receptivity to tobacco ads; see Table H-2). Distefan and colleagues (1999) showed that adolescent never-

smokers who shared favorite stars with adolescent ever-smokers were more likely to be susceptible to smoking than adolescent never smokers who did not share stars with adolescent ever-smokers (OR = 1.35, 95 percent confidence interval 1.12–1.62; $p < .01$) (Distefan et al. 1999).

Similarly, Tickle and colleagues (2001) provided some support that smoking by movie stars is associated with greater risk of smoking initiation among adolescents. For youth with smoking experience, after controlling for possible confounds, the odds of having a higher smoking status (ranging from nonsusceptible never-smoker to smoker, see Table H-2) increased with their favorite stars' on-screen smoking. For adolescents whose star smoked in one film, the odds of being higher in smoking status were 0.78 (0.53–1.15, 95 percent confidence interval [CI]). For adolescents whose stars smoked in two films, odds increased to 1.53 (1.01–2.32, 95 percent CI), and whose stars smoked in three or more films, the odds of being higher in smoking status increased to 3.1 (1.34–7.12, 95 percent CI). The same pattern was found for never-smokers, that is susceptibility to smoking increased as their favorite stars' smoking increased. Specifically, for adolescents whose star smoked in one film, the odds of being higher in smoking status were 2.16 (0.86–5.45, 95 percent CI). For those whose stars smoked in two films, 4.78 (95 percent CI, 1.60–14.23), and for those whose stars smoked in three or more films, the risk increased to 16.18 (95 percent CI, 2.33–112.61). However, no effects were found for adolescents in other stages of smoking initiation or for current smokers. Thus, the direction of influence between exposure to smoking in movies and adolescent smoking status was not determined (Tickle et al. 2001).

Unfortunately, since both the Distefan and colleagues (1999) and the Tickle and colleagues (2001) studies used a cross-sectional design, it is impossible to determine whether adolescents who were more susceptible to smoking paid more attention to smoking in films or whether they were truly influenced by smoking images (Distefan et al. 1999; Tickle et al. 2001). Using a longitudinal design, Distefan and colleagues (2004) shed further light on the relationship between exposure to favorite movie stars' smoking on-screen and tobacco use among adolescents. They showed that adolescents with a favorite star who smoked on-screen were more likely to have smoked at follow-up 3 years later (odds ratio [OR] = 1.36; 95 percent CI 1.02–1.82). For adolescent females, the corresponding values were strong (OR = 1.86; 95 percent CI 1.26–2.73) when all other variables were controlled (including receptivity to tobacco advertising). For adolescent males, smoking initiation at follow-up was associated only with receptivity to tobacco advertising and promotions but not with having a favorite star smoke on-screen (Distefan et al. 2004).

Finally, using a controlled experimental design in which adolescents were exposed to a film clip depicting either smoking or nonsmoking by popular male and female actresses, adolescents were asked to rate character attractiveness and similarity to themselves (Hines and Saris 2000). Adolescents who viewed the smoking clips reported a greater likelihood of smoking (mean = 2.5, standard deviation [SD] = 1.6) than participants who viewed the nonsmoking clips (mean = 2.2, SD = 1.5; $F(1,135) = 7.44$, $p = .007$). This effect accounted for 5.2 percent of the variance. Adolescents' current smoking status also had a significant relationship with adolescents' report of their likelihood to smoke in the future ($F(2,135) = 446.75$, $p < .001$), with regular smokers (mean = 4.7, SD = 0.5) more likely to smoke than occasional smokers (mean = 3.3, SD = 1), who in turn were more likely to smoke than nonsmokers (mean = 1.3, SD = 0.4). This effect accounted for 86.7 percent of the variance. Thus, these results indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips.

Although these studies were modest in size and scope, they do provide evidence that adolescents are more susceptible to initiating tobacco use if they have observed their favorite movie

star smoke on-screen. However, given the limited experimental and longitudinal data available to date, caution must be exercised in interpreting these findings.

Exposure to Smoking Depictions in Movies and Television

A number of studies have questioned whether exposure to smoking in the movies more generally, not just by one's favorite actor or actress, has an influence on youth smoking. The majority of the research on movie smoking exposure and adolescent smoking initiation has been conducted by Sargent and colleagues (2001) and has employed both cross-sectional and longitudinal designs. Using quartiles of smoking exposure in movies in a cross-sectional study, Sargent and colleagues (2001) showed that increased exposure to smoking in movies was associated with greater risk of trying smoking (Sargent et al. 2001). Further, this relationship was demonstrated among a nationally representative sample including adolescents from broad geographic regions of the United States and among different racial and ethnic groups (Sargent et al. 2005). Sargent and colleagues (2005) estimated that exposure to smoking in movies is an independent, primary risk factor for smoking initiation among 38 percent of the adolescents who tried smoking in the study sample (0.10 ever tried smoking prevalence in overall study sample of 6,522) (Sargent et al. 2005). It was also shown that higher exposure to smoking in movies and increased smoking susceptibility (OR = 1.60; 95 percent CI, 1.24–2.07), more normative views of adult smoking (OR = 1.37; 95 percent CI 1.09–1.71), and more positive expectations from smoking (OR = 1.38; 95 percent CI 1.13–1.70) were related to adolescent smoking initiation (Sargent et al. 2002).

These results also showed that exposure to 50 occurrences of smoking in movies (about five R-rated movies) has a moderate effect on smoking attitudes similar to other social influences, such as having family members or friends who smoke (Sargent et al. 2002). No association was found between more exposure to smoking in movies and peer norms of smoking when controlling for sociodemographics, social influences, and personality factors.

Using a longitudinal design, Dalton and colleagues (2003) provided support for a clear dose effect between movie exposure and initiation, with greater exposure to smoking in the movies associated with a greater likelihood of tobacco initiation, particularly in participants with non-smoking parents. The dose effect size ranged from 2.0 to 2.7, even when controlling for a number of covariates including demographics; school achievement; parent, sibling, and friend smoking; receptivity to tobacco promotions; parental education; parenting styles; and perception of parental disapproval of smoking. However, only a small proportion of the sample (10 percent) initiated smoking, and a positive relationship was found between exposure and personal characteristics of adolescents such as sensation seeking, rebelliousness, or a negative association with school performance and parenting styles, suggesting that these results may reflect only a particular subset of adolescents (Dalton et al. 2003). An alternate view of these data is that a small subset of adolescents who already have many variables that contribute to a higher likelihood of smoking initiation, such as personality traits and parenting factors, could pay more attention to depictions of smoking than adolescents in general. Dalton and colleagues (2003) acknowledged that some aspects of R-rated movies other than smoking could conceivably contribute to smoking initiation and that further research is needed to determine other possible aspects.

Two studies examined whether there is a similar relationship between television and smoking behavior. Gutschoven and Van den Bulck (2004) examined the relationship between television viewing and the amount of cigarettes smoked by adolescent smokers per unit time of television. Smoking volume was correlated with self-assessed health, even when controlling for level of education and age ($r = -0.11$, $p = .03$), with heavier smokers feeling less healthy. Television

viewing was a significant predictor of smoking volume, with smokers who watch 5 or more hours a day reporting smoking between 60 and 147 more cigarettes per week than those who watch an hour or less a day. Television viewing explained an additional 3 percent of the variance ($F(8,399) = 30.975$, model $R^2 = .383$, $p < .0001$) when gender, educational level, parental and peer smoking, and frequency of going out were accounted for in the model. Using longitudinal data from the National Longitudinal Survey of Youth, Gidwani and colleagues (2002) examined whether youth with greater exposure to television exhibited higher rates of smoking initiation. They found a dose–response relation between amount of TV viewing and smoking initiation when taking control variables into account; specifically, adolescents who watched more than 5 hours of TV per day were 5.99 times more likely to initiate smoking than adolescents who watched 0–2 hours a day ($p = .02$; 95 percent CI 1.39–25.71) (Gidwani et al. 2002). Similarly, adolescents who watched more than 4 to 5 hours per day were 5.24 times more likely to initiate smoking than adolescents who watched 0–2 hours per day ($p = .03$; 95 percent CI 1.19–23.10) (Gutschoven and Van den Bulck 2004).

These cross-sectional and longitudinal studies provide clear support that youth report greater susceptibility and intentions to smoke and are more likely to actually try smoking following exposure to smoking in the movies and on television. Further, even after controlling for other factors known to be associated with adolescent tobacco intention and use, studies show a clear dose effect, whereby greater exposure to smoking in the movies is associated with a greater chance of smoking. Studies have not yet been conducted to determine whether such a relationship between viewing smoking in the movies and tobacco use continues after initial tobacco use (Sargent 2005).

The Effects of Smoking in Movies Can Be Reduced by Antismoking Advertisements and Parental Restriction of R-Rated Movies

As shown in Table H-3, a small number of studies have investigated whether antismoking advertisements can ameliorate the influence that exposure to smoking in the movies has on youth tobacco use. Pechmann and Shih (1999) conducted the first experimental study addressing this question, with results yielding significant interactions between viewing or not viewing an anti-smoking advertisement on the level of positive arousal ($F[1227] = 6.91$, $p < .01$), perceptions of a smoker’s stature ($F[1228] = 4.82$, $p < .05$), smoker’s perception of their own stature ($F[1228] = 4.88$, $p < .05$), and participants’ intent to smoke ($F[1203] = 4.88$, $p < .05$). Further, when viewing an antismoking advertisement, more negative thoughts were generated about the lead characters when the character was a smoker as compared to not being a smoker (2.37 vs. 1.31, $t = 2.70$, $p < .01$). This effect was not found if an antismoking ad was not viewed ($F[1188] = 6.98$, $p < .01$). A limitation of this study is that the outcome measure was not related to actual smoking behavior of adolescents. Nevertheless, the study provides evidence that antismoking advertisements may help to combat the positive associations that smoking in movies may foster (Pechmann and Shih 1999).

Edwards and colleagues (2004) attempted to replicate and expand on Pechmann and Shih’s results by using the “real-world” environment of actual movie theaters to evaluate the effect of antismoking advertisement on women’s perceptions of smoking in movies and their intentions to smoke. Nonsmokers who saw the ad were more likely to perceive smoking as “not ok” (48.2 percent) compared to nonsmokers who did not view the ad (25.2 percent, $X^2=83.11$, $df = 3$, $p = .0001$). This difference was maintained when age and movie exposure differences were adjusted (Wald $X^2 = 75.784$, $df = 1$, $p = .0001$). However, no effect was found for smokers, even when

age and movie were accounted for, and no overall effect was found for the antismoking ad on intentions to smoke. When smokers and nonsmokers were analyzed separately, smokers were more likely to have lower intentions to smoke (31.9 percent versus 47.8 percent; $X^2 = 9.03$, $df = 2$, $p = .01$), and when age and movie were accounted for the group of smokers who saw the ad continued to have lower intentions to smoke (Wald $X^2 = 4.59$, $df = 1$, $p = .03$). No effect was found for nonsmokers ($X^2 = .97$, $df = 2$, $p = .62$), even when age and movie were accounted for (Wald $X^2 = 1.25$, $df = 1$, $p = .263$). These results may indicate that antismoking advertisements may have only a small effect upon intention to smoke and that other factors may play a role in adolescents' intentions to smoke (Edwards et al. 2004).

Dixon and colleagues (2001) also found similar results in their quasi-experimental study investigating the effects of viewing a movie with anti-tobacco content. Theater patrons were surveyed before and after viewing the film *The Insider*, with results indicating that their perceptions of the business conduct of the tobacco industry were more negative than perceptions held by theater patrons who saw a control movie without anti-tobacco content. Further, viewing the anti-tobacco industry content also appeared to promote a short-term reduction in intentions to smoke (Dixon et al. 2001).

In a study examining the effect of parental restriction of R-rated movies on adolescent smoking initiation, Sargent and colleagues (2004) found that decreased parental restriction was associated with higher risk of smoking initiation. They also found a reverse effect, where increased parental restriction was associated with decreased risk, compared to adolescents reporting no change (Sargent et al. 2004). This pattern was even more pronounced for adolescents from non-smoking families compared to adolescents from families that smoke. Similarly, Dalton and colleagues (2002a) found higher levels of trying smoking and drinking alcohol among adolescents with no parental restriction of R-rated movies compared to adolescents whose parents did not allow them to view any R-rated movies (Dalton et al. 2002a).

Although limited in scope and methodology, the results from this set of studies provide evidence that viewing antismoking advertising and parental restrictions limiting youth exposure to R-rated movies can ameliorate the effect that smoking in the movies has on youth.

SUMMARY AND RECOMMENDATIONS

Portrayals of smoking in the movies, especially images that put smoking in a positive or sexy vein, are likely to alter perceived norms about smoking, resulting in smoking being viewed as more normative, positive and socially acceptable. Indeed, the convergence of study results provides persuasive evidence of a relationship between exposure to smoking in the movies and adolescent perceptions of tobacco, as well as actual tobacco use, and that the effects are at least comparable to those of pro-tobacco advertisements. It is clear that youth's exposure to smoking in movies, including but not limited to tobacco use among the more popular youth film stars, has an effect on youth initiation. Research provides evidence for a relationship between smoking exposure in movies and adolescent smoking behavior, but it also indicates avenues by which this risk of smoking initiation from exposure to smoking in movies can be reduced.

Given the serious public health concern, action to closely monitor and limit adolescent exposure to smoking in the movies is warranted. A number of recommendations can guide engaging the movie industry in a discussion and educating the many decision makers in the industry about the issue of smoking in the movies and adolescent tobacco use.

We recommend two strategies that the movie industry should consider to reduce smoking in the movies and combat the effect tobacco exposure has on youth.

Recommendation 1: First and foremost, we encourage the entertainment industries to create a set of self-regulatory strategies that closely limit and monitor youth exposure to smoking in the movies, television programming, and videos that combat the effect tobacco exposure has on youth's smoking attitudes and behavior. These strategies should both guide and educate the movie industry about the evidence linking smoking in the movies and adolescent tobacco use (e.g., Dalton et al. 2003; Sargent et al. 2005), as well as spark a cogent discussion within the industry and between the industry and policy makers.

We recommend a number of strategies and a range of options that the entertainment industries, and in particular the Motion Picture Association of America (MPAA), should adopt to reduce smoking in the movies. The industries' self-regulation should include but not be limited to the following possible options:

Recommendation 1a: The film rating board of the MPAA should consider the use of tobacco in the movies as a criterion in assigning mature film ratings (e.g., an R-rating indicating Restricted: no one under age 17 admitted without parent or guardian) to films that depict tobacco use.

A Ratings Board, which is appointed by the president of the MPAA, decides on ratings assigned to each movie. Currently, such ratings are based on the extent to which there is violence, language, nudity, sensuality, and drug abuse in the film. Tobacco use is not a criterion by which ratings are assigned. Assigning films with tobacco use a mature rating (R-rating) increases the likelihood that parents will restrict youth access to such films, a strategy that has been shown to reduce smoking initiation (Dalton et al. 2002a; Sargent et al. 2003; Sargent et al. 2004).

Recommendation 1b: The MPAA should encourage the use of antismoking advertisements before the film. As reviewed above, the effects of youth viewing smoking in the movies is reduced among youth who first viewed an antismoking advertisement (e.g., Edwards et al. 2004; Pechmann and Shih 1999).

Investigations of the effectiveness of antismoking advertisements with adolescents indicate strategies that are effective in reducing the influence of viewing smoking depictions in the media in general and can be applied to smoking depictions in the movies as well. Goldman and Glantz (1998) showed that messages that are aggressive, delegitimize the tobacco industry, deglamorize smoking, and portray the negative effects of secondhand smoke were the most effective messages for changing perceptions about the normality of smoking and reducing cigarette consumption (Goldman and Glantz 1998). A recent study of a specific antismoking advertising campaign (the Truth campaign) echoes the same results and found this counter-industry media campaign to be effective in increasing negative beliefs and attitudes about the tobacco industry and associated with lower receptivity to pro-tobacco advertising and less progression of smoking intention and behavior (Hershey et al. 2005).

Recommendation 1c: The MPAA should regulate smoking on all movie and television sets so as to minimize exposure to smoke among actors and crewmembers. Emphasis should also be given to banning smoking on all sets in which children, including child actors, are present.

Findings from the Environmental Protection Agency (EPA) and other studies showing the adverse health effects of secondhand smoke led the EPA to classify secondhand smoke as a human carcinogen (DHHS 2002a). The findings also led several states and municipalities to create laws restricting smoking in workplaces and other public places. Further, the *Healthy People 2010* objectives included a goal to reduce the percentage of nonsmokers exposed to secondhand smoke by 45 percent (DHHS 2000; DHHS 2002b). Reducing one's exposure to secondhand smoke should be applied to all individuals, but especially to infants, children, and youth for whom secondhand smoke has been shown to cause sudden infant death syndrome, low birth weight, chronic middle ear infections, and respiratory illnesses including asthma, bronchitis, and pneumonia (DHHS 1999). Many of these adverse health effects linked to secondhand smoke are expected to continue into adulthood, including increasing one's chance of developing lung cancer (Janerich et al. 1990).

Given that movie sets are workplaces, they should fall under similar regulations that restrict exposure to secondhand smoke among employees in other work settings. Further, the evidence summarized in this report strongly suggest that the MPAA, film directors, and other film producers should create extensive strategies to ensure that youth have limited exposure to tobacco smoke while on the movie and television sets. Such strategies adopted by the MPAA should include restricting the use of tobacco on the set unless absolutely necessary, reducing the number of times a scene that includes smoking is filmed, and creating as many outdoor scenes as possible.

Recommendation 2: Congress should appropriate the necessary funds to enable the U.S. Department of Health and Human Services to conduct a periodic review of a representative sample of movies, television programs, and videos that are offered at times or in venues in which there is likely to be a significant youth audience (e.g., 15 percent) in order to ascertain the nature and frequency of images portraying tobacco use. The results of these reviews should be reported to Congress and to the public.

Despite our overall recommendation that strategies to reduce youth exposure to the portrayal of tobacco use in movies, television, and videos should be implemented on a voluntary basis by the relevant entertainment industry and related trade associations, some independent oversight of these standards and strategies is warranted. Such oversight of industry accountability should be facilitated through public monitoring and awareness of industry practices. Accordingly, we recommend that the U.S. Department of Health and Human Services be authorized and funded to monitor these media practices and report to Congress and the public.

Recommendation 3: Finally, we encourage additional research on the effects of smoking in the movies on adolescent tobacco use. The research on how and the extent to which exposure to smoking in the movies influences adolescent tobacco use is still nascent and thus should be replicated and expanded. Current studies are a key step in the right direction, but there are questions that still must be addressed. For example, Dalton and colleagues' (2003) longitudinal study provided the most persuasive evidence that smoking depictions in movies influence adolescent smoking initiation (Dalton et al. 2003). However, the sample was predominately comprised of white, rural, nonsmoking youth and therefore should be replicated with a more diverse sample. Further, it is not clear how to measure cumulative effects of repeated exposure to smoking depictions from not only movies but also the combination of various media outlets. Sargent and colleagues' (2005) study provided the most comprehensive study

of a large, diverse group of adolescents and includes an impressive list of control variables, but the study's cross-sectional design still leaves unanswered questions (Sargent et al. 2005).

Measures of adolescent smoking in current research are also limited, with most studies focusing on smoking initiation (Dalton et al. 2003; Distefan et al. 2004; Sargent et al. 2004; Sargent et al. 2001; Sargent et al. 2002) or other factors such as intentions to smoke, susceptibility to smoking (Edwards et al. 2004; Hines and Saris 2000; McCool et al. 2004) or perceptions of smoking (Pechmann and Shih 1999; Watson et al. 2003). No information is available to date that indicates effects of smoking depictions in movies on long-term or addicted smoking. Another related issue is the lack of information about possible effects of exposure to smoking in movies depending upon different smoking status and experience of the adolescent. For example, results from Hines and Saris (2000) indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips. Additional prospective research is needed with nonsmokers to establish predictive relationships.

Another limitation of current research is determining whether adolescents with an interest in tobacco or with greater intentions to try cigarettes are more likely to attend to or notice smoking in movies. Adolescents who are more susceptible to smoking may pay more attention to smoking in films or admire stars who smoke more than less susceptible adolescents; the direction of this relationship is yet to be clearly answered. Although the Dalton and colleagues (2003) study provided evidence that movie exposure is predictive of initiation, the limitations of the study prevent definitive conclusions about causal relationships. Finally, finer-tuned measures of smoking exposure in movies are needed (Dalton et al. 2003). The specific factors of smoking depictions in movies that influence behavior must be identified, including possible genre-specific smoking depictions, smoking by actors with different character traits, and smoking in contexts with different situational and affective variables, and the way the gender and ethnicity of both actors and viewers influence interpretation of depictions, must be determined.

We thus recommend that further research be conducted in a number of areas. One question that remains to be answered by research is how the movies influence actual smoking behavior and whether viewing smoking depictions in the movies and other media has a lasting effect on continued smoking, since the crucial health issue of concern is adolescent smoking that results in health problems. Further, research on identifying the cumulative effect of advertising and other media depictions of smoking and movies is needed in order to gauge appropriate public health measures to address smoking in the movies. Finally, effects of exposure to smoking in the movies and other media must be considered within the entire context of variables that influences adolescent smoking, including parents, peers, and individual-level variables.

Table H-1 Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (Sargent et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent et al., 2003 Describe adolescents' exposure to smoking and examines how access to movies, parenting, and characteristics of the adolescent are associated with exposure to movie smoking	Cross sectional School based survey List of specific movies with smoking occurrences measured for each	Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA Mainly white rural population N=4919	<u>Exposure to smoking in films</u> : Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies (median=436; interquartile range=387-492) <u>Exposure to smoking in popular contemporary movies</u> : the ratio of individual participant exposure multiplied by total possible occurrences on the entire sample of 601 movies shown in box offices from years 1988-99 <u>Movie access</u> : cable movie channels at home, videotapes viewed in a week, and movie theater outings in a month <u>Parenting factors</u> : Restriction of R-rated movies, TV restriction, authoritative parenting measure <u>Characteristics of Adolescent</u> : age, sex, school performance, sensation seeking, rebelliousness, and self esteem	Participants had seen 30% of the movie sample (interquartile range=20-44%) which contained 1160 (640-1970) occurrences of movie smoking All movie access factors were strongly associated with exposure to adolescent exposure to movie smoking ($F=63.4$, adjusted $R^2=0.34$). Exposure increased by 10% (150 occurrences) for each additional movie channel and video watched per week. Movie theater outings more than once a month were associated with a 20% (300 occurrences) increase in movie smoking exposure. Adolescents who reported no parental restriction of R-rated movies had seen about 50% (650) more smoking occurrences, and those with partial restriction saw 260 additional occurrences, than adolescents with full restriction of R-rated movies. An effect was not found for parenting style on exposure to movie smoking. Lower exposure to movie smoking mediated the effect of little or no R-rated movie restriction on risk of trying smoking which dropped from OR 8.8 (5.6-13.9) to 5.4 (3.3-8.7), 95% CI when exposure was included in the logistic regression model. Adolescents with no TV restrictions saw 140 more occurrences of smoking than those with full TV restriction. Participants who rated above the median for sensation seeking and rebelliousness had seen respectively 200 and 120 more occurrences of smoking in movies.	Finer tuned measures of smoking exposure in movies is needed, including measuring the effects of lifetime exposure, and of different depictions of smoking that include different character traits and contextual variables.

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (Watson et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Watson et al., 2003</p> <p>Examined perceptions of smoking images in TV, movies, newspapers, and magazines to gauge the extent that adolescents notice smoking in the media, and how adolescents interpret social acceptability of smoking through visual cues</p>	<p>Focus groups</p> <p>Metropolitan high school based focus groups, 4 groups of each age: 13,14, 15, and 16</p> <p>Participant pool divided into smoker and non-smoker groups and then randomly Selected</p> <p>Media clips shown to the groups, each was rated and then discussed</p> <p>Preliminary focus groups used to develop semantic scales used in subsequent groups to rate the media items</p>	<p>High school students aged 13-16 years old from schools selected for a range of socio-economic backgrounds</p> <p>N=117</p>	<p><u>Media items:</u> a media placement company provided movie and TV segments, magazine photos, newspaper articles, and cartoons for popularity among 13-16 year olds that all depicted smoking by people ranging in physical characteristics such as age, sex, appearance, and clothing</p> <p><u>Questionnaires to guide group discussion:</u></p> <p><u>Semantic scales:</u> Social acceptability (cool, normal, rewarding), physical health effects (addictive, unhealthy), mental health effects (relaxing, exciting, happy), cosmetic/body image effects (attractive, classy)</p> <p><u>Indicate overall if the clip represented smoking as a good or bad thing to do</u></p>	<p>78% of the sample noticed and commented on the smoking images unprompted by facilitator</p> <p>64% of responses were positive for social acceptability, especially the social benefits of smoking</p> <p>negative physical health responses were 46%, and positive ratings were 33%, rarely sufficient information to rate the media item on physical health effects</p> <p>65% of mood ratings were positive, especially issues of stress relief and emotional control</p> <p>39% of ratings were positive and 44% were negative for appearance effects, most positive ratings were from depictions of physically attractive persons</p> <p>52% of the sample rated smoking as a good thing to do, 48% rated it as a bad thing</p>	<p>Not linked to behavior or intentions to smoke</p>

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al . 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2004</p> <p>To assess the effects of age, sex, smoking susceptibility, and ethnicity on smoking stereotypes, and the influence of emotional and image of smoking stereotypes on smoking susceptibility in adolescents</p>	<p>Cross sectional</p> <p>School-based survey</p> <p>List of possible image and emotional traits of general female and male smokers presented and rated</p>	<p>2 samples of adolescents from schools in Auckland, New Zealand</p> <p>N=3041</p> <p>Young adolescents: Mean age 12 yrs, 52.7% male, 55.5% European, 12.9% Maori, 13.5% Pacific island, 17% Asian, 5.7% other</p> <p>Older adolescents: mean age 18 yrs, 57.6% male, 53.9% European, 10.2% Maori, 19.5% Pacific Island, 19.3% Asian, 6% other</p>	<p><u>Smoking Susceptibility</u>: How likely to try a cigarette in the next year, how likely to be a smoker in the future on five point likert scale, all non-smokers who responded “probably” or “definitely” for both questions were defined as susceptible smokers</p> <p><u>Smoker Stereotypes</u>: “In general, do you think female (male) smokers in films tend to be...” range of actor traits presented on dichotomous yes/no scale, Stereotype data presented by category: <u>Emotional sensitivity stereotype</u>: depressed, bored, stressed, weak, angry and <u>Image stereotype</u>: stylish, tough smart, sexy, hard, healthy, intelligent</p>	<p><u>Age</u>: <u>Female smokers in film</u>: Younger adolescents were less likely than older adolescents to report female smokers as healthy and stressed but more likely to report female smokers in film to be angry <u>Male smokers in film</u>: Younger adolescents more likely than older adolescents to perceive male smokers as angry and depressed</p> <p><u>Gender</u>: <u>Female smokers in film</u>: Males more likely than females to perceive female smokers as sexy, intelligent, and healthy. Females more likely than males to perceive female smokers as stressed, bored, angry and depressed <u>Male smokers in film</u>: Females more likely than males to perceive male smokers as sexy, stressed, bored, angry, and depressed. Males more likely than females to perceive male smokers as stylish, intelligent, and healthy.</p> <p><u>Ethnicity</u>: <u>Female smokers in film</u>: Pacific more likely than European group to perceive female smokers as sexy, stylish, and intelligent. <u>Male smokers in film</u>: Pacific more likely to perceive male smokers as sexy, stylish, intelligent, bored, and depressed. Asian adolescents more likely to perceive male smokers as stylish and intelligent compared to other ethnic groups.</p> <p><u>Smoking Susceptibility</u>: Sexy and stylish were significantly associated with smoking susceptibility ($p's < .01$) for both female and male smokers in film.</p>	<p>Stereotypes measure based on linguistic trait matching from a generalized question rather than based on specific actors or viewed images</p>

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2001</p> <p>To explore how adolescents interpret smoking depictions in movies, whether they were aware of media tactics, and how smoking depictions relate to their surrounding culture</p>	<p>Qualitative focus groups conducted at school</p> <p>Grounded theory analysis of same gendered focus group discussions</p>	<p>Adolescents from schools in Auckland, New Zealand</p> <p>N=76</p> <p>Young adolescents: Age 12 & 13 yrs, 50% male, 615% European, 14% Maori, 9% Pacific island, 11% Asian, 5% other</p>	<p>List of themes to discuss: centered around experiences and attitudes of media imagery, desired images, self-image, recall of smoking images, images of smokers, perceptions of smoking among peers and adults, weight and stress factors in smoking</p>	<p>Participants perceived smoking depictions in movies as very prevalent and recognizable and regarded smoking depictions as a reflection of reality</p> <p>Nonchalant attitude towards inclusion of smoking depictions in movies and linked to the perception that smoking prevalence is high among peers and adults</p> <p>Smoking imagery in film may reinforce perceptions of smoking as stress relief, development of self-image, and a marker of adult independence</p>	<p>Relatively young adolescents and no systematic measure of smoking status of participants</p>

Table H-1. Exposure to Smoking Depictions in Movies Influences Adolescent Perceptions of Smoking (McCool et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2003</p> <p>To explore how older adolescents respond to smoking imagery in film and meanings and relevance to their beliefs about smoking</p>	<p>Qualitative focus groups conducted at school</p> <p>Grounded theory analysis of same gendered focus group discussions</p>	<p>Adolescents from schools in Auckland, New Zealand</p> <p>N=88</p> <p>Young adolescents: Average age 16 yrs, 46.6% male, 41% European, 29% Maori, 19% Pacific island, 8% Asian, 3% other</p>	<p>List of themes to discuss: centered around self-image, ideal images in popular culture, sub-culture affiliation and awareness, awareness and interpretation of smoking depiction in movies, symbolic significance of smoking images, media analysis skills, attitudes toward inclusion of smoking in media, media ‘immunity’ and perceived prevalence of smoking in reality</p>	<p>Participants were receptive to smoking depictions when used in a credible way to portray an emotional state, sub-culture affiliation, and lifestyle</p> <p>Experience as a smoker appeared to inflate credibility of depictions of smoking, particularly in gritty realism or drama</p> <p>Stereotypical images were readily recalled and appeared to support misconceptions of smoking, recall of images were associated with stress, anxiety, drug use, and seduction</p> <p>Smoking depictions in specific contexts hold specific meanings, realistic images were seen as salient representations of reality</p> <p>Pervasive and credible smoking scenes may offer support and reassurance to smokers or teens who are ambivalent about smoking</p> <p>Most responses were nonchalant about smoking depictions in film, indicating the pervasiveness of smoking</p> <p>Older teens tended to draw upon their own experience with tobacco use when interpreting smoking depictions in film</p>	<p>Unclear how the views expressed are shared among a larger sample of adolescents and how these influence smoking behavior</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Distefan et al. 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Distefan et al., 1999</p> <p>Examine the relationship between adolescents' favorite movie stars and smoking status while controlling for variables associated with smoking initiation</p>	<p>Cross-sectional</p> <p>Telephone surveys in English and Spanish</p> <p>Favorite actors elicited from participants and then ranked into the top ten mentioned, differences between non-smoker and smoker adolescents in their nominations examined</p>	<p>Adolescents aged 12-17 years from a random digit-dialing telephone survey of households in California</p> <p>N=6252 (71.2% of original sample of 8778)</p> <p>51.% male, 54.8% Caucasian, 25.2% Hispanic, 9.3% Asian, 7% African American, 3.4% other</p>	<p><u>Smoking status of favorite star:</u> Participants at baseline were asked to list their 2 favorite male and female movie stars. The top 10 stars listed by gender of participant determined and 50 films in the 3 years before the study (1994-96) were viewed to rate whether or not the star smoked on-screen in at least 2 of these films; smoking status of star in real life determined by print media coverage</p> <p><u>Smoking status of adolescent:</u> Positive responses to both, "Have you ever smoked a cigarette?" and "Have you ever tried or experimented with cigarette smoking, even a few puffs?"</p> <p><u>Control variables:</u> Exposure to parental and friend smoking, perceived safety of experimenting with cigarettes, rebelliousness, and receptivity to tobacco advertising and promotions</p>	<p>5 of the 6 favorite stars of adolescent smokers smoked in real life, compared to 1 of the 4 stars preferred by never smokers</p> <p>After controlling for other variables associated with adolescent smoking, adolescent never smokers who shared favorite stars with adolescent ever smokers were more likely to be susceptible to smoking than those who did not share stars with adolescent ever smokers (OR=1.35, 95% CI 1.12, 1.62; p<.01)</p>	<p>No link to actual smoking behavior</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Tickle et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Tickle et al., 2001</p> <p>Assess relation between adolescents' favorite movie stars smoking on screen and adolescent smoking status</p>	<p>Cross sectional</p> <p>School based survey</p> <p>Open-ended question elicited adolescents' favorite movie stars, list condensed to 43 film stars whose films between 1994-96 were evaluated for the star's smoking</p>	<p>Adolescents aged 10-19 years in grades 6-12 at 5 schools in New England, USA</p> <p>Mainly white rural population</p> <p>N=632 who had selected one of the 43 film stars identified for analysis</p> <p>Out of 1236 responses to open ended question to name favorite movie/film star, 228 stars named and analysis restricted to 43 stars who were named by at least 5 adolescents that had appeared in films within 3 precious years of study (1994-96)</p>	<p><u>Smoking status:</u> "Have you ever tried smoking cigarettes, even a few puffs?" and How many cigarettes have you smoked in your whole life?" Never: answered "no" and "none" to both q Experimental: smoked fewer than 100 cigarettes, and whether they had smoked in the last 30 days Smokers: smoked 100 or more cigarettes (Bogus pipeline procedure using saliva sample to increase validity of smoking reports)</p> <p><u>Smoking status index:</u> non-susceptible never smokers, susceptible never smokers, non-current experimenters, current experimenters, smokers</p> <p><u>Star tobacco use index:</u> Number of movies in sampling frame in which star smoked more than 2 times</p> <p><u>Control variables:</u> Family and friend smoking, receptivity to tobacco promotions, grade, sex, school performance</p>	<p>53% of adolescents selected stars who did not smoke on-screen</p> <p>After controlling for possible confounds, the odds of having a higher smoking status increased with higher number of incidence of on screen star smoking, for adolescents whose star smoked in 1 film, the odds of being higher in smoking status was 0.78 (95%CI, 0.53-1.15), for stars who smoked in 2 films, 1.53 (95%CI, 1.01-2.32), for stars who smoked in 3 or more films, 3.1 (95%CI 1.34-7.12)</p> <p>For never smokers, the same pattern was found in susceptibility to smoking, for adolescents whose star smoked in 1 film, the odds of being higher in smoking status was 2.16 (95%CI, 0.86-5.45), for stars who smoked in 2 films, 4.78 (95%CI, 1.60-14.23), for stars who smoked in 3 or more films, 16.18 (95%CI 2.33-112.61)</p>	<p>Cross sectional nature of study cannot determine whether adolescents who are more susceptible to smoking may pay more attention to smoking in films or admire stars who smoke more than less susceptible adolescents</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Distefan et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Distefan et al., 2004 Adolescents whose favorite movie stars smoke on-screen have a higher risk of smoking	Longitudinal Baseline telephone surveys in 1996 with follow up telephone surveys in 1999 Male and female actors elicited from participants, their on-screen smoking rated and then compared to other variables related to adolescent smoking	Adolescents aged 12-15 years from a random digit-dialing telephone survey of households in California N=2084 (67% of original sample of 3104) Never smokers from baseline sample used Non-participants more likely to be non-White, report average or below average school performance, and to have family members who were smokers	<u>Smoking status of favorite star:</u> Participants at baseline were asked to list their 2 favorite male and female movie stars. The top 10 stars listed by gender of participant determined and 50 films in the 3 years before the study (1994-96) were viewed to rate whether or not the star smoked on-screen in at least 2 of these films <u>Smoking status by follow up survey:</u> Positive responses to both, "Have you ever smoked a cigarette?" and "Have you ever tried or experimented with cigarette smoking, even a few puffs?" <u>Control variables: Receptivity to tobacco advertising and promotions:</u> "Have you ever bought or received for free any product which promotes a tobacco brand or distributed by a company?" and "Do you think you would ever use a tobacco industry promotional item, such as a t-shirt?" yes to either has high receptivity, low receptivity was unable to recall unaided a tobacco advertising brand or not having a favorite advertisement but able to name a brand most advertised, intermediate receptivity measured by having a favorite advertisement Exposure to parental and friend smoking, parental disapproval of smoking, school performance	34.5% of participants had favorite stars that smoked on-screen and the participants with smoking stars were more likely to be female (39.2% vs. 29.9%) and aged 14-15 years (40.7% vs. 29.5% aged 12-13 years at baseline) Adolescents with a favorite star who smoked on-screen were more likely to have smoked at follow up (OR=1.36; 95% CI=1.02-1.82) For adolescent females, having a favorite star who smoked on-screen increased the risk of smoking at follow up (OR=1.86;95% CI=1.26-2.73) when all other variables were controlled. When receptivity to tobacco advertising and gender was taken into account, an effect was found for adolescent females: 20% initiated smoking if at baseline they were minimally receptive and their favorite star did not smoke on-screen, compared to more than 50% of females who initiated smoking when at baseline they were highly receptive to advertising and had a favorite star who did smoke on-screen. For adolescent males, smoking initiation at follow up was only associated with receptivity to tobacco advertising and promotions but not to having a favorite star smoke on-screen	Only measures smoking initiation, no indication of continued or addicted smoking Further research needed to determine possible genre specific smoking depictions and how gender influences interpretation of depictions

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Hines et al. 2000)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Hines et al., 2000 To determine the effect of exposure to smoking in the movies on attractiveness of the character, urge to smoke, and likelihood of smoking in certain situations by smoking status and gender.	Controlled Experiments School based surveys and film showings during class Film clips depicting both smoking and non smoking by popular male and female actresses Ratings of character attractiveness and similarity elicited after each clip	College students at a Midwestern university in the United States as part of general psychology course requirement N=151 64 females, 84 males aged 17-41 years (x=20.08), 87% Caucasian, 9% African American, 2% Asian American, 1% Hispanic	<u>Exposure to smoking in the movies:</u> Film actors who were attractive and popular to 160 General psychology students. Eight 3-minute film segments depicting 4 male and 4 female actors smoking (experimental condition) and not smoking (control condition). Distractor clips depicting different actors not smoking were also included. <u>Rating of character attractiveness:</u> physically attractive, sexy, in shape, sophisticated, wise, adventurous, cool, sociable, popular, desirable for a date, feminine, and masculine (5-point Likert scale) <u>Rating of perceived similarity to character:</u> how much the character is "like me". <u>Smoking status:</u> smoking history and current smoking status elicited and participants categorized as regular (smoking every day and at least 100 cigarettes in lifetime), some-day (some days of the week and at least 100 cigarettes in lifetime), or nonsmokers (participants who did not meet above criteria) <u>Desire to smoke:</u> 7-point Likert scale <u>Smoking scenarios:</u> 18 scenarios of 3 different levels of cigarette availability (cigarette must be purchased or requested, cigarette is offered or pack is available, cigarette is being pushed by friends) rated likelihood of smoking on a 5-point Likert scale.	n.s. main effects and interactions found for ratings of the male actor attractiveness by the experimental condition and participant smoking status The effect of the experimental condition accounted for 9.3% of the variance in ratings of attractiveness, the interaction between the experimental condition and smoking status accounted for an additional 4.5% of the variance The experimental condition by gender by smoking status interaction for desire to smoke was significant $F(2, 143)=3.46$, $p=.03$ and accounted for 5% of the variance The main effect of experimental condition on likelihood of smoking was significant ($F(1,135)=7.44$, $p=.007$), with those who viewed the smoking clips ($x=2.5$, $SD=1.6$) reporting a greater likelihood of smoking than participants who viewed the nonsmoking clips ($x=2.2$, $SD=1.5$). This effect accounted for 5.2% of the variance The main effect of smoking status of participant on likelihood of smoking was also significant ($F(2,135)=446.75$, $p<.001$) with regular smokers ($x=4.7$, $SD=.5$) more likely to smoke than occasional smokers ($x=3.3$, $SD=1$) who were more likely to smoke than nonsmokers ($x=1.3$, $SD=.4$). This effect accounted for 86.7% of the variance	The results indicate that smoking status has a much stronger effect on likelihood of smoking than viewing smoking depictions in film clips. Further prospective research is needed with non-smokers to establish predictive relationships

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2005)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Sargent, et al., 2005</p> <p>Measure exposure to movie smoking in a nationally representative sample and determine whether exposure is associated with smoking initiation in adolescents</p>	<p>Cross-sectional</p> <p>Telephone based survey</p> <p>List of specific movies with smoking occurrences measured for each</p>	<p>Adolescents aged 10-14 years randomly selected across the USA</p> <p>Broad geographic regions across USA and different ethnic and racial groups</p> <p>N=6522</p>	<p><u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 500 movies from 1998-2002 and 32 movies during 2003; categorized into quartiles based on median number of smoking occurrences (46, interquartile range 19,88) for analysis.</p> <p><u>Smoking Initiation:</u> Any lifetime cigarette smoking by answering yes to the question, "Have you ever tried smoking a cigarette, even just a puff?"</p> <p><u>Controlled variables:</u> age, sex, parent education, self-reported school performance, sensation seeking, rebelliousness, self esteem, parent, sibling, friend smoking, parenting style, weekly spendable income, access to cigarettes in the home, extracurricular activities, weekday TV watching, weekday videogame use, self regulation, parental oversight of smoking behavior, and parent report of household income.</p>	<p>Exposure to smoking in movies was an average of 61 occurrences (mean number of 13 (SE:0.11) movies seen by participants from the randomized list of 50).</p> <p>Exposure was higher among Hispanic (65 occurrences; SE: 2.1) and black (74 occurrences; SE: 2.7) adolescents compared to white adolescents (57 occurrences; SE: 0.9; p<.001)</p> <p>The proportion of adolescents who tried smoking increased with each quartile of exposure to smoking in movies: quartile 1= 0.02, quartile 2= 0.06, quartile 3= 0.11 & quartile 4= 0.22, consistent across racial/ethnic groups and no difference between region of the country</p> <p>In addition, when controlling for all possible confounding variables, adolescents with higher exposure to smoking in movies had significantly higher odds of trying smoking when compared to quartile 1: quartile 2= OR 1.7 (1.1-2.7) CI 95%; quartile 3= OR 2.0 (1.2-3.1); and quartile 4= OR 2.7 (1.7-4.2).</p> <p>Attributable risk, determined by setting movie smoking to quartile 1 for adolescents in higher quartiles and holding other risk factors constant, was 0.38 (0.20-0.56) CI 95%. Thus, exposure to smoking depictions in movies is an independent, primary risk factor for smoking initiation in 38% of adolescents in the sample who tried smoking.</p>	<p>Not longitudinal and therefore cannot assess temporal sequence or causation</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent et al., 2001 Exposure to movie smoking associated with smoking initiation in adolescents	Cross-sectional School based survey List of specific movies with smoking instances measured for each	Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA Mainly white rural population N=4919	<u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 601 movies from 1988-99, categorized into 4 groups for analysis 0-50 (26.4% of sample), 51-100 (28.7%), 101-150 (19.5%), and >150 (25.4%). <u>Smoking Initiation:</u> Any lifetime cigarette smoking <u>Controlled variables:</u> age, sex, school, parent education, self-reported school performance, sensation seeking, rebelliousness, self esteem, receptivity to tobacco advertising, authoritative parenting, parental disapproval of smoking, and parent, sibling, friend smoking	Exposure to smoking in movies increased with age, lower school performance, and higher levels of sensation seeking and rebelliousness More males than females had exposure to smoking in movies (mean=126 SD: 88 vs. mean= 95 SD: 72, p<.0001) The proportion of adolescents who tried smoking increased with more exposure to smoking in movies as follows, 0-50 occurrences 4.9% (64) tried smoking, 51-100 occurrences 13.7% (194), 101-150 occurrences 22.1% (212), >150 31.3% (391), independent of age p<.0001 In addition, when controlling for possible confounding variables, adolescents with higher exposure to smoking in movies had significantly higher odds of trying smoking: 51-100 occurrences OR 1.9 (1.3-2.7) CI 95%, 101-150 occurrences OR 2.6 (1.8-3.7), >150 occurrences OR 2.5 (1.7-3.5)	Sample mainly white rural population of non-smokers Smoking occurrence is so prevalent in R-rated films, may not be able to determine independent effect of exposure to smoking from other R-rated movie content

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Sargent et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Sargent et al., 2002</p> <p>Higher exposure to smoking in movies among never smokers will be associated with more favorable attitudes toward smoking initiation</p>	<p>Cross sectional</p> <p>School based survey</p> <p>List of specific movies with smoking occurrences measured for each</p>	<p>Adolescents aged 9-15 years in grades 5-8 at 14 schools in New England, USA</p> <p>Mainly white rural population</p> <p>N=3702</p> <p>Only participants who reported no lifetime smoking experience were eligible</p> <p>Non-participants were more likely to be in 5th and 6th grade, to have parents, siblings, and friends who smoke; and have lower school performance compared with participants. No differences in attitudes toward smoking were found, except more likely to view adult smoking as normative than participants</p>	<p><u>Exposure to smoking in movies:</u> Total number of smoking occurrences viewed in a random subset of 50 movies selected from 601 movies from 1988-99, categorized into 4 groups for analysis: 0-50 (30% of sample), 51-100 (30%), 101-150 (19%), and >150 (21%).</p> <p><u>Smoking susceptibility:</u> intentions: “Do you think you will smoke a cigarette in the next 6 months?” and resistance to peer smoking: “Would you smoke a cigarette if your best friend offered you one?”</p> <p><u>Normative peer smoking:</u> “I think most kids in my school smoke”</p> <p><u>Normative adult smoking:</u> “I think most adults smoke”</p> <p><u>Positive expectations of smoking:</u> enjoyment, something to do when bored, deal with problems or stress, stay thin, feel more comfortable at parties, relaxing, look older dichotomized y/n and then summed into an index ranging from 0 to 7</p> <p><u>Controlled variables:</u> grade, school, self-reported school performance, sensation seeking, rebelliousness, self esteem, receptivity to tobacco advertising, parent education, authoritative parenting, and parent, sibling, friend smoking</p>	<p>Exposure to smoking in movies increased with higher grade in school, lower school performance, higher levels of sensation seeking and rebelliousness, and lower levels of self esteem.</p> <p>More males than females had exposure to smoking in movies (mean=115, SD: 84 vs. mean= 87, SD: 68)</p> <p>Positive attitudes increased with more exposure to smoking in movies: 14% of never smokers in lowest quartile of exposure were susceptible to smoking vs. 36% who were in the highest quartile (p<.001)</p> <p>14% in the lowest category of exposure endorsed >2 positive expectations compared to 31% in the highest category of exposure (p<.0001)</p> <p>Associations were found between higher exposure to smoking in movies and smoking susceptibility (OR 1.60, 95% CI 1.24-2.07), normative adult smoking (OR 1.37, 95% CI 1.09-1.71), and positive expectations from smoking (OR 1.38, 95% CI 1.13-1.70)</p> <p>Exposure to 50 occurrences of smoking in movies (about 5 R-rated movies) has a moderate effect on attitudes, similar to other social influences such as having family members or friends who smoke (OR 1.16 (.97-1.39) 95% CI) for 0-50 occurrences vs. (OR 1.31 (1.05-1.62) 95% CI) for 51-100 occurrences</p> <p>No association was found between higher exposure to smoking in movies and peer norms of smoking when controlling for sociodemographics, social influences, and personality factors</p>	<p>Sample mainly white rural population of non-smokers</p> <p>Cannot determine if positive smoking attitudes are due to another unknown variable which in turn leads adolescents to seek out movies with smoking or other adult behaviors</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Dalton et al. 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Dalton et al., 2003 Exposure to movie smoking predicts smoking initiation in adolescents	Longitudinal Baseline school-based surveys and follow up phone interviews 13-26 months later List of specific movies with smoking occurrences measured for each	Adolescents aged 10-14 years in grades 5-8 at 14 schools in New England, USA N=2603 Only participants who reported no lifetime smoking experience on baseline were eligible for follow up interviews Non-participants comparable to participants in age, sex, grade, and exposure to movie smoking but were more susceptible to smoking at baseline; were more likely to have parents, siblings, and friends who smoke; and were more likely to have lower school performance	<u>Exposure to smoking in movies:</u> Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies selected from 601 movies from 1988-99, classified into quartiles (0-531, 532-960, 961-1664, 1665-5308) <u>Child characteristics:</u> sex, age, school, self-reported school performance, sensation seeking, rebelliousness, self esteem <u>Social influences on smoking initiation:</u> Parent, sibling, friend smoking, receptivity to tobacco advertising <u>Parenting characteristics:</u> parent education, authoritative parenting, and adolescent perceptions of parental disapproval of smoking <u>Smoking Initiation:</u> Any lifetime cigarette smoking reported on follow up survey	Participants saw 32% (n=16) of the 50 movies on the survey for a total mean of 98.5 (SD=75.1) smoking occurrences Females saw a mean of 14.6 (SD=7.4) movies with a mean of 85.1 (SD=66.4) occurrences vs. Males saw a mean of 17.1 (SD=8.2) movies and a mean of 113.5 (SD=81.2) smoking occurrences Smoking in movie exposure was positively associated with sensation seeking and rebelliousness and negatively associated with school performance and measures of authoritative parenting 10% (259) of participants initiated smoking and of those 208 reported “just a few puffs” and 6 reported more than 100 cigarettes After controlling for age, sex, and school adolescents with the highest exposure to smoking in the movies were 2.71 (95%, CI 1.73-4.25) times more likely to initiate smoking compared to adolescents with the lowest exposure The effect of exposure to smoking in movies was stronger for adolescents whose parents did not smoke than for adolescents whose parents smoked 52.2% of smoking initiation was attributed to smoking in movies exposure	Sample mainly white rural population of non-smokers Did not control for age, as increase in age also increase in exposure to smoking, how to measure the cumulative exposure? Unable to separate out effects of R-rating and smoking content of movies since many R-rated movies contain smoking thus another aspect of R-rated movies may influence smoking initiation

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Gutschoven and Van den Bulck 2004)

Authors and Re-search Question	Methods	Sample	Measures	Findings	Limitations
<p>Gutschoven & Van den Bulck, 2004</p> <p>Examining the relationship between television viewing and the amount of cigarettes smoked by adolescent smokers per time unit</p>	<p>Cross-sectional</p> <p>School bases survey conducted in assembly setting</p>	<p>Adolescents average age 16.51 (SD=.81) in schools in Flanders, Belgium</p> <p>N=421</p> <p>Only participants who reported smoking at least one cigarette in the past year were used for analysis</p>	<p><u>Television viewing time:</u> total television viewing in hours per week</p> <p><u>Cigarette smoking:</u> variable calculated into number of cigarettes smoked per week</p> <p><u>Self-assessed health:</u> How healthy you feel and how many days in the past year unable to attend school because of sickness</p> <p><u>Control variables:</u> sex, educational level (general, technical, and vocational), peer smoking, frequency of going out to taverns, pubs, bars, discos, parties, etc., parental smoking</p>	<p>Smokers watched an average of 3.04 hours a day of television</p> <p>Males (3.14, SD=1.44) watched more TV than females (2.48, SD=1.35; t=2.648, df=415, p=.0008)</p> <p>Smokers of the highest (general) educational level (2.32m SD=1.17) watched significantly less TV than smokers in the technical (3.09,SD=1.42) and vocational levels (3.32, SD=1.52; F (2416)=64.821, p=.0001)</p> <p>Smoking volume was correlated with self-assessed health, even when controlling for level of education and age (r = -0.11, p=.03) with heavier smokers feeling less healthy and this was also found between volume and days off sick (r = .28, p<.0001).</p> <p>Television viewing was a significant predictor of smoking volume, with smokers who watch 5 or more hours a day smoke between 60 and 147 more cigarettes per week than those who watch 1 hour or less a day. Television viewing explained an additional 3% of the variance (F(8399)= 30.975, Model R² = .383, p<.0001) when gender, educational level, parental and peer smoking, and frequency of going out was accounted for in the model.</p>	<p>Definition of smokers for sample inclusion was unclear, not well defined</p> <p>Unable to separate out direction of the relationship, smokers may watch more TV due to an unmeasured variable.</p> <p>School performance was not measured</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Gidwani et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Gidwani et al., 2002</p> <p>Determine whether youth with greater exposure to television exhibit higher rates of smoking initiation</p>	<p>Longitudinal</p> <p>Annual interviews from the National Longitudinal Survey of Youth (NLSY) compared between 1990-1992</p>	<p>Adolescents from 10 to 15 years old mean age 11.5 years from the NLSY nationally representative sample of youth which was over sampled for African American, Hispanic American, and poor non-Hispanic white populations</p> <p>N=592</p> <p>Only participants who had completed reports of television viewing and no smoking before 1990</p>	<p><u>Television viewing time:</u> average television viewing in hours per day categorized into 0-2, >2-3, >3-4, >4-5, and >5 hours per day</p> <p><u>Initiation of smoking:</u> self-reported smoking in the last 3 months</p> <p><u>Control variables:</u> ethnicity, household poverty, marital status, number of children in household, maternal education, intelligence, employment, gender, baseline aptitude scores</p>	<p>Smoking increased from 4.8% in 1990 to 12.3% in 1992</p> <p>Average hours of television viewing was 4.8 hours in 1990, of the participants who initiated smoking in 1992, 42% viewed >5 hours of television per day</p> <p>Dose-response relation was found between amount of TV viewing and smoking initiation when taking control variables into account: adolescents who watch >5 hours of TV per day were 5.99 times more likely to initiate smoking (P=.02; 95%CI:1.39-25.71) than adolescents who watched 0-2 hours a day.</p> <p>Similarly, adolescents who watched >4-5 hours per day were 5.24 times more likely to initiate smoking than adolescents who watched 0-2 hours per day (P=.03; 95% CI: 1.19-23.10)</p>	<p>Content of TV viewing, peer smoking, and exposure to other media were not measured</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (McCool et al. 2005)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>McCool et al., 2005</p> <p>To assess the media interpretation model of adolescents' exposure to smoking in film, perceptions of smoking imagery in film, and smoking intentions</p>	<p>Cross-sectional</p> <p>School based surveys during required class or after-school assembly</p>	<p>Two samples of adolescents median age 12 and median age 16 years from schools in Auckland, New Zealand</p> <p>N=3041</p> <p>Ever smoker 12 yrs cohort: 28.8% and 16 yrs cohort: 66.4%</p>	<p><u>Film experiences:</u> film exposure, perception of smoking depiction frequency, nonchalant attitudes toward smoking in movies, positive stereotypes of smokers in movies</p> <p><u>Smoking beliefs and intentions:</u> perceptions of smoking prevalence, attitudes towards smokers, intentions to smoke</p>	<p>Film exposure predicted higher levels of perceived smoking frequency and nonchalant attitudes about smoking imagery</p> <p>24% of the variance of smoking intentions was accounted for by the media interpretation model</p> <p>Perceptions of smoking were prevalent, non-judgmental attitudes toward smoking and positive smoker stereotypes independently accounted for variance within smoking intentions</p>	<p>Direction of influence of noticing smoking depictions and perceptions of smoking frequency is unclear</p> <p>Smoking experience was not taken into account</p>

Table H-2. Exposure To Smoking Depictions In Movies Increases Risk For Smoking Initiation (Goldberg 2003)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Goldberg, 2003</p> <p>Examine the relationship between level of exposure to American movies and videos, exposure to American cigarette advertising and access to promotional products for cigarettes, and smoking behavior including exploratory puffing, cigarettes smoked in the last week, and intentions to smoke in the future</p>	<p>Cross-sectional</p> <p>School based surveys during free class time</p>	<p>Adolescents aged between 14 and 16 years from schools in Hong Kong</p> <p>N=3041</p> <p>Ever smoker 12 yrs cohort: 28.8% and 16 yrs cohort: 66.4%</p>	<p><u>Film exposure:</u> Number of American movies and videos seen over the past 2 months</p> <p><u>Smoking behavior and intentions:</u> ever puffed a cigarette, smoked in the last 7 days, expectations of smoking cigarettes one year from now</p> <p><u>Brand of cigarette smoked and brand of cigarette advertising recalled</u></p> <p><u>Number of cigarette promotional products owned</u></p>	<p>Adolescents had seen an average of 1.4 American movies and 1.2 American videos</p> <p>Significant differences in smoking experience and intentions found between adolescents who saw 0-1 movies vs. 4 or more movies (34% vs. 47% and 21% vs. 30%, $p < .01$, Chi square values not reported)</p> <p>Significant differences in smoking experience, current smoking, and intentions to smoke found between adolescents who reported seeing 0-5 cigarette advertising products vs. 9 or more products (28% vs. 50%; 13% vs. 27%; 16% vs. 34%, $p < .001$)</p> <p>Significant differences in smoking experience, current smoking, and intentions to smoke found between adolescents who reported owing no vs. 2 or more cigarette promotional products (34% v.71%, 16% vs. 44%, 22% vs.58%; $p < .001$)</p>	<p>Depictions of smoking in movies not measured</p> <p>Direction of influence not discernable</p> <p>No other variables controlled for or measured</p>

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Pechmann and Shih, 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Pechmann and Shih, 1999</p> <p>Experimental design to test rival theses about the effects of smoking in movies on adolescents and whether these effects can be nullified with antismoking advertising</p>	<p>Controlled Experiments</p> <p>School based surveys and film showings during class</p> <p>Study 1: Clips of 2 films with smoking either present or professionally edited out</p> <p>Study 2: Entire feature length film with smoking present or edited out</p> <p>Ratings of arousal and smoking perceptions elicited after each scene in both studies</p>	<p>9th graders aged 14-15 years from southern California</p> <p>Non smokers, half female</p> <p>Study 1: N= 607; 75% Caucasian</p> <p>Study 2: N= 232; 50% Caucasian, screened out if already seen stimulus movie</p>	<p><u>Study 1:</u> <u>Smoking in Movies:</u> 14 scenes from 2 feature films (16 minutes of total footage) that included high and low positive arousal scenes with a female and a male star who either originally smoke in the scene or the smoking is professionally edited out of the scene</p> <p><u>Positive arousal:</u> Each scene rated sad vs. happy and boring vs. exciting</p> <p><u>Perceptions of Smokers:</u> “How does a teenager who smokes cigarettes look to you?” (1-9, 9= most favorable), rating teenage smokers on 4 factors: stature (intelligent, smart, rich, successful), vitality (healthy, well, fit, athletic, clean, good-smelling), popularity (well-liked, fun to be with, desirable to date, sexy, cute, good-looking), and poise (confident, comfortable around others, own person, free to make own decisions, contented, relaxed), and “If you were to smoke a cigarette, how do you think it would make you feel?”, rating on same 4 factors</p> <p><u>Study 2:</u> <u>Smoking in Movies:</u> original version of feature film <i>Reality Bites</i>, 12 (30%) out of 40 scenes depicted smoking, a total of 99 minutes of footage, and version of same film with smoking, cigarettes, ash trays,</p>	<p><u>Study 1:</u> The smoking vs. nonsmoking scenes elicited more positive arousal ($x=3.42$ vs. 3.19; $F(1596)=10.06$, $p<.01$); more positive perceptions of how smokers are perceived by others in stature (3.58 vs. 3.13, $F(1601)=7.49$, $p<.01$) and vitality (3.16 vs. 2.76, $F(1601)=4.86$, $p<.01$); and more positive perceptions about how a smoker perceives their own stature (3.63 vs. 3.27, $F(1601)=5.85$, $p<.01$)</p> <p><u>Study 2:</u> In control ad condition, the smoking vs. nonsmoking scenes elicited more positive arousal ($x=4.35$ vs. 4.03, $t=2.19$, $p<.05$); more positive perceptions of how smokers are perceived by others in stature (3.91 vs. 3.13, $t=2.33$, $p<.05$); more positive perceptions of smoker self-perception of stature (3.80 vs. 2.96, $t= 2.32$, $p<.05$); and more intentions to smoke (1.91 vs. 1.59, $t=1.88$, $p<.05$). In the antismoking ad condition, the smoking scenes did not differ from the other scenes ($p<.05$)</p> <p>Significant interactions were found between the ad conditions and smoking depictions with the level of positive arousal ($F(1227)=6.91$, $p<.01$); other’s perceptions of a smoker’s stature ($F(1228)=4.82$, $p<.05$); smoker’s perception of their own stature ($F(1228)=4.88$, $p<.05$); and participants’ intent to smoke ($F(1203)=4.88$, $p<.05$)</p> <p>In the antismoking ad, more negative thoughts were generated when the lead characters were smokers vs. nonsmokers (2.37 vs.1.31, $t=2.70$,</p>	<p>Outcome measure was not actual smoking behavior</p> <p>Reactions were measured after each scene which could have influenced results</p> <p>Smoking depictions limited to one movie, further research is needed with more smoking depictions in movies</p>
Pechmann and Shih,					

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Pechmann and Shih, 1999)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
1999 (Cont)			<p>and secondhand smoke professionally edited out</p> <p><u>Positive arousal and Perceptions of Smokers:</u> Same as above</p> <p><u>Anti-Smoking Advertisement:</u> 30-second television spot of negative caricatures of a smoker vs. control advertisement on AIDS with same length and format of caricatures</p> <p><u>Intentions to Smoke:</u> "Do you think that you will smoke at any time during the next year? and Would you smoke if your best friend dared you?" (1=definitely not, 4=definitely yes)</p> <p>Ad-induced increases in negative smoker-related thoughts (positive, negative, or neutral)</p> <p>Extensive manipulation and suspicion checks also included</p>	<p>p<.01), this was not found in the control ad condition. Significant interaction between the ad conditions and smoking depictions with the number of negative thoughts about the lead characters (F(1188)=6.98, p<.01)</p>	

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Edwards et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Edwards, et al., 2004 Evaluate the effect of anti-smoking advertisement on women's perceptions of smoking in movies and their intentions to smoke	Quasi-experimental Surveys administered after viewing movies in movie theater to patrons who looked between 12 and 17 years old Five movies with various amounts of smoking viewed in 'real-world' movie theaters Control condition: no ad was shown before the movie (week 1) Experimental condition: Anti-smoking advertisement shown before the movie (week 2)	Female movie theater patrons aged 12-17 years in Sydney, Australia N=2038 Mean age=13.9 years (SD=1.58) Age not evenly distributed for 16 and 17 year olds 9.2% reported smoking cigarettes in the previous 4 weeks	<u>Movie exposure to smoking:</u> 5 movies on "Screenit", an internet film review site were identified for varying levels of smoking depiction <u>Perceptions of smoking in movies:</u> whether smoking was present in the movie seen and which characters smoked, answer to question: "was it ok the characters were smoking?" 5-point Likert scale responses <u>Smoking history and intentions:</u> "have you smoked cigarettes in the last 4 weeks?" and "do you think you will be smoking cigarettes this time next year?" 7-point Likert scale <u>Anti-smoking advertisement:</u> A national anti-tobacco campaign's ad was modified with an anti-smoking voice-over by a popular female teen star was shown before the movie	Nonsmokers who saw the ad were more likely to see smoking as "not ok" (48.2%) vs. nonsmokers who did not see the ad (25.2%, $X^2=83.11$, $df=3$, $p=.0001$); this difference was maintained when age and movie exposure differences were adjusted for (Wald $X^2=75.784$, $df=1$, $p=.0001$). No effect was found for smokers ($X^2=2.52$, $df=2$, $p=.28$), even when age and movie were accounted for (Wald $X^2=1.37$, $df=1$, $p=.242$). No overall effect was found for the intervention on intentions to smoke ($X^2=3.26$, $df=2$, $p=.196$). When smokers and nonsmokers were analyzed separately, smokers were more likely to not intend to smoke (31.9% vs. 47.8%; $X^2=9.03$, $df=2$, $p=.01$), and when age and movie were accounted for the intervention group of smokers continued to have lower intentions to smoke (Wald $X^2=4.59$, $df=1$, $p=.03$). No effect was found for nonsmokers ($X^2=.97$, $df=2$, $p=.62$), even when age and movie were accounted for (Wald $X^2=1.25$, $df=1$, $p=.263$). .	No baseline information about perceptions of smoking or intentions to smoke. Sampling strategy open to researcher bias and may not be representative.

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Dixon 2001)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
<p>Dixon, 2001</p> <p>Assess public perceptions of the tobacco industry and tobacco use intentions after watching the movie <i>The Insider</i></p>	<p>Quasi-experimental</p> <p>Surveys administered before and 2 weeks after viewing movies in a movie theater for a free movie pass</p> <p>Control movie: <i>Erin Brockovich</i></p>	<p>Commercial theater patrons between ages 15-60+ years (majority between 20-39 years) in Melbourne, Australia</p> <p>N=322, <i>Insider</i> viewers =182 <i>Brokovich</i> viewers=141</p> <p>Only participants who had not seen either movie were included in the sample</p> <p>Both sets of viewers had comparable smoking status (majority non-smoker) and education.</p>	<p><u>Film conditions:</u> both rated “M15+” which means viewers 15 year or under not admitted unless with a parent or adult guardian</p> <p><i>The Insider</i> was a tale of a whistleblower of the tobacco industry cover up of the harmful health effects of their products. <i>Erin Brokovich</i> which had an analogous plot but without the tobacco industry content.</p> <p><u>Perceptions of different professions:</u> List of professions were presented and rating on “ethics and honest” and “power” elicited. Statements of agreement presented about business conduct of tobacco industry and other industries.</p> <p><u>Intentions to smoke:</u> “Do you think you will be smoking cigarettes this time next year?”</p> <p><u>Perception of smoking prevalence:</u> in real life and in movies compared to real life</p>	<p>Patrons who viewed <i>The Insider</i> held more negative views of the tobacco industry business conduct than those who saw the control movie, even when pre-existing attitudes were controlled for (pre-film means = 1.68 vs. 1.78, post-film means = 1.63 vs. 1.90, F(1, 242)= 3.09, p=.0004)</p> <p>Viewing <i>The Insider</i> was also associated with short term reductions in intentions to smoke (pre-film mean = 1.97 (SD: 1.57) vs. post-film mean = 1.76 (SD: 1.44) F(4,188)=114.97, p<.001).</p>	<p>No baseline information about perceptions of smoking or intentions to smoke.</p> <p>Self-selection bias of viewing <i>The Insider</i> and non-equivalent control movie make the intentions finding difficult to interpret.</p>

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Sargent et al. 2004)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Sargent, et al., 2004 Examine the effect of parental R-rated movie restriction on adolescent smoking initiation	Longitudinal School-based surveys at baseline and follow up phone interviews 13-26 months later List of specific R-rated movies with smoking occurrences measured for each	Adolescents aged 10-14 years at 14 schools in New England, USA N=2596 Only participants who reported no lifetime smoking experience on baseline were eligible for follow up interviews Non-participants comparable to participants in age, sex, grade, and parental R-rated movie restriction but were more slightly more susceptible to smoking at baseline; were more likely to have parents, and friends who smoke; have parents who did not complete high school and were more likely to have lower school performance	<u>Exposure to smoking in R-rated movies:</u> Ratio of total number of smoking occurrences viewed by total possible number of smoking occurrences in a subset of 50 movies selected from 601 movies from 1988-99, adolescents classified into 3 categories of R-rated movie exposure: no exposure (n=594), low (n=1109, exposure to 1-499 occurrences of R-rated movie smoking), and high (n=893, exposure to 500-3376 occurrences) <u>Parental Restriction of R-rated movies:</u> "How often do your parents let you watch movies or videos that are rated R?" responses ranged from "never" to "all the time" and then coded into 3 categories: greater strictness (score moved to more restrictive category during follow up), greater leniency (score moved to a less restrictive category), or no change <u>Confound variables:</u> sex, age, school, self-reported school performance, sensation seeking, rebelliousness, self esteem; Parent, sibling, friend smoking, receptivity to tobacco advertising; parent education, authoritative parenting, and adolescent perceptions of parental disapproval of smoking <u>Smoking Initiation:</u> Any lifetime cigarette smoking reported on follow up survey	Exposure to R-rated movie smoking decreased significantly (p<.001) with increasing parental restriction, adolescents who were "never" allowed to view R-rated movies had low exposure to R-rated movie smoking (4.9%), compared to 20% for adolescents allowed to watch them "once in while", and 54% for adolescent allowed to "sometimes/all the time" After controlling for confound variables, risk of smoking initiation increased with decreased parental restriction from viewing R-rated movies RR 1.8(95% CI 1.1-3.1) for "once in a while" vs. RR 2.8 (95% CI 1.6-4.7) for "sometimes" or "all the time" This pattern was even more pronounced for adolescents from non-smoking families (RR 4.3 (95% CI, 1.4-13) when "once in while" vs. "sometimes, all the time" RR 10 (95% CI 3.6-31) compared to adolescents from families that smoke (RR 12 (4.1-37) for "once in a while" vs. "sometimes, all the time" RR 13 (4.4-38) Decreased parental restriction was associated with higher risk of smoking initiation and increased restriction with decreased risk, compared with adolescents reporting no change.	Only measures smoking initiation, no indication of continued or addicted smoking

Table H-3. The Effects of Smoking in Movies Can Be Reduced by Anti-Smoking Advertisements and Parental Restriction of R-Rated Movies (Dalton et al. 2002)

Authors and Research Question	Methods	Sample	Measures	Findings	Limitations
Dalton et al., 2002 Examine the effect of parental R-rated movie restriction on adolescent smoking and alcohol use	Cross-sectional School-based surveys List of specific R-rated movies elicited whether student had seen or not	Primarily White (93%) adolescents average age 12 years at 30 schools in New England, USA N=4544	<u>Exposure to smoking in R-rated movies:</u> List of a subset of 50 movies selected from 603 movies from 1988-99 rated on whether participant saw movie or not <u>Parental Restriction of R-rated movies:</u> "How often do your parents let you watch movies or videos that are rated R?" responses ranged from "never" to "all the time" <u>Confound variables:</u> sex, school, grade, school performance, sensation seeking, rebelliousness, self esteem; parent education, parental disapproval of smoking, maternal supervision and responsiveness <u>Whether participant ever tried smoking or alcohol:</u> "How many cigarettes have you smoked in your life?" any answer of "just a few puffs" or more coded as tried smoking. "Have you ever had beer, wine, or other drink with alcohol that your parents didn't know about?" yes or no.	Trying smoking prevalence was 35% for no restriction of R-rated movies, 12% for partial restrictions, and 2% with complete restrictions. Trying alcohol prevalence was 46% for no restrictions, 16% for partial restriction, and 4% with complete restriction. When R-rated movies were completely restricted, adolescents were less likely to smoke (Relative Risk 0.29, 95% CI, 0.19-0.45) and drink alcohol (Relative Risk 0.30, CI, 0.21- 0.42) compared with no restrictions of R-rated movies, even after controlling for confound variables.	Not a clear measure of smoking depiction exposure Only measures trying behavior, not continued use Not clear that other variables associated with smoking and drinking behavior, e.g. peer behaviors, account for findings

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I

State Statutes Governing Direct Shipment of Alcoholic Beverages to Consumers: Precedents for Regulating Tobacco Retail Shipments

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An important issue in contemporary tobacco control is the regulation of the conditions under which it is permissible for internet retailers or mail-order companies to ship tobacco directly to consumers. Given the difficulty of policing Internet tobacco transactions and constitutional barriers to additional, state-imposed delivery requirements, the only practical way to effectively regulate online tobacco retailers is through legislation prohibiting both online tobacco sales and direct shipment of tobacco products to consumers. Statutes restricting direct shipment of alcoholic beverages provide a precedent for such legislation because most states either explicitly prohibit direct shipment to consumers or do so practically by requiring that all transactions for alcoholic beverages take place within the state's licensed distribution system. Under a similar legislative scheme, shipment of tobacco products would be restricted to licensed wholesale or retail outlets, and consumers would only be permitted to purchase these products only in face-to-face transactions in licensed retail settings. Such legislation would be effective at a state level, as the New York statute banning direct shipment has demonstrated (*Brown & Williamson Tobacco Corp. v. Pataki*, 2003), or at a federal level, enforceable by the Bureau of Alcohol, Tobacco, Firearms, and Explosives.

To facilitate a better understanding of the range of mechanisms available for the regulation of online and mail-order tobacco purchases, the following pages review state statutes regulating shipments of alcoholic beverages. Of the states that ban alcohol shipment directly to consumers, most have enacted such prohibitions with respect to all alcoholic beverages, including wine, beer, and liquor. State statutes restricting direct shipment to consumers typically require that individuals importing alcoholic beverages from outside the state hold a commercial wholesaler's or importer's license.¹ Under tiered distribution systems, manufacturers may sell alcoholic beverages to licensed wholesale distributors, who may sell to retailers, who, in turn, make the products available to consumers. By requiring that all direct shipments take place within this system,

¹ Ark. Code Ann. § 3-7-106 (2005); Cal. Bus. & Prof. Code § 23661 et seq. (2005); Colo. Rev. Stat. § 12-47-901 (2004); Del. Code Ann. tit. 4, §§ 501, 526 (2005); Fla. Stat. Ann. § 561.545 (2005); Ga. Code Ann. § 3-3-32 (2004); Idaho Code §§ 23-102, 23-1055 (2005); 235 Ill. Comp. Stat. 5/6-29.1 (2005); Ind. Code Ann. § 7.1-5-11-1.5 (2004); Iowa Code § 123.22 (2004); Kan. Stat. Ann. §§ 41-104, 41-306 (2005); Ky. Rev. Stat. Ann. § 244.165 (2004); La. Rev. Stat. Ann. § 26:359 (2005); Me. Rev. Stat. Ann. tit. 28, § 2077-B (2004); Md. Code Ann., art. 2B, § 16-506.1 (2004); Mass. Ann. Laws ch. 138, § 18 (2005); Mich. Comp. Laws Ann. § 436.1203 (2005); Minn. Stat. § 340A.3021 (2004); Miss. Code Ann. § 97-31-47 (2005); Mont. Code Ann. § 16-3-101 (2004); N.J. Stat. Ann. § 33:1-2 (2005); N.M. Stat. Ann. §§ 60-7A-3, 60-7A-4 (2004); N.Y. Alco. Bev. Cont. Law § 102 (2005); N.C. Gen. Stat. §§ 18B-102, 18B-102.1, 18B-109 (2004); Ohio Rev. Code Ann. § 4301.19 (2005); Okla. Stat. Ann. tit. 37, § 505 (2004); Or. Rev. Stat. § 471.405 (2003); Pa. Stat. Ann. tit. 47, § 4-491 (2004); R.I. Gen. Laws § 3-4-8 (2005); S.C. Code Ann. § 61-2-175 (2004); S.D. Codified Laws § 35-4-66 (2004); Tenn. Code Ann. § 57-3-402 (2004); Tex. Alco. Bev. Code Ann. § 107.07 (2004); Utah Code Ann. § 32A-12-504 (2005); Va. Code Ann. § 4.1-310 (2005); Wash. Rev. Code Ann. § 66.12.030 (2005); Wash. Admin. Code §§ 314-36-020, 314-68-050 (2005); W. Va. Code Ann. §§ 60-1-4, 60-1-5 (2005); Wis. Stat. §§ 125.30, 125.58 (2004); Wyo. Stat. Ann. § 12-2-204 (2004).

states effectively prevent out-of-state manufacturers, wholesalers, and retailers from selling directly to state residents.² Through either outright prohibitions against direct shipment or tiered distribution systems, states are able to closely regulate commerce in alcoholic beverages and limit opportunities for minors to purchase these products.

States that permit direct shipment of alcohol to consumers employ approaches that vary widely. Alaska and Missouri are alone in imposing no restrictions on the direct shipment of alcoholic beverages to consumers.³ Connecticut, Nevada, North Dakota, and the District of Columbia permit the direct shipment of liquor and beer to consumers, but strictly limit the quantity of alcoholic beverages that may be imported across their borders.⁴ Arizona, Nebraska, and New Hampshire permit direct shipment to consumers provided that the out-of-state seller holds a direct shipment license or permit authorizing shipments to state residents.⁵ Texas and Wyoming allow importation from licensed direct shippers for wine, alone, while Virginia permits licensed direct shipment for both wine and beer.⁶

In contrast, a few other states require the in-state consumer to receive either the express permission of the state's alcohol control board or a license authorizing importation from outside of the state. Hawaii permits residents to import up to 5 gallons of alcoholic beverages into the state provided they obtain a prior approval in the form of a single-shipment permit issued by the state's alcohol control board. Ohio allows importation upon completion of an application to the state liquor control board, but limits direct shipment under these conditions to beer and wine.⁷ Montana permits importation by residents who hold connoisseur's licenses, but also limits shipments to beer and wine.⁸ Vermont allows individuals to import liquor, beer, or wine into the state if they hold a permit issued by the liquor control board; otherwise, the state grants exclusive authority to import alcoholic beverages to the control board.⁹

Notwithstanding the restrictions described above, most states have created statutory exceptions to their direct shipment laws to allow for private importation of wine. The 2002 Department of Justice Appropriations Authorization Act requires that all states permit direct shipment of wine to state residents provided that: (1) the wine was purchased while the purchaser was physically present at the winery, (2) the purchaser of the wine provided the winery verification of legal age to purchase alcohol, (3) the shipping container in which the wine is shipped is marked to require an adult's signature upon delivery, (4) the wine is for personal use only and not for resale, and (5) the purchaser could have carried the wine lawfully into the state (or the District of Columbia) to which the wine is shipped.¹⁰ A number of states—including Arizona, Georgia, Louisiana, Nebraska, Nevada, New Hampshire, North Carolina, North Dakota, Rhode Island, South Carolina, Texas, Wyoming, and the District of Columbia—permit additional limited direct shipment of wine from out-of-state sellers, even beyond the conditions imposed by the federal

² Ala. Admin. Code r. § 20-X-8-.03 (2005); Del. Code Ann. tit. 4, §§ 501, 526 (2005); Pa. Stat. Ann. tit. 47, § 4-491 (2004).

³ Alaska Alcoholic Beverage Control Board, *Trade Practices*, available at <http://www.dps.state.ak.us/abc/trade.asp> [last visited July 12, 2005]; Mo. Rev. Stat. § 311.010 et seq. (2005); *State ex rel. Nixon v. Beer Nuts, Ltd.*, 29 S.W.3d 828, 838 (Mo. Ct. App. 2000); S.B. 102, 90th Gen. Assem. (Mo. 1998).

⁴ Conn. Gen. Stat. § 12-436 (2004); D.C. Code Ann. § 25-772 (2005); Nev. Rev. Stat. Ann. § 369.490 (2004); N.D. Cent. Code § 5-01-16 (2005).

⁵ Ariz. Rev. Stat. § 4-203.04 (2004); Neb. Rev. Stat. Ann. § 53-123.15 (2005); N.H. Rev. Stat. Ann. § 178:27 (2004).

⁶ S.B. 877, 2005 Leg. 79th Sess. (Tex. 2005); Va. Code Ann. § 4.1-112.1 (2005); Wyo. Stat. Ann. § 12-2-204 (2004).

⁷ Haw. Rev. Stat. Ann. § 281-33.1 (2004); Ohio Department of Commerce Division of Liquor Control, *Direct Shipment of Beer & Wine to Ohio Residents*, available at <http://www.liquorcontrol.ohio.gov/1516pdf> [last visited July 13, 2005].

⁸ Mont. Code Ann. § 16-4-903 (2004).

⁹ Vt. Stat. Ann. tit. 7, § 63 (2004).

¹⁰ H.R. 2215, 107th Cong. (2002).

legislation.¹¹ Other states—including California, Colorado, Hawaii, Idaho, Illinois, Iowa, Minnesota, Missouri, New Mexico, Oregon, Washington, West Virginia, and Wisconsin—all permit limited direct shipment from states that authorize reciprocal shipping privileges.¹² In addition, a few states—including Delaware, Montana, Ohio, and Virginia—have also established statutory-limited direct shipment exceptions for beer.¹³

Many of the states that allow direct shipment exceptions for wine have followed the Wine Industry Model Direct Shipping Bill developed by the National Conference of State Legislatures.¹⁴ The Model Bill limits the quantity of shipments to two cases per month, requires that packages bear a label indicating that a signature of a person 21 years of age or older is necessary for delivery, and requires that sellers report all shipments to state authorities annually.¹⁵ Many states also require that recipients of alcoholic beverages present a valid form of identification so that common carriers may verify their age. For example, North Carolina, Texas, and Virginia all require that common carriers obtain proof of identification prior to delivery of direct shipments of alcoholic beverages to confirm that recipients are 21 years of age or older.¹⁶

A recent Supreme Court decision invalidated restrictions on the direct shipment of wine that distinguished between in-state and out-of-state retailers, but left intact legal justifications for nondiscriminatory direct shipment laws (*Granholm v. Heald*, 544 U.S. 460 [U.S. 2005]). While the Court rejected the states' arguments that banning interstate shipments was necessary to curb underage drinking, the majority's consideration of the facts indicated that the Court would permit narrow restrictions on beverages that are more popular with underage drinkers, such as beer,

¹¹ Wine Institute, *State Shipping Laws*, available at <http://www.wineinstitute.org/shipwine/> [last visited July 13, 2005].

¹² *Id.*

¹³ Del. Code Ann. tit. 4, § 526 (2005); Mont. Code Ann. § 16-4-903 (2004); Ohio Department of Commerce Division of Liquor Control, *Direct Shipment of Beer & Wine to Ohio Residents*, available at <http://www.liquorcontrol.ohio.gov/1516pdf> [last visited July 13, 2005]; Va. Code Ann. §§ 4.1-112.1, 4.1-310 (2005).

¹⁴ *Model Direct Shipping Bill*, National Conference of State Legislatures Task Force on the Wine Industry, available at <http://www.freethegrapes.org/wineries.html#model> [last visited July 12, 2005].

¹⁵ Wine Institute, *Answers to Frequently Asked Questions*, available at <http://www.wineinstitute.org/shipwine/> [last visited July 13, 2005]; *Model Direct Shipping Bill*, National Conference of State Legislatures Task Force on the Wine Industry, available at <http://www.freethegrapes.org/wineries.html#model> [last visited July 12, 2005]; Ariz. Rev. Stat. § 4-203.04 (2004); Cal. Bus. & Prof. Code § 23661.2 (2005); Colo. Rev. Stat. § 12-47-104 (2004); Conn. Gen. Stat. § 30-93a (2004); Del. Code Ann. tit. 4, § 526 (2005); Idaho Code § 23-1309A (2005); 235 Ill. Comp. Stat. 5/6-29 (2005); La. Rev. State. Ann § 26:359 (2005); Minn. Stat. § 340A.417 (2004); Mo. Rev. Stat. § 311.462 (2005); N.H. Rev. Stat. Ann. § 178:27 (2004); N.M. Stat. Ann § 60-7A-3 (2004); N.C. Gen. Stat. § 18B-1001.1 (2004); N.D. Cent. Code § 5-01-16 (2005); Or. Rev. Stat. § 471.229 (2003); R.I. Gen. Laws § 3-4-8 (2005); S.C. Code Ann. § 61-4-747 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tx. 2005); Va. Code Ann. § 4.1-112.1 (2005); Wash. Rev. Code Ann. § 66.12.200 (2005); W. Va. Code Ann. § 60-8-6 (2005); Wyo. Stat. Ann. § 12-2-204 (2004).

¹⁶ N.C. Gen. Stat. § 18B-1001.1 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tx. 2005); Va. Code Ann. § 4.1-112.1 (2005).

wine coolers, and liquors. The Court also explicitly encouraged less restrictive measures to minimize the risk of direct shipment of alcohol to minors, recommending that states enact provisions such as those provided in the Model Direct Shipping Bill. The Court was clear, however, that states will bear the burden of proof to demonstrate the need for any difference in treatment between in-state and out-of-state producers.

TABLE I-1

State	Statutory and/or Regulatory Authority	Direct Shipment Permitted (subject to restrictions)	Direct Shipment to Non-licensed Individuals Prohibited	Description of State Regulation	Labeling and Delivery Requirements for Direct Shipments	Exception for wine? ^a	Shipment, Labeling, and Delivery Regulations for Direct Shipment of Wine
Alabama	Ala. Admin. Code r. § 20-X-8-.03 (2005); Ala. Code § 28-3A-9 (2005)	X		Direct shipment permitted only with prior approval from the state Beverage Control Board; shipments must be delivered through tiered system and may only be consigned to the care of an ABC store	Shipments must be consigned to the care of an ABC store	No	N/A
Alaska	Alaska Alcoholic Beverage Control Board, Trade Practices, available at http://www.dps.state.ak.us/abc/trade.asp [last visited July 12, 2005]	X		Direct shipment permitted by the state, but subject to local bans on importation (some of which make it a felony to ship alcoholic beverages to their communities)	N/A (but may be imposed at local level)	No	N/A

ENDING THE TOBACCO PROBLEM

Arizona	Ariz. Rev. Stat. § 4-203.04 (2004)	X	Direct shipment permitted only by out-of-state retailers holding a direct shipment license	The licensed retailer may deliver the liquor directly to the consumer, but must ensure that (1) the person making the delivery is 21 or older, (2) the delivery occurs only during the hours that liquor may be lawfully served, (3) delivery is not made to a person who appears intoxicated, and (4) the person accepting the delivery is 21 years of age or older. The retailer must also make a record of the delivery, including the name, age, and signature of the person accepting the delivery, along with the type and serial number of the written identification presented by the person accepting delivery	Yes—limited direct shipment	Wine may be shipped from out of state as long as: (1) the wine was purchased while the purchaser was physically present at the winery, (2) the purchaser of the wine provided the winery verification of legal age to purchase alcohol, (3) the wine is for personal use only and not for resale, (4) the winery ships to a residential address, (5) the purchaser could have carried the wine lawfully into this state, and (6) the winery ships not more than two cases of wine to the purchaser per calendar year. Also, the shipping container must be marked to require an adult's signature on delivery and delivery confirmation
Arkansas	Ark. Code Ann. § 3-7-106 (2005); S.B. 762, 85th Gen. Assem., Reg. Sess. (Ark. 2005)	X	Direct shipment prohibited to individuals who do not hold state-issued licenses	N/A	No	N/A
California	Cal. Bus. & Prof. Code § 23661 et seq., 23661.2 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's license	N/A	Yes—reciprocity	Out-of-state parties may ship no more than two cases of wine per month to any adult resident in this state. Delivery is not considered a sale in the state. The shipping container must be clearly labeled to indicate that the package cannot be delivered to a mi-

						nor or to an intoxicated person
Colorado	Colo. Rev. Stat. §§ 12-47-104, 12-47-901 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's license	N/A	Yes—reciprocity	Out-of-state parties may ship no more than two cases of wine to any adult resident in the state. Delivery is not considered a sale in this state. Any order must be made in person at the licensed premises of the alcoholic beverage licensee from whom the product is purchased. Any person authorized to ship wine must obtain a wine shipment permit from the state licensing authority. The shipping container must be clearly labeled to indicate that that package cannot be delivered to a minor or intoxicated person
Connecticut	Conn. Gen. Stat. §§ 12-436, 30-77, 30-93a (2004)	X	Direct shipment permitted; individuals may import into the state up to 5 gallons of alcoholic beverages within a 60-day period	The contents of such package or carton must be clearly marked on the outside of such package or carton, and the delivery person must obtain the signature of an individual who is at least 21 years of age or legally authorized to receive such alcoholic liquor	No	N/A

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Delaware	Del. Code Ann. tit. 4, §§ 501, 526 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued importer's or manufacturer's license; although the states permits residents to purchase wine or beer from manufacturers domiciled outside of the state, the beverages must be delivered to a state wholesaler who may deliver it to a retailer, who may, finally, deliver the wine or beer to the resident	When the retail licensee delivers wine or beer to a resident that was originally purchased from an out-of-state wholesaler or retailer, the package must be prominently labeled as containing alcoholic beverages and must be received by a person 21 or older	No	N/A
District of Columbia	D.C. Code Ann. § 25-772 (2005)	X	Limited direct shipment permitted; common carriers may transport up to one quart of alcoholic beverages to an individual per calendar month	N/A	No	N/A
Florida	Fla. Stat. Ann. § 561.545 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's or wholesaler's license or an exporter's registration	N/A	Yes—limited direct shipment	Florida residents visiting on-site at a winery may have up to one gallon of wine shipped back to the state

Georgia	Ga. Code Ann. § 3-3-32 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's, importer's, broker's, or wholesaler's license	N/A	Yes—limited direct shipment	An out-of-state winery is permitted to ship wine directly to consumers in this state for personal use under the following circumstances: (1) the consumer must purchase the wine while physically present at the winery, (2) the winery must verify that the consumer purchasing the wine is 21, and (3) no winery shall ship in excess of five cases to any one consumer or any one address in this state in any calendar year
Hawaii	Haw. Rev. Stat. Ann. §§ 281-33.1, 281-33.5 (2004)	X	Limited direct shipment permitted; unlicensed adults may apply to the liquor commission to receive a single shipment permit to receive up to 5 gallons of liquor from outside of the state for personal use	N/A	Yes—reciprocity	Out-of-state parties may ship up three cases per year to a resident over 21 years of age. Delivery does not constitute a sale in the state. Shipment only by a licensed wine manufacturer wine from another state that affords holders of a license to manufacture wine under section 281-31 an equal reciprocal shipping privilege

Idaho	Idaho Code §§ 23-102, 23-1055, 23-1309A (2005)	X	Direct shipment prohibited; the state liquor dispensary has the exclusive authority to import and sell liquor, and it is unlawful for any beer brewer located outside the state to sell beer in the state except to licensed dealers and wholesalers	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases of wine per month for personal use from another state without payment of state tax, fees, or charges if shipped from a reciprocity state. The shipping container must be labeled to indicate that it contains alcoholic beverages and cannot be delivered to a person who is not at least 21 years of age. The delivery person must have the recipient sign for receipt of wine shipments, not deliver to a minor or one that is visibly intoxicated, and must retain the signature for one year
Illinois	235 Ill. Comp. Stat. 5/6-29, 5/6-29.1 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued license	N/A	Yes— reciprocity	Out-of-state wineries may ship not more than two cases of wine per year to an adult resident. No broker shall solicit consumers to engage in interstate reciprocal wine shipments. The shipping container of any wine sent into or out of the state shall be clearly labeled to indicate that the package cannot be delivered to a person under the age of 21 years
Indiana	Ind. Code Ann. § 7.1-5-11-1.5 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's permit; statute specifically	N/A	No	N/A

			prohibits the ordering and selling of alcohol over a computer network			
Iowa	Iowa Code §§ 123.22, 123.187 (2004)	X	Direct shipment prohib- ited; the state liquor di- vision holds the exclu- sive authority to import all forms of alcoholic liquor into the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases per month for personal use to a person 21 years of age or older. Such wine shall not be resold
Kansas	Kan. Stat. Ann. §§ 41-104, 41- 306 (2005)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued license	N/A	No	N/A
Kentucky	Ky. Rev. Stat. Ann. § 244.165 (2004)	X	Direct shipment prohib- ited to individuals who do not hold a state- issued wholesaler's or distributor's license	N/A	Yes— limited direct shipment	A Kentucky resident visiting another state or country may purchase and ship alcoholic beverages to his or her resi- dence, business, or mailing address in Kentucky

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Louisiana	La. Rev. State. Ann § 26:359 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's permit	N/A	Yes— limited direct shipment	Wine may be sold and shipped directly to a consumer in Louisiana by the manufacturer or retailer of such beverage domiciled outside of the state provided both that all taxes have been paid in full and that (1) the consumer is 21 years of age or older, (2) the wine is for the consumer's personal consumption, (3) the total amount of wine shipped does not exceed 48 bottles per calendar year per household, (4) the manufacturer or retailer engaging in such direct sales holds a valid manufacturer's or retailer's license issued by the state of its domicile, and (5) the winery does not have wholesaler representation in the state. The package must be prominently labeled as containing alcohol and must be received by a person 21 years of age or older
Maine	Me. Rev. Stat. Ann. tit. 28, § 2077-B (2004)	X	Direct shipment prohibited; statute specifically prohibits individuals from selling, furnishing, delivering, or purchasing liquor from an out-of-state company by mail order	N/A	No	N/A

Maryland	Md. Code Ann., art. 2B, §§ 7.5-104, 16-506.1 (2004)	X	Direct shipment prohibited to individuals who do not hold the required state-issued permit	N/A	Yes—limited direct shipment	Out-of-state wineries may obtain a wine seller's permit which enables the them to ship only wines that are not already available (and have not been in the last two years) in Maryland through a distributor. The shipper may not sell more than 900 liters of wine total per year or not more than 108 liters of wine to a single consumer in a calendar year. The consumer must designate a wholesaler in Maryland through which the transaction will be facilitated via a licensed retailer to the consumer
Massachusetts	Mass. Ann. Laws ch. 138, § 18 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or importer's license		No	
Michigan	Mich. Comp. Laws Ann. § 436.1203 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or importer's license, who are not agent's of the state liquor commission, and who do not have prior written permission from the commission	N/A	No	N/A

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Minnesota	Minn. Stat. §§ 340A.417, 340A.3021 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's license; alcoholic beverages may only be consigned, shipped, and delivered to a licensed wholesaler's warehouse if they were manufactured outside of the state	N/A	Yes— reciprocity	Wineries with equal reciprocal shipping privilege may ship, for personal use and not for resale, not more than two cases in any calendar year to any resident of Minnesota age 21 or over. Delivery does not constitute a sale in the state. The law prohibits advertising or soliciting shipments and specifically prohibits accepting orders via the Internet. The shipping container of any wine sent under this section must be clearly marked "Alcoholic Beverages: adult signature (over 21 years of age) required"
Mississippi	Miss. Code Ann. § 97-31- 47 (2005)	X	Direct shipment prohibited; it is unlawful to transport intoxicating liquors into the state or to transport such liquors from one place to another within the state or from one point within the state to a point outside the state	N/A	No	N/A

Missouri	<p>Mo. Rev. Stat. §§ 311.010 et seq., 311.462 (2005); State ex rel. Nixon v. Beer Nuts, Ltd., 29 S.W.3d 828, 838 (Mo. Ct. App. 2000); S.B. 102, 90th Gen. Assem. (Mo. 1998)</p>	X	<p>Direct shipment permitted; the code does not ban direct shipment of alcoholic beverages into the state, and a proposal to do so was not passed into law; however, a court has interpreted the liquor statute to hold that although direct shipment of alcoholic beverages is permitted, out-of-state distributors must comply with the state liquor code in order to transact business in the state</p>	N/A	Yes— reciprocity	<p>Out-of-state parties may ship not more than two cases per year to an adult resident from wineries in a state affording equal reciprocal shipping privileges. Brokers are prohibited from soliciting consumers to engage in interstate reciprocal wine shipments. In addition, no shipper located outside of Missouri may advertise interstate shipments. The shipping container of any wine sent into or out of this state under this section shall be clearly labeled to indicate that the package cannot be delivered to a person under the age of 21 years or to an intoxicated person</p>
Montana	<p>Mont. Code Ann. §§ 16-3-101, 16-4-903 (2004)</p>	X	<p>Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or connoisseur's license, and the statute specifically extends the prohibition to alcoholic beverages ordered or purchased by phone and computer; however holders of a connoisseur's license may import up to 12 cases of beer or wine annually (and may do so via phone or computer)</p>	<p>The holder of a connoisseur's license must forward to the out-of-state brewery or winery a distinctive address label, provided by the State of Montana, clearly identifying any package that is shipped as a legal direct shipment package to the holder of a connoisseur's license</p>	No	N/A

Nebraska	Neb. Rev. Stat. Ann. § 53-123.15 (2005)	X	Direct shipment to consumers permitted only if the seller holds a permit issued by the commission (of the state into which the beverage is shipped)	N/A	No	N/A
Nevada	Nev. Rev. Stat. Ann. § 369.490 (2004)		Limited direct shipment permitted; a state resident may import one gallon or less of alcoholic beverage per month or 12 cases of wine per year for personal use	N/A	No	N/A
New Hampshire	N.H. Rev. Stat. Ann. § 178:27 (2004)	X	Direct shipment to consumers permitted only if the seller holds a permit issued by the commission (of the state into which the beverage is shipped); the state limits shipment of 60 containers of not more than one liter each of liquor and wine per address per calendar year	Packages must be marked "Alcoholic Beverages, adult signature (over 21 years of age) required." All shipments shall be made by a licensed carrier and such carriers are required to obtain an adult signature	No	N/A
New Jersey	N.J. Stat. Ann. § 33:1-2 (2005)	X	Direct shipment prohibited from out-of-state retailer to an in-state consumer	N/A	No	N/A

New Mexico	N.M. Stat. Ann §§ 60-7A-3, 60-7A-4 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's or manufacturer's license	N/A	Yes— reciprocity	Out-of-state parties may ship no more than two cases for personal use per month to an individual not a minor. Delivery does not constitute a sale in this state and nothing in the Liquor Control Act limits or applies to such shipments. The shipping container of any wine sent into or out of this state under this subsection shall be labeled clearly to indicate that the package cannot be delivered to a minor or to an intoxicated person
New York	N.Y. Alco. Bev. Cont. Law § 102 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued license to traffic in alcoholic beverages	N/A	No	N/A
North Carolina	N.C. Gen. Stat. §§ 18B-102, 18B-102.1, 18B-109, 18B-1001.1 (2004)	X	Direct shipment prohibited from out-of-state retailer or wholesaler to individuals who do not hold a state-issued wholesaler's license	N/A	Yes— limited direct shipment	Holders of Wine Shippers Permits are authorized to ship not more than two cases of wine per month to any one individual purchaser for personal use. All shipments must be made through an approved common carrier. Each common carrier must (1) require the recipient to demonstrate that s/he is at least 21 years of age by providing appropriate identification, (2) require the recipient to sign an electronic or paper form acknowledging receipt,

						and (3) refuse delivery when the proposed recipient appears to be under the age of 21 years and refuses to present valid identification
North Dakota	N.D. Cent. Code § 5-01-16 (2005)	X	Limited direct shipment permitted; individuals may import 9 liters or less of liquor, or 288 fluid ounces or less of beer, per month for personal use from a person holding a valid manufacturer's or retailer's license issued by the state of its domicile	Every package shipped directly to an individual in this state must be labeled with conspicuous words "SIGNATURE OF PERSON AGE 21 OR OLDER REQUIRED FOR DELIVERY." A shipper shall obtain the signature of an individual 21 years of age or older before delivering any alcoholic beverages shipped directly to an individual in this state	No	N/A
Ohio	Ohio Rev. Code Ann. § 4301.19 (2005); Ohio Department of Commerce Division of Liquor Control, Direct Shipment of Beer & Wine to Ohio Residents, available at http://www.liqu	X	Limited direct shipment permitted; state liquor dispensary has the exclusive right to sell liquor in the state; however, Ohio residents may import beer or wine, provided that they fill out a "personal consent" form requiring that (1) the beer or wine is for personal use and not for resale, (2) the resident is	N/A	No	N/A

	orcontrol.ohio.gov/1516pdf [last visited July 13, 2005]		21 years of age or older, (3) the laws of the United States allow the shipment of the beer or wine into the United States, (4) all taxes due the State of Ohio shall be paid prior to the importation, or within 30 days of the receipt, of beer or wine			
Oklahoma	Okla. Stat. Ann. tit. 37, § 505 (2004)	X	Direct shipment prohibited by manufacturers, wholesalers, and retailers located outside of the state	N/A	No	N/A
Oregon	Or. Rev. Stat. §§ 471.229, 471.405 (2003)	X	Direct shipment prohibited; state liquor control commission holds the exclusive right to procure alcoholic beverages in the state	N/A	Yes— reciprocity	Out-of-state parties may ship not more than two cases of wine per month to individuals 21 years of age or older for personal use. Receipt of a shipment does not constitute a sale in the state. Out-of-state wine or cider suppliers must obtain a license from the Oregon Liquor Control Commission before selling or soliciting sales of wine or cider in Oregon. The shipping container of any wine or cider sent into or out of this state under this section must be clearly labeled to indicate that the container contains alcoholic beverages and cannot be delivered to a person who is not at least 21 years of

						age or to a person who is visibly intoxicated
Pennsylvania	Pa. Stat. Ann tit. 47, § 4-491 (2004)	X	Direct shipment prohibited; all commerce in alcoholic beverages must occur within the state-run system	N/A	Yes—limited direct shipment	Internet ordering and direct shipments of out-of-state wine are permitted, provided that (1) the wine must be purchased from a licensed Direct Wine Shipper, (2) only wines which are not available in Pennsylvania wine & spirits stores may be purchased through this mechanism, (3) consumers may not purchase more than 9 liters per month from a single Direct Wine Shipper, (4) the Direct Wine Shipper will have a shipping charge and must add a handling fee, and that state's liquor and sales taxes, and (5) the wine will be shipped to a Pennsylvania Wine and Spirits Store for the consumer to pick up
Rhode Island	R.I. Gen. Laws § 3-4-8 (2005)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's license	N/A	Yes—limited direct shipment	Individuals may place an order for intoxicating beverages personally at the manufacturer's premises, for shipment to an address in Rhode Island for personal use. Shipments must display the language: "Contains Alcohol, Adult Signature (over 21) Required for Delivery"

South Carolina	S.C. Code Ann. §§ 61-2-175, 61-4-747 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued wholesaler's, manufacturer's, or producer's license	N/A	Yes—limited direct shipment	<p> Holders of wine shipper's licenses may sell and ship not more than 24 bottles of wine per month to any person in South Carolina to whom alcoholic beverages may be lawfully sold. Any shipment must be labeled conspicuously with the words "CONTAINS ALCOHOL: SIGNATURE OF PERSON AGE 21 OR OLDER REQUIRED FOR DELIVERY"</p>
South Dakota	S.D. Codified Laws §§ 35-12A-1, 35-4-66 (2004)	X	Direct shipment prohibited to any individual not licensed by the state to traffic in alcoholic beverages	N/A	Yes—reciprocity	<p> Any person who is at least 21 years of age may purchase wine from another state if the wine is not in distribution in this state and the wine comes from a winery that is located in a state that affords South Dakota wineries an equal reciprocal shipping privilege or a winery located in South Dakota. The person must place an order with a licensee, who may order the wine through a wholesaler who shall, in turn, ship the wine to the licensee</p>
Tennessee	Tenn. Code Ann. § 57-3-402 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued manufacturer's or wholesaler's license	N/A	No	N/A

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Texas	Tex. Alco. Bev. Code Ann. § 107.07 (2004); S.B. 877, 2005 Leg. 79th Sess. (Tex. 2005)	X	Direct shipment prohibited to state residents from persons located outside of the state	N/A	Yes—limited direct shipment	All in-state and out-of-state wineries are able to sell and ship their product directly to adult Texas consumers located anywhere in the state, provided they hold a permit to do so. Wine shipped by the holder of a winery permit may not be delivered to any person other than (1) the person who purchased the wine, (2) a recipient designated in advance by such purchaser, or (3) a person at the delivery address who is age 21 or over. Wine may be delivered only to a person who is age 21 or over after the person accepting the package (1) presents proof of identity and age and (2) personally signs a receipt acknowledging delivery of the package
Utah	Utah Code Ann. § 32A-12-504 (2005)	X	Direct shipment prohibited; alcoholic beverages may not be shipped into the state or from one point to another within the state	N/A	No	N/A
Vermont	Vt. Stat. Ann. tit. 7, § 63 (2004)	X	Limited direct shipment permitted; individuals may import liquor, beer, or wine into the state if they hold a permit issued by the liquor control board; otherwise, the liquor control board	N/A	No	N/A

West Virginia	W. Va. Code Ann. §§ 60-1-4, 60-1-5, 60-8-6 (2005)	X	Direct shipment prohibited; state-run alcoholic beverage control agency holds the exclusive right to sell alcoholic beverages within the state	N/A	Yes— reciprocity	that the package cannot be delivered to a person under 21 years of age or to an intoxicated person Out-of-state parties may ship not more than two cases per month for personal use from an out-of state winery or retailer in states affording the same reciprocal privileges. Delivery does not constitute sale in the state. No adult resident or duly licensed retailer or distributor may advertise the availability of wines by shipment to residents of this state. The shipping container of any wine sent into or out of this state under this subsection shall be clearly labeled to indicate that the package cannot be delivered to any person under the age of 21 or to an intoxicated person
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Wisconsin	Wis. Stat. §§ 125.30, 125.58 (2004)	X	Direct shipment prohibited to individuals who do not hold a state-issued permit	N/A	Yes— with re- porting require- ment	A winery located outside of this state may ship wine into this state provided that (1) the winery is located in a state that has a reciprocal agreement with this state, (2) the winery holds a valid business tax registration certificate, (3) the winery submits a copy of its current license from the state from which it will ship wine into this state, and (4) the winery submits a detailed report to the department about the shipments
Wyoming	Wyo. Stat. Ann. § 12-2-204 (2004)	X	Direct shipment of liquor and malt beverages prohibited to state residents from persons located outside of the state	N/A	Yes— limited direct shipment	Any person currently licensed in its state of domicile as an alcoholic liquor or malt beverage manufacturer, importer, wholesaler, or retailer who obtains an out-of-state shipper's license by from the state of Wyoming may ship no more than a total of 18 liters of manufactured wine directly to any household in this state in any 12-month period for personal use. The recipient must be at least 21, and out-of-state shippers must ensure that all containers of wine shipped pursuant to this section are conspicuously labeled with the words: "CONTAINS ALCOHOLIC BEVERAGES. ADULT (OVER 21) SIGNATURE REQUIRED FOR

DELIVERY"

^a Where states have created exceptions for both wine and beer, they have been classified as permitting direct shipment, subject to limitations.

J

The Role of Public Policies in Reducing Smoking Prevalence: Results from the SimSmoke Tobacco Policy Simulation Model

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INTRODUCTION

The computer simulation model, known as SimSmoke, is a model that has been developed to examine the effect of tobacco control policies for the United States (Levy et al. 2002; Levy et al. 2000a). SimSmoke projects smoking prevalence over time and estimates the effect of tobacco control policies on those rates. The purpose of this appendix is to describe and to provide predictions from that model.

The development of the model and results from it have been published in a series of papers examining different types of policies (Levy et al. 2000a; Levy et al. 2000b; Levy and Friend 2001; Levy and Friend 2002a; Levy and Friend 2002b; Levy et al. 2001a; Levy et al. 2001b). Other papers have considered the future impact of the policies (Levy et al. 2003; Levy et al. 2005b). In addition, a group of papers has validated the model. Levy and colleagues (2004a; 2004c; 2004d) found that the model predicted smoking prevalence rates well for the United States over the time period 1993–2003, with most of the changes over that period due to prices changes. These studies also show that models for the states of California and Arizona predicts smoking prevalence relatively well after comprehensive programs were developed, and that an important part of the changes was explained by the media campaigns or comprehensive programs implemented in the states (Levy et al. 2004a; Levy et al. 2004c; Levy et al. 2004d).

This appendix considers the effects of individual policies and a combination of different policies on smoking prevalence as explained by the model and using effect sizes developed in conjunction with the Institute of Medicine's (IOM) Committee on Reducing Tobacco Use. Specifically, we estimate how much smoking rates may be changed by additional policies, including tax changes, clean air laws, media or comprehensive campaigns, school education programs, cessation treatment policies, and youth access enforcement. We also consider the effect of abandoning some of the policies currently in place as well as the effect of policies on smoking rates in total and by age groups.

METHODOLOGY

Basic Model

The SimSmoke simulation model begins with the number of smokers, never-smokers, and ex-smokers by age and gender for the United States in the baseline year. In developing the model, we chose a best year for which there were data to develop the necessary smoking meas-

ures. We chose the year 2002 as our baseline year, which also had the advantage that there were no large changes in policies in recent years (since the large 1998–1999 price changes).

The basic SimSmoke model involves a population model, a smoking model, and policy modules. Following a discrete first-order Markov process, the entire population evolves through birth and death rates, and the number of smokers, never-smokers, and ex-smokers evolves through initiation, cessation, and relapse rates. Tobacco control policies change initiation and cessation rates through individual policy modules. Consequently, smoking rates over time depend on tobacco control policies and prior smoking patterns.

The version of the model used in this report is built on an Excel platform. This section presents a brief description of that model and a discussion of future policy scenarios. The data sources are summarized in Table J-1. A mathematical formulation and further description of the model can be found at http://cisnet.flexkb.net/mp/pub/cisnet_lung_pire_profile.pdf and referenced papers.

Population Model

SimSmoke is built first on a demographic model. The population, distinguished by age, starts in the year 2002. The population evolves over time with fertility (leading to births) and some portion of the population dying at each age. We do not consider immigration or changes in racial or ethnic composition for the purposes of this model.

Mathematically, the total population (Pop) is distinguished by time period (T) and age (A) (and is further distinguished in the model by gender and racial ethnic group). Mortality rates (MR) are distinguished by age and gender. The number of newborns depends on first-year death rates and fertility rates (Fert) of females by age, with equal birth rates for males and females. Births through the first year (age 0) for each gender are:

$$\text{Pop}_{T,0} = 0.5 * (1 - \text{MR}_0) * \sum_A (\text{Pop}_{T,A,1} * \text{Fert}_A), \text{ where } T = 1 \dots 20; A = 14 \dots 49$$

After the first year, the population evolves as:

$$\text{Pop}_{T,A} = \text{Pop}_{T-1,A-1} * (1 - \text{MortRate}_A)$$

Population data are obtained from the 2000 Census of Population, and projected forward to 2002. Fertility rates are from the U.S. Census Vital Rate Inputs Tables for the year 2002. Mortality rates are from the 2001 Multiple Cause-of-Death File compiled from death certificates, by the National Center for Health Statistics (NCHSU; www.nchs.gov). The file includes information on all deaths in the United States in 2001.

Smoking Model

SimSmoke next divides the population in the base year into: (1) never-smokers, (2) smokers and (3) 16 categories of ex-smokers ($n = 1 \dots 16+$), corresponding to years since last smoking. After the base year, individuals are classified as never-smokers (designated by NS) from birth until they initiate smoking or die, according to:

$$\text{Neversmokers}_{T,A} = \text{Neversmokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,NS}) * (1 - \text{Initiation Rate}_A)$$

Through age 24, the number of smokers (designated by S) is tracked as:

$$\text{Smokers}_{T,A} = \text{Smokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,S}) + \text{NeverSmokers}_{T-1,A-1} * (1 - \text{MortRate}_{A,ns}) * \text{Initiation Rate}_A$$

Once a smoker, individuals continue in that category until they quit, die, or reenter the group through relapse. After age 24, smokers are tracked as:

$$\text{Smokers}_{T,A} = \text{Smokers}_{T-1,A-1} * (1 - \text{MortRate}_{T,A,S}) * (1 - \text{Cessation Rate}_A) + \Sigma_{16}^N = 1 \text{ Ex-smokers}_{T-1,A-1,N} * (1 - \text{MortRate}_{T,A,N}) * (\text{Relapse Rate}_{A,N})$$

First year ex-smokers are determined by the first-year cessation rate applied to surviving smokers in the previous year. Individuals who have been ex-smokers for $n = 2 \dots 15$ years, are defined as:

$$\text{Ex-smokers}_{T,A,N} = \text{Ex-smokers}_{T-1,A-1,N-1} * (1 - \text{MortRate}_{A,N}) * (1 - \text{Relapse Rate}_{A,N-1})$$

For those who have ceased smoking for more than 15 years, we add to the above equation the ex-smokers from the previous year who have quit for more than 15 years and did not die or relapse in the previous year.

In the model, smokers are defined as individuals who are currently smoking (either daily or on some days) and have smoked more than 100 cigarettes in their lifetime. Due to empirical challenges in measuring initiation and quitting and to ensure the stability and internal consistency of the model, initiation rates at each age are a measured net of quitting. Specifically, net initiation is measured as the difference between the smoking rate at a given age and that same rate at the previous age. Because the duration of smoking is not considered, we do not track the specific year when individuals initiate in this population-level model. Since smoking rates typically level off by age 24 (DHHS 1994), initiation in the model occurs until age 24.

Cessation is tracked from age 24, since the relative risks of mortality from smoking are not discernible for those who quit smoking before that age (DHHS 1990; DHHS 2004). Cessation rates in the first year are distinguished by age, but relapse rates in later years are only distinguished by years since quitting. Ex-smokers are defined as those over the age of 24 who were not smoking at the time of the survey. In SimSmoke, ex-smokers are broken down into six categories, categorized by year since quitting through 15 years and then aggregated at >15 years. Never-smokers are those who have not smoked 100 cigarettes in their lifetime or have smoked 100 cigarettes in their lifetime, but are less than the age of 24 and are not currently smoking.

The primary source of baseline data on smoking habits by age and gender is the Tobacco Use Supplement (TUS) of the Current Population Survey (CPS), a sample of approximately 475,000 respondents conducted in September 2001, January 2002, and May 2002. Data are obtained by single age from ages 15 to 24 years, and then by 10 year age groups through age 90. Smoking rates are multiplied by the relevant 2002 population to determine the number of smokers and ex-smokers by demographic group.

In the model, we assign the value for the age bracket to the midpoint age of the bracket, and interpolate between that bracket and the midpoint value in the previous age bracket. Smoking may begin before age 15, but the TUS only asks individuals age 15 and older about their smoking status. For those below age 15, we use data from the 1993 TAPS (Teenage Attitudes and

Practices) survey. To maintain comparability, we scaled those data by the ratio of the TAPS 15–17-year-old smoking rate divided by the U.S. 15–17-year-old smoking rate.

Policy Modules

In separate policy modules, we examine the effect of tax changes, clean indoor air laws, mass media policies, school education policies, cessation treatment policies, and strategies to reduce youth access to cigarettes. The original policy parameters in the model used to generate the predicted effects are based on thorough reviews of the literature and the advice of an expert panel. These parameters have been reviewed by the IOM committee and are either accepted or modified, as described below. In the case of cessation treatment and school education policies, significant changes have been made in the structure of the original SimSmoke policy modules.

The effects of policies are calculated in percentage terms relative to the initial rates [$PR = (\text{Post-policy Rate} - \text{Initial Rate})/\text{Initial Rate}$], where $PR < 0$. For most policies, the greatest effect is generally in the first few years in which the policy is in effect. These are modeled as a permanent additive effect on smoking prevalence, that is, $\text{Smokers}_{T,A} * (1 + PR_{I,T,A})$ for policy (I) at time period (T) that may vary by age (A). While the effect may be spread over several years, we model the effects as occurring in the first year that the policy is in effect.

If the policy is maintained, the effects of the policy are maintained through modification of the initiation rates. The percentage reduction is applied throughout the years (T) during which the policy is in effect to the initiation rate [as $\text{Initiation Rate}_A * (1 + PR)$]. The percentage effects of the policy are also enhanced over time through increases in the first year cessation rate [as $\text{Cessation Rate}_A * (1 - PR)$]. First-year quit rates continue to be elevated for each of the policies (except youth access policies), because policies reduce the quantity smoked per smoker and quitting is more likely among those who smoke less (Hughes 2000; Hymowitz et al. 1991; Hymowitz et al. 1997). We assume that relapse rates are unaffected by the policy, except insofar as the amount of relapse increases in proportion to any added cessation.

Unless otherwise indicated, the same proportionate effect of a policy is applied to the prevalence, initiation, and cessation rates when a new policy is implemented and maintained. When a long-standing policy is reversed, it is assumed that only initiation and cessation rates are affected (i.e., the effects of a policy are asymmetric in terms of implementation of a proactive policy and the scaling back of that policy). We expect that those who have quit and maintained cessation over a reasonable period of time are unlikely to relapse when the policy is abandoned, although future initiation rates will be higher and cessation rates will be lower. Policy effects may also vary by age. For example, some policies are directed at and are expected primarily to affect youth.

When more than one policy is in effect, the percentage reductions are multiplicatively applied, that is, $(1 + PCI) * (1 + PCI)$ for policies (I), which implies that the relative effect is independent of other policies but the absolute effect is smaller when another policy is in effect. Some specific synergies are built into the model as described below.

We track the effects of policies from the year 2006 forward. Because the model begins in the year 2002, we track the effect of policies through 2005. Since the CPS and TUS data are collected between September of the preceding year and May of the current year, we consider the estimates as representing smoking rates in the midpoint month (January), and policy data are matched to their levels on January 1 of the particular year.

Taxes

In the tax module (Levy et al. 2000b), price increases are modeled as age-specific, constant proportional, effects on prevalence, initiation, and cessation rates (Levy et al. 2000b). Based on economic theory, cigarette use is determined by changes in the retail price relative to the prices of other goods, as measured by the participation (i.e., prevalence) and demand elasticity (i.e., the percentage change in consumption from a 1 percent increase in price). Based on the studies that distinguish by age, the simulation model assigns a price elasticity of -0.6 for individuals below age 18, -0.3 for those ages 18 to 24, -0.2 for those ages 25 to 34, and -0.1 for those age 35 and above. Based on recent evidence (Farrelly and Bray 1998), these elasticity estimates have been lowered since our earlier work (Levy et al. 2000b). These parameters have been accepted by the IOM panel.

For the period 2002–2005, prices are averaged over states with weights based on tobacco sales and are adjusted for inflation using the Bureau of Labor Statistics (BLS) Consumer Price Index. Data on retail prices and taxes were obtained for 2002 and 2003 from (Orzechowski and Walker 2003) and for 2004 and 2005 from www.tobaccofreekids.org/research/factsheets/pdf/0212.pdf. The retail price is measured by a price index that includes generic cigarettes weighted by their proportionate sales. Inflation-adjusted prices increased slightly from \$3.75 to \$4.20 between 2002 and 2005, and the average state tax in 2005 was \$1.23.

From 2005, we assume that cigarette prices relative to inflation stay constant (i.e., we assume that taxes adjust upward to reflect general price inflation). To model the effect of additional tax changes, prices change by the amount of change in the average state plus the federal tax on cigarettes, based on studies reported in Jha and Chaloupka (2000).

Clean Air Laws

The clean air policy module examines the effect of three types of laws: work site, restaurant, and other public places (Levy et al. 2001b). The module predicts an 11 percent reduction in prevalence rates with all policies fully implemented and with strong enforcement and media publicity. Work site laws have the largest effect, 7 percent, with restaurant and bars laws producing a 2 percent effect, and laws covering other places a 1 percent effect. Work site bans without high compliance have two-thirds of the effect of a total ban with high compliance, and partial work site and restaurant bans have one-third the effect of total bans. Media publicity and enforcement yield an added 0.5 percent effect each for work sites and restaurants. Based on differences in labor participation rates and on the effect on workers who smoke, females experience 80 percent of the effect compared to males, and effects increase between ages 26 to 39 but decrease at older ages. These parameters have been accepted by the IOM panel.

The effects of newly implemented clean air laws depend on the extent of clean air laws already in place and the extent of private work site restrictions already implemented. By January 2005, 11 states had adopted smoke-free restaurant laws (California, Connecticut, Delaware, Florida, Idaho, Maine, Massachusetts, New York, Rhode Island, Utah, and Vermont) and 10 states (California, Delaware, Florida, Massachusetts, Maryland, New York, Oregon, Rhode Island, South Dakota, and Washington) had adopted stricter work laws that required smoke-free or separately ventilated areas for smoking. We also consider the effect of partial bans and the percentage of firms that currently have strict bans.

In addition to taking into account the extent of policies already in effect, the model considers changes over the tracking period (2002–2005). We estimate that 72 percent of work sites already had strict bans by 2005 (up from 67 percent in 2002) and that 36 percent of restaurants and 31

percent of other public places were covered in 2005. We estimate that enforcement and publicity were at half the maximum level from 2002 to 2005.

Mass Media

The mass media policy module is based on a model of the effect of media campaign expenditures on smoking prevalence (Levy and Friend 2001). Media expenditures must be high enough for messages to reach potential smokers and quitters a sufficient number of times, but after a threshold, additional expenditures show diminishing returns. The effects of media campaigns also depend on other policies that are currently in place. In particular, many states have comprehensive programs as well as local programs and cessation treatment programs. These can also be accompanied by tax increases. These other programs create added publicity, which reinforces the messages of the media campaign, thus having more potential to change attitudes toward smoking. The model distinguishes policies aimed at the entire population and those aimed primarily at youth.

The early California, Massachusetts, and Arizona (after the first year) campaigns directed their efforts to all ages. In Massachusetts, where price stayed constant, there was a 6 percent reduction in prevalence with no price change and similar effects are implied for California after netting out prices (CDC 1996; Farrelly et al. 2003; Friend and Levy 2002). It is estimated that across states and over time, tobacco control expenditures at high levels (including an intensive media campaign) would reduce per capita tobacco consumption (which includes prevalence and quantity smoked per smoker changes) by 8 percent, and a recent meta-analysis (Snyder et al. 2004) found that media campaigns (most of which were generally part of a more comprehensive tobacco program) yielded a 5 percent reduction in smoking prevalence. Studies generally have not been able to distinguish the effect of media campaigns from other aspects of comprehensive programs.

Using the formal model presented by Levy and colleagues (2001a) that provides the relationship between per capita expenditures and reductions in smoking prevalence, SimSmoke predicts that a highly publicized mass media campaign (publicized heavily on television and other media) directed at all smokers yields a 6 percent reduction in smoking prevalence, which increases over time to as much as 7 percent (Levy et al. 2001a). A low-publicity campaign (publicized only sporadically) has 20 percent the effect of a highly publicized campaign. In the absence of other policies, the effects are halved. These parameters have been accepted by the IOM panel.

Media and comprehensive campaigns in Florida and Arizona in the first year and the American Legacy Foundation campaign since 2000 have been directed at youth. A recent study (Tauras et al. 2005) obtained results for youth that were broadly consistent with those found for the effect of adult campaigns, and a recent study (Farrelly et al. 2005) indicated a 7 percent reduction in smoking prevalence associated with the American Legacy Foundation campaign (22 percent of the overall 36 percent decline in youth smoking prevalence). We estimate that youth-oriented campaigns lead to a 6 percent reduction in youth prevalence. We do not consider the effect on smokers ages 18–24 and on those age 25 and above, due to the lack of studies.

To incorporate the effect of past media campaigns, state per capita expenditures in 2002 were used to calculate the implied annual reductions in smoking rates by state. The annual reductions were then weighted by the number of smokers in a state, with separate estimates for campaigns directed at youth and all ages. Between 1993 and 1999, Massachusetts—followed by Utah, Arizona, Florida, and Oregon—implemented campaigns. California had a media campaign prior to 1993. Since 1999, Alaska, Maine, Idaho, Indiana, Maryland, Minnesota, Mississippi, New York,

New Jersey, and Vermont have added campaigns, but many were directed primarily at youth, and some were conducted at a low level. Since January 2002, Arkansas, Hawaii, and Delaware have implemented campaigns, but many states (including California, Colorado, Massachusetts, Minnesota, New Jersey, and Oregon) reduced campaign expenditures due to fiscal constraints (www.Tobaccofreekids.org/reports/settlements/2004/trends.pdf and www.slati.lungusa.org/reports/SLATI2004MidTermReport.pdf). Due to difficulties in obtaining measures in recent years, media campaigns are considered only for 2002, but media expenditures since then have decreased in some states. Using our mass media model, which relates per capita expenditures to reductions in smoking rates (Levy and Friend 2001), we estimate a 1.5 percent reduction from campaigns implemented in 2002.

For youth campaigns, we include the American Legacy Foundation national truth® campaign directed at youth. We estimate that current youth campaigns reduced smoking prevalence by 5 percent for the years 2002 through 2005.

School Education Programs

School education policies are added to the model for this report. They consist of well-tested programs applied through middle and high school. These programs have been shown to be more effective when accompanied by sustained media campaigns directed at youth. The effect sizes are based primarily on studies using the 30-day prevalence measure of smoking, which are assumed to ultimately lead to reductions in established smoking.

Since the model is in terms of established smokers, the effect of school-based programs has been developed in terms of their ultimate effect on initiation rates into established smoking. Based on the review in this report of school programs (Flay, Appendix D), it is estimated that sustained school programs alone reduce smoking rates by 10 percent and by 20 percent if accompanied by a sustained media campaign. The 10 percent incremental effect of media campaigns reflects the synergies from implementing the campaign in conjunction with the educational programs and is thus higher than the effect of a youth campaign alone (as described above). These effects are modeled as across-the-board reductions in initiation rates at all ages through age 24 applied to males and females. Because there is a lag between the programs and their ultimate effect on initiation, we assume that the program affects initiation rates of youth through age 15 in the first year that the program is in effect, through age 16 the second year that the program is in effect, and one additional age each for each year of implementation through age 24, the last age of initiation.

Because current educational programs are generally not implemented in a consistent manner (in other words, using well-tested formats continuously applied throughout middle and high school), it is assumed that they have no measurable effect. There have, however, been youth campaigns in effect, through the American Legacy Foundation campaign and various state campaigns, as described above. The education policy would, therefore, have the entire effect described above, but a concurrent media campaign effect would only reflect the difference between the current campaigns and the additional effects from having the campaigns in conjunction with the educational campaign.

Cessation Treatment Policies

In a previously published version of the cessation treatment policy module, SimSmoke considers the effects of mandated brief interventions delivered by health care providers to encourage patients to quit smoking, and complete financial coverage of cessation treatments with the

smoker having the flexibility to choose from the array of treatment options (Levy and Friend 2002a; Levy and Friend 2002b). Physicians receive training, their practices are monitored, and the financial coverage is well publicized. In that version, cessation policies only affect first-year quit rates. They increased the quit rate by 28 percent, which translates into a 1.4 percent decrease in smoking prevalence in the first 2 years and a 5 percent decrease after 20 years.

The cessation treatment module has been revised for the purposes of this report to consider a more all-inclusive policy. In particular, the module considers the effect of quitlines that are well publicized (e.g., through a media campaign) and that encourage follow-up with multiple sessions. In addition, the quitline is accompanied by a “free NRT” (nicotine replacement therapy) program that enables quitline callers to obtain NRT for a specified period of time. The module has also been modified to allow for a direct prevalence effect as well a continuous effect on the future first-year quit rate as long as the program is in operation. The effect on future one-year quit rates is halved to reflect the greater use of treatments and effectiveness of interventions in the first year of the program.

Parameters in the new module have been developed in cooperation with the IOM committee. In the revised module, we set the quit success rate of those who complete a quit attempt at 6 percent, which is consistent with an overall quit rate of 4 percent with about 45 percent of smokers making a quit attempt. We continue to assume that behavioral or pharmacotherapy use doubles quit rates, and their combined use quadruples quit rates (Fiore et al. 2000). Proactive quitlines with follow-up double the quit success rate of those making a quit attempt (Zhu et al. 2002). We estimate that quitlines alone with high media publicity attract 1 percent of smokers and, when free NRT is added, attract 6 percent of smokers (Metzger et al. 2005; Miller et al. 2005; West et al. 2005), of whom 30 percent are new quit attempts. Through the complete coverage of effective cessation treatments, an additional 4 percent of smokers use cessation treatment alone, 2 percent use behavioral treatment alone, and 3 percent use combined pharmacotherapy and behavioral treatment. We estimate that 50 percent of those who use treatments as a result of the policy would not otherwise have made a quit attempt. In addition, brief interventions increase quit attempts by 20 percent and further increase new treatment use (through quitlines and other financial access) by 10 percent. With the combined policies, quit attempts in the first year increase by 40 percent (from 45 to 63 percent of smokers) and average quit success (per quit attempt) increases by 28 percent (from 8.9 to 11.4 percent). As a result of all the policies, the prevalence of smokers is reduced by 3.4 percent in the first-year, and future first-year quit rates increase by about 20 percent.

From 2002 forward, the module takes into account the level of treatment coverage and health care involvement. By 2003, 36 Medicaid programs covered some counseling or medication for all Medicaid recipients, but only New Jersey and Oregon offered comprehensive coverage and Medicare did not provide coverage (CDC 2004). Measures of insurance coverage by private payers are more limited (Levy and Friend 2002b). A study of managed care organizations (McPhillips-Tangum et al. 2002) found that 59 percent of plans had some type of pharmacotherapy coverage and 86 percent had some kind of behavioral coverage, but a study of employer coverage (www.cdc.gov/tobacco/educational_materials/cessation/page1.html) found that only 24 percent of employers provided any type of cessation treatment coverage. In 2002, 14.6 percent of adults were not covered at any time in last year, 71 percent were covered by private insurance, 11 percent by Medicaid, and 13.5 percent by Medicare (www.ferrer.bls.census.gov/macro/032002/health/h02_001.htm). We estimate that less than 20 percent of the population is covered for pharmacotherapy and for behavioral therapy, and these

benefits are not well publicized. We estimate that about 40 states have quitlines—but these quitlines are generally not widely publicized and do not provide free pharmacotherapy (www.cdc.gov/tobacco/quit/Quitlines/Appendix.pdf)—and that about 50 percent of smokers were receiving brief interventions.

Youth Access

The youth access module considers the effect of self-service and vending machine bans, and three components of retail compliance (compliance checks, penalties, and merchant awareness or community mobilization). The module also takes into account that, as retail sales to youth are reduced, youth switch to non-retail sources such as theft, older peers, and parents.

The model considers three levels of enforcement: (1) strongly enforced and publicized (compliance checks are conducted four times per year per outlet, penalties are potent and enforced, and there is heavy publicity and community involvement); (2) well enforced (compliance checks are conducted regularly, penalties are potent, and publicity and merchant training are included, but there is little community support); and (3) weakly enforced (compliance checks are conducted sporadically, penalties are weak, and there is little merchant awareness along with minimal community participation). With a strongly enforced and well-publicized program, we estimate a 20 percent reduction in youth smoking prevalence and future initiation for 16–17 year olds when all policies are in full force, with a 30 percent reduction for those ages 10–15 years (Levy et al. 2001a; Levy and Friend 2000). The well-enforced and weakly enforced policies, respectively, yield 50 percent and 10 percent of the effect. These policies work through the prevalence and initiation rate, but do not affect cessation. These parameters have been accepted by the IOM panel.

Data from the Substance Abuse and Mental Health Administration website (<http://prevention.samhsa.gov/tobacco/01synartable.asp>) indicate that noncompliance is about 15 percent, but these figures may be overstated because they affect future funding. Based on current compliance rates and programs in effect across states, we estimate that states on average have a low enforcement policy.

Prediction of Status Quo Trends and the Effect of Tobacco Control Policies

The model provides a prediction of smoking prevalence from the year 2002 through 2005, taking into account changes in policies during that time period. The model will be used to project smoking rates in future years beginning in the year 2006. We will consider the smoking prevalence rate over a 20-year time horizon ending in 2025. We examine rates for the adult population (ages 18 and above), as well as breakdowns by age.

First, we present a status quo scenario. This scenario incorporates policies in the year 2002 and changes in policy between 2002 and 2005, and then holds policies constant at their 2005 levels to project changes in smoking prevalence in the absence of any policy changes. We then consider the effect of policy changes on smoking rates in future years. Policy changes are made in the year 2006 and maintained in all future years. Their incremental effect will depend on the level of policies in effect in 2005. The effects of policies are presented relative to the status quo level in the same year, that is $(\text{Policy Rate}_T - \text{Status Quo Rate}_T) / \text{Status Quo Rate}_T$.

Worst Case Scenario

Since 1998, large price increases, new clean air laws, and other tobacco control policies have been associated with a reduction in smoking prevalence of about 20 percent (Levy et al. 2005a).

However, this reduction might be reversed if policy changes are not maintained. We consider a reverse in some of the more prominent policies, especially those relating to the settlement funds (including those to the American Legacy Foundation), which we call a worst-case scenario. This scenario typifies the possibilities if tobacco control regresses, as it has done in some states.

While states are not expected to reduce taxes, cigarette manufacturers might be expected to reduce price to gain back some of the customers that they have lost in recent years due to price increases (Levy et al. 2005a), especially if public pressure is reduced. For example, after the settlement, average cigarette prices increased about \$0.80 net of tax increases. That price increase might be reversed once the settlement is no longer an issue, since there would no longer be an incentive to raise prices to reduce youth consumption, and thereby, reduce the size of settlement payouts. With the settlement abandoned, prices might be expected to decrease. We separately consider price reductions of \$0.40 and \$0.80. As part of the worst-case scenario, we also assume that current taxes do not adjust to future inflation, suggesting a slight erosion of taxes over time.

Clean air laws are not expected to revert, but compliance with those laws might be lower as less attention is focused on tobacco control, especially if media campaigns are abandoned. We consider the effect of reduced publicity and enforcement surrounding the laws.

In recent years, media campaigns have been abandoned in some states, such as Massachusetts, and faced large cutbacks in others, such as California. The American Legacy Foundation campaign may also be abandoned. We consider the effect of reductions in those campaigns from their current level to no funding, both for youth and for adults.

Education policies are currently at levels where they are of minimal effectiveness. Consequently, no change is expected under the worst-case scenario. In addition, no change is expected for youth access policies. These policies are not currently conducted at levels that are expected to have large effects on smoking prevalence, especially adult prevalence, and large cutbacks are not expected.

For cessation, we consider only the elimination of the quitlines. It is not expected that Medicaid or other coverage is likely to revert.

We then consider the reversion of all policies: a reduction in price of \$0.80, a reduction in enforcement and clean air laws, a reduction in adult media campaigns, a reduction in youth media campaigns, and a reduction in cessation treatment programs.

Future Policies

Finally, we consider the effect of strengthening current policies to what might be viewed as the desired set of policies recommended by the IOM committee. We consider changes in the following policies, individually and in combination:

We consider tax increases of \$1.00, \$2.00, and \$3.00. We assume that these taxes are indexed to inflation, so that their value is maintained over time.

We consider a clean air policy that bans smoking at all work sites—which includes bars, restaurants, and grocery stores—plus increased compliance through publicity from other policies (especially media policies regarding secondhand smoke).

We consider an intensive media campaign as part of a more comprehensive strategy (at levels recommended by the Centers for Disease Control and Prevention), directed at adults and youth in all states.

We will consider a comprehensive cessation treatment policy with all of the policies described above (full coverage of pharmacotherapy and behavioral therapy, training and mandated

tobacco brief interventions, and multi-session quitlines with free NRT). We further assume that the policies are well-publicized.

School education policies consist of well-tested programs applied through middle and high school. We include a media campaign as part of the policy.

The youth access policy is assumed to be conducted at a high enforcement level, with high penalties, and be well-publicized. The policy is part of the comprehensive campaign, implying a high degree of community mobilization.

RESULTS

We present the effect of varying levels of tobacco control policies in isolation and together through a comprehensive tobacco control strategy. The estimates of smoking prevalence under the status quo and varying policy scenarios are shown for the adult population (18 years of age and above) in Tables J-2 and J-3.

The Status Quo Scenario

The model begins in 2002 with policy levels and changes in policy inputted into the model through 2005. The smoking prevalence is estimated as 21.7 percent in 2002, falling to 20.6 percent in 2004. Part of this decline is due to long-run trends, including policies implemented before 2002, and part is due to policies implemented between January 2002 and January 2005. The average price increased about 14 percent, and several states implemented clean air laws.

New policies are implemented and maintained from 2006 through 2025. Their effect on smoking prevalence is presented relative to the status quo, in which tobacco control policies remain unchanged from their 2005 levels. In the status quo scenario, adult smoking prevalence is projected to decline from the 2005 level of 20.6 percent to the 2010 level of 19.3 percent. This absolute reduction of 1.3 percentage points represents a 6.3 percent decline relative to the 2005 level. Kept at 2005 policy levels, smoking rates are projected to fall to 15.5 percent by 2025. This drop represents a 24.7 percent decrease relative to the 2005 level. At least some of the reduction in smoking prevalence is explained by stricter public policies implemented prior to 2005, including the increase in prices since 1998, more stringent smoking restrictions in work and public places, and better information about the effects of smoking (DHHS 2000). The largest reductions are among the 35–64-year-old age groups, due to higher cessation rates among those groups and reduced initiation at earlier ages.

Worst-Case Scenario

In the worst-case scenario, we first look at the effect of decreasing the average tax rate. A \$0.40 decrease without taxes indexed to inflation will lead to a projected 1.6 percent relative increase in adult smoking prevalence within 5 years compared to the status quo, and by the year 2025 it will lead to a 5 percent relative increase. A \$0.80 decrease in average tax price is projected to have an even greater effect, causing a 3 percent relative increase within 5 years compared to the status quo, rising steadily to a 7.6 percent relative increase in adult smoking prevalence by the year 2025.

Taking away enforcement and publicity of clean air laws has a smaller effect than a tax decrease. This reduction in clean air laws is projected to cause a 0.2 percent relative rise in smoking prevalence compared to status quo within 5 years, and a 0.5 percent relative rise after 20 years. Reductions in media coverage lead to slightly larger increases in smoking prevalence

compared to the reduction in clean air laws. Abandoning adult media campaigns is projected to cause a 0.3 percent relative rise in smoking prevalence compared to status quo within 5 years and an 0.8 percent relative rise after 20 years. Abandoning youth media campaigns is projected to cause a 0.1 percent relative rise in smoking prevalence compared to status quo within 5 years and a 0.3 percent relative rise after 20 years. Reductions in cessation treatment policies rise 0.2 percent after 5 years and have a 2.0 percent relative rise after 20 years.

Finally, we consider the elimination of all policies: a reduction in price of \$0.80, a reduction in enforcement and clean air laws, a reduction adult media campaigns, and a reduction in cessation treatment programs. After 5 years, these reductions are projected to lead to a 3.5 percent increase in smoking prevalence relative to the status quo. The smoking prevalence is projected to increase steadily relative to the status quo. After 20 years, smoking prevalence is projected to be 17.1 percent compared to 15.5 percent under the status quo, or a 10.4 percent relative increase. Relative to the status quo, most of the increases are among the younger age groups due to the greater effect of price increases on those age groups (especially below age 35).

Taxes

Of the tobacco control policies, SimSmoke attributes the most pronounced effect on smoking prevalence trends between 1993 and 2003 to taxes (Levy et al. 2004e). However, the same absolute increase in taxes or price has a smaller percentage effect at the higher prices found in 2005 than in earlier years, since prices are now at a higher rate and the changes represent smaller relative increases. An increase in the average tax rate of \$0.50 from the 2005 level is projected to result in an absolute decline of 0.5 percent in adult smoking prevalence compared to the status quo between 2005 and 2010, which represents a 2.4 percent relative drop. This decrease is projected to continue steadily, reaching a 0.7 percent decline compared to the status quo by the year 2025, which represents a 4.4 percent relative drop. An increase in the average tax rate of \$1.00 is projected to result in a 0.9 percent absolute (a 4.4 percent relative) reduction compared to status quo within the first 5 years, rising to a 1 percent reduction (6.8 percent relative to status quo) by 2025. An increase in the average tax rate of \$2.00 is projected to result in a 1.5 percent reduction (7.7 percent relative) compared to status quo by the year 2010 and a decrease of 1.8 percent (11.8 percent relative) by 2025. Finally, a \$3.00 average tax increase is projected to result in a 2.0 percent reduction in adult smoking prevalence compared to status quo in the first 5 years, which represents a 10.3 percent relative reduction. The smoking prevalence is projected to have a 2.4 percent absolute (15.8 percent relative) decline compared to the status quo by the year 2025.

The largest effects of the price increases are on those at younger ages, particularly those below age 18. Consequently, the growth in effect over time is primarily because youth are more responsive to price increases than adults. We also assume that taxes increase with the rate of inflation over time, but some of the effect on smoking prevalence dissipates over time if the per-unit taxes are not indexed to inflation (Levy et al. 2000b).

Clean Air Policies

Clean air policies have a similar, although smaller, effect on smoking prevalence compared to tax policies. The model predicts the effects derived from implementing a total smoking ban in workplaces, restaurants, and public places supported by both publicity and enforcement of the ban. By 2010, these policies lead to a 3.4 percent relative drop in the smoking rate compared to the status quo. By 2025, the model predicts a 4.2 percent drop compared to the status quo, the increased effect due primarily to higher cessation rates. The largest effects are among those in

the 25–64-year-old age groups, particularly 35–44-year-old groups, due to the more pronounced effect of work site laws on this group (particularly among males).

Mass Media

We examine a media campaign directed at all smokers implemented at a high intensity, used in conjunction with other programs, and maintained over time. The decline of 1.1 percent in adult smoking after 5 years compared to status quo translates to a 5.9 percent relative decrease. The effect increases steadily to a 7.3 percent reduction relative to the status quo by 2025. Media campaigns initially have a greater effect on younger smokers, but have greater effects on older smokers in later years.

School Education Policies

We look at the effects of a sustained school program combined with a media campaign directed at youth. There is a very small projected decline in adult smoking prevalence after 5 years, which is to be expected considering this policy is directed at youth. After 10 years, this policy is projected to result in an absolute decline in adult smoking prevalence of 0.5 percent compared to status quo, which is a relative decline of 2.9 percent. By the year 2025 there will be a projected 0.9 percent absolute or 5.9 percent relative drop in smoking prevalence compared to the status quo. These programs only directly affect youth, but their effects spread to lower prevalence rates at older ages over time.

Cessation Policies

A policy of mandated brief interventions delivered by health care providers, along with full financial coverage of cessation treatments and well-publicized quitlines with free NRT, have smaller effects in the earlier years of the projection, but their impact grows over time through increased cessation rates, which affect those greater than age 24 (Levy and Friend 2002b). The combined cessation policies are projected to reduce adult smoking prevalence by an absolute value of 1.1 percent by 2010 or, in other words, a 5.8 percent relative improvement over the status quo scenario. This effect grows to an 11.2 percent reduction relative to the status quo by 2025.

Youth Access Policies

We look at a policy of strict control of youth access (bans on access to self-service and vending machines in addition to strict retail compliance checks, penalties for noncompliance, and a high level of publicity). Initially, smoking rates of youth are reduced by about 25 percent. Not surprisingly, adult smoking rates (of which youth are included only in later years) decline by a small amount (1.1 percent) relative to the status quo by 2010, with a greater relative decline of 5.1 percent by 2025 as a large portion of youth affected by the policies become older, replacing those cohort with higher initiation rates.

Best-Case Scenario: A Comprehensive Set of Policies

The final cases consider a combination of policies representing a tax increase of \$1.00, \$2.00, and \$3.00, along with work site, restaurant, and public place smoking bans with publicity and enforcement; a high-intensity media campaign; comprehensive cessation policies; and strict youth access policies. With a \$1.00 tax and the other policies, the smoking rate is projected to

fall by 19.7 percent below the status quo level by 2005. Maintaining this policy is projected to reduce the smoking rate 34.0 percent relative to the status quo by 2025. With a \$2.00 tax and the other policies, the smoking rate is projected to fall to 14.9 percent by 2010, which is 22.5 percent below the status quo level of 19.3 percent in relative terms. Maintaining this policy is projected to reduce the smoking rate to 9.7 percent compared to a status quo level of 15.5 percent by 2025, which is 37.6 percent lower relative to the status quo. With a \$3.00 tax and the other policies, the smoking rate is projected to fall to 14.5 percent by 2010, which is 24.7 percent below the status quo level in relative terms. Maintaining this policy is projected to reduce the smoking rate to 9.3 percent by 2025, which is a 40.3 percent reduction relative to the status quo.

Of the policies in the comprehensive package, media campaigns, clean air laws, and taxes have the greatest effect in 2010, but cessation treatment, education, and youth access policies play a greater role by 2025. Some policies have a greater impact on adult smoking prevalence and others on youth prevalence. Overall, the largest effects are on youth through the effects of price, youth access policies, and education programs. The effects of a comprehensive policy strategy are shown as the SimSmoke screen in Figure J-1.

CONCLUSIONS

From the current smoking prevalence of about 20.6 percent, the SimSmoke model projects a reduction in smoking rates to 19.3 percent by 2010, if policies are maintained at their 2005 levels. The decline occurs due to the aging of older cohorts and the impetus from policies in years through 2005. This rate is substantially above the *Healthy People 2010* target of 12 percent. By the year 2025, the smoking rate is projected to fall to 15.5 percent in the absence of policy change. However, if policies regress (the worst-case scenario), the model predicts that the smoking rate would be at 17.1 percent, about 10 percent higher than the status quo scenario.

We considered a package of policies as suggested in this report. With a cumulative set of policies (with taxes increased \$2.00), we predict that smoking prevalence will fall to about 15 percent by 2010, which is 23 percent below the status quo level of 19 percent in relative terms, and to about 10 percent by 2025, or a 40 percent decrease relative to the status quo. The cumulative impact of the comprehensive set of policies over a 20-year period provides strong encouragement for implementing the policy objectives set out in this report.

In summary, the SimSmoke model suggests that policies can have a large impact on smoking rates. With the implementation of strong policies, we project a smoking rate of about 15 percent in 2010. Evidence from California, which has had policies in line with these goals, suggests that this projection is attainable (Gilpin et al. 2003). Maintaining policies at high levels could reduce the smoking prevalence in the United States to about 10 percent by 2025. Although later, these levels are in line with *Healthy People 2010* targets.

TABLE J-1 Data Used in SimSmoke

Variable	Source	Specifications
I. Population model		
A. Population	2002 Current Population Survey (CPS)	Breakdowns by age and gender
B. Fertility rates	U.S. Census Vital Rate Inputs Tables, 2000	Breakdowns by age
C. Mortality rates	2001 Multiple Cause-of-Death File, NCHS	Breakdowns by age and gender: total deaths
II. Smoking model		
A. Baseline prevalence rates for current and ex-smokers	Tobacco Use Supplement of the CPS (1992–93) for age 15+, and 1993 Teen-age Attitudes and Practices Survey (TAPS) for <age 15	Based on 100+ cigarettes lifetime and distinction between current and previous smokers. Breakdowns by smoking experience (<1, 1–2, 3–5, 6–10, 11–14, 15+ years), by age and gender
B. Initiation rates	Change in smoking rates between contiguous age groups	Breakdowns by age and gender
C. First-year quit rates	Calculated from cessation module with adjusters for demographic group based on the CPS	Breakdowns by age and gender
D. Relapse rates	(DHHS 1989) McWhorter et al. 1990; U.S. DHHS 1990; Gilpin et al. 1997), COMMIT data	Breakdowns by age
E. Relative death risks of smokers and ex-smokers	Cancer Prevention Study II (see Thun et al. 2001)	Breakdowns by age and gender
III. Policy modules		
A. Taxes	Tobacco Institute, Tobaccofreekids.org, www.bls.gov/cpi/home.htm	Prices and taxes for 2002–05
B. Clean air laws	www2.cdc.gov/nccdphp/osh/state/report_index.asp and slati.lungusa.org/search-form.asp (National Cancer Institute 2000)	Different types of laws and their stringency
C. Media and other educational campaigns	CDC and various state websites: (Farrelly Matthew C et al. 2003; Wakefield and Chaloupka 2000)	Expenditures per capita and audience

D. Youth access	CDC, SAMHSA, (Levy et al. 2001a)	Enforcement checks, penalties, community campaigns, self-service, and vending machine bans
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NOTE: CDC = Centers for Disease Control and Prevention; NCHS = National Center for Health Statistics; SAMHSA = Substance Abuse and Mental Health Administration.

TABLE J-2 Projected Adult Smoking Prevalence (%) from 2003 to 2008, with Projection Through 2025 under Status Quo and Worst-Case Policy Scenarios^a

YEAR	2002	2005	2006	2010	2015	2020	2025
Prevalence (%)							
Status quo	21.7	20.6	20.3	19.3	18.1	16.9	15.5
\$0.40 price reduction	21.7	20.6	20.4	19.6	18.6	17.6	16.3
\$0.80 price reduction	21.7	20.6	20.6	19.9	18.9	18.0	16.7
Clean air reduction	21.7	20.6	20.3	19.3	18.1	17.0	15.6
Media reduction	21.7	20.6	20.3	19.4	18.2	17.0	15.7
Youth media reduction	21.7	20.6	20.3	19.3	18.3	17.2	15.8
Cessation reduction	21.7	20.6	20.3	19.3	18.1	17.0	15.6
	21.7	20.6	20.6	20.0	19.2	18.4	17.1
% Change in Prevalence from Status Quo ^b							
Status quo							
\$0.40 price reduction			0.7	1.6	2.8	4.0	5.0
\$0.80 price reduction			1.4	3.0	4.8	6.4	7.6
Clean air reduction			0.1	0.2	0.3	0.4	0.5
Media reduction			0.2	0.3	0.5	0.7	0.8
Youth media reduction			0.0	0.1	0.2	0.3	0.3
Cessation reduction			0.0	0.2	1.0	1.6	2.0
			1.6	3.8	6.4	8.8	10.4

SOURCE: SimSmoke model.

^a Policies are implemented and maintained from year 2005 forward.^b Percent changes calculated relative to the status quo rate at (Policy Rate - Status Quo Rate)/Status Quo Rate.

TABLE J-3 Projected Adult Smoking Prevalence (%) from 2003 to 2005, with Projections Through 2025 Under Status Quo and Best-Case Policy Scenarios^a

YEAR	2002	2005	2006	2010	2015	2020	2025
Prevalence (%)							
Status quo	21.7	20.6	20.3	19.3	18.1	16.9	15.5
\$0.50 tax increase	21.7	20.6	19.9	18.8	17.6	16.4	14.9
\$1.00 tax increase	21.7	20.6	19.6	18.4	17.1	15.9	14.5
\$2.00 tax increase	21.7	20.6	19.1	17.8	16.4	15.1	13.7
\$3.00 tax increase	21.7	20.6	18.6	17.3	15.8	14.5	13.1
Clean air laws	21.7	20.6	19.7	18.6	17.4	16.3	14.9
Media campaign	21.7	20.6	19.2	18.1	16.9	15.8	14.4
Cessation treatment	21.7	20.6	19.7	18.2	16.7	15.3	13.8
Education programs	21.7	20.6	20.3	19.2	17.6	16.1	14.6
Youth access policies	21.7	20.6	20.3	19.1	17.6	16.2	14.7
All policies with \$1.00 tax	21.7	20.6	17.4	15.5	13.4	11.8	10.2
All policies with \$2.00 tax	21.7	20.6	16.9	14.9	12.9	11.2	9.7
All policies with \$3.00 tax	21.7	20.6	16.5	14.5	12.4	10.8	9.3
% Change in Prevalence from Status Quo ^b							
Status quo							
\$0.50 tax increase			-1.8	-2.4	-2.9	-3.3	-3.7
\$1.00 tax increase			-3.4	-4.4	-5.3	-6.2	-6.8
\$2.00 tax increase			-6.1	-7.7	-9.3	-10.7	-11.8
\$3.00 tax increase			-8.2	-10.3	-12.4	-14.2	-15.6
Clean air laws			-3.1	-3.4	-3.7	-3.9	-4.2
Media campaign			-5.5	-6.0	-6.5	-6.9	-7.4
Cessation treatment			-3.1	-5.8	-7.8	-9.4	-11.2
Education programs			0.0	-0.7	-2.9	-4.8	-5.9
Youth access policies			0.0	-1.1	-2.8	-4.3	-5.1
All policies with \$1.00 tax			0.0	-19.7	-25.7	-30.5	-34.0
All policies with \$2.00 tax			-14.3	-22.5	-28.9	-33.8	-37.6
All policies with \$3.00 tax			-16.7	-24.7	-31.3	-36.4	-40.3

SOURCE: SimSmoke model.

^a Policies are implemented and maintained from year 2005 forward.^b Percent changes calculated relative to the status quo rate at (Policy Rate - Status Quo Rate)/Status Quo rate.

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Commissioned Simulation Modeling of Smoking Prevalence as an Outcome of Selected Tobacco Control Measures

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The statement of work requested by the committee can be divided into three tasks:

1. An analysis of future U.S. smoking prevalence under “status quo,” “best-case” and “worst-case” scenarios. The best-case scenario was defined by the committee as the United States achieving the State of California’s current smoking initiation and cessation rates. The worst case scenario was defined by the committee as the United States achieving the State of Kentucky’s current initiation and cessation rates.
2. An analysis of different combinations of initiation and cessation rates that would achieve an adult smoking prevalence of 10 percent by the year 2025.
3. An analysis of the impact on smoking prevalence of increases in specific age group cessation rates.

For all three analysis tasks, the committee requested reports of current, former, and never-smokers’ prevalence by age group and year. Current smokers are defined as individuals who have smoked more than 100 cigarettes during their entire lives and who smoke now every day or some days.

To carry out the analysis we used the model of U.S. smoking prevalence that we developed, which has been described elsewhere (Mendez et al. 1998). We introduced the following modifications to the model:

1. Age-specific population figures were updated using the 2000 U.S. Census.
2. Death rates were updated with year 2000 figures (from the Statistical Abstract of the United States).
3. Overall adult prevalence for the year 2005 was fixed at 20.6 percent. This figure is a projection, because the year 2005 smoking prevalence figure is not known yet. For reference, the Center for Disease Control and Prevention’s (CDC) preliminary estimate (from National Health Interview Survey [NHIS] data) of the adult smoking prevalence in 2004 is 20.9 percent.
4. Output was modified to conform to the committee’s specification.

DESCRIPTION OF ANALYSES

Pages 1 through 11 in the Results section show the outcomes from the model when subject to status quo as well as California and Kentucky's initiation and cessation rates.

Status quo initiation rate was taken to be 25 percent, consistent with the prevalence for the 18–24 age group observed in 2003 (CDC 2005). Cessation rates for the status quo scenario were taken to be the ones estimated by Mendez and colleagues (1998): 0.21 percent for the 18–30 age group; 2.15 percent for the 31–50 age group; and 5.97 percent for individuals aged 51 and older. By using these age group-specific cessation rates we obtained an estimated 2.59 percent overall cessation rate in 2005 for the United States.

California and Kentucky rates were estimated with data from the Behavioral Risk Factor Surveillance System (BRFSS) from recent years (2000–2003). California's initiation rate was estimated to be 20 percent, an average of the 18–24 age group prevalence from 2000 to 2003. Kentucky's smoking initiation rate was estimated to be 39 percent.

Cessation rates for California and Kentucky were estimated in the following way: first, we obtained from BRFSS adult smoking prevalence by age group for each state from 2000 to 2003. We also obtained, from the Statistical Abstract of the United States, population size by age for each of the two states for the year 2000. We aged the population from 2000 to 2003 according to age-specific death rates and, for every year, computed the adult smoking prevalence assuming a single cessation rate for the population. We estimated the single cessation rate as the value that matched the calculated overall adult smoking prevalence with the prevalence reported from BRFSS for a specific year. These years, 2001 for Kentucky and 2002 for California, were chosen to highlight the high cessation in California and the low cessation in Kentucky. This procedure yielded an estimated cessation rate of 3.33 percent for California and 1.00 percent for Kentucky. We should note that this is a crude estimation procedure that ignores the effect of migration into and out of the states. The procedure is aimed to produce a rough estimate of the cessation rates in the states.

To obtain national age-specific cessation rates consistent with the aggregate quit rates obtained for California and Kentucky, we multiplied the status quo age-specific cessation rates by the ratio of the estimated cessation rates for California and Kentucky to the overall U.S. cessation rate: that is, $3.33/2.59$ for California and $1.00/2.59$ for Kentucky.

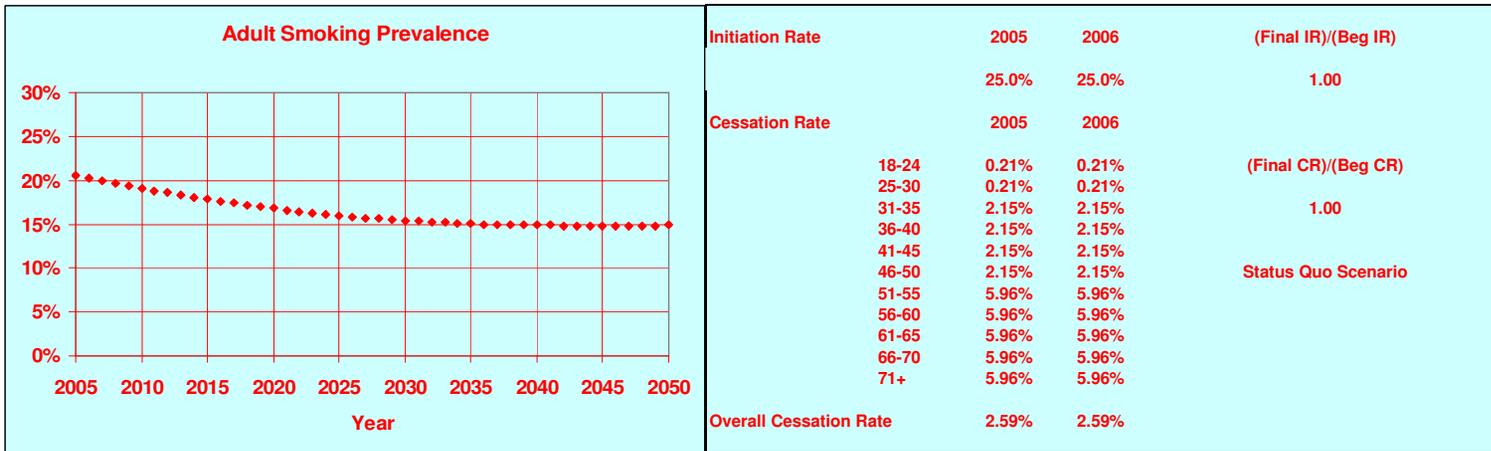
Page 1 in Results presents the status quo scenario. Pages 2 through 11 show scenarios in which the United States attains California and Kentucky rates at different times: almost instantaneously (in 2006) and gradually (linearly), by 2010, 2015, and 2020.

Pages 12 through 26 in Results describe different scenarios in which the country will move from a current adult smoking prevalence of 20.6 percent in 2005 to a 10 percent adult smoking prevalence in 2025. These scenarios describe necessary changes in initiation and/or cessation rates to achieve the 2025 10 percent target prevalence. These changes in initiation and cessation rates are assumed to happen instantaneously by 2006 or gradually (linearly) by 2010, 2015, and 2020. Once target cessation and initiation rates are reached, they are kept constant at the target levels for the remainder of the analysis period.

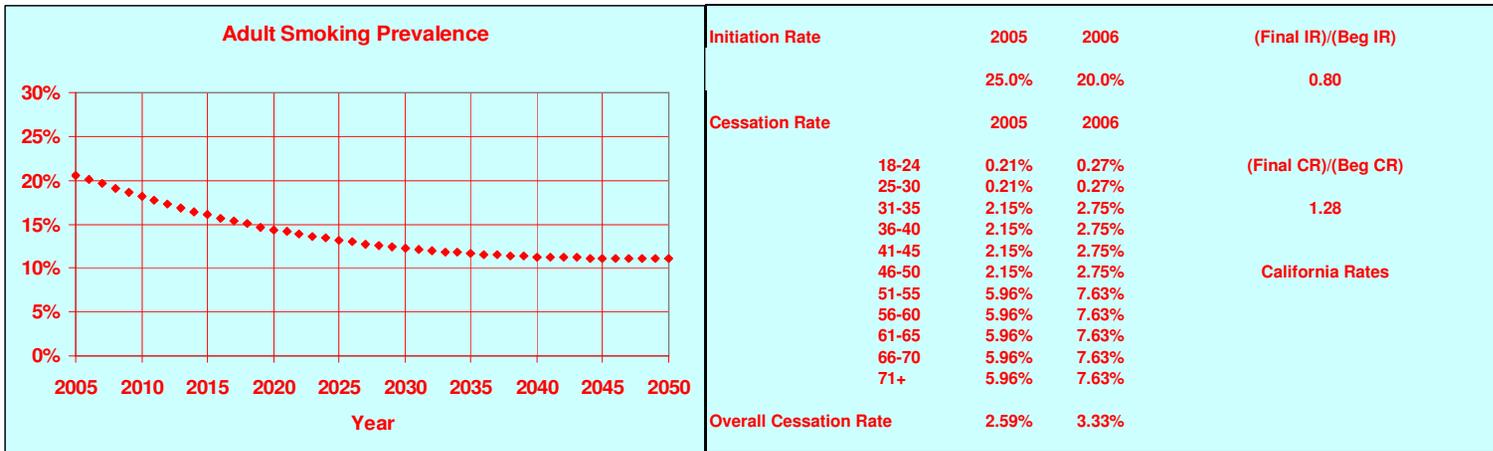
Finally, pages 27 through 38 present the percentage decrease in adult smoking prevalence (from the status quo) due to a 10 percent increase in cessation for each of the age groups reported in the analysis.

Page	Description
4	Status Quo Scenario
5	Country moves from Status Quo rates to California rates – California rates are reached by 2006
6	California rates are reached by 2010
7	California rates are reached by 2015
8	California rates are reached by 2020
9	Country moves from Base Case rates to Kentucky rates – Kentucky rates are reached by 2006
10	Kentucky rates are reached by 2010
11	Kentucky rates are reached by 2015
12	Kentucky rates are reached by 2020
13	Smoking prevalence under California, Kentucky and Base Case rates – Rates are reached by 2006
14	Smoking prevalence under California, Kentucky and Base Case rates – Rates are reached by 2010
15	If initiation drops to 5.9% by 2006, prevalence will drop to 10% by 2025
16	If initiation drops to 4.1% by 2010, prevalence will drop to 10% by 2025
17	If initiation drops to 0.5% by 2015, prevalence will drop to 10% by 2025
18	If initiation is fixed at 30% in 2006 and cessation increases 4.39-fold by 2006, prevalence will drop to 10% by 2025
19	If initiation is fixed at 30% in 2006 and cessation increases 4.54-fold by 2010, prevalence will drop to 10% by 2025
20	If initiation is fixed at 30% in 2006 and cessation increases 4.79-fold by 2015, prevalence will drop to 10% by 2025
21	If initiation is fixed at 30% in 2006 and cessation increases 5.23-fold by 2020, prevalence will drop to 10% by 2025
22	If initiation is fixed at 25% in 2006 and cessation increases 3.21-fold by 2006, prevalence will drop to 10% by 2025
23	If initiation is fixed at 25% in 2006 and cessation increases 3.24-fold by 2010, prevalence will drop to 10% by 2025
24	If initiation is fixed at 25% in 2006 and cessation increases 3.48-fold by 2015, prevalence will drop to 10% by 2025
25	If initiation is fixed at 25% in 2006 and cessation increases 3.81-fold by 2020, prevalence will drop to 10% by 2025
26	If initiation is fixed at 20% in 2006 and cessation increases 2.36-fold by 2006, prevalence will drop to 10% by 2025
27	If initiation is fixed at 20% in 2006 and cessation increases 2.38-fold by 2010, prevalence will drop to 10% by 2025
28	If initiation is fixed at 20% in 2006 and cessation increases 2.55-fold by 2015, prevalence will drop to 10% by 2025
29	If initiation is fixed at 20% in 2006 and cessation increases 2.78-fold by 2020, prevalence will drop to 10% by 2025
30	Combinations of initiation and cessation rates to reach 10% prevalence by 2025
31	Sensitivity analysis – 10% increase in cessation rate for the 18-24 group in 2005
32	Sensitivity analysis – 10% increase in cessation rate for the 25-30 group in 2005
33	Sensitivity analysis – 10% increase in cessation rate for the 31-35 group in 2005
34	Sensitivity analysis – 10% increase in cessation rate for the 36-40 group in 2005
35	Sensitivity analysis – 10% increase in cessation rate for the 41-45 group in 2005
36	Sensitivity analysis – 10% increase in cessation rate for the 46-50 group in 2005
37	Sensitivity analysis – 10% increase in cessation rate for the 51-55 group in 2005
38	Sensitivity analysis – 10% increase in cessation rate for the 56-60 group in 2005
39	Sensitivity analysis – 10% increase in cessation rate for the 61-65 group in 2005
40	Sensitivity analysis – 10% increase in cessation rate for the 66-70 group in 2005
41	Sensitivity analysis – 10% increase in cessation rate for the 71+ group in 2005

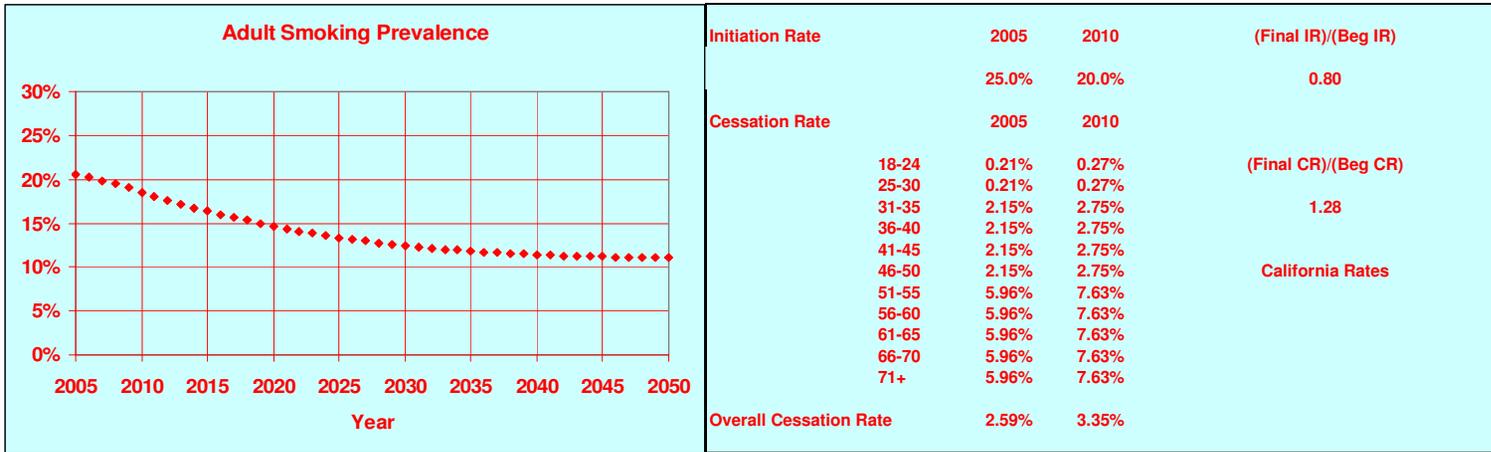
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



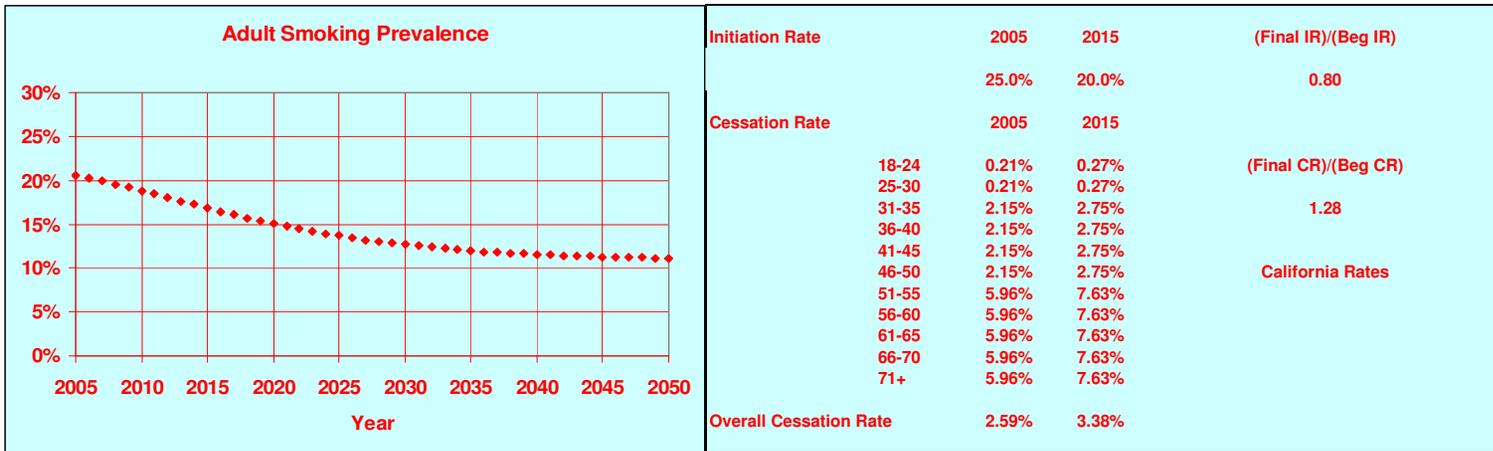
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.198	0.198	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.216	0.195	0.195	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.243	0.233	0.206	0.183	0.165	0.116	0.075	0.023	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.218	0.211	0.202	0.179	0.179	0.196	0.148	0.105	0.049	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.206	0.190	0.184	0.176	0.179	0.208	0.224	0.175	0.131	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.206	0.179	0.165	0.160	0.208	0.208	0.235	0.249	0.199	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.183	0.162	0.141	0.130	0.345	0.255	0.252	0.273	0.284	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.133	0.123	0.109	0.095	0.367	0.406	0.315	0.305	0.319	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.117	0.089	0.083	0.073	0.367	0.422	0.450	0.355	0.341	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.117	0.079	0.060	0.056	0.377	0.422	0.460	0.479	0.382	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.067	0.061	0.049	0.038	0.417	0.434	0.458	0.483	0.501	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.181	0.160	0.144	0.132	0.227	0.227	0.225	0.220	0.212	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



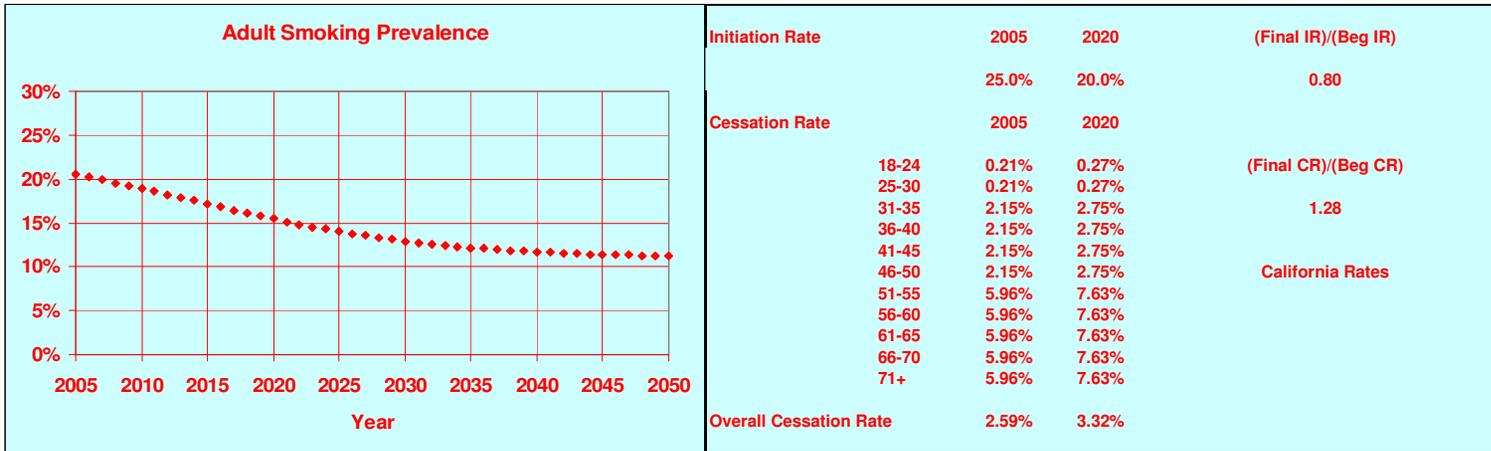
Prevalence	Current Smokers										Former Smokers					Population				
	Age Group	Year					Year					Year								
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025				
	18-24	0.247	0.225	0.200	0.198	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137				
	25-30	0.258	0.247	0.231	0.200	0.195	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690				
	31-35	0.249	0.244	0.233	0.219	0.188	0.165	0.115	0.075	0.023	0.018	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081				
	36-40	0.235	0.221	0.212	0.203	0.191	0.179	0.193	0.147	0.105	0.052	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982				
	41-45	0.235	0.209	0.192	0.185	0.176	0.179	0.205	0.222	0.174	0.131	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647				
	46-50	0.230	0.209	0.182	0.167	0.161	0.208	0.205	0.232	0.247	0.198	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034				
	51-55	0.194	0.187	0.164	0.142	0.131	0.345	0.252	0.250	0.272	0.283	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237				
	56-60	0.172	0.138	0.126	0.110	0.096	0.367	0.401	0.312	0.304	0.318	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138				
	61-65	0.172	0.122	0.093	0.085	0.074	0.367	0.417	0.446	0.353	0.340	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024				
	66-70	0.152	0.122	0.082	0.062	0.057	0.377	0.417	0.457	0.477	0.381	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525				
	70-89	0.069	0.070	0.063	0.050	0.039	0.417	0.431	0.455	0.481	0.500	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973				
	18-89	0.206	0.185	0.164	0.147	0.134	0.227	0.225	0.223	0.219	0.211	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467				



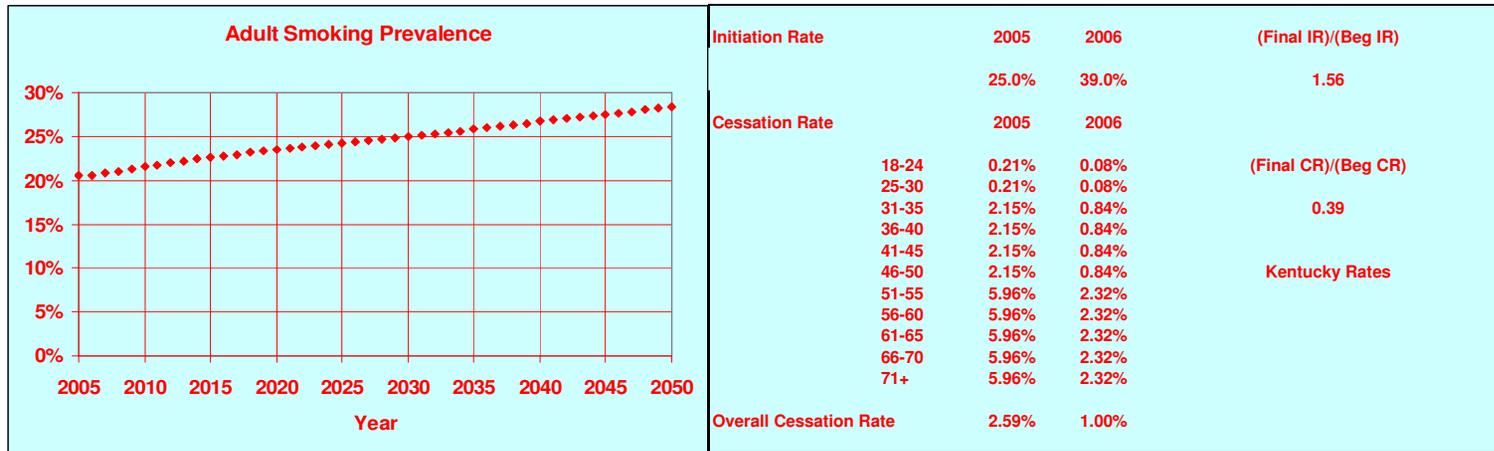
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.236	0.214	0.199	0.198	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.236	0.217	0.197	0.098	0.051	0.008	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.245	0.234	0.223	0.206	0.165	0.114	0.074	0.023	0.020	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.222	0.215	0.203	0.194	0.179	0.192	0.144	0.104	0.052	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.210	0.195	0.187	0.177	0.179	0.204	0.219	0.172	0.130	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.210	0.184	0.170	0.163	0.208	0.204	0.230	0.244	0.196	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.189	0.167	0.145	0.133	0.345	0.249	0.247	0.269	0.281	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.140	0.131	0.113	0.097	0.367	0.399	0.307	0.301	0.317	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.124	0.097	0.088	0.076	0.367	0.415	0.442	0.350	0.338	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.124	0.086	0.065	0.059	0.377	0.415	0.453	0.474	0.379	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.071	0.066	0.053	0.041	0.417	0.430	0.453	0.479	0.498	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.188	0.168	0.151	0.137	0.227	0.223	0.221	0.217	0.210	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



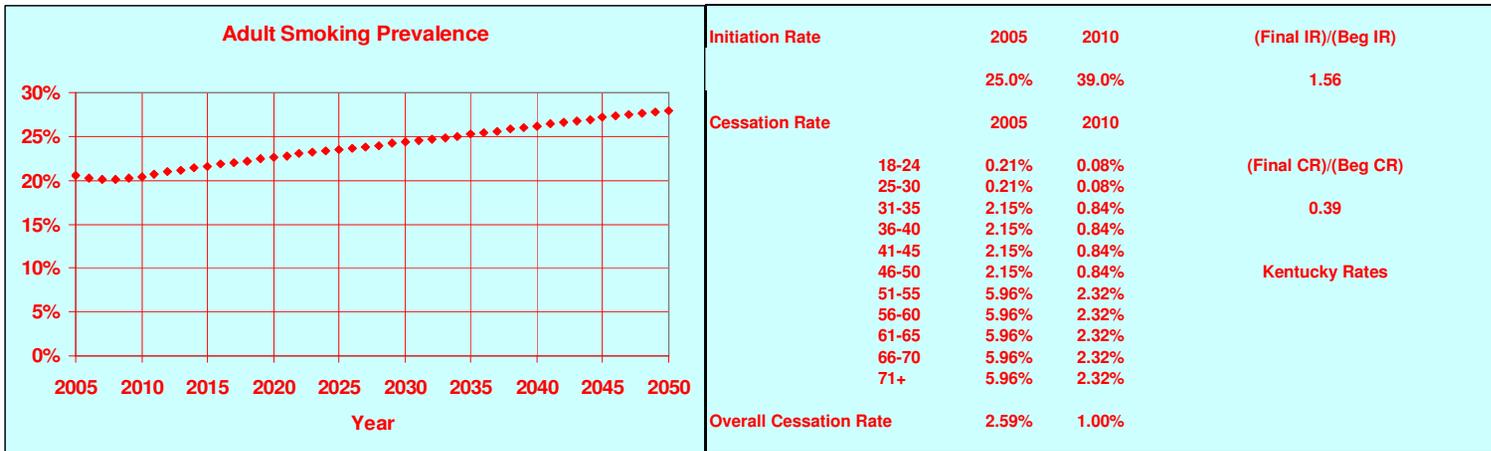
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.239	0.225	0.208	0.199	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.238	0.226	0.210	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.245	0.235	0.224	0.214	0.165	0.114	0.073	0.022	0.020	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.223	0.217	0.205	0.195	0.179	0.191	0.142	0.102	0.051	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.210	0.197	0.190	0.179	0.179	0.204	0.217	0.169	0.129	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.210	0.186	0.173	0.165	0.208	0.204	0.228	0.241	0.194	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.190	0.170	0.147	0.135	0.345	0.248	0.244	0.267	0.279	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.141	0.134	0.116	0.099	0.367	0.398	0.304	0.298	0.315	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.125	0.100	0.092	0.078	0.367	0.414	0.439	0.346	0.336	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.125	0.088	0.068	0.062	0.377	0.414	0.451	0.471	0.376	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.068	0.055	0.043	0.417	0.430	0.451	0.476	0.496	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.189	0.172	0.155	0.140	0.227	0.223	0.219	0.215	0.209	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



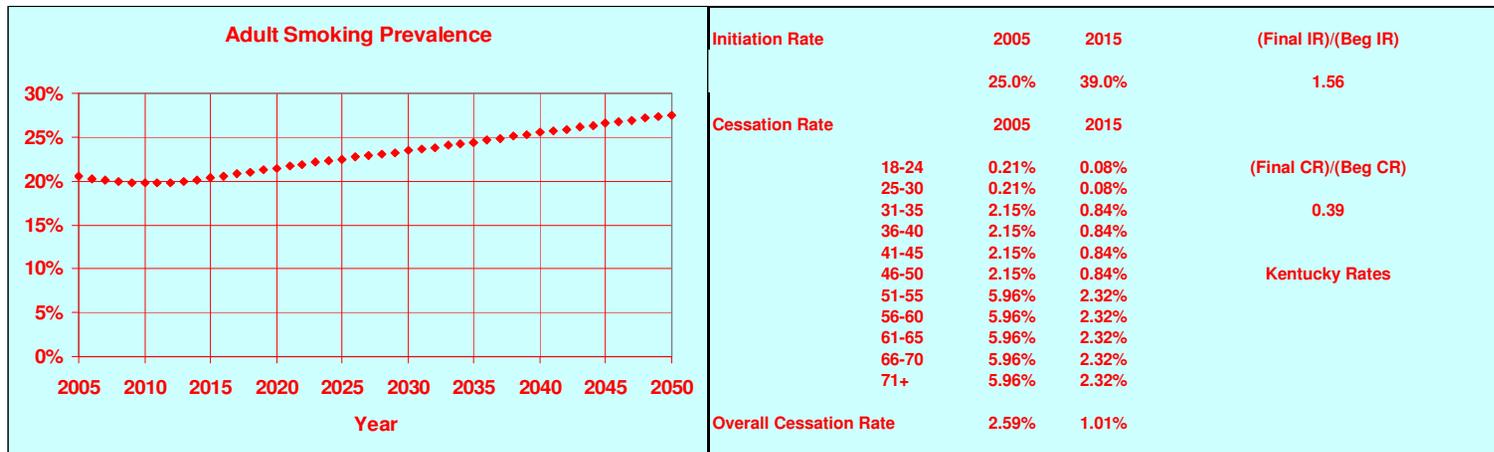
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.348	0.389	0.389	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.248	0.315	0.387	0.387	0.098	0.049	0.005	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.253	0.245	0.295	0.379	0.165	0.106	0.062	0.011	0.011	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.236	0.243	0.235	0.283	0.179	0.178	0.116	0.072	0.023	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.223	0.226	0.233	0.225	0.179	0.191	0.188	0.126	0.082	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.223	0.214	0.217	0.223	0.208	0.191	0.200	0.197	0.136	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.212	0.207	0.199	0.202	0.345	0.227	0.207	0.215	0.212	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.166	0.188	0.184	0.177	0.367	0.373	0.250	0.230	0.237	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.147	0.148	0.167	0.164	0.367	0.392	0.391	0.271	0.250	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.147	0.131	0.131	0.149	0.377	0.392	0.408	0.408	0.289	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.084	0.100	0.106	0.109	0.417	0.417	0.418	0.425	0.430	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.215	0.226	0.235	0.243	0.227	0.210	0.193	0.177	0.162	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



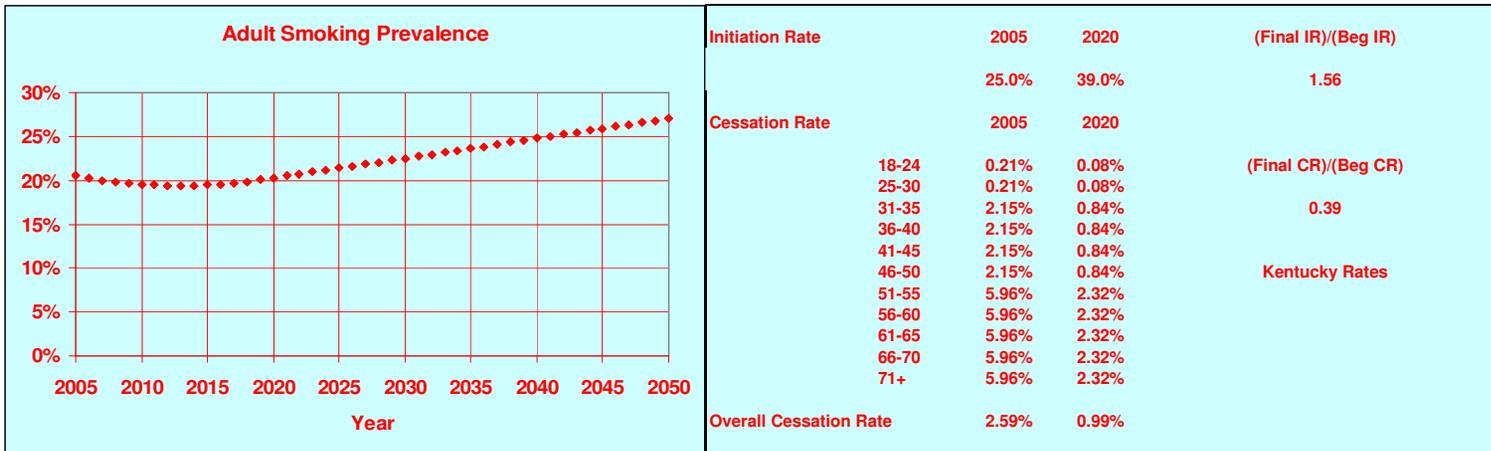
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.308	0.385	0.389	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.248	0.272	0.373	0.387	0.098	0.050	0.005	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.250	0.244	0.255	0.363	0.165	0.109	0.063	0.011	0.010	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.230	0.240	0.234	0.245	0.179	0.184	0.119	0.073	0.021	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.217	0.220	0.230	0.225	0.179	0.197	0.194	0.129	0.083	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.217	0.208	0.211	0.220	0.208	0.197	0.206	0.203	0.138	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.203	0.202	0.193	0.196	0.345	0.236	0.212	0.221	0.218	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.154	0.180	0.179	0.172	0.367	0.385	0.258	0.235	0.242	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.136	0.137	0.160	0.160	0.367	0.403	0.402	0.278	0.254	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.136	0.121	0.122	0.143	0.377	0.403	0.418	0.417	0.295	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.078	0.093	0.099	0.101	0.417	0.423	0.425	0.433	0.438	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.204	0.216	0.226	0.235	0.227	0.216	0.198	0.181	0.165	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



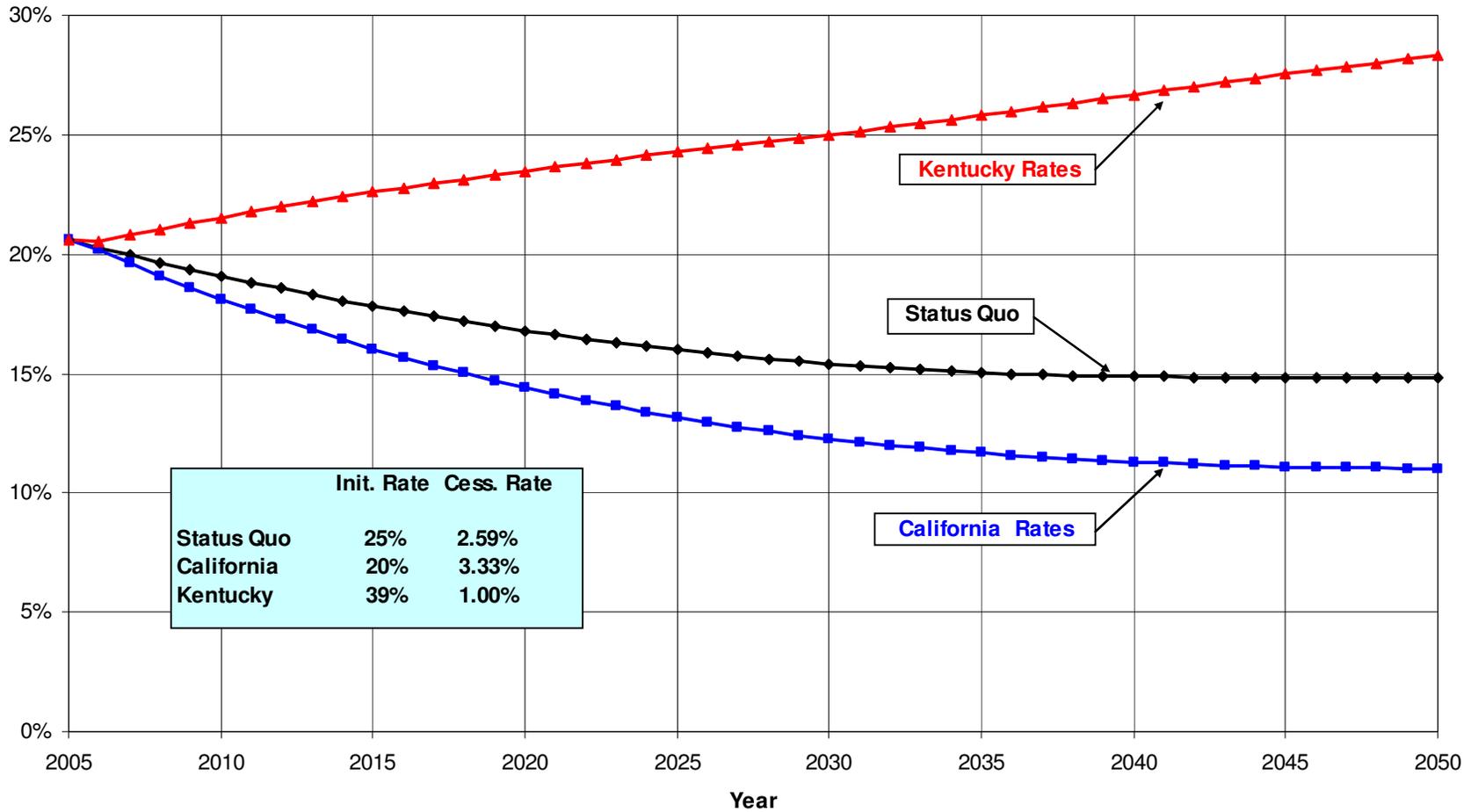
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.277	0.346	0.387	0.389	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.257	0.323	0.380	0.098	0.050	0.006	0.003	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.248	0.242	0.246	0.311	0.165	0.111	0.065	0.011	0.009	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.227	0.233	0.232	0.236	0.179	0.187	0.126	0.075	0.021	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.214	0.213	0.223	0.223	0.179	0.200	0.201	0.135	0.084	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.214	0.201	0.204	0.214	0.208	0.200	0.213	0.210	0.145	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.197	0.193	0.187	0.190	0.345	0.241	0.221	0.227	0.224	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.148	0.166	0.172	0.166	0.367	0.391	0.273	0.242	0.248	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.131	0.125	0.147	0.153	0.367	0.408	0.414	0.291	0.261	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.131	0.110	0.111	0.131	0.377	0.408	0.429	0.428	0.307	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.075	0.085	0.090	0.092	0.417	0.426	0.434	0.442	0.447	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.198	0.203	0.215	0.225	0.227	0.219	0.204	0.186	0.169	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



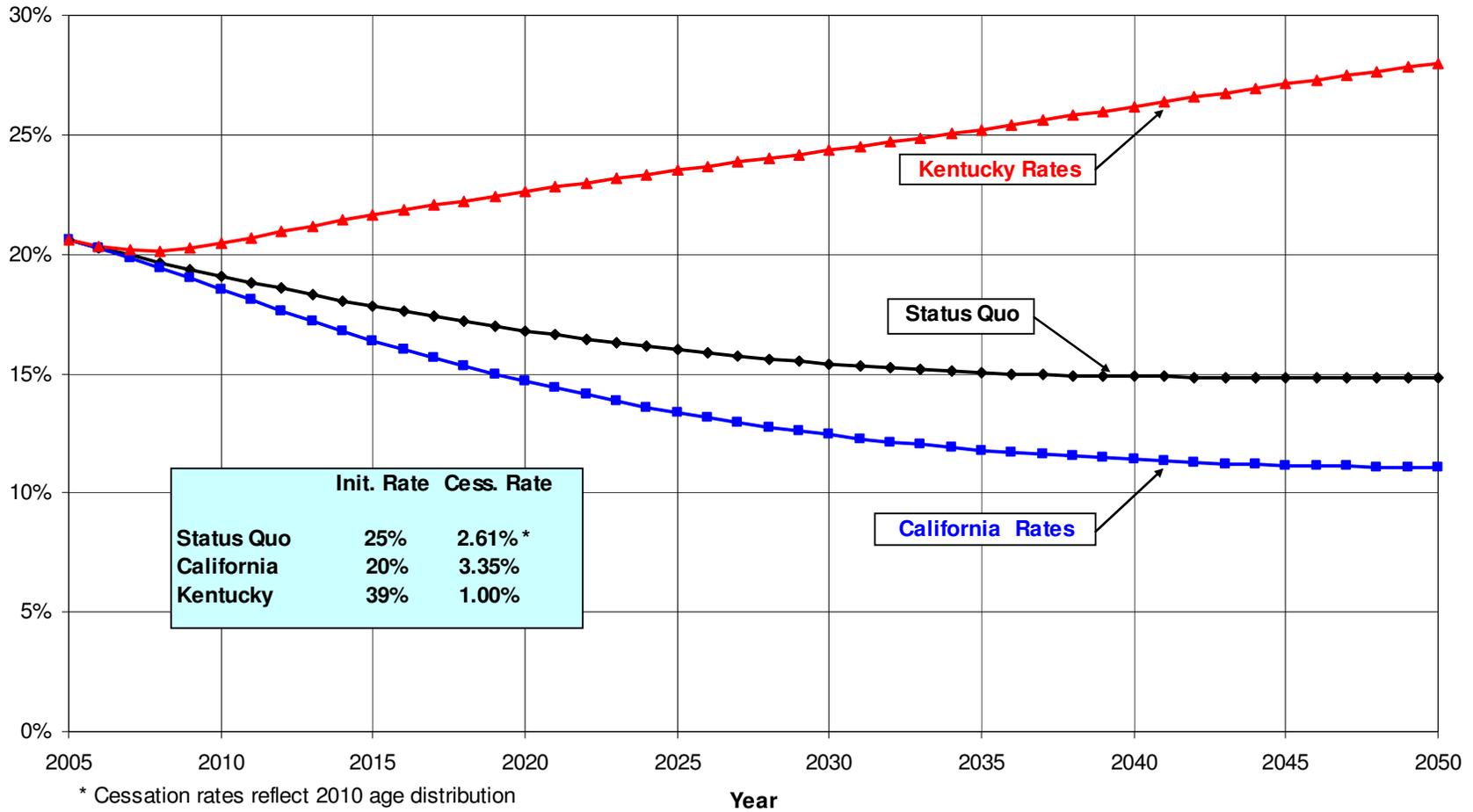
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.267	0.313	0.361	0.388	0.030	0.002	0.001	0.001	0.001	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.252	0.297	0.345	0.098	0.051	0.006	0.004	0.003	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.247	0.240	0.242	0.287	0.165	0.112	0.067	0.013	0.009	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.226	0.229	0.228	0.232	0.179	0.188	0.130	0.080	0.023	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.213	0.209	0.217	0.218	0.179	0.201	0.205	0.142	0.089	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.213	0.197	0.198	0.208	0.208	0.201	0.217	0.216	0.151	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.195	0.187	0.180	0.184	0.345	0.243	0.227	0.234	0.230	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.146	0.157	0.160	0.160	0.367	0.393	0.281	0.254	0.254	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.129	0.118	0.135	0.143	0.367	0.410	0.421	0.303	0.271	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.129	0.104	0.101	0.120	0.377	0.410	0.435	0.438	0.318	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.074	0.080	0.082	0.084	0.417	0.427	0.438	0.450	0.455	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.195	0.195	0.203	0.214	0.227	0.220	0.208	0.192	0.174	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



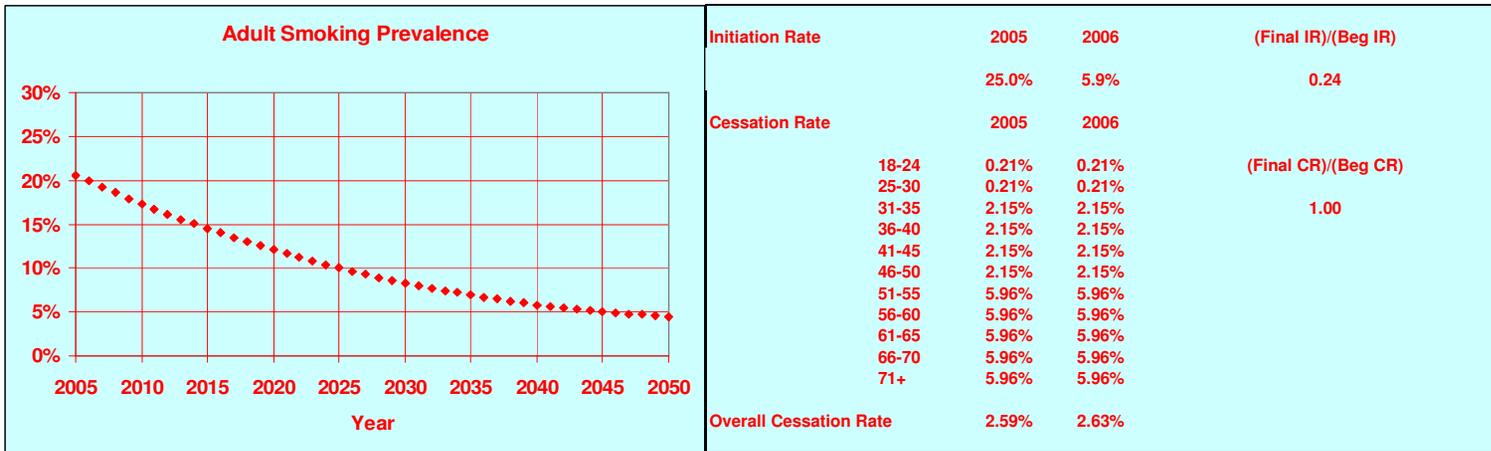
Projections of U.S. Adult Smoking Prevalence under Status Quo, California and Kentucky Smoking Initiation and Cessation Rates (California and Kentucky rates are reached instantaneously in 2006)



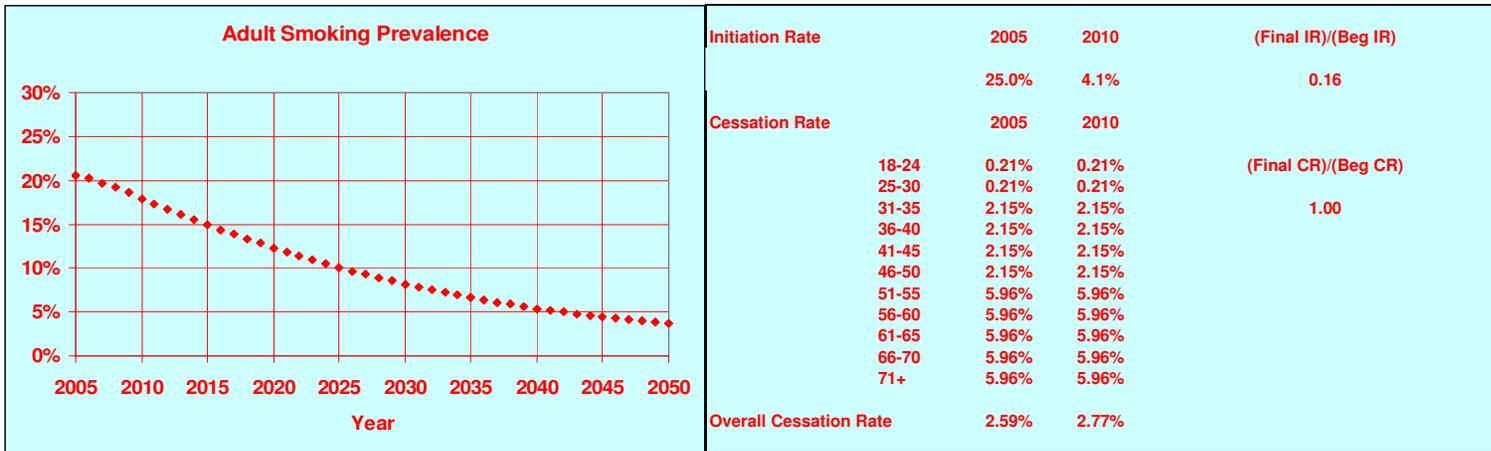
Projections of U.S. Adult Smoking Prevalence under Status Quo, California and Kentucky Smoking Initiation and Cessation Rates (California and Kentucky rates are reached gradually by 2010)



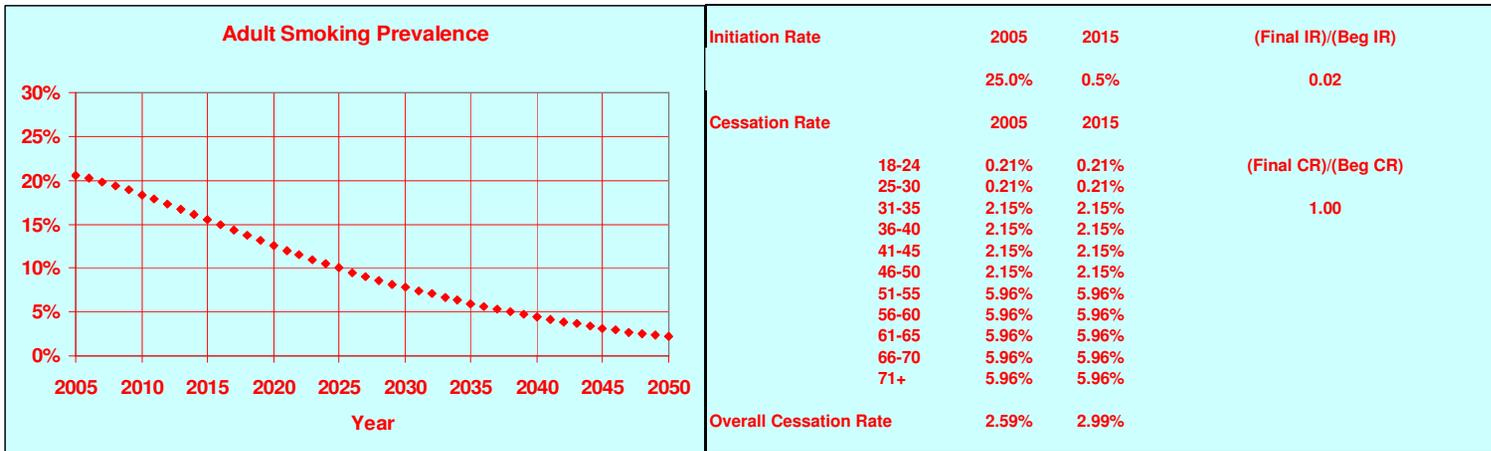
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.109	0.059	0.059	0.059	0.030	0.002	0.000	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.146	0.058	0.058	0.098	0.051	0.006	0.001	0.001	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.155	0.055	0.165	0.113	0.071	0.016	0.004	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.139	0.179	0.190	0.138	0.095	0.032	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.173	0.145	0.121	0.100	0.227	0.222	0.216	0.208	0.197	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



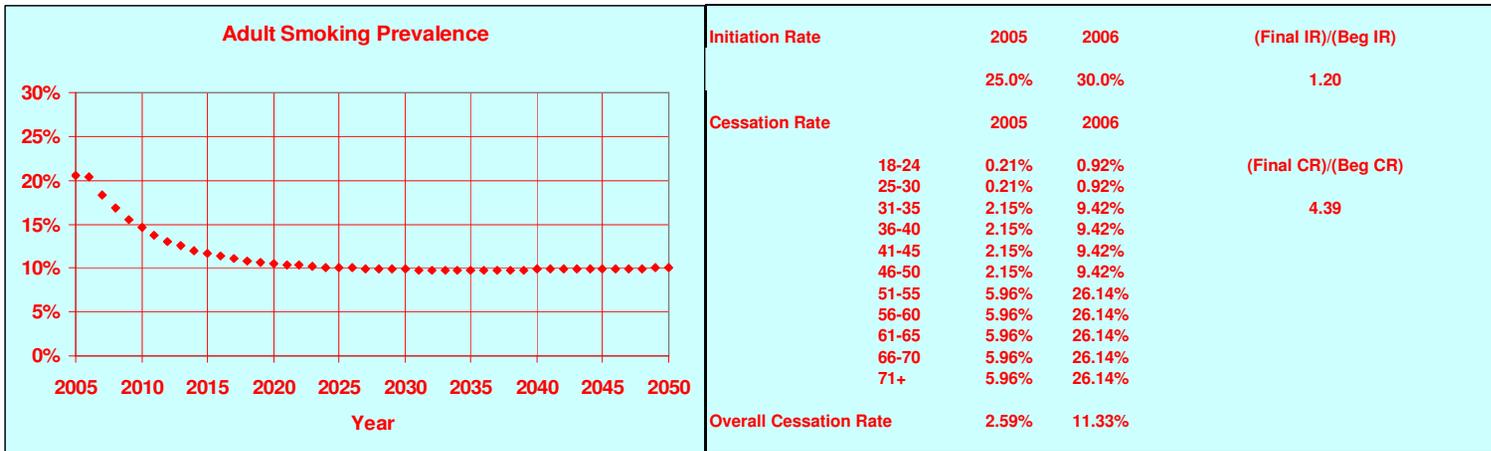
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.156	0.047	0.041	0.041	0.030	0.002	0.000	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.200	0.061	0.040	0.098	0.051	0.006	0.001	0.001	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.205	0.061	0.165	0.113	0.071	0.018	0.005	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.184	0.179	0.190	0.138	0.095	0.039	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.149	0.123	0.101	0.227	0.222	0.216	0.208	0.198	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



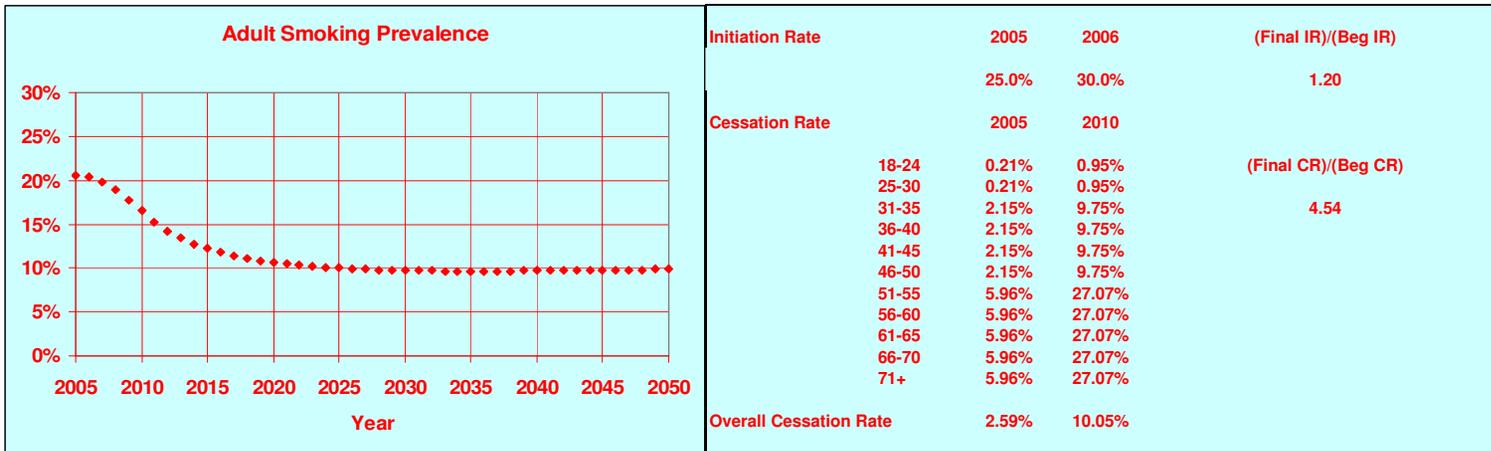
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.193	0.079	0.008	0.005	0.030	0.002	0.001	0.000	0.000	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.247	0.217	0.114	0.017	0.098	0.051	0.007	0.002	0.000	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.246	0.236	0.215	0.118	0.165	0.113	0.071	0.019	0.010	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.224	0.221	0.212	0.193	0.179	0.190	0.138	0.095	0.041	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.184	0.155	0.126	0.100	0.227	0.222	0.216	0.208	0.198	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



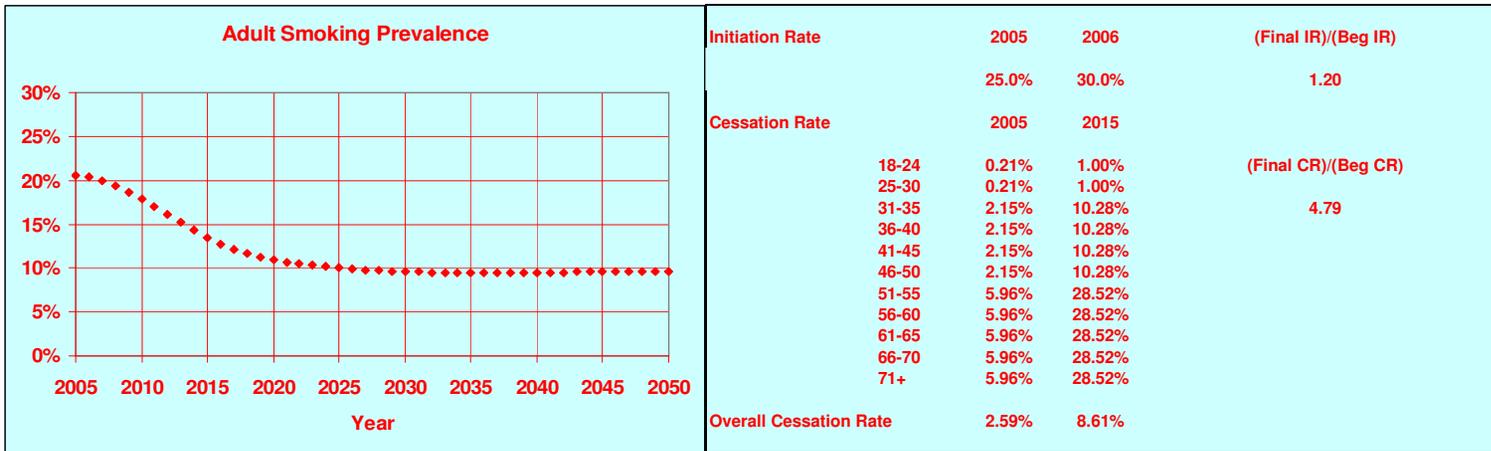
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.278	0.292	0.292	0.292	0.030	0.008	0.008	0.008	0.008	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.240	0.251	0.275	0.275	0.098	0.058	0.023	0.025	0.025	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.209	0.194	0.200	0.220	0.165	0.149	0.114	0.069	0.080	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.164	0.128	0.118	0.122	0.179	0.250	0.231	0.189	0.147	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.155	0.100	0.078	0.072	0.179	0.259	0.314	0.281	0.235	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.155	0.095	0.061	0.048	0.208	0.259	0.319	0.353	0.311	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.107	0.065	0.040	0.026	0.345	0.332	0.349	0.374	0.388	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.054	0.023	0.014	0.009	0.367	0.485	0.415	0.400	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.048	0.012	0.005	0.003	0.367	0.491	0.527	0.433	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.048	0.011	0.003	0.001	0.377	0.491	0.528	0.536	0.437	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.028	0.008	0.002	0.001	0.417	0.474	0.510	0.529	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.146	0.116	0.105	0.100	0.227	0.272	0.286	0.284	0.275	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



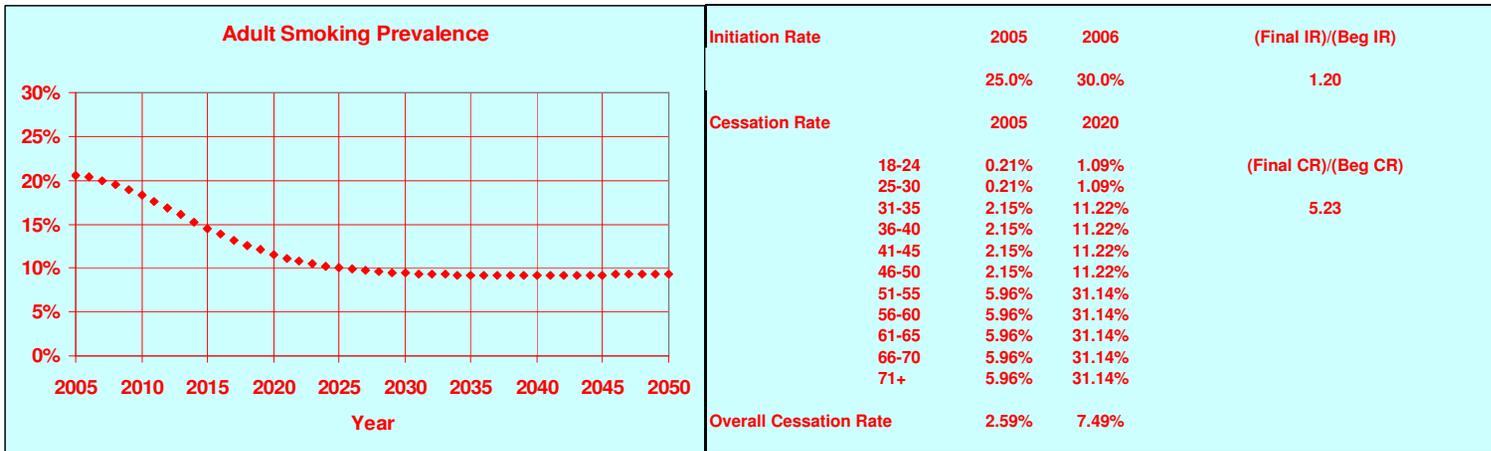
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.280	0.291	0.292	0.292	0.030	0.006	0.009	0.008	0.008	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.243	0.253	0.274	0.274	0.098	0.054	0.021	0.026	0.026	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.223	0.195	0.200	0.218	0.165	0.136	0.113	0.069	0.082	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.191	0.133	0.117	0.120	0.179	0.223	0.225	0.191	0.149	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.180	0.114	0.080	0.070	0.179	0.234	0.300	0.279	0.238	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.180	0.108	0.068	0.048	0.208	0.234	0.306	0.346	0.311	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.137	0.073	0.044	0.028	0.345	0.302	0.341	0.370	0.386	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.088	0.028	0.015	0.009	0.367	0.451	0.410	0.399	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.078	0.018	0.006	0.003	0.367	0.461	0.521	0.432	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.078	0.016	0.004	0.001	0.377	0.461	0.523	0.535	0.437	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.045	0.012	0.003	0.001	0.417	0.456	0.506	0.528	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.166	0.122	0.106	0.100	0.227	0.252	0.281	0.283	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



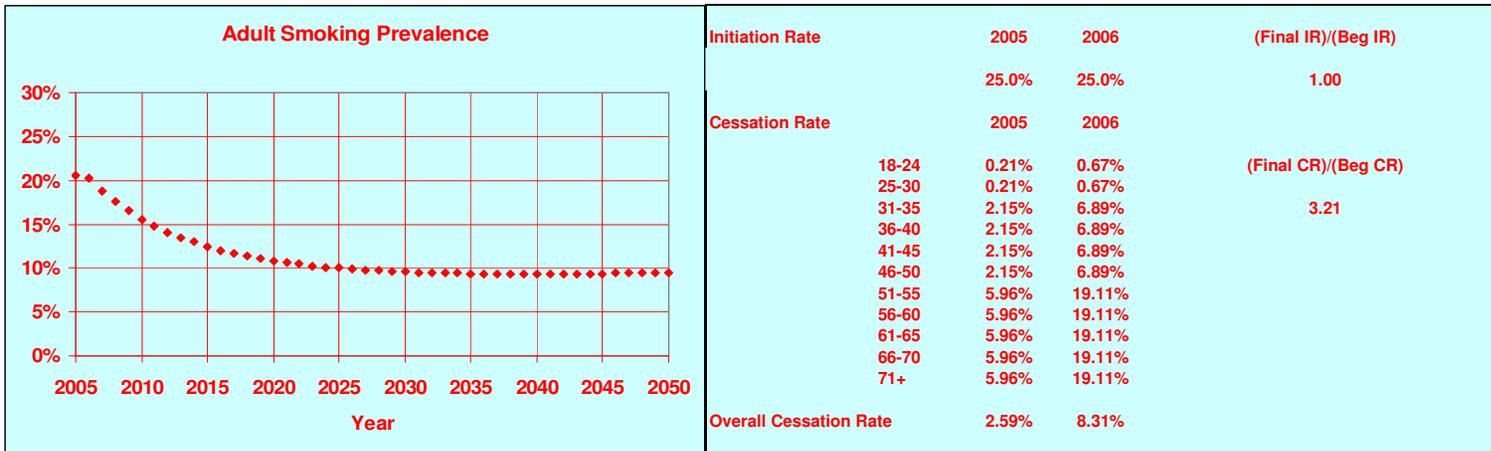
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.281	0.293	0.291	0.291	0.030	0.004	0.007	0.009	0.009	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.245	0.258	0.276	0.273	0.098	0.053	0.017	0.024	0.027	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.233	0.202	0.201	0.216	0.165	0.126	0.105	0.068	0.084	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.206	0.155	0.117	0.117	0.179	0.208	0.204	0.190	0.152	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.194	0.137	0.090	0.068	0.179	0.220	0.277	0.269	0.239	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.194	0.129	0.080	0.052	0.208	0.220	0.285	0.334	0.306	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.161	0.092	0.050	0.031	0.345	0.278	0.322	0.364	0.383	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.111	0.047	0.017	0.009	0.367	0.428	0.391	0.397	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.098	0.033	0.009	0.003	0.367	0.441	0.506	0.429	0.411	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.098	0.029	0.006	0.002	0.377	0.441	0.510	0.533	0.436	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.057	0.022	0.005	0.001	0.417	0.445	0.496	0.527	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.135	0.110	0.100	0.227	0.239	0.268	0.280	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



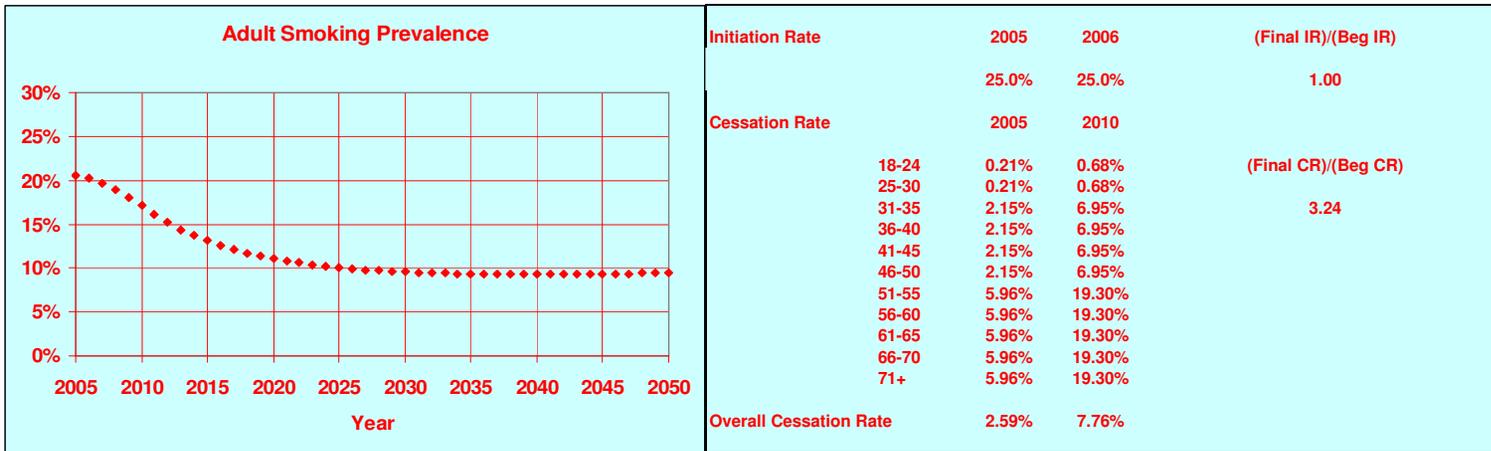
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.281	0.294	0.292	0.290	0.030	0.004	0.006	0.008	0.010	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.260	0.279	0.272	0.098	0.052	0.014	0.021	0.028	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.236	0.210	0.205	0.214	0.165	0.122	0.097	0.064	0.086	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.210	0.170	0.128	0.113	0.179	0.204	0.189	0.179	0.156	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.198	0.151	0.104	0.071	0.179	0.216	0.263	0.255	0.237	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.198	0.143	0.092	0.057	0.208	0.216	0.271	0.322	0.302	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.168	0.109	0.058	0.032	0.345	0.270	0.305	0.356	0.382	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.119	0.063	0.024	0.009	0.367	0.420	0.375	0.390	0.405	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.105	0.045	0.014	0.004	0.367	0.434	0.494	0.424	0.410	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.105	0.040	0.010	0.002	0.377	0.434	0.499	0.529	0.436	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.060	0.030	0.008	0.001	0.417	0.441	0.488	0.524	0.538	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.183	0.145	0.116	0.100	0.227	0.235	0.257	0.273	0.276	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



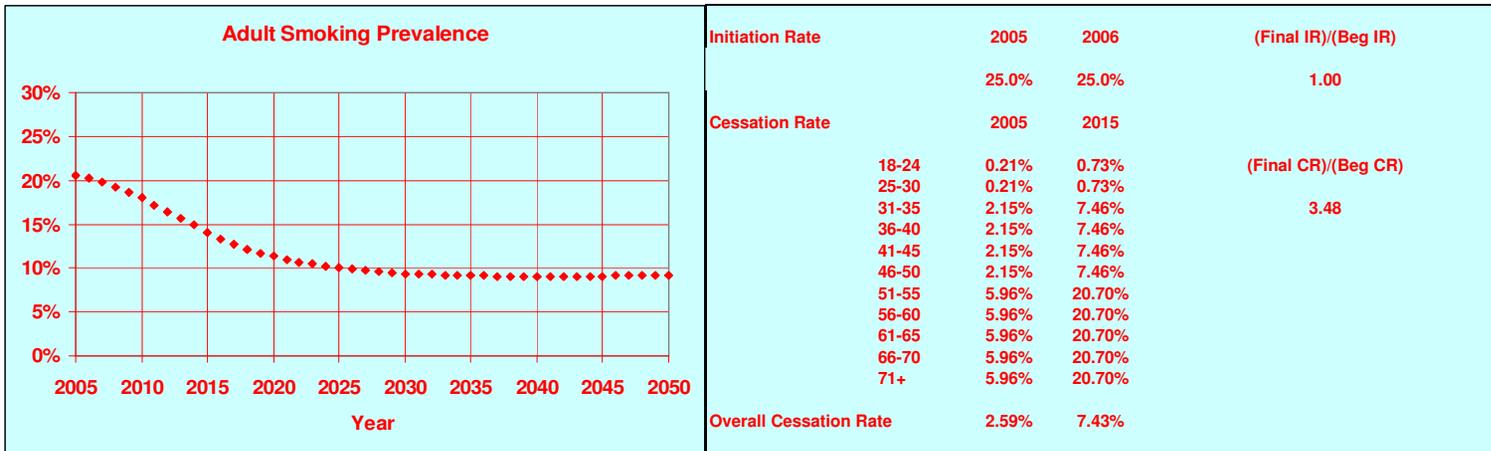
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.244	0.245	0.245	0.245	0.030	0.005	0.005	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.243	0.232	0.234	0.234	0.098	0.055	0.016	0.016	0.016	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.222	0.208	0.198	0.199	0.165	0.137	0.100	0.051	0.051	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.183	0.155	0.145	0.138	0.179	0.231	0.204	0.162	0.110	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.173	0.128	0.109	0.102	0.179	0.241	0.286	0.250	0.206	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.173	0.121	0.090	0.076	0.208	0.241	0.293	0.324	0.283	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.132	0.093	0.065	0.048	0.345	0.307	0.321	0.349	0.366	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.078	0.046	0.032	0.023	0.367	0.461	0.393	0.382	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.069	0.027	0.016	0.011	0.367	0.470	0.512	0.422	0.403	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.069	0.024	0.009	0.005	0.377	0.470	0.515	0.530	0.432	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.040	0.018	0.008	0.003	0.417	0.461	0.500	0.524	0.536	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.156	0.125	0.108	0.100	0.227	0.257	0.270	0.268	0.260	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



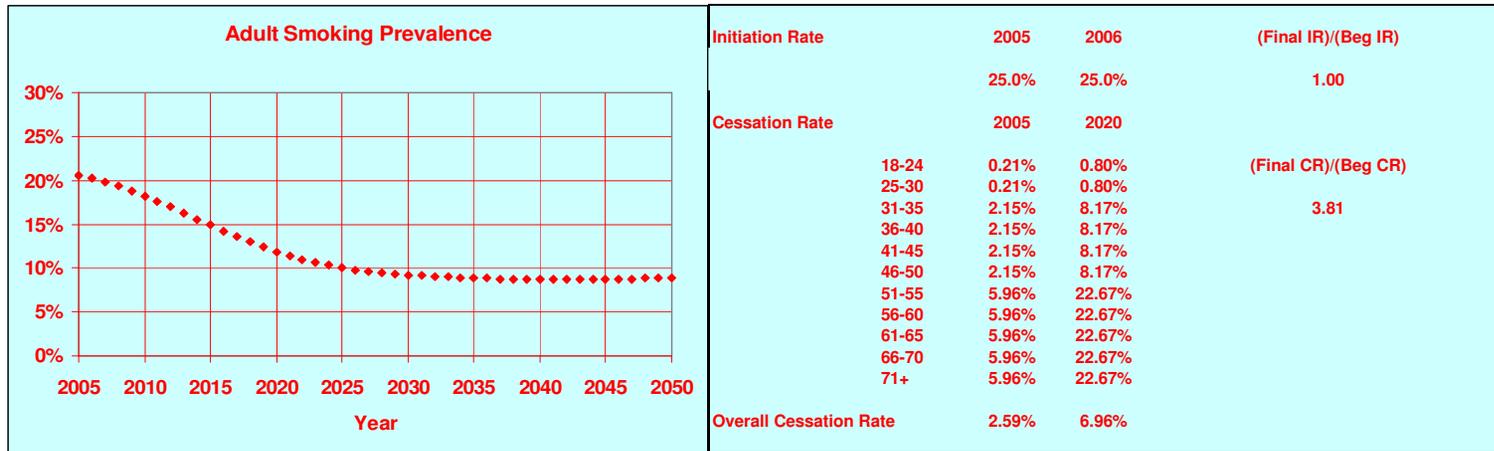
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.245	0.245	0.245	0.245	0.030	0.004	0.005	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.245	0.234	0.234	0.234	0.098	0.053	0.015	0.016	0.016	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.231	0.209	0.199	0.199	0.165	0.128	0.098	0.050	0.051	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.203	0.161	0.146	0.139	0.179	0.211	0.198	0.161	0.110	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.191	0.141	0.112	0.102	0.179	0.223	0.273	0.246	0.206	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.191	0.133	0.099	0.078	0.208	0.223	0.281	0.315	0.280	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.156	0.102	0.071	0.052	0.345	0.283	0.312	0.343	0.362	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.106	0.053	0.035	0.024	0.367	0.433	0.385	0.379	0.390	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.094	0.036	0.018	0.012	0.367	0.445	0.503	0.420	0.402	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.094	0.032	0.012	0.006	0.377	0.445	0.507	0.527	0.432	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.054	0.025	0.010	0.004	0.417	0.447	0.494	0.521	0.535	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.171	0.131	0.111	0.101	0.227	0.242	0.263	0.266	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



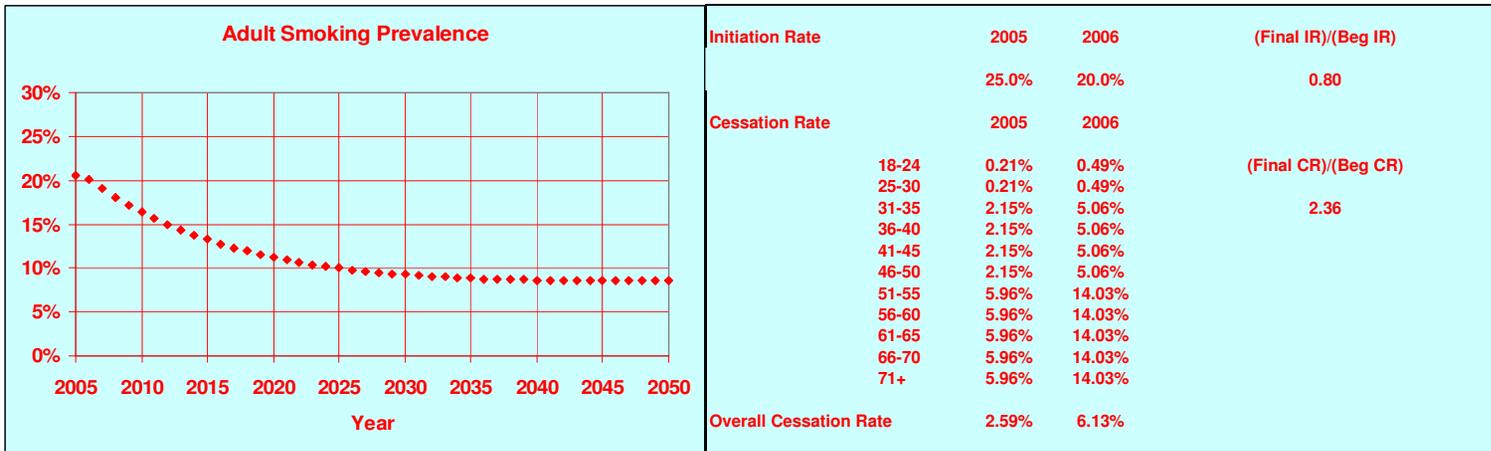
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.246	0.246	0.245	0.245	0.030	0.003	0.004	0.005	0.005	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.236	0.235	0.233	0.098	0.052	0.013	0.015	0.017	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.238	0.213	0.199	0.197	0.165	0.121	0.094	0.050	0.053	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.212	0.176	0.145	0.135	0.179	0.202	0.183	0.163	0.114	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.200	0.157	0.119	0.098	0.179	0.214	0.257	0.240	0.209	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.200	0.148	0.106	0.081	0.208	0.214	0.266	0.308	0.278	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.171	0.116	0.075	0.054	0.345	0.267	0.298	0.339	0.360	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.122	0.070	0.036	0.023	0.367	0.417	0.368	0.378	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.107	0.050	0.022	0.011	0.367	0.432	0.489	0.416	0.403	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.107	0.044	0.016	0.007	0.377	0.432	0.495	0.523	0.431	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.062	0.034	0.013	0.005	0.417	0.439	0.485	0.519	0.534	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.180	0.141	0.113	0.100	0.227	0.233	0.253	0.263	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



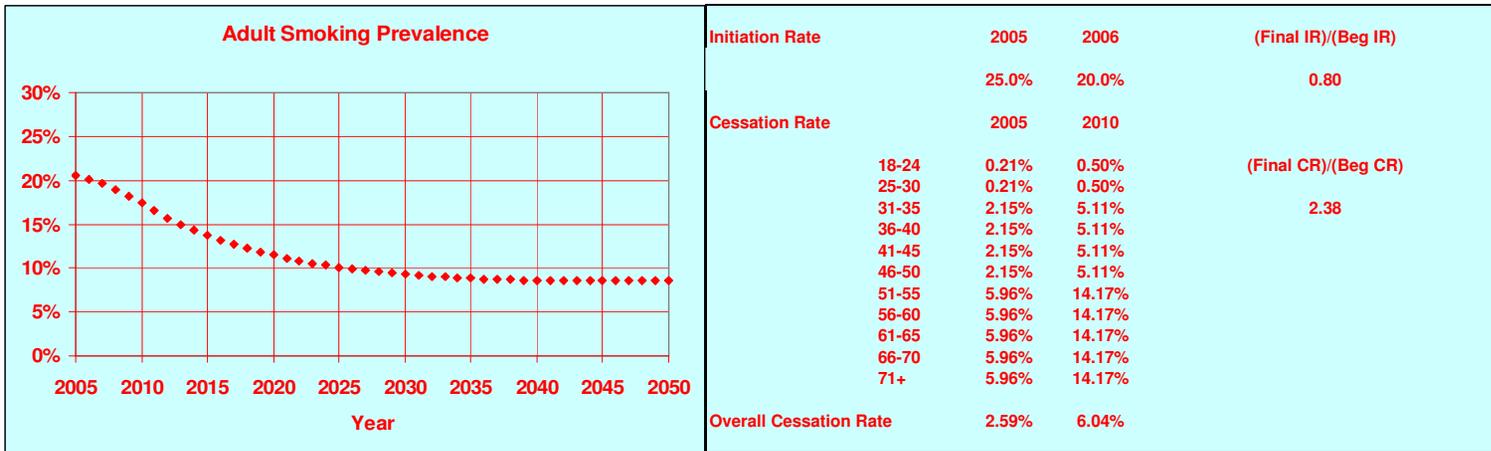
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.246	0.246	0.245	0.244	0.030	0.003	0.004	0.005	0.006	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.246	0.238	0.236	0.233	0.098	0.052	0.011	0.014	0.017	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.240	0.219	0.200	0.195	0.165	0.119	0.089	0.048	0.055	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.215	0.186	0.152	0.131	0.179	0.199	0.173	0.155	0.118	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.203	0.166	0.129	0.100	0.179	0.211	0.248	0.229	0.208	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.203	0.157	0.116	0.085	0.208	0.211	0.257	0.298	0.274	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.176	0.128	0.082	0.055	0.345	0.262	0.286	0.332	0.359	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.126	0.084	0.044	0.023	0.367	0.413	0.354	0.370	0.391	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.112	0.060	0.029	0.012	0.367	0.427	0.479	0.409	0.402	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.112	0.053	0.021	0.008	0.377	0.427	0.486	0.518	0.430	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.064	0.041	0.017	0.005	0.417	0.437	0.477	0.515	0.534	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.182	0.149	0.119	0.100	0.227	0.231	0.245	0.258	0.259	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



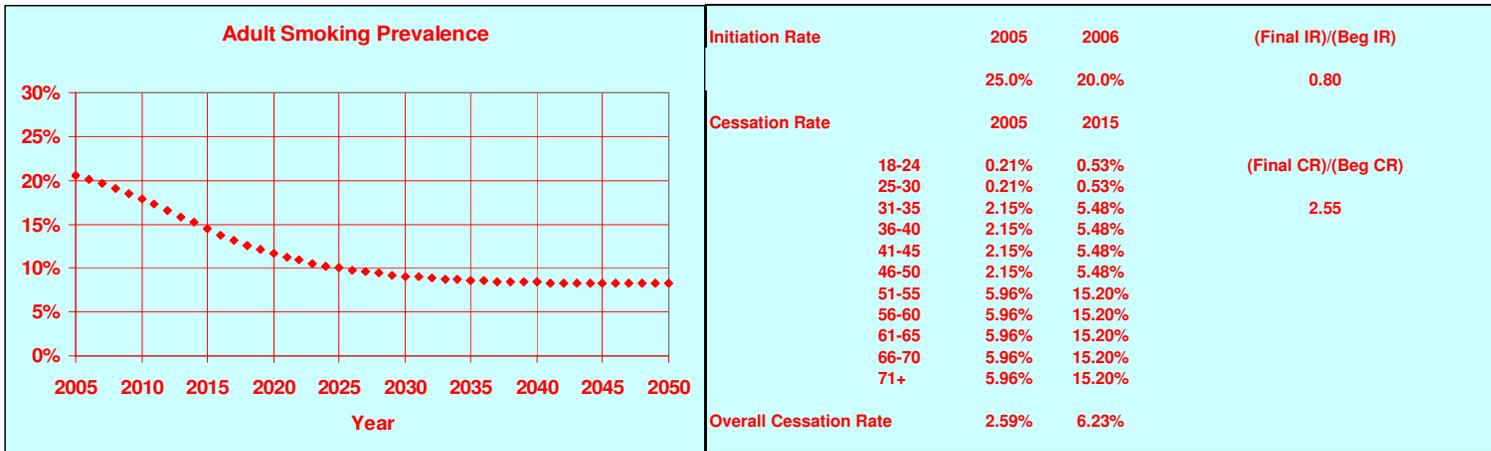
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.209	0.197	0.197	0.197	0.030	0.004	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.244	0.212	0.191	0.191	0.098	0.054	0.012	0.009	0.009	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.231	0.218	0.191	0.169	0.165	0.128	0.089	0.038	0.031	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.198	0.178	0.168	0.147	0.179	0.216	0.181	0.139	0.081	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.187	0.153	0.137	0.130	0.179	0.227	0.261	0.222	0.177	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.187	0.144	0.118	0.106	0.208	0.227	0.270	0.296	0.253	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.153	0.119	0.092	0.075	0.345	0.286	0.295	0.322	0.339	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.100	0.072	0.056	0.043	0.367	0.439	0.367	0.358	0.371	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.088	0.047	0.034	0.026	0.367	0.451	0.492	0.404	0.388	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.088	0.041	0.022	0.016	0.377	0.451	0.498	0.517	0.422	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.051	0.032	0.018	0.010	0.417	0.451	0.487	0.514	0.529	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.163	0.132	0.112	0.100	0.227	0.245	0.253	0.252	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



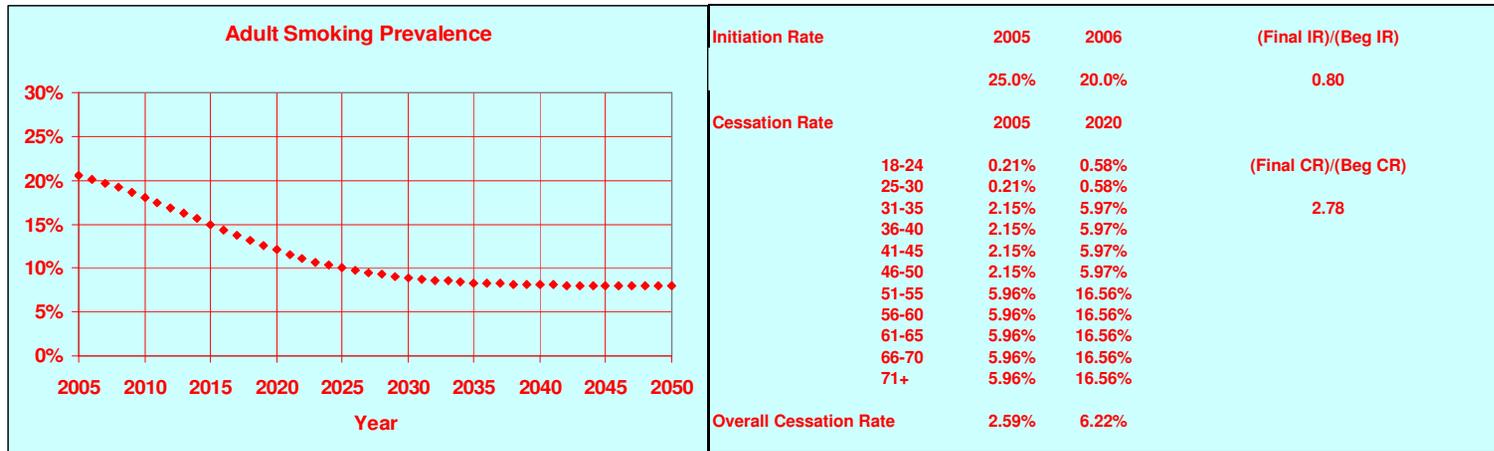
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.197	0.197	0.197	0.030	0.003	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.212	0.191	0.191	0.098	0.052	0.011	0.009	0.009	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.237	0.219	0.192	0.169	0.165	0.122	0.088	0.037	0.031	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.210	0.182	0.169	0.147	0.179	0.204	0.177	0.139	0.081	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.199	0.162	0.140	0.130	0.179	0.215	0.252	0.219	0.177	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.199	0.153	0.125	0.108	0.208	0.215	0.261	0.289	0.251	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.169	0.126	0.097	0.079	0.345	0.270	0.288	0.317	0.335	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.119	0.079	0.059	0.045	0.367	0.420	0.360	0.355	0.369	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.105	0.056	0.037	0.027	0.367	0.434	0.483	0.401	0.387	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.105	0.049	0.026	0.017	0.377	0.434	0.490	0.513	0.421	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.061	0.038	0.021	0.011	0.417	0.441	0.481	0.511	0.528	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.174	0.137	0.115	0.101	0.227	0.234	0.248	0.249	0.242	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



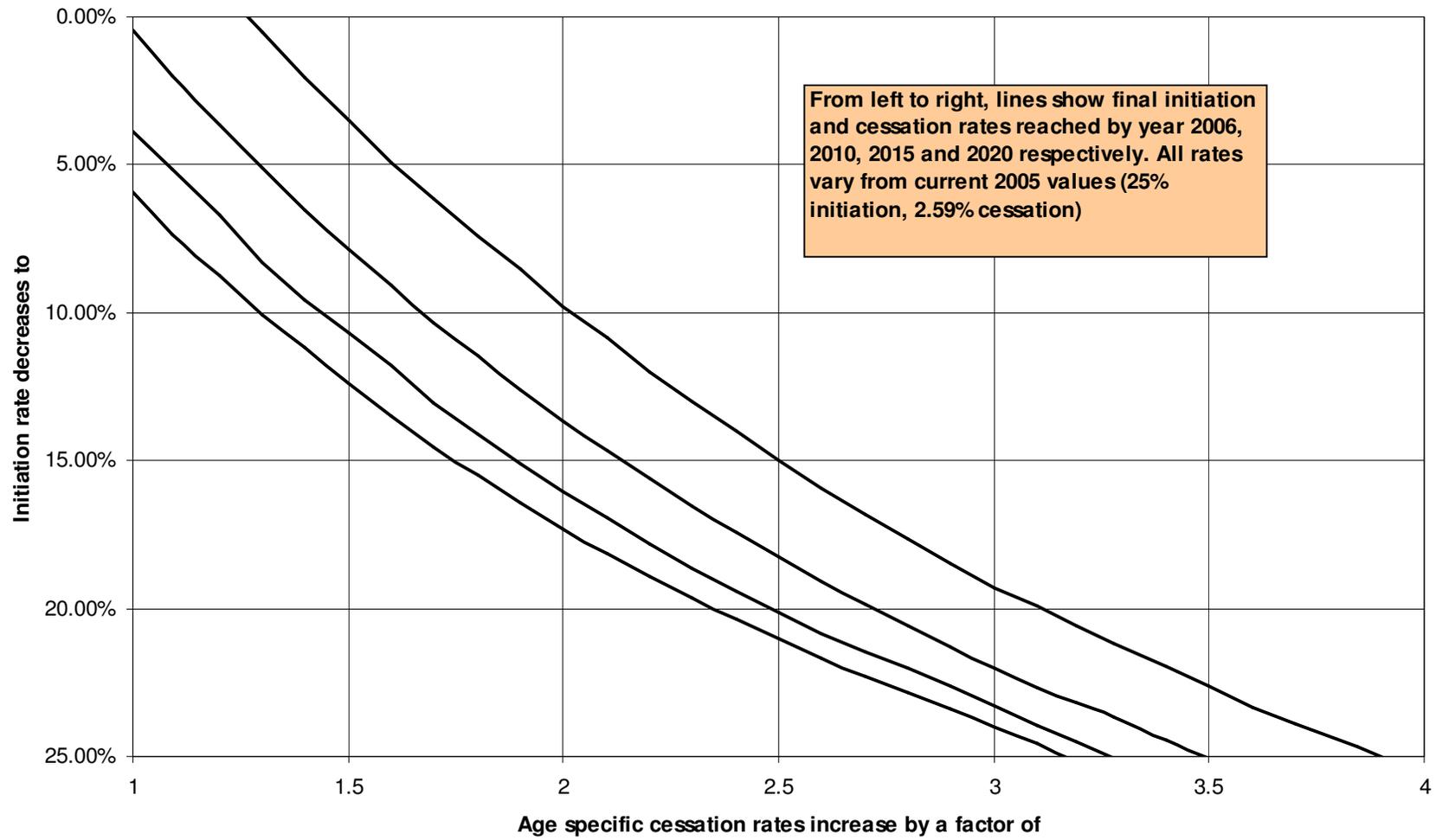
Prevalence	Current Smokers					Former Smokers					Population					
	Age Group	Year					Year					Year				
		2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.197	0.197	0.197	0.030	0.003	0.003	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137	
25-30	0.258	0.246	0.214	0.191	0.190	0.098	0.052	0.010	0.009	0.010	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690	
31-35	0.249	0.241	0.222	0.191	0.168	0.165	0.118	0.086	0.037	0.032	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081	
36-40	0.235	0.216	0.191	0.167	0.144	0.179	0.198	0.167	0.140	0.084	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982	
41-45	0.235	0.204	0.172	0.144	0.126	0.179	0.210	0.242	0.214	0.181	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647	
46-50	0.230	0.204	0.162	0.130	0.109	0.208	0.210	0.252	0.284	0.250	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034	
51-55	0.194	0.179	0.135	0.099	0.079	0.345	0.260	0.279	0.315	0.335	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237	
56-60	0.172	0.129	0.092	0.059	0.044	0.367	0.410	0.346	0.355	0.370	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138	
61-65	0.172	0.114	0.067	0.040	0.026	0.367	0.425	0.472	0.398	0.388	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024	
66-70	0.152	0.114	0.059	0.029	0.018	0.377	0.425	0.480	0.510	0.420	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525	
70-89	0.069	0.066	0.045	0.024	0.012	0.417	0.436	0.473	0.508	0.527	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973	
18-89	0.206	0.179	0.144	0.116	0.100	0.227	0.229	0.241	0.248	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467	



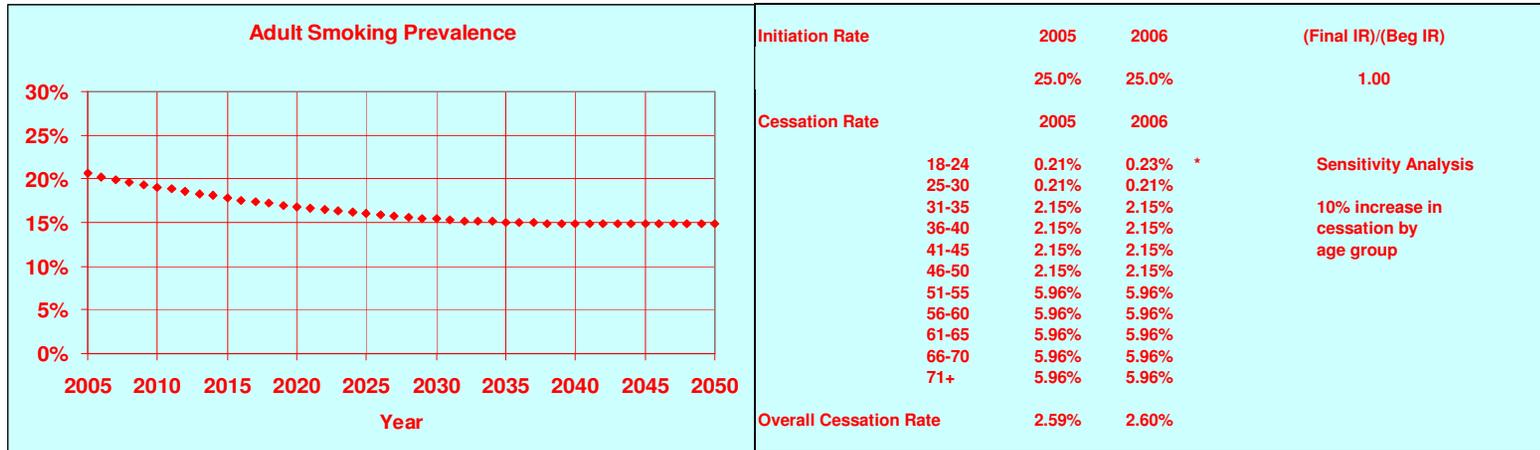
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.210	0.198	0.197	0.197	0.030	0.003	0.002	0.003	0.003	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.246	0.214	0.192	0.190	0.098	0.051	0.009	0.008	0.010	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.242	0.225	0.192	0.167	0.165	0.117	0.082	0.036	0.033	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.218	0.198	0.172	0.141	0.179	0.196	0.161	0.135	0.087	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.206	0.178	0.152	0.127	0.179	0.208	0.236	0.207	0.181	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.206	0.168	0.137	0.111	0.208	0.208	0.246	0.277	0.247	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.182	0.144	0.105	0.080	0.345	0.257	0.270	0.309	0.334	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.132	0.102	0.066	0.042	0.367	0.407	0.336	0.348	0.372	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.117	0.074	0.047	0.027	0.367	0.422	0.465	0.391	0.387	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.117	0.066	0.034	0.019	0.377	0.422	0.473	0.505	0.419	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.067	0.050	0.028	0.013	0.417	0.434	0.468	0.504	0.526	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.181	0.150	0.121	0.100	0.227	0.227	0.236	0.244	0.243	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467



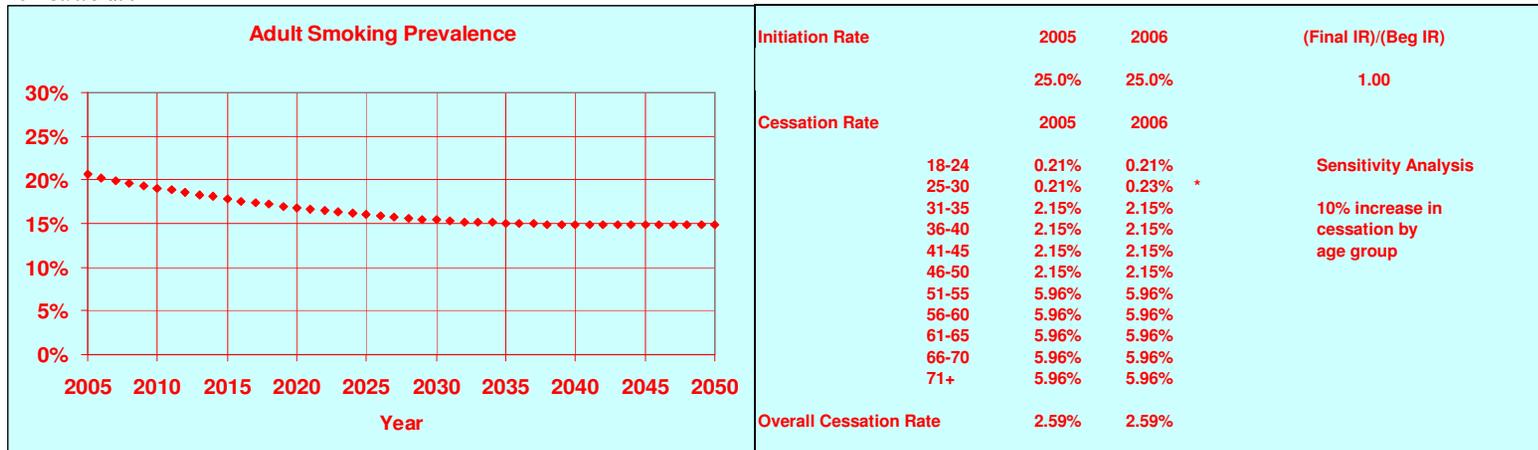
Combinations of Initiation and Cessation Rates to Reach a Smoking Prevalence of 10% by Year 2025



Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.246	0.248	0.248	0.248	0.030	0.003	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.241	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.020	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.205	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.02%	0.04%	0.05%	0.07%										



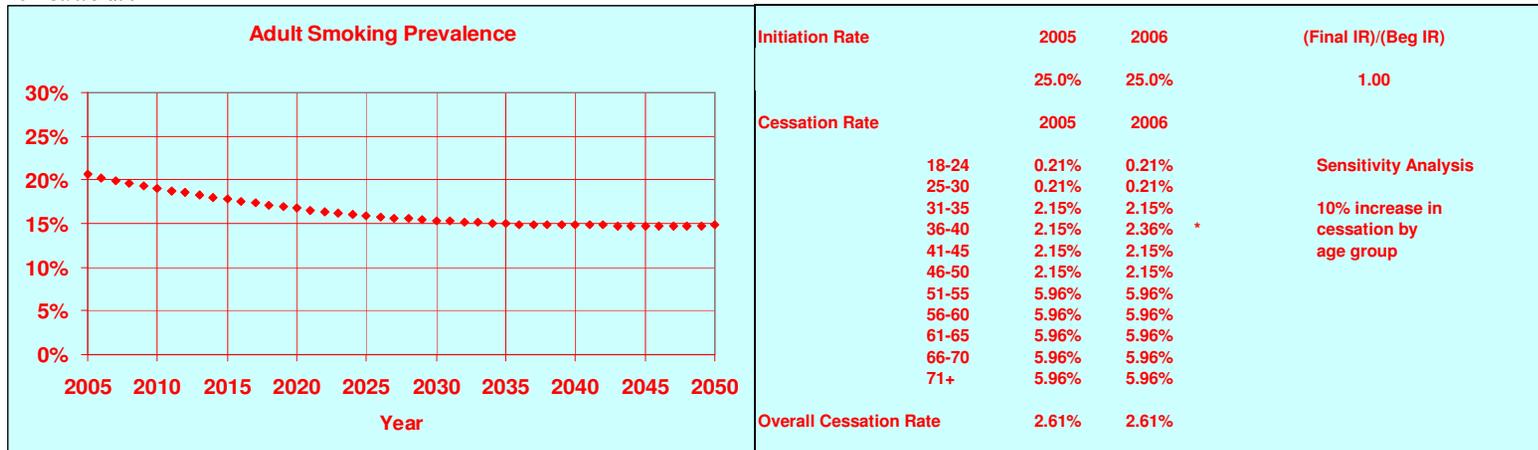
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.020	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.220	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.177	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.149	0.345	0.247	0.239	0.257	0.265	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.168	0.160	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.01%	0.03%	0.04%	0.05%										



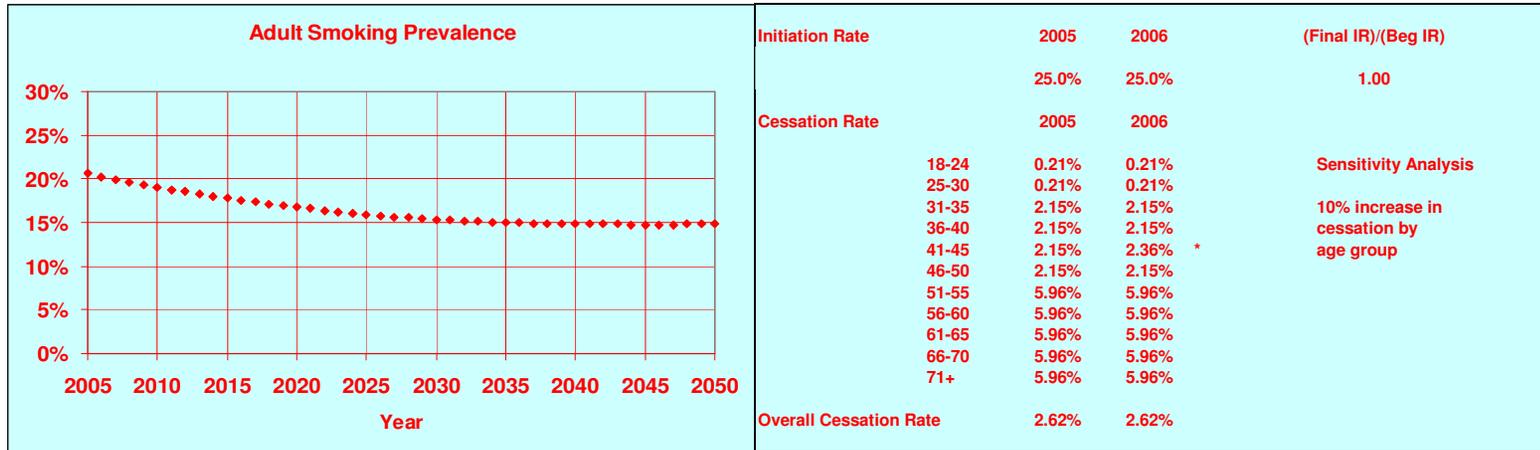
Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.245	0.235	0.228	0.232	0.165	0.114	0.072	0.020	0.018	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.222	0.218	0.210	0.204	0.179	0.192	0.141	0.098	0.045	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.199	0.196	0.188	0.179	0.203	0.215	0.163	0.119	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.179	0.176	0.208	0.203	0.224	0.235	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.157	0.148	0.345	0.247	0.239	0.257	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.116	0.367	0.396	0.297	0.285	0.298	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.22%	0.32%	0.42%										



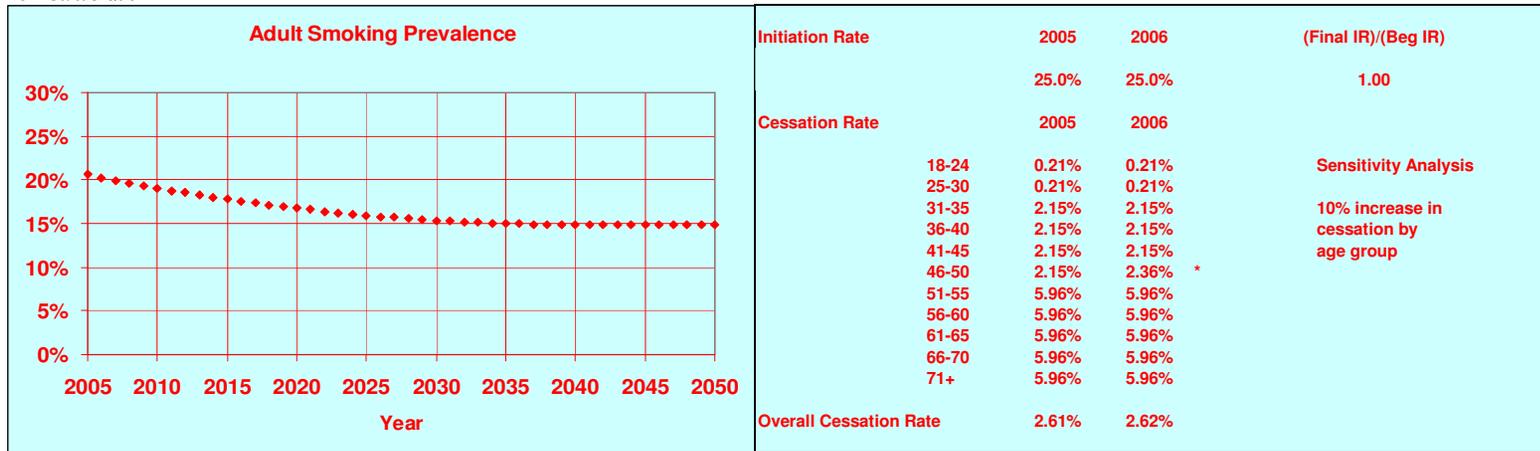
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.223	0.220	0.211	0.205	0.179	0.191	0.139	0.096	0.044	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.210	0.199	0.196	0.188	0.179	0.204	0.215	0.163	0.119	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.188	0.178	0.176	0.208	0.203	0.226	0.236	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.175	0.156	0.148	0.345	0.247	0.239	0.258	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.129	0.115	0.367	0.396	0.297	0.285	0.299	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.095	0.367	0.413	0.434	0.334	0.319	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.21%	0.29%	0.36%										



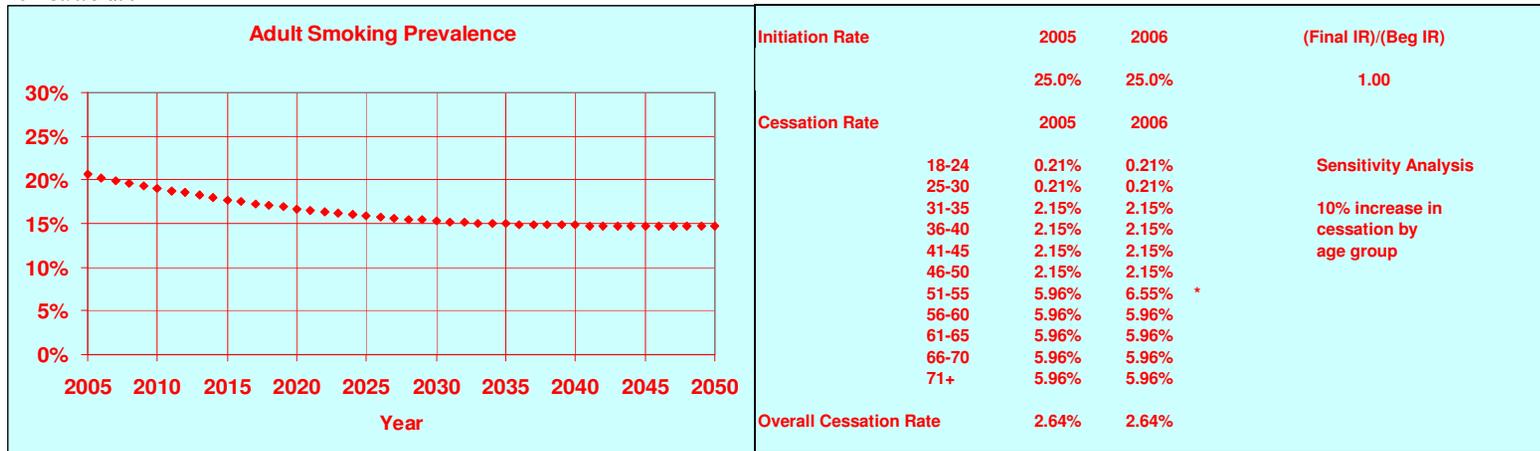
Age Group	Current Smokers					Former Smokers					Population				
	2005	Year				2005	Year				2005	Year			
		2010	2015	2020	2025		2010	2015	2020	2025		2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.210	0.200	0.197	0.189	0.179	0.204	0.214	0.162	0.118	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.210	0.187	0.178	0.176	0.208	0.204	0.227	0.236	0.183	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.192	0.174	0.155	0.148	0.345	0.247	0.240	0.259	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.141	0.128	0.114	0.367	0.396	0.297	0.286	0.300	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.104	0.094	0.367	0.413	0.434	0.334	0.320	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.361	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.12%	0.21%	0.27%	0.31%										



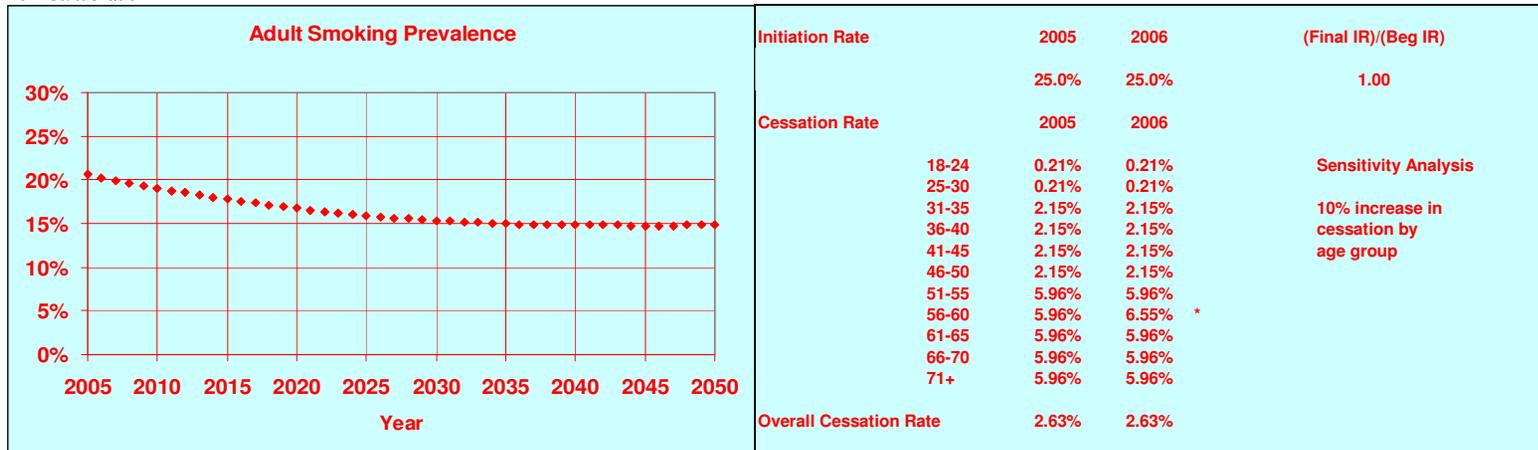
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.210	0.189	0.179	0.177	0.208	0.204	0.225	0.235	0.182	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.190	0.173	0.155	0.148	0.345	0.248	0.241	0.259	0.266	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.143	0.140	0.128	0.114	0.367	0.396	0.298	0.286	0.300	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.105	0.103	0.094	0.367	0.413	0.434	0.335	0.320	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.077	0.076	0.377	0.413	0.446	0.462	0.362	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.053	0.417	0.429	0.447	0.469	0.486	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.191	0.178	0.167	0.159	0.227	0.222	0.216	0.209	0.200	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.11%	0.19%	0.24%	0.26%										



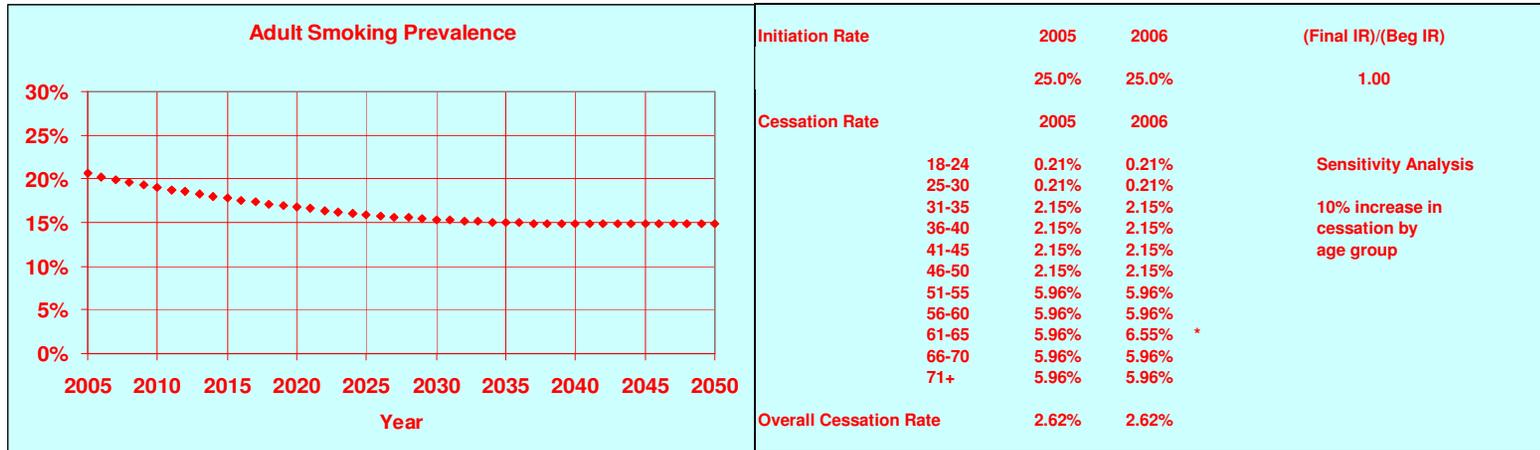
Age Group	Current Smokers					Former Smokers					Population				
	Year					Year					Year				
	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025	2005	2010	2015	2020	2025
18-24	0.247	0.247	0.248	0.248	0.248	0.030	0.002	0.002	0.002	0.002	28,170,884	28,809,290	28,119,208	26,494,277	26,229,137
25-30	0.258	0.247	0.242	0.245	0.245	0.098	0.051	0.007	0.005	0.005	22,594,835	24,040,328	24,257,599	24,506,737	22,790,690
31-35	0.249	0.246	0.236	0.229	0.233	0.165	0.113	0.071	0.019	0.017	19,812,168	18,459,108	19,940,806	19,910,835	20,466,081
36-40	0.235	0.224	0.221	0.212	0.206	0.179	0.190	0.138	0.095	0.043	20,580,855	19,663,179	18,321,136	19,791,536	19,761,982
41-45	0.235	0.211	0.201	0.198	0.190	0.179	0.203	0.213	0.161	0.117	22,663,512	20,365,985	19,457,459	18,130,901	19,585,647
46-50	0.230	0.211	0.190	0.180	0.178	0.208	0.203	0.224	0.234	0.181	21,738,585	22,320,148	20,056,554	19,161,164	17,857,034
51-55	0.194	0.189	0.173	0.155	0.147	0.345	0.249	0.241	0.259	0.267	19,122,955	21,252,801	21,819,662	19,605,490	18,729,237
56-60	0.172	0.140	0.137	0.125	0.112	0.367	0.399	0.302	0.289	0.302	16,061,197	18,465,213	20,520,682	21,065,052	18,925,138
61-65	0.172	0.126	0.103	0.101	0.092	0.367	0.413	0.436	0.337	0.322	12,239,416	15,196,090	17,461,534	19,403,599	19,914,024
66-70	0.152	0.126	0.093	0.076	0.074	0.377	0.413	0.446	0.463	0.364	9,710,302	11,304,880	14,036,814	16,125,198	17,917,525
70-89	0.069	0.072	0.071	0.063	0.052	0.417	0.429	0.447	0.469	0.487	23,814,098	24,701,480	26,325,510	30,082,950	35,126,973
18-89	0.206	0.190	0.177	0.167	0.159	0.227	0.222	0.217	0.210	0.201	216,508,806	224,578,501	230,316,966	234,277,740	237,303,467
% Decrease in Prevalence from Status Quo	0.00%	0.23%	0.42%	0.54%	0.58%										



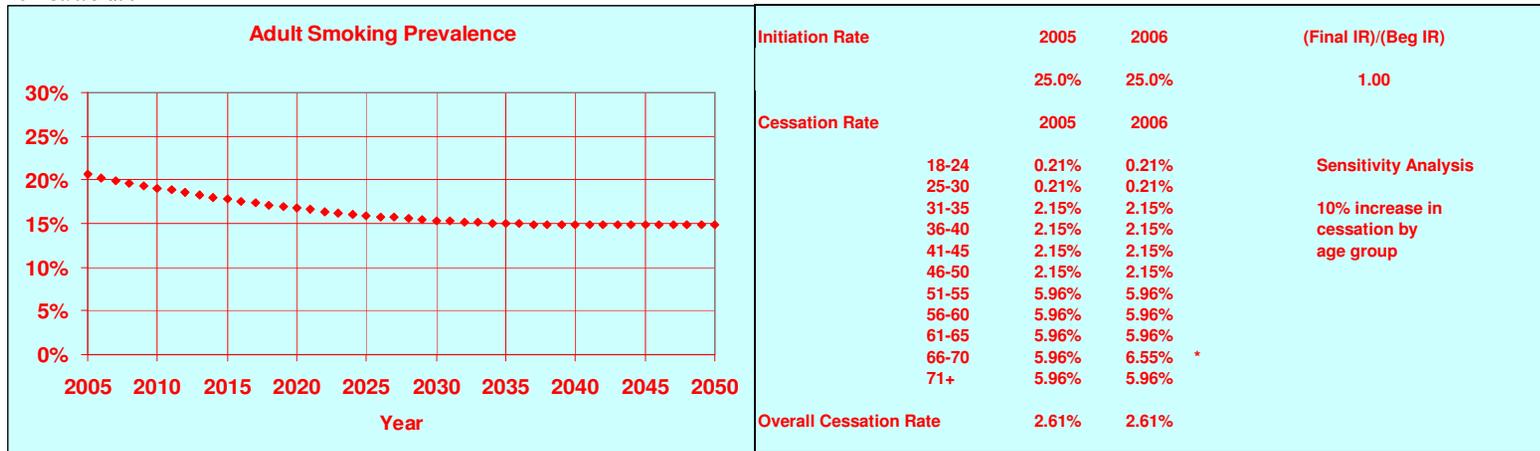
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% Decrease in Prevalence from Status Quo	0.00%	0.16%	0.28%	0.39%	0.44%										



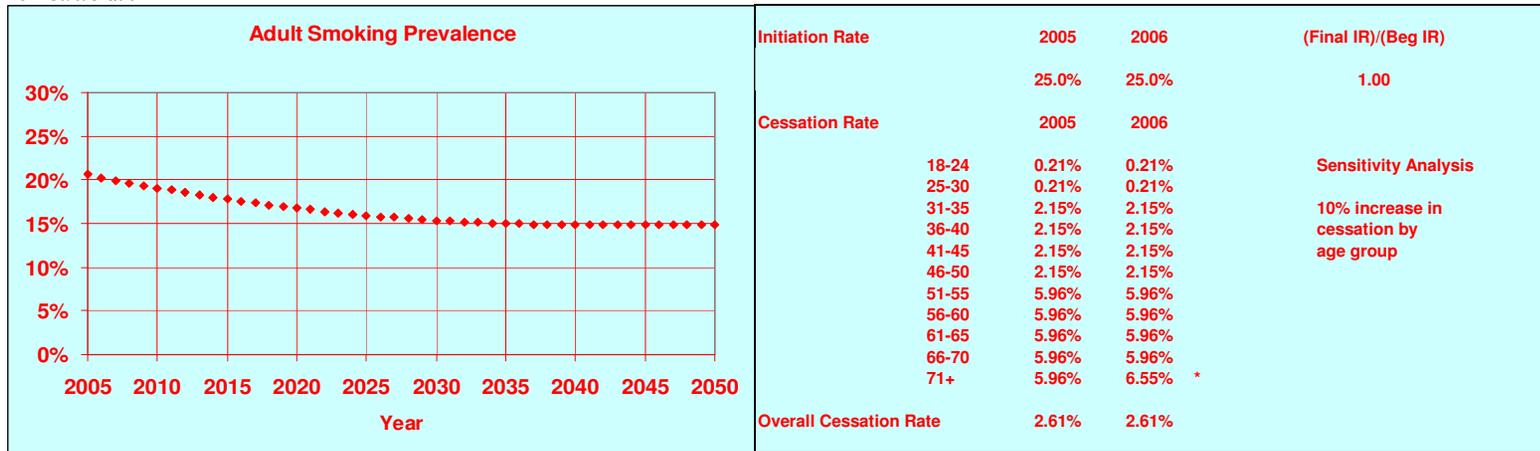
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% Decrease in Prevalence from Status Quo	0.00%	0.08%	0.14%	0.17%	0.19%										



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Controlling the Retail Sales Environment: Access, Advertising, and Promotional Activities

Robert L. Rabin
Stanford University
School Law

RESTRICTIONS ON YOUTH ACCESS

Introduction

In the 1990s, the attention of the public health community came to focus, among other concerns, on youth access to tobacco products. In part, this attentiveness reflected the persisting high number of underage smokers and the continuing indications in the trend data that no significant inroads were being made in reducing the initiation and prevalence of youth smoking (Johnston et al. 2004b). But the emerging public health concern for supply-side strategies also indicated a sense of disenchantment with the efficacy of information-based, demand-side smoking reduction strategies, such as in-school programs. In addition, at that time, counter-advertising strategies aimed at reformulating youth attitudes towards tobacco use—once again, a demand-side set of initiatives—had yet to provide any indication of success. To the contrary, taking into account the broader vantage point of advertising and promotion engaged in by the tobacco industry to encourage youth smoking, it appeared quite clear that the industry had the upper hand (DiFranza et al. 1991).

The case for the legitimacy of the state’s engaging in youth access protection activity was firmly grounded: The rationale of a state’s undertaking child protection activity rests on long-standing tradition. Reflecting this tradition, tobacco sales to minors were illegal in every state (in most cases, with an age limitation of 18 years). Hence, proactive enforcement of youth access restrictions simply reflected implementation of sanctions on illegal conduct. As a policy choice, however, in contrast to a question of legal authority, the case is not quite so clear-cut. Glantz (1996), among others, has argued that vigorous enforcement of youth access restrictions is a highly problematic public health strategy on the grounds that it is likely to make smoking—as a “forbidden fruit” and one proscribed by “authority”—more attractive to youth, rather than less so (Glantz 1996). Whatever the merits of this argument, clearly the dominant strand in 1990s thinking was that supply-side restriction, in the form of more effective youth access limitations, was a strategy worth pursuing.

Youth Access: 1990–2001

In 1992, Congress enacted the Synar Amendment, aimed at addressing the continuing illegal sales of tobacco to minors (Section 1926, Public Health Service Act [42 USC 300x-26] 2004). This legislation required that all states enact and enforce youth access laws, with the sanction of

loss of federal block grant substance abuse and treatment funding for noncomplying states. Under subsequently adopted Department of Health and Human Services (DHHS) regulations, states were required to reduce the rate of retailer violations of youth access laws to 20 percent or less by 2003 (DHHS 1996).

In a complementary mode, the Federal Drug Administration (FDA) adopted a comprehensive set of youth regulations in 1996 that included a major compliance check program under the auspices of the agency. The regulations had a short shelf-life, however: The FDA program was invalidated by the U.S. Supreme Court in 2000 on the grounds that tobacco regulation was outside the scope of the agency's authority (*FDA v. Brown & Williamson*, 2000).

As mentioned above, every state has baseline legislation prohibiting sales to minors. Both the Synar Amendment and the failed FDA effort reflect the fact that in the 1990s, when attention came to focus on youth access, there was a widespread perception that states and localities were simply not enforcing these provisions with any vigor. Rigotti (2001) documents a considerable number of studies, beginning in 1987 and extending well into the 1990s, revealing widespread merchant indifference to the laws and a like indifference on the part of enforcement authorities (Rigotti 2001).

Indifference is, of course, quite a different matter from disagreement in principle, and Rigotti (2001) asserts that in fact there is widespread agreement among tobacco control activists and public health experts on the provisions that would be incorporated in a model access restriction law. In summary, the principal guideposts Rigotti (2001) mentions are: (1) establish a minimum age of at least 18, (2) require that retailers establish proof of age through checking identification, (3) create a tobacco sales licensing scheme, (4) require periodic tests of retailers' compliance, (5) establish administrative or civil law penalties for illegal sales, and (6) prohibit self-service displays of tobacco products (IOM 1994).

The existing state and local laws on the books, as might be expected, incorporate many of these provisions. However, there were almost no data on ongoing enforcement levels, so it was impossible to conclude with any confidence whether enforcement practices had changed in any meaningful way from the rather dismal record of the period immediately before the Synar Amendment was enacted. Moreover, in a considerable number of instances, local ordinances that appeared strong, at least as written, were diluted by weaker state laws preempting inconsistent local provisions.

In 1996, once the Synar Amendment came into effect, the logical inquiry was whether it would exert an independent positive influence on state and local enforcement practices. In the early years, this appears not to have been the case. In an analysis of 1997 substance abuse block grant applications from all states, DiFranza (1999) concluded that "states and DHHS are violating the statutory requirements of the Synar Amendment rendering it ineffective" (DiFranza 1999). In a subsequent study of state Synar compliance through 2000, however, DiFranza and Dussault (2005) find a more positive state of affairs (DiFranza and Dussault 2005). Despite some leniency in holding states to established targets, as DHHS pressured some states to move from educational to compliance-testing strategies, states made considerable progress in achieving maximum 20 percent noncompliance goals.

In the late 1990s, a number of studies were conducted of communities that engaged in proactive enforcement, aimed at assessing the efficacy of these efforts. Initially, these studies generally took reduction in access as an outcome measure (i.e., merchant compliance rates, as measured by failed efforts by minors to successfully purchase tobacco products), rather than reduction in smoking initiation or prevalence. These earlier studies were generally uncontrolled, rather than

matched with non-proactive communities sharing like demographic characteristics. Later studies made an effort to measure effects on smoking activity through self-reports from sample youth populations in the communities and also were designed as controlled studies. Rigotti (2001) analyzes the studies in detail through 2001 and concludes that the results, in terms of efficacy, are mixed at best.

The first wave of studies to examine the impact of tobacco sales laws assessed intermediate endpoints (merchant compliance laws) and clearly demonstrated that enforcing the laws changed retailer behavior. Enforcement must continue to be done regularly to remain effective. The relative effectiveness of different penalties as deterrents to selling tobacco to minors has not been systematically studied (Stead and Lancaster 2000).

The second wave of studies uses youth access to tobacco and tobacco use as outcomes. These studies have yet to provide conclusive evidence that interventions using retailer education or law enforcement alone can change the ease with which young people obtain tobacco products. Because interventions have not been able to interrupt the supply of tobacco to minors, it is not surprising that they have not been clearly shown to reduce youth tobacco use (DiFranzia 2000; Rigotti 1999; Stead and Lancaster 2000). Existing studies have not been able to provide a rigorous test of the supply reduction hypothesis because it has proved difficult to mount interventions that substantially reduce the supply of tobacco to minors (Rigotti 2001).

Another variable that warrants further exploration—both in future efficacy studies and as a more general policy matter—is the nature of the sanctions attached to violation of youth access laws. Existing laws have ordinarily relied on fines and penalties assessed against errant merchants; a stronger sanction obviously would be the threat of loss of license to sell tobacco products (Fichtenberg and Glantz 2002).¹ But penalizing merchants does not exhaust the field. Another approach, either complementary or independently, would be to criminalize either purchase or possession. In other words, relying from a deterrence perspective on the threat of criminal sanction against the purchasing minor (demand side) as well as the vendor of the product. In tandem, these sanctions might prove more efficacious than relying exclusively on punishing the seller.

However, these alternative sanctioning approaches nonetheless fail to address, in themselves, two critical dimensions of the problem in reducing tobacco use by minors. At the threshold, there is the temporal concern—that is, the very real prospect that a short-term commitment to vigorous enforcement will yield only short-term effects—that staying power has yet to be demonstrated. The still more complicated factor is the presence of noncommercial sources of tobacco—friends and family—as alternative sources, which appear to play a more significant role when commercial sources are perceived to be less available.

Recent Analyses: Post-2001

Once again, it is critical to keep in mind three distinct possible outcome measures: (1) changes in merchant compliance (ordinarily measured by “stings,” i.e., test purchasing), (2) changes in ease of access (ordinarily measured by studies of youth perceptions of availability), and (3) changes in youth smoking behavior (ordinarily measured by trends in smoking initiation or prevalence).

In a recent study of perceived ease of access, based on *Monitoring the Future* data, 1997–2002, Johnston and colleagues (2004a) find that perceived ease of access is linked to smoking

¹ It should be noted, however, that a majority of states already have licensing statutes on the books, and this datum has had no discernable deterrent effect in restricting youth access.

consumption: current regular smokers are significantly more likely to report easy access than never-smokers or past smokers (Johnston et al. 2004a). Moreover, a strikingly high percentage of current smokers (65 percent) report obtaining cigarettes from noncommercial sources (friends, relatives) within the past 30 days.

Gilpin and colleagues (2004) provide confirmatory findings, based on analysis of population data from the California Tobacco Surveys, in a study of two cohorts of adolescent smokers in California, 1993–1996 and 1996–1999 (Gilpin et al. 2004). In the earlier cohort, without significant change throughout the period in level of enforcement activity, there was no noticeable difference in transitioning into the current smokers category between those who perceived cigarettes as difficult to obtain and those who perceived this as an easy matter. In the later period, when there was considerably higher enforcement activity, there was a significantly higher transition to current smoking among those who perceived access as easy at the beginning of the period compared to those who perceived it as difficult. After controlling for changes in other regulatory control variables, the authors conclude that higher levels of enforcement had a protective effect, reinforcing the propensity of never-smokers to avoid initiation.

The Johnston and colleagues (2004b) study also confirms the finding across numerous studies that social sources of cigarettes undercut the benefits achieved from reducing availability from commercial sources. At the same time, however, Johnston and colleagues (2004b), along with the confirmatory findings in Gilpin and colleagues (2004), suggest a more subtle corollary: even if confirmed smokers do find alternative sources of tobacco—“friendly” commercial establishments or social sources and if commercial access generally is constrained, never-smokers or past-smokers may well be dissuaded from commencing or recommencing smoking by perceptions of difficulty in obtaining tobacco products.

But there is conflicting evidence on virtually every dimension of the youth access problem. Dent and Biglan (2004) draw on Oregon Healthy Teens data to survey 8th and 11th grade students from 75 communities in the state regarding the relationship between illegal sales activities and prevalence of tobacco use (Dent and Biglan 2004). Although the findings do indicate a weak relationship between illegal sales rates and smoking prevalence among 11th graders, the dominant finding in the study is the extent to which adolescents adjust their tobacco sources to the available outlets—in particular, the pronounced effect of youths’ shifting to social sources when commercial sources become more problematic.

Fichtenberg and Glantz (2002) stake out an even stronger position in a review essay on the eight studies they were able to identify, conducted between 1985 and 2001, in which an effort was made to conduct cohort studies of the association between youth access merchant compliance programs (featuring sting operations) and smoking prevalence (Fichtenberg and Glantz 2002). The authors concluded that no positive association has been established between these youth access interventions and prevalence of youth smoking. Once again, they speculate that the lack of association is largely determined by the availability of noncommercial sources.

Finally, on the independent issue of youth perceptions of availability, as distinguished from smoking behavior, Thomson and colleagues (2004) examine a database of all town-level access ordinances in Massachusetts, and in a cross-sectional analysis finds no significant association between communities with high-level restrictions and adolescent perceptions of availability, apart from those communities that had banned free-standing displays of tobacco products (where a positive association was present) (Thomson et al. 2004).

Summary

While the efficacy of proactive enforcement has yet to be firmly established, it can be argued that continued efforts at supply-side access restrictions are warranted, not as the endpoint of an effective tobacco control policy, but as a complementary component of a comprehensive package of control initiatives, if for no other reason than the symbolic value of demonstrating that the public commitment to reducing tobacco use in the critical early years of smoking initiation is not simply a matter of lip-service. In their recent analysis of state compliance with the Synar Amendment, 1992–2000, DiFranzia and Dussault (2005) cautiously suggest:

It is certainly plausible that Synar has contributed to this salubrious trend [a 30 percent decrease in youth smoking rates since Synar went into effect] as one component of a multifaceted public health effort that has included price hikes, education, anti-smoking media campaigns, limited restrictions on tobacco marketing, and restrictions on public smoking. It would therefore seem wise to maintain this policy while its impact is carefully evaluated (DiFranzia 2005, *supra* note 11 at 98).

Beyond this, on the basis of presently available data, it cannot be predicted with any degree of confidence that positive outcome determinations in smoking prevalence will result from investing resources in proactive merchant compliance activities.

POINT-OF-PURCHASE PROMOTIONS AND ADVERTISING

Introduction

With the adoption of the Master Settlement Agreement (MSA) in 1998, billboard advertising was prohibited, brand item advertising was limited, and the public entertainment forum advertising was sharply restricted. As a consequence, there was a dramatic shift in the tobacco industry's advertising and promotion budgets. Pierce and Gilpin (2004) report that by 2001, more than 80 percent of the total advertising and promotion expenditures by the industry were targeted at incentives to merchants and retail value-added offers; in short, retail marketing became the dominant strategy (Pierce and Gilpin 2004).

The main venues of such advertising are convenience stores, small grocery stores (often in tandem with the sale of gas), liquor stores, chain supermarkets, and chain pharmacies, with youth access especially concentrated at the first two of these sources. Concomitantly, it appears that a notably disproportionate share of the industry's advertising and promotion budget, as detailed below, is channeled to those outlets where underage youths tend to hang out or make purchases, raising serious questions as to the efficacy of the MSA advertising limitations in addressing the problem of underage smoking.

Indeed, contractual arrangements regarding placement and promotional initiatives are highly site-specific. In the case of independent stores, manufacturers' representatives generally make site visits to discuss these matters while arrangements with chains are more commonly conducted through dealings with the central retailing office.

What are the principal strategies used in the retail environment? For analytical purposes, it is possible to identify a set of promotional policies and a set of pricing strategies. The former would include product placement initiatives, such as self-service displays. As indicated in the preceding section on youth access, self-service readily lends itself to shoplifting, as well as providing a particularly prominent enticement to an on-the-spot purchase attempt. Apparently, however, self-service is on the decline as a voluntary matter: Retailers don't like it, precisely because

of the pilferage problem, and at least one of the tobacco manufacturers—Philip Morris, in fact—has come down against the practice, most likely as part of its effort to present a better image.

Closely related to self-service as a strategy is a broader set of height and visibility display considerations, which are in fact the subject of detailed specification in the manufacturer–retailer contract, indicating the importance of these marketing considerations to the tobacco companies. Related to these specifications are the so-called slotting fees, which are industry fees paid to retailers in the form of discounts linked to advantageous placement and promotion vis-à-vis competing brands. In addition to product placement itself, these merchandising strategies address an array of product accessories: signage (e.g., discount deals), logos, banners, display racks, and window posters.

The second set of strategies involves pricing policies. So-called “buy-downs” feature inventory clearance deals, which are time-constrained discounts. Then, there is the most basic of pricing strategies: straight volume discounts. Finally, there are an array of other stratagems, ranging from “buy one, get one free” to coupon-related inducements. In tandem with the promotional strategies, these initiatives constitute the industry’s current effort to shift directions, post-MSA, from the traditional mass medium advertising to a frame of reference that is much closer to the potential buyer’s immediate impulse for gratification.

Retail Environment: Magnitude of the Concern

In 2000, tobacco manufacturers spent \$4.26 billion on point-of-sale advertising and promotional programs and \$3.52 billion on retail value-added items (e.g., free gifts, multipack discounts). Such expenditures totaled 81.2 percent of cigarette manufacturers’ marketing budgets for the year. In the same year, a study by Wakefield and colleagues (2000) found that 80 percent of retail outlets surveyed had interior tobacco advertising displays, 60 percent had exterior advertising, and 70 percent used tobacco product-endorsed functional items (e.g., floormats, clocks) within the store (Wakefield et al. 2000). A study of California retail outlets found that 94 percent of stores displayed tobacco advertisements (Feighery et al. 2001). A 42-state survey conducted in 1999 found that 92 percent of stores contained point-of-purchase advertising for tobacco products (Feighery et al. 2003).

The prime advertising space within most stores is the radius around the checkout counter. A study conducted in California found close to 90 percent of tobacco marketing materials within 4 feet of store checkout counters. A similar study found that nearly 50 percent of surveyed California retailers posted tobacco product advertisements at 3 feet or lower in height, easy eyelevel for young children. Additionally, 23 percent of stores had cigarette product displays in close proximity to candy, another high value to volume item that is attractive to youth (Feighery et al. 2001).

Store advertising may vary with the store size, store type, and demographics of the neighborhood in which the shop is located. A study of neighborhoods in Boston revealed that the number of stores in an area selling tobacco products was related to the neighborhood’s economic status. In a region with a recorded per capita income in 1989 of \$7,620, 19.4 percent of stores sold tobacco products. By contrast, in an affluent neighborhood with a \$46,490 per capita income, only 3.7 percent of stores sold tobacco. The study also found that lower-income and minority neighborhood stores were more likely than their affluent counterparts to advertise mentholated cigarettes and to post a greater number of tobacco advertisements on the exterior of the store (Laws et al. 2002).

Retail Environment: Marketing Strategies

Point-of-purchase marketing efforts by tobacco manufacturers take several main forms. Feighery and colleagues (2003) conducted in-depth interviews with 29 tobacco retailers in the United States to determine the type and extent of relationships between tobacco manufacturers and retailers (Feighery et al. 2003). In addition to the production and distribution of marketing materials (i.e., posters, packaging), tobacco manufacturers cultivate direct relationships with retailers in order to achieve the desired placement of their products and materials within stores. Along with slotting fees—direct payments to retailers for prime product placements—manufacturers also offer trade promotions and special offers to retailers as provisions in the retail sales agreement. In the Feighery and colleagues (2003) study, most of the retailers surveyed reported having contracts with tobacco companies at some point. Contract provisions include volume discount offers for stores fulfilling minimum sales volume levels. Such promotional offers, however, tend to be accompanied by requirements that the retailer conform to specifications about product placement within the store.

Buy-downs are another prominent promotional incentive offered by manufacturers to retailers. Buy-downs are used to place a store's existing inventory on sale. Manufacturers will approve a certain reduction in the sale price of their products. The retailer sells its inventory at that reduced price and collects a reimbursement from the manufacturer at a later date. To participate in the buy-down, a retailer must agree to erect special product displays and other promotional signs. One retailer interviewed in the Feighery and colleagues (2003) study reported that manufacturers have reduced their use of "give-aways," such as T-shirts, cameras, hats, and other promotional products that would be offered free with purchase of tobacco products in the wake of the increased tobacco lawsuits. Instead, the companies have increased their use of techniques such as buy-downs.

As noted, a proviso of the manufacturer's promotional offers is that participating retailers comply with product placement specifications. Placement requirements may differ between firms in the industry and among the specific contracts that each company maintains. However, some trends are worthy of note. Tobacco manufacturers vie for the space closest to the cashier area and for eye-level placement within that space. One retailer told Feighery that manufacturers now want to keep their cigarette products behind the service counter and not in self-service displays because of legislative compliance concerns.

Placement of signage is also largely controlled by manufacturers. Companies produce diagrams to show where their advertisements and posters should be placed within the store. Again, line of vision and proximity to the checkout area are the prime considerations.

Relationships with tobacco manufacturers can prove exceptionally lucrative for tobacco retailers. Convenience store owners reported annual benefits worth up to \$20,000 for fully complying with the marketing programs of tobacco companies (Bloom 2001).

PUBLIC POLICY OPTIONS

As suggested above, there seems to be a consensus among researchers in attributing the rise in slotting fee and trade promotion expenditures—indeed, in the entire array of retail marketing incentives—to the tobacco industry's attempt to offset the impact of the ban on billboard advertising and related measures in the MSA. Along parallel lines, Slater and colleagues (2001) found that Philip Morris was significantly more likely to offer a gift-with-purchase promotion for Marlboros in states with comprehensive tobacco control programs than in states without such controls

(Slater et al. 2001). Regulations aimed at retail outlet advertising and/or promotion may be deemed necessary to close this major loophole in the MSA. Bloom (2001), in his survey of slotting fees and product promotions, discusses an array of options that policy makers might consider by way of limiting the recent shift in industry strategy (Bloom 2001).

First, Bloom (2001) suggests that government entities could impose a full ban on slotting fees and trade promotions by tobacco companies. He cites similar action taken by the Bureau of Alcohol, Tobacco and Firearms in 1995 in an attempt to protect small wineries and breweries from being ousted from retail shelves due to high product placement fees paid to large retailers by the major alcohol producers. An outright ban could serve to alleviate the economic pressure felt by retailers to court the big tobacco manufacturers and thereby become their political allies on issues related to teen smoking. Bloom (2001) notes, however, that such a ban could have unwanted effects. As noted above, tobacco companies spend exorbitant amounts of money every year on such promotional fees, money that would remain in the pockets of the industry if such payments were banned. Bloom (2001) suggests that tobacco companies might use these savings to facilitate reductions in product price, an effect that might actually increase youth access to tobacco products.

Another option might be to regulate retail prices as a means of preventing retailers from passing on manufacturer-created price breaks to customers. Bloom (2001) refers to a New York regulatory scheme that prohibits retailers from selling tobacco products below cost (plus a statutorily required markup). He contends that by limiting the degree to which manufacturers' special offers can actually affect the market price, states can diminish the stimulation of demand through trade promotions. On this score, however, in a comparative study of states with and without retail minimum price controls—half of the states fall into each category—Feighery and colleagues (2005) found no conclusive evidence that states with controls had lower prices or lower retailer participation rates in these promotional programs (note, however, that these programs, with the exception of New York's, do not exclude promotional programs from their minimum price formulas) (Feighery et al. 2005).

Still other regulatory options, such as elimination of self-service displays and restrictions on signage—or requirements for antismoking warning signage—would take direct aim at the retailing environment. The likely efficacy of these measures varies. One can question whether more prominent warning signage at the point of sale would add much, if anything, as a deterrent to consumption decisions by minors intent on making illegal purchases. Self-service display bans, by contrast, may very well have a salutary effect, as discussed above. But this practice appears to be on the way out in any event. When one turns to more restrictive controls on advertising and promotion in the retail setting, constitutional considerations, discussed briefly in the following section, become a matter of considerable salience.

It would be possible to address controls on the retail sales environment from a distinctly different perspective—namely, placing limits on the number of retail outlets in a particular community. As discussed in Holder (2004), this strategy has been employed, at times, in the context of retail sales of alcoholic beverages (Holder 2004). Licensing schemes and public monopoly systems are two methods states have used to limit alcohol retailers in their jurisdictions. Under a licensing scheme, the state requires retailers to obtain a license in order to sell alcohol products. Licenses are issued for a limited period and require reapplication for renewal. Retailer density can be controlled directly by the licensing body either by limiting the total number of licenses distributed or by limiting the density of licenses within geographic areas. Imposing prohibitive application fees can also serve as an indirect limit on the number of retailers in an area. A public

monopoly system prohibits the sale of a certain product by private retailers and establishes the state (or local government) as the sole distributor of the good.

The rationale for these measures is that reducing the number and density of outlets makes access to the product less convenient and increases the opportunity cost of using the product (i.e., the time and resources expended on search costs) (Shipman 1940). While either of these approaches may succeed in limiting the supply and availability of tobacco products, it should be noted that neither approach is targeted directly at youth access. Rather, the strategies would impact all consumers of tobacco.

It would probably be hard to justify outlet restriction as a primary strategy for reducing youth access to tobacco—it would be regarded as overkill because of spillover effects to adults if this were the principal justification. In the Holder (2004) study just cited, reduction in youth access is regarded as a salutary secondary consequence of policy reasons for reducing the number of outlets for the purchase of liquor across the board.

Then the question becomes whether the “inconvenience effects” (search costs) of outlet restriction can serve as a direct justification, or strategy, for reducing tobacco consumption across the board (i.e., not just for youth). Interestingly, the present array of strategies that impose inconvenience effects do so as a secondary consequence of achieving other goals. In particular, second-hand smoke zoning-type restrictions on smoking in public accommodations, which are justified on the grounds of either health effects or public nuisance effects on nonsmokers (with inconvenience to smokers and consequent reduction in smoking serving as a collateral benefit). These considerations, along with the obvious opposition of current tobacco sales outlets, suggest the formidable political barriers that would confront an outlet restriction strategy.

CAVEAT: THE LORILLARD CASE AND THE FIRST AMENDMENT

In *Lorillard Tobacco Company v. Reilly* (533 U.S. 525 [2001]), the U.S. Supreme Court invalidated Massachusetts regulations and adopted as a more stringent supplement to the restrictions on advertising in the MSA that prohibited outdoor advertising within 1,000 feet of schools (including, in particular, billboard advertising) and proscribed certain retail sales practices, such as displaying tobacco product advertising lower than 5 feet from the floor of the establishment. The Supreme Court left only the narrowest of the regulations in place—a ban on self-service displays—on the tailored rationale that the self-service proscription was not aimed at advertising but at product placement per se (with ease of underage access the immediate basis for the prohibition).

The case has been read by many antitobacco activists as sounding a virtual death knell for regulation of advertising at point of purchase, and not without some basis in fact. *Lorillard v. Reilly* stands on a two-pronged foundation: First, the commercial speech doctrine as enunciated in *Central Hudson Gas & Elec. Corp. v. Public Service Commission of New York* (447 U.S. 557 [1980]), and broadly applied in *Liquormart, Inc. v. Rhode Island* (517 U.S. 484 [1996]), and second, the statutory preemption provision in the Federal Cigarette Labeling and Advertising Act of 1966 which, as interpreted in *Cipollone v. Liggett Group, Inc.* (505 U.S. 504 [1992]) establishes immunity from tort suits based on claims of failure to adequately warn to tobacco advertisements complying with the labeling requirements of the statute.

The broad reach of the latter provision is evident in the Supreme Court’s assertion that “a distinction between state regulation of the location as opposed to the content of cigarette advertising has no foundation in the text of the pre-emption provision.” Most of the constraints on product placement and advertising content in the retail setting are put in jeopardy by one or the other

prong of *Lorillard v. Reilly*, just as the 5-feet-or-lower proviso is explicitly struck down. At the same time, however, *Lorillard v. Reilly* would seem to have no bearing on measures aimed at outlet limitations or other price-related discount restrictions.

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M

Sales and Marketing of Cigarettes on the Internet: Emerging Threats to Tobacco Control and Promising Policy Solutions

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INTRODUCTION

An editorial in *Tobacco Control* by Connolly (2001) expressed concern about the tobacco industry embracing a relatively unregulated Internet because “many of the public health interventions that we have developed to curb real world lung cancer could go up in a puff of cyber smoke (Connolly 2001). Taxes, ad bans, and youth access laws are easily eroded online.” There is great potential for the sales and marketing of tobacco products on the Internet to undermine the progress that has been made in tobacco control. Experts at the Centers for Disease Control and Prevention (CDC) selected the “recognition of tobacco use as a health hazard and subsequent public health antismoking campaigns” as one of the 10 greatest public health achievements of the twentieth century (CDC 1999). Recent evidence-based reviews (Task Force on Community Preventive Services 2005) and reports by the U.S. Surgeon General (DHHS 2001) have concluded that tobacco control policies and programs account for much of this progress. One of the most potent strategies for reducing tobacco use involves increasing tobacco prices, which is typically accomplished through increasing state and federal excise taxes on tobacco products. When tax-free cigarettes are sold on the Internet, this reduces their price and can undermine the public health benefits of increased cigarette prices. Restricting tobacco product advertising and marketing has

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also reduced consumption, with complete advertising bans having the greatest impact. Since 1971, advertising for tobacco products has been banned on all broadcast media in the United States. Under the 1998 Master Settlement Agreement, Joe Camel and other cartoon characters were banned from appearing in cigarette advertisements, sponsorships were restricted, and cigarette advertisements were banned on billboards and buses. Outside of the United States, many countries have implemented complete bans on all forms of tobacco advertising. The landmark Framework Convention on Tobacco Control, a worldwide public health treaty sponsored by the World Health Organization in 2003 (Shibuya et al. 2003; Taylor and Bettcher 2000), urges all ratifying countries to ban all tobacco advertising (if their constitution permits it), including cigarette advertising on the Internet. The impact of advertising bans and restrictions at home and abroad will be diluted if the tobacco industry aggressively markets its products online and if bans, such as those included in the Framework Convention, are not adequately implemented and enforced.

This appendix addresses two fundamental questions: (1) What are the major threats to tobacco control posed by the sales and marketing of cigarettes on the Internet and (2) what current policies and practices and promising new ones can counteract these threats? The first section provides background on the scope and magnitude of Internet cigarette sales. The next section examines the three major threats to tobacco control efforts: online sales of cheap “tax-free” cigarettes, online marketing and promotional efforts by Internet cigarette vendors and tobacco companies, and online cigarette sales to minors. In the final section we review policies designed to regulate these practices and conclude with a proposed framework for regulating Internet cigarette sales.

BACKGROUND ON INTERNET CIGARETTE SALES

Trends in the Number of Internet Cigarette Vendors

Over the past 6 years, there has been a substantial increase in the number of Internet cigarette vendors. Although there is no national licensing system for Internet vendors that would precisely enumerate the number, researchers have relied on comprehensive web searching strategies to estimate the number of Internet vendors. Ribisl and colleagues (2001) used a standardized searching protocol whereby data collectors manually entered several search strings (e.g., discount cigarettes, tax-free cigarettes) into multiple search engines (Ribisl et al. 2001). This approach identified 88 unique domestic Internet cigarette vendors in January 2000. Unpublished follow-up studies using a similar protocol identified 195 domestic vendors in January 2002 and 338 domestic and international vendors in January 2003. Of the 338 sites found in 2003, 266 (78.7 percent) were domestic, 34 (10.1 percent) were outside the United States, and the location could not be determined for 38 (11.2 percent). In January 2004, 775 Internet cigarette vendors were identified, of which 323 (41.7 percent) were domestic, 347 (44.8 percent) were outside the United States, and the location could not be determined for 105 (13.5 percent). In January 2005, 664 Internet cigarette vendors were identified. Of those vendors, 306 (46.1 percent) were domestic, 300 (45.2 percent) were outside of the United States, and the location could not be determined for 58 (8.7 percent). Although a small number of international vendors were identified in January 2000 and 2002, they were excluded from the sample because the original study focused on domestic vendors and policies that were unique to the United States (e.g., presence of a U.S. Surgeon General’s warning on the site). However, in 2003 and subsequent years, the eligibility criteria were

expanded to include international vendors after a pilot study revealed that their numbers were growing.

The growth in the number of Internet cigarette vendors from 2000 to 2005 could be a true increase or it could simply reflect improvements in the sampling protocol. At each wave of data collection, several sources of information (such as shopping portals and search directories) were used in addition to keyword searching to identify new vendor websites. Starting in 2004, however, keyword searching was replaced with new automated searching strategies developed by Cyveillance, a private sector online risk monitoring and management firm. They entailed deploying specially developed algorithms and intelligent web spiders that reviewed more than 40 million websites, as well as postings to nearly 100,000 message boards and newsgroups and 1 million spam email messages to identify websites that were likely to be Internet cigarette vendors, which were then reviewed by trained research assistants for inclusion in the study.

A small change was also made to the protocol for removing “duplicate” sites. In the first three waves from 2000 to 2003, when two sites appeared to be nearly identical based on visual inspection of the site and the contact information, only one site was coded. However, starting in 2004, each site with a domain name (i.e., website address) was counted as an individual website because they are listed separately on search engines and are rated separately by organizations that collect data on visitor traffic to the site. This minor change in protocol would have a small effect on increasing the number of sites compared to prior waves of data collection. The extent to which the growth in the number of Internet cigarette vendors represents a true increase versus better detection or the revised protocol is currently being explored in an ancillary study. However, it is likely that the increase in the number of vendors identified represents both true growth and better detection methods. It is important to realize that the number of websites identified by these rigorous search strategies is still a lower-bound estimate of the true number of Internet cigarette vendors. First, these studies have only examined sites written in English, and there would be more Internet cigarette vendors if foreign language sites were included. Second, the World Wide Web contains billions of web pages and even the most comprehensive search strategy will miss some sites. Given the dynamic changing nature of the Internet, the searching protocol was modified and improved at each wave with the goal of identifying the highest number of Internet cigarette vendors at each given period.

Location of Internet Cigarette Vendors

Many Internet cigarette vendors are located on tribal lands and countries outside the United States, which presents regulatory and enforcement challenges. In January 2005, among domestic vendors, 63.4 percent appeared to have a Native American affiliation. Sites were coded as having a Native American affiliation if they explicitly mentioned being located on sovereign land or an Indian reservation, or if they featured Native American wording or imagery, such as descriptions of tax-related treaties or pictures of an Indian chief or Native American artwork. In January 2005, the Seneca Indians located on two reservations near Buffalo, New York comprised 77.7 percent of Native American sites. In fact, 98.1 percent of sites in the State of New York were Native American, which explains why New York State has consistently led the nation in the number of websites selling cigarettes. Background information on the Seneca and their retail, mail order, and Internet tobacco operations is provided elsewhere (Ribisl et al. 2001; Tedeschi 2005). Figure M-1 shows the growth and location of Internet cigarette vendors from 2000 to 2004.

Outside of New York, the next greatest concentration of Internet cigarette vendors occurs in southern tobacco-producing states, such as Kentucky, North Carolina, and Virginia. Historically, these states have had low cigarette excise taxes. As of March 18, 2005, the mean excise tax in tobacco-producing states was 19.8 cents per pack compared to 93.1 cents per pack for other states (McMahon 2005). Why would proximity to low cigarette excise taxes be important to Internet cigarette vendors? A newspaper article described how one unemployed North Carolina resident set up *www.CutRateSmokes.com* and operated his small online business out of his home. The owner mentioned selling a carton of Marlboro cigarettes for \$26.50 a carton (plus a flat fee of \$6.00 for shipping), which was a bargain for smokers paying approximately \$70.00 a carton in New York City. Although his source of cigarettes was not identified in the article, presumably he was purchasing them from a North Carolina warehouse club for approximately \$19.99, which would still allow him to resell them online for a small profit. This example illustrates how web vendors located in low-tax states can profitably sell cigarettes to smokers residing in high-tax states. Although the cigarette excise taxes are paid for in the “source” state, they are not being collected and remitted to the revenue department in the “destination” state. Similar to tax-free cigarette sales from Indian reservations, they also constitute a source of tax avoidance because it is very rare for recipients of the cigarettes to pay the back taxes that are owed in their own state.

Another trend is the emergence and growth of Internet cigarette vendors located outside the United States. This may reflect a growth in international vendors or, alternatively, a trend of U.S. Internet cigarette vendors relocating their businesses offshore in order to escape U.S. regulations. Determining the true location of Internet cigarette vendors has become increasingly difficult. Over time, the number of vendors not listing a location for their operations has been increasing. Nevertheless, many vendors make claims that they are selling from “outside of the United States,” “Europe,” or “a duty-free zone.” Table M-1 describes the claimed location of 664 Internet vendors identified in January 2005. The United States led all other countries in the number of English language websites selling cigarettes, followed by Switzerland (22.9 percent), the United Kingdom (1.2 percent), Spain (1.1 percent), and Indonesia (1.1 percent). There were also 34 “international” sites (5.1 percent) and 55 “European” sites (8.3 percent); these regional locations were inferred based on information provided on the site. Neither country nor regional location could be determined for 58 (8.7 percent) sites. Among the 606 sites with country-specific or regional location information, 306 (50.5 percent) were based in the United States and 300 (49.5 percent) were based outside of the United States.

Manufacturers Selling Directly to Consumers

Cigarette manufacturers have traditionally sold their cigarettes to wholesalers or distributors who then sell to the retailers. The retailer then sells the cigarettes to the smoker. Recently, there have been changes in the distribution channel whereby some small manufacturers are now selling their brands directly to consumers via the Internet. Also, some large manufacturers are selling selected brands online. For example, the upscale manufacturer of premium cigarettes, Nat Sherman, sells its own brand on its website (*www.natsherman.com*). Philip Morris, the market leader in the United States, does not sell its cigarette brands online, but R.J. Reynolds sells its supposedly reduced-exposure product, Eclipse (*www.eclipse.rjrt.com*), and provides coupons and other special offers for its generic brand Doral (*www.smokerswelcome.com*) online. The promotional aspects of the Smokers Welcome site and others like it are described in the marketing and promotion section of this chapter. In 2000, the Brown & Williamson Tobacco Company announced that it was going to sell its less popular cigarette brands directly to consumers via

mail order, telephone, and eventually, the Internet. The company established a subsidiary, BWT Direct LLC, because it claimed that scarce shelf space at U.S. retailers forced retailers to stock only the most popular cigarette brands (Fairclough 2000). The company appears to have discontinued its direct sales of cigarettes to consumers. In general, relatively little is known about the market share of direct sales of cigarettes from manufacturers and the implications of this new delivery channel for tobacco control efforts.

Estimated Sales of Cigarettes Online

Two approaches have been put forth to estimate the extent of Internet cigarette sales: (1) industry report projections and (2) assessing smokers' Internet cigarette purchasing behavior over time. Several industry reports have attempted to estimate the market size and share of Internet cigarette sales. In 2001, the private firm Forrester Research estimated that by the end of 2005, online tobacco sales would exceed \$5 billion and comprise 14 percent of all U.S. tobacco sales (Rubin et al. 2001). A 2002 report by Prudential Securities (Campagnino 2002) projected that Internet cigarette sales would account for 5.9 percent of industry volume in 2005, but these figures should be interpreted with caution because most are outdated and based on proprietary assumptions and methodologies that were not adequately described or peer-reviewed. The U.S. Department of Commerce conducts a Census of Retail Trade that estimates annual revenue and the number of establishments selling various product categories, including tobacco products. In the nonstore retailer category, "electronic shopping and mail order" houses were estimated in 1997 to have sold \$127,801,000 in "cigars, cigarettes, tobacco, and smokers' accessories (excluding sales from vending machines operated by others)" (U.S. Department of Commerce 2001). This is a small fraction of the total \$36.8 billion sales for the category. Aside from being outdated, another shortcoming in the methodology of this economic census is that it covers only the subset of establishments with a payroll, which tend to be the larger establishments. An upcoming Census of Retail Trade might provide a more useful estimate of the magnitude of Internet and mail order tobacco sales. Both of the private industry projections seem to be overestimates given recent studies described below that have examined sources of cigarettes for smokers, which have generally concluded that a relatively small proportion of smokers purchase their cigarettes via the Internet.

A study of 5,215 adult smokers from the 1999 California Tobacco Survey found that 70 percent of respondents regularly purchased cigarettes from traditional retail markets, such as convenience stores and gas stations, compared to only 5.1 percent who purchased from lower or non-taxed sources such as out-of-state outlets, military bases, or the Internet (Emery et al. 2002). Only 0.3 percent of smokers in California regularly purchased their cigarettes from the Internet in 1999. A subsequent survey in 2002 found a small increase whereby 1.1 percent of California smokers reported purchasing cigarettes on the Internet. A study of 3,602 smokers who were originally in the Community Intervention Trial for Smoking Cessation (COMMIT) study were asked in 2001 about their cigarette purchasing patterns, including purchasing cigarettes on the Internet (Hyland et al. 2005). Overall, 59 percent of smokers reported engaging in a high price avoidance strategy, such as purchasing at a reservation or switching to discount cigarettes. The rate of regularly purchasing cigarettes from the Internet was 2.0 percent overall, with a range of 0 percent in Greensboro, North Carolina, where the state excise tax was 5 cents per pack to 9 percent in Yonkers, New York, where the state excise tax was \$1.11 at the time. The rate of purchasing online was higher in communities with higher state excise taxes, unless the community was in close proximity (<40 miles) to an Indian reservation.

Most recently, the 2003 International Tobacco Control (ITC) Four Country Survey of 6,682 smokers in the United States, the United Kingdom, Canada, and Australia found that 6.1 percent of U.S. smokers, 19.7 percent of UK smokers, 3.7 percent of Canadian smokers, and 1.1 percent of Australian smokers reported a low or untaxed source for their last cigarette purchase. American smokers reported buying cigarettes online more than the other three countries in the survey, with 1.3 percent of American smokers reporting the Internet as the source for their last cigarette purchase. Canada, the United Kingdom, and Australia had very low percentages of smokers reporting buying their cigarettes online, with 0 percent, 0.1 percent, and 0.1 percent respectively. In each country, except Canada, these estimates represented an increase over the percentage of smokers purchasing their cigarettes online during a wave of data collected 7 months earlier, when 0.6 percent of U.S. and 0.0 percent of UK and Australian smokers reported the Internet as the source of their most recent cigarette purchase (Hyland et al. 2006).

Studies have also been conducted in states with high state excise taxes. A telephone survey of 3,447 current adult smokers in New Jersey found that 0.8 percent usually purchased their cigarettes on the Internet in 2000, which rose to 3.1 percent in 2002 after the state increased its cigarette excise tax (Hrywna et al. 2004). In New Jersey, the rate of ever purchasing cigarettes on the Internet rose from 1.1 percent in 2000 to 6.7 percent in 2002. Smokers who bought cigarettes online were more likely to be white, to be older, and to report fewer quit attempts in the past year. Similarly, after New York City levied an additional excise tax of \$1.50 on top of the state excise tax of \$1.50 per pack of cigarettes, there was a tenfold increase in tax receipts and an 89 percent increase in cigarettes purchased outside of the city, 18.1 percent of which were purchased over the Internet (Frieden et al. 2005). A recent economic study examined patterns over time for state cigarette excise taxes, tax-paid cigarette sales, and cigarette consumption (Stehr 2005). The analysis suggested that the decline in tax-paid sales (i.e., elasticity of tax-paid sales) in response to tax increases is significantly greater than the decline observed in consumption (i.e., elasticity of consumption) measured by population surveys. In other words, when cigarette prices increase because of a tax hike, the percentage decline in tax-paid sales is greater than the decline in actual smoking rates. The fact that both do not decline equally suggests that some smokers are simply avoiding the taxes. The author estimated that from 1985 to 2001, 9.6 percent of cigarettes were purchased without payment of state taxes. Similar findings were observed in another econometric study that found that the rise of the Internet, and the associated ability of consumers to purchase tax-free cigarettes, has altered the elasticity of tax-paid cigarette sales and suggests that states now have a reduced ability to raise revenue by increasing cigarette taxes (Goolsbee and Slemrod 2004).

In summary, the number of Internet cigarette vendors appears to have increased substantially over the past half-decade, with a growing proportion of sites coming from outside the United States. Longitudinal studies in selected states and countries suggest that the proportion of adults purchasing online may be rising, especially in states with higher excise taxes. However, few smokers appear to be purchasing cigarettes online if they have ready access to cheaper cigarettes from nearby Indian reservations or if they reside in a state with a low excise tax. The issue of tax avoidance is described in greater detail in the following section.

THREATS

Threat 1: The Internet as a Source of Cheap Cigarettes from Tax Avoidance

The public health benefits of raising cigarette prices to reduce consumption are undermined by sales of low-tax or tax-free cigarettes online. Up to 78 percent of Internet cigarette vendors advertise selling cigarettes tax-free (GAO 2002a), which is attractive to price-sensitive smokers residing in states with high excise taxes. Internet vendors can sell cigarettes more cheaply than brick-and-mortar retail outlets because they are generally selling low-tax or untaxed products from tobacco-producing states, foreign countries, or American Indian reservations. Their customers are generally smokers residing in high-tax areas. Figure M-2 is a scatterplot based on one Internet vendor's shipping records that shows the relationship between a state's cigarette excise tax rate and the number of shipments to that state per 100,000 smokers (based on state-level rates of current smoking for adults). There are very few shipments to states where the excise taxes are fairly low, and the highest rate of shipment occur in the six states with the highest excise taxes. The shipment rate was only moderately related to other possible predictors, such as state-level rates of Internet access (Frieden et al. 2005).

The availability of low-cost cigarettes online may have a negative impact on public health because price-sensitive smokers who might have considered quitting or reducing their consumption after a tax hike can continue to smoke by purchasing cheaper cigarettes online. In the COMMIT study, 59 percent of smokers reported trying to avoid high cigarette prices when taxes increased (Hyland et al. 2005). Hyland and colleagues (2005) found that when cigarette prices increased, price-sensitive smokers who are not motivated to quit most commonly seek out lower-priced or tax-free cigarettes, rather than switch to generic brands or use coupons, especially when lower-priced tax-free sources are readily available. Given that the Internet is accessible to approximately 66 percent of the U.S. population (Pew Internet and American Life Project 2005), price-sensitive smokers may seek out cheaper cigarettes online when cigarette taxes increase. A small-scale study of New York and New Jersey smokers found that smokers who purchased cigarettes online were motivated primarily by lower prices (Kim et al. 2006). Additionally, smokers who purchased cheaper cigarettes from the Internet and other lower-taxed sources significantly increased their consumption over time, compared to smokers who reported paying full-price at traditional brick-and-mortar retail stores. This result is consistent with findings from a prior longitudinal study of New York smokers that 68.4 percent of smokers who paid full price at retail outlets attempted to quit, compared to only 44.4 percent of smokers who paid lower-tax prices from American Indian reservations (Hyland et al. 2005). Among those who paid full price, 20 percent successfully quit smoking at follow-up, compared to only 10.2 percent who purchased cigarettes from Indian reservations. These studies suggest that easy access to low-tax cigarettes online may influence price-sensitive smokers to continue smoking when retail prices increase, thereby undermining the public health benefits of increased cigarette excise taxes.

Despite concerns that Internet cigarette sales may undermine the efforts of raising cigarette taxes, recent data suggest that increasing taxes still confers tax revenue benefits on states. In 2002, New York City raised its city's cigarette excise tax from \$0.08 to \$1.50, which occurred in addition to the New York State excise tax of \$1.50. After the New York City tax increase, tax receipts increased tenfold even though the proportion of cigarettes reportedly purchased by smokers outside of New York City increased 89 percent (Frieden et al. 2005). Of cigarettes purchased elsewhere, 29.0 percent were bought in New York State outside of New York City, 21.7 percent were bought in a different state, 18.1 percent were bought over the Internet, 12.4 percent

were bought from another person, and 7.8 percent were bought from an American Indian reservation.

Tax evasion from online sales also deprives governments and tobacco control or public health programs of much needed revenue. Forrester Research estimated that states would lose more than \$1.4 billion in 2005 due to the sale of untaxed cigarettes on the Internet (Rubin et al. 2001). It is likely that the actual amount of lost revenue to states is lower, but still quite significant. When Congress held the first ever hearings about problems posed by Internet tobacco sales,² economist Patrick Fleenor presented estimates of state and local revenue losses under three scenarios. The first scenario assumed Internet retailers would capture a 2 percent market share in 2003, and this yielded \$552.4 million in lost state and local government revenue. The second scenario assumed Internet retailers would capture a 6 percent market share in 2005, and this yielded \$1.7 billion in lost state and local government revenue. The final scenario assumed a 14 percent market share in 2005, which yielded nearly \$4 billion in lost revenue. As mentioned earlier, there are no firm national estimates of Internet tobacco sales, so the exact revenue losses cannot be calculated at this time, but it is likely that the 2005 market share was considerably lower than the 14 percent estimate and probably lower than the 6 percent estimate. Given that the 2003 International Tobacco Control Four Country Survey showed that 1.3 percent of adult smokers made their last cigarette purchase online (Hyland et al. 2006), the 2 percent market share estimate is probably the most accurate estimate, yielding more than half a billion dollars in lost revenue to state and local governments.

Although there are no federal laws that require Internet vendors to collect and remit cigarette taxes to taxation authorities, under state law consumers who purchase cigarettes on the Internet are liable for their own state's cigarette excise tax and, in some instances, for sales and/or use taxes (GAO 2002b). One of the ways to prevent lost revenue from cigarette excise taxes is by having policies that require vendors to register with states and share their customer lists. The Jenkins Act (Title 15, Chapter 10A, Sections 375–378) is a federal law from 1949 that regulates interstate commerce of cigarettes and has the potential to reduce tax evasion on the Internet (Banthin 2004; GAO 2002b). The Jenkins Act requires that tobacco vendors selling out-of-state must “first file with the tobacco tax administrator of the state into which such shipment is made.” The vendors must also report all cigarette sales to state taxation authorities by the tenth day of each calendar month. These reports must include “the name and address of the person to whom the shipment was made, the brand, and the quantity thereof.” Thus, if a smoker from New York City purchases three cartons from an Internet vendor in Virginia, the Virginia Internet vendor is obligated to report to the New York tobacco tax administrator the name and address of the buyer and the brand and quantity of cigarettes purchased. The penalties for violation are a misdemeanor with a fine of not more than \$1,000 or imprisonment of 6 months, or both.

An investigation conducted by the U.S. General Accounting Office (GAO) concluded that most websites openly stated that they violate the Jenkins Act and that there have been no successful prosecutions of noncompliant Internet cigarette vendors (GAO 2002b). The GAO concluded that the Jenkins Act is violated, in part, because it is a misdemeanor and not a felony. In addition, there has been little enforcement because the U.S. Federal Bureau of Investigation has jurisdiction, and this has been a low priority for them because of their new challenges and priori-

²HR 1839 (May 1, 2003): Youth Smoking Prevention and State Revenue Enforcement Act: Hearing before the Subcommittee on Courts, the Internet, and Intellectual Property of the Committee on the Judiciary, House of Representatives, 108th Congress. Serial No.19. Washington DC.

ties related to the threat of terrorism. The GAO recommended that the penalties for noncompliance be elevated to a felony and jurisdiction be given to the Bureau of Alcohol, Tobacco, Firearms and Explosives. Finally, although many tribal websites claim that they are not subject to the Jenkins Act provisions because they reside on sovereign lands, the GAO concluded that they are obligated to comply and the U.S. Supreme Court has ruled that the federal government can regulate interstate commerce including tribal commerce that occurs across state lines.

The GAO report was based on the advertised sales practices of websites. Our research team conducted a purchase survey to assess the actual rate of compliance with the Jenkins Act, which we believed would be very low based on reviewing website content and anecdotal reports in the media. The study is currently being prepared for publication. One buyer in California purchased cigarettes from 101 Internet vendors, all of which should have filed a Jenkins Act report for California. Research staff then asked the state's taxation authority, the California Bureau of Equalization, what proportion of the 101 vendors filed reports. None of the 101 vendors filed a Jenkins Act report.

Several states have identified individuals who have purchased cigarettes online because a small number of Internet vendors have filed Jenkins Act reports in the past and because some Internet vendors have turned over their customer lists to taxation authorities as a condition of legal settlements. In addition, the Massachusetts Revenue Department has identified Massachusetts residents who received deliveries of cigarettes from out-of-state Internet vendors by requiring shippers, such as United Parcel Service (UPS), to hand over their records (Mohl 2003; 2004). The GAO report (GAO 2002b) profiled the efforts of six states to promote Jenkins Act compliance by notifying Internet vendors of their duty to comply with the act. Relatively few Internet vendors complied. For instance, only 13 of 262 Internet vendors in Massachusetts responded to the notification with reports of their customers. However, in cases where the states received customer names and addresses, state revenue authorities then notified individual smokers to collect back taxes. In California, approximately 23,500 were identified from 20 Internet vendors. Approximately 13,500 of the 23,500 notified responded and the state recovered approximately \$1.4 million in back taxes, penalties, and interest. More recent news reports (Copeland 2005) have described how other cities and states, such as New York City, Pennsylvania, and Ohio, have sent thousands of letters to smokers who purchased their cigarettes on the Internet.

In summary, the Internet offers cheap so-called tax-free cigarettes for smokers concerned about high retail cigarette prices in their area. The availability of low-cost cigarettes from low-taxed sources, including the Internet, appears to be related to decreased quit attempts, thereby undermining the public health benefit of higher cigarette prices. Of the three threats to tobacco control posed by the Internet, tax avoidance is probably the most significant. Concern over revenue losses caused by Internet cigarette sales, however, should not deter states from increasing cigarette excise taxes. Despite some losses due to Internet sales and other tax evasion activities, states still experience a net increase in their tax revenue when increasing their cigarette taxes (Farrelly et al. 2003). An important topic for future study, according to Farrelly and colleagues (2003), is to better understand the effectiveness and the cost-effectiveness of controlling tax evasion and Internet sales.

Threat 2: Marketing and Promotional Efforts

The Internet provides unprecedented opportunities to market and promote tobacco products in a largely unregulated medium. A Surgeon General's report on smoking noted that "the future of tobacco advertising and promotion may lie in cyberspace" because "the Internet offers endless

possibilities for promoting tobacco use and marketing tobacco products” (DHHS 2001, p.16). These advertising and promotional messages are available 24 hours a day, 7 days a week to smokers who are online. The Internet has the potential to be a more potent medium than static print advertising in magazines because of its ability to individually tailor marketing strategies and to engage in these activities relatively unnoticed in the vast World Wide Web. As a result, this medium presents new challenges for the monitoring and regulation of tobacco marketing and promotions. In this section, we examine the range of marketing and promotional strategies that Internet cigarette vendors use based on findings from our ongoing longitudinal study of Internet cigarette vendors. We also present results from a small study on cigarette spam e-mails, explore how the major tobacco companies are using the Internet to build relationships with their customers, and conclude with a discussion of several policies that have been proposed to regulate online tobacco marketing practices.

Wide Variety of Cigarette Brands and Tobacco Products

Internet cigarette vendors sell a wide variety of cigarette brands and tobacco products online. In 2005, we found that all these sites sold some type of cigarettes (Table M-2). Approximately 30 percent advertised selling duty-free cigarettes, which are manufactured for export only and are illegal to sell in the United States because they violate the Imported Cigarette Compliance Act of 2000. Another 22.7 percent sold clove cigarettes, while about 5 percent sold bidis or herbal cigarettes. Internet cigarette vendors sold an average of 39.3 (standard deviation [SD] 21.52, range = 1 to 98) unique cigarette brands, with 45 percent of sites selling 40 or more brands. Internet cigarette vendors also sold cigars (42.2 percent), smokeless tobacco such as Skoal (28.0 percent), loose tobacco for pipes and roll-your-own cigarettes (23.0 percent), and tobacco paraphernalia such as lighters, ashtrays, and cigar cutters (19.3 percent). Approximately 10 percent of sites sold other tobacco-related products such as candles and air fresheners designed specifically for smokers, and roughly 15 percent of sites also sold non-tobacco products such as coffee, moccasins, jewelry, or condoms. These results suggest that Internet cigarette vendors advertise and carry a wide range of tobacco and non-tobacco products for virtually every type of customer. Whereas traditional brick-and-mortar retail vendors are restricted in the number of tobacco products they can sell because of limited physical storage and shelving space, Internet cigarette vendors can carry a much larger inventory of items and offer greater brand and product selection that might be appealing to a wider customer base. This may become increasingly important if more smokers switch cigarette brands and alter their purchasing and consumption patterns in response to rising cigarette excise taxes. One report suggested that Internet cigarette vendors aggressively promote cheaper, deep-discount brands because they yield more than four times the profit for vendors than premium brands and because many smokers who buy online are very cost conscious (Campagnino 2002).

Price-Related Promotions

Internet cigarette vendors also offer price-related promotions that reduce the actual cost of cigarettes or add value to their purchase. In 2005, 31.8 percent of Internet cigarette vendors offered reduced-price specials (Table M-2) such as discounts on specific brands, monthly or weekly price specials, and coupons. Approximately 40 percent of sites advertised that they sold cigarettes tax-free; this was explicitly stated on their website or incorporated into their business name or website URL (Figure M-3). By advertising that their cigarettes are tax-free, Internet

cigarette vendors are targeting smokers who reside in high-excise-tax states and currently pay high cigarette prices at retail stores. Few sites offered gifts, multipack specials, or contests, but those doing so gave away items such as free cigarettes or enter-to-win vacation contests.

Peer-to-Peer Promotions

One of the advantages of selling products on the Internet is using features of email and website technology to facilitate word-of-mouth communication among peer social networks (Hoffman and Novak 1997). In our study, we found that Internet cigarette vendors use several peer-to-peer strategies to attract more customers to their site. Approximately a third of the sites offered mechanisms to refer friends to the site (30.1 percent) and ways to link to their site (16.7 percent), while a few offered wish lists to their customers (3.9 percent). Wish lists enable customers to create lists of cigarette and tobacco products they desire that they can make available to friends who might purchase the products for them. The “link-to-us” function enables customers to create a bookmark or link on their own personal website so that interested friends can click on the link, which takes them directly to the Internet cigarette vendor site. Once new customers are at the website, Internet cigarette vendors also use strategies such as “customer testimonials” and “top-selling brands” as a way to share information about other customers’ purchasing patterns and experiences. In 2005, 11.6 percent of Internet cigarette vendors utilized customer testimonials and 28.3 percent advertised “top-selling brands.” The ease of sharing information via the Internet allows Internet cigarette vendors to utilize strategies that encourage word-of-mouth promotions among peer networks. Direct peer-to-peer marketing becomes more important in the electronic marketplace because online businesses only have a virtual presence among billions of other web pages, making it difficult for customers to find Internet cigarette vendors unless they actively search for the sites or are referred to them by friends.

Customized Services

The interactive capabilities of the Internet allow Internet vendors to communicate directly with their customers via email, to tailor these communications precisely to individual customers’ needs, and to obtain relevant information from customers so that vendors can customize their services and serve their customers more effectively in the future (Hoffman et al. 1995). In 2005, approximately 45 percent of Internet cigarette vendors provided register or create-an-account capabilities, which allow vendors to collect information about their customers’ product and ordering preferences and to store this in their databases so that future interactions with the customer can be personalized (Figure M-4). Approximately 40 percent of Internet cigarette vendors also offered mailing lists, which are emailed newsletters announcing upcoming sales or promotions that can be tailored to individual consumers’ product preferences. Approximately 20 percent of Internet cigarette vendors also offer automated shipping programs that enable customers to designate how many cigarettes they want delivered on a regular time schedule. All of these features ease the ordering process for customers and help vendors to build personalized relationships with their customers, which might translate into customer loyalty and retention over time.

Use of Spam Email to Attract Customers to Internet Cigarette Vendor Websites

Internet cigarette vendors can also attract new customers to their site by sending out unsolicited email messages (spam) to a wide range of recipients. This is a relatively inexpensive strategy

since vendors can purchase lists of tens of thousands of email addresses for only hundreds of dollars. A pilot study analyzing cigarette spam emails found that lower prices (99 percent) and tax evasion (43 percent) were most emphasized in the subject line or body of the email message (Potts 2004). Commonly used messages for conveying low cost or tax evasion included phrases such as:

“Stop wasting your money on high priced cigarettes, get your cigarettes at a huge discount!”

or

“I have some very exciting news for you. No longer will you be taxed to death. You can buy premium brand cartons of cigarettes for only \$13.95 a carton. That is \$1.39 a pack for all the top brands.”

Results from this study suggest that Internet cigarette vendors are marketing lower tax-free prices as the main incentive to purchase cigarettes from their sites. Kim and colleagues (2006) found that 46 percent of smokers in their sample reported seeing ads about Internet cigarette sales from mass media sources such as local newspapers or magazines (20.9 percent), spam emails (16.0 percent), banners or pop-up ads (11.2 percent), and Val-U-Pak coupon mailers (11.2 percent) (Kim et al. 2006). Because many of these channels are direct-to-consumer (e.g., spam e-mail, Val-U-Pak coupon mailer), these marketing strategies occur under the public radar and should be monitored. Future studies need to examine the extent of these marketing strategies and how they influence smokers' decisions to purchase cigarettes online.

Extent of Marketing Online by Tobacco Companies

Relative to their aggressive promotions in other venues such as retail outlets, direct mail, and magazines, most of the major U.S. tobacco companies appear to have a fairly restrained approach to utilizing the Internet for promoting or selling their brands. In 2002, the tobacco industry claimed that it spent only \$940,000 on company website-related expenses, which was less than 0.01 percent of its annual \$12.5 billion advertising and promotional expenditures (FTC 2004). Tobacco company websites tend to be neutral in tone and provide factual information about their companies (Figure M-5). For example, the R.J. Reynolds official website has the latest information about its stock prices, whereas the Phillip Morris USA website has detailed information on health issues, responsible marketing, and its policies, including a section on Internet cigarette sales. The industry did not report spending any additional funds on other Internet advertising such as banner ads or direct email marketing in 2002. Tobacco companies appear to have varying levels of involvement in and support for Internet tobacco sales and marketing. Philip Morris appears to be the most critical of Internet sales and has actually filed federal lawsuits against Internet vendors for violating its trademarks (e.g., the Marlboro logo) and illegally selling Marlboros manufactured for export (Beirne 2002). Philip Morris has also lobbied for legislation that would restrict Internet tobacco sales. One reason that it may want to discourage Internet tobacco sales is related to the fact that buyers are very cost conscious and would begin to purchase deep-discount brands, which takes business away from costlier premium brands such as Marlboro (Beirne 2002). Other tobacco companies, however, appear to have a more favorable attitude toward the Internet than the market leader.

In 2004, when Brown & Williamson (B&W) launched its KOOL Mixx hip hop ad campaign, it also included a web component. The House of Menthol website (www.houseofmenthol.com) featured information about the national DJ battle, free software demos, history of hip hop, and lists of retail stores where smokers could purchase the special edition KOOL Mixx cigarette packs (Figure M-6). The website was just one element of the marketing campaign, but as the House of Menthol website illustrates, tobacco companies can use the web to provide more promotional offers and to aggressively build the brand image with content that is engaging and interactive. B&W voluntarily pulled the ad campaign including the website after receiving pressure from attorneys general who threatened to sue claiming that the campaign violated the Master Settlement Agreement because it targeted youth and because it featured merchandise (e.g., a radio) with a cigarette brand name.

Some tobacco companies are using the web to advertise certain brands and to establish a database of smokers. R.J. Reynolds sells Doral cigarettes, a generic brand, on the web at www.smokerswelcome.com (Figure M-7). This site is advertised as “an online community for smokers by smokers” and offers attractive gifts for redeeming Doral pack seals and services such as online bulletin boards that help to engender a sense of community among Doral smokers. Philip Morris operates a similar website, www.smokersignup.com, where smokers can sign up to receive coupons and other promotional offers via postal mail (Figure M-8). As more smokers participate in these direct-marketing programs (Lewis et al. 2004), tobacco control advocates will have to monitor these practices both offline and online and examine how they influence smokers’ attitudes and behaviors. Data from the National Youth Tobacco Survey conducted by the CDC in 2004 showed that 34.1 percent of middle school students and 39.2 percent of high school students reported seeing advertisements for tobacco products on the Internet (CDC 2005). Although Cohen and colleagues (2001) have called for studies to determine the effects of web-based tobacco advertising on the tobacco-related knowledge, attitudes, and behaviors of viewers, to our knowledge there are no published studies on this topic (Cohen et al. 2001).

Threat 3: Youth Access to Cigarettes Via the Web

Will Internet Cigarette Vendors Sell to Underage Youth?

Several recent studies suggest that most Internet cigarette vendors sell to buyers without verifying age. In 2001, Ribisl and colleagues (2003) conducted a purchase survey in which four youth, aged 11–15, purchased cigarettes from 55 Internet cigarette vendors in 12 states. The vendors sold to minors in 76 out of 83 purchase attempts (92 percent overall sales rate). Very little was done to verify the age of the buyers in this purchase survey. Out of 83 money order and credit card purchase attempts, in only nine cases (11 percent) did the vendor request that the buyer submit a copy of a photo ID, the prevailing standard for age verification at retail outlets (Ribisl et al. 2003). Proof of age was not provided for any vendors, but only four of those nine purchases were refused due to lack of ID. Furthermore, although six (10.7 percent) vendors stated on their websites that they verify age at delivery (Ribisl et al. 2002), only one package arrived marked “Adult signature required for delivery.” The package was delivered to a parent while the youth buyer was at school, so there is no way to know whether the delivery person would have verified the age of the recipient if the youth buyer had received the package. More than 85 percent of the deliveries in the study were left at the door without any interaction with

the recipient. Altogether, youth in this study received 1,650 packs of cigarettes from Internet vendors.

A similar study asked college students to attempt to buy cigarettes from 32 Internet cigarette vendors without providing proof of age (Bryant et al. 2002). Of the 28 orders received by the vendor, 20 (71 percent) were filled and 4 orders (14 percent) were rejected because no proof of age was provided. Four orders were never received by the vendors, and four orders remained unfilled for other reasons.

Jensen and colleagues (2004) conducted a youth purchase survey where 30 youths, aged 15 to 16, were instructed to find an Internet cigarette vendor website on their own and to purchase one carton of cigarettes with their parent's credit card (Jensen et al. 2004). This study showed that the youths were able to find Internet cigarette vendors on their own without being provided a list of vendors as our previous studies had done (Ribisl et al. 2003). Of the 30 youth, 29 (96.7 percent) were able to find a tobacco vendor and place an order, usually in under 20 minutes, and 23 (76.7 percent) successfully received their orders, with 91 percent of the packages delivered without requests for proof of age. Most recently, a purchase survey assessing compliance with California's law designed to prevent youth access to cigarettes from Internet vendors found that none of the 101 vendors in the sample verified the age of the buyer in accordance with California law (Williams et al. In press). The results of these purchase surveys suggest that most Internet cigarette vendors do a poor job of preventing cigarette sales to minors.

Are Underage Youth Buying Cigarettes Online?

Several studies have assessed whether youth purchase cigarettes online. In the 2001 National Household Survey on Drug Abuse, 3.3 percent of adolescent smokers aged 12–17 reported buying cigarettes from the Internet in the past 30 days (Office of Applied Studies 2002). A study conducted in 1999–2000 found that, among current smokers under 18 years of age ($n = 1,689$), 2.2 percent reported attempting to purchase cigarettes online (Unger et al. 2001). Those who attempted purchases were younger, smoked more frequently, and reported greater perceived difficulty in obtaining cigarettes from commercial and social sources.

In 2001, 1,323 9th grade smokers in three western New York counties were asked about purchasing cigarettes online: 2.3 percent reported ever having purchased cigarettes online, and 1.7 percent reported buying online in the past 30 days (Abrams et al. 2003). Nearly 9 percent intended to purchase cigarettes online during the next year. Youth who had been refused cigarette sales at retail outlets in the previous month were more than three times as likely to purchase cigarettes online than youth who had successfully purchased cigarettes at a retail outlet in the past month. A follow-up survey in 2005 found that 6.5 percent of 9th grade smokers reported ever having purchased cigarettes online, with 5.2 percent having purchased online in the past 30 days. Youth smokers were 2.6 times more likely to report having purchased cigarettes online in the past 30 days in 2005 than in 2001 (Fix et al. 2006).

Although these results suggest that few teens are currently buying cigarettes on the Internet, the small proportion of youth who do purchase online reported greater difficulty in obtaining cigarettes from retail outlets, suggesting that if retail access becomes sufficiently restricted, more youth might turn to the Internet to obtain cigarettes.

How Can Internet Cigarette Vendors Discourage Youth Buyers?

There are four potential strategies for reducing sales to minors that can be used by Internet cigarette vendors: the posting of minimum age-of-sale warnings, the posting of health warnings, use of parental control filter information, and age verification.

Minimum age-of-sale warnings were featured on the home page of 83.4 percent of Internet cigarette vendor websites in 2005. Most state laws in the United States on youth access to cigarettes in retail stores require that vendors post the minimum age of sale. This same standard should be applied to online vendors, and age warnings should be prominent and immediately visible when the page is accessed. While 83.4 percent of vendors feature age warnings on their home pages, only 26.2 percent of vendors feature them at the top section of a web page that is immediately visible without scrolling when the page is accessed (note: this is when viewed on a monitor with 800 x 600 screen resolution, the prevailing standard for web designers).

Parental control filters (PCFs) are software programs that allow parents to restrict their children's access to inappropriate material on the Internet, such as pornography and violence. Most PCFs automatically filter out sites in which tobacco is the primary focus, but this method is not comprehensive because PCFs rely heavily on website owners to register with them. Prior studies (Center for Media Education 1999; Reagan et al. 2002) have found that PCFs are ineffective at blocking pro-tobacco websites, with the most effective programs blocking 70 percent, and the least effective failing to block any. Regan and colleagues (2002) also noted that PCF programs disagreed on which sites to block, with the highest level of agreement between programs only blocking 21.4 percent of the same sites. Because PCFs are ineffective at blocking access to pro-tobacco websites they should not be relied upon as an effective measure to block youth access to Internet cigarette vendors. They do provide some protection, but are not a stand-alone solution, since most Internet cigarette vendors (97.9 percent) do not register with PCFs and youth might be able to disable PCFs on their own.

Age verification is the most effective strategy for Internet cigarette vendors to reduce sales to minors. There are two main points at which age can and should be verified by vendors to ensure their customers are adults. Age should be verified both at the point of order and at the point of delivery. In retail stores, the point of order and delivery are one and the same, leaving only one point in time for age verification, the standard for which is a face-to-face matching of the customer to a valid driver's license. In online transactions, age should be verified with photo ID before a sale is made, but should also be verified at the point of delivery, since matching the customer to the photo on a driver's license is impractical in online transactions. Unfortunately, few Internet cigarette vendors (11 percent) request that their buyers submit a copy of their photo ID before making a sale, and often those that do will fulfill orders submitted without the requested ID (Ribisl et al. 2003).

While rigorous age verification methods, such as requiring photo ID submission, are uncommon among Internet cigarette vendors, self-age verification methods are more common, such as typing in a birth date (23.3 percent) or stating that by simply submitting an order, the customer is certifying that he or she is of legal age to purchase cigarettes (35.2 percent). These ineffective self-age verification methods (see Figure M-9) are not likely to deter youth buyers, and vendors should be discouraged from relying upon them.

Some vendors (15.2 percent) claim that by only accepting credit cards for payment, they are ensuring their buyers are adults, which assumes that only adults can obtain valid credit cards. However, it is plausible for teens to own their credit cards since vendors such as VisaBuxx market prepaid debit cards specifically for teens to use online. While accepting only credit card pay-

ments may deter most youth who don't have access to a credit card, it should not be relied upon as a method of age verification.

Age verification at delivery is potentially the most effective strategy available to Internet cigarette vendors to reduce sales to minors, since it is the sole face-to-face opportunity for the customer to be matched to a photo ID. Currently, few Internet cigarette vendors verify the age of their customers at delivery. In our youth purchase survey (Ribisl et al. 2003), the age of the youth buyers was not verified at delivery by any vendors. There are several barriers to widespread adoption of age verification at delivery by Internet cigarette vendors, the most significant of which is that currently the only shipping carrier legitimately available to Internet cigarette vendors is the U.S. Postal Service, which does not offer an age verification at delivery service. UPS is the only delivery company in the United States with an age verification at delivery service. In October 2005, however, UPS announced that, like FedEx and DHL, it would no longer ship cigarettes to consumers (Gormley 2005), leaving no age verification at delivery options for Internet cigarette vendors.

Self-Regulation of Internet Cigarette Vendors

The Online Tobacco Retailers Association (OLTRA) is an organization of Internet Cigarette Vendors formed, ostensibly, to "bring a standard of service to the online tobacco industry" (www.oltra.com). OLTRA claims to be a self-regulating organization and state that in addition to providing member benefits such as group purchasing benefits, legal representation, and an "OLTRA Certified Website Seal," all OLTRA member websites adhere to certain business standards, including only accepting customers aged 21 and over, requiring customers to submit a copy of their driver's license prior to order fulfillment, and exclusively using the "UPS adult signature required" shipping method to ensure that tobacco products are not delivered to minors.

OLTRA's claims about its members' self-regulation were tested in a separate compliance survey (Williams 2005). During this purchase survey, which was designed to assess the extent of vendor compliance with California Business and Professions Code § 22963, California's law regulating what Internet cigarette vendors must do to prevent sales to minors, 11 of the 20 member vendors listed on OLTRA's website were included in the randomly selected study sample. Compliance with OLTRA's standards among these member vendors was low. Of the vendors included in the study, only three required that their buyers be 21 and over, two required buyers to submit a copy of their driver's license, and none used UPS age verification at delivery. These results suggest that OLTRA's attempts at self-regulation are ineffective.

POLICY SOLUTIONS AND RECOMMENDATIONS

This final section examines some of the state-level policies in place to address the challenges posed by Internet cigarette sales and concludes with a recommended framework for addressing Internet cigarette sales. An analysis of laws governing Internet and mail order sales of cigarettes in the 50 U.S. states and the District of Columbia identified 33 state laws (Chriqui et al. Under Review). Data were collected as part of the National Cancer Institute's State Cancer Legislative Database system, and this represents the first comprehensive analysis of state laws to prevent tax evasion and youth access from Internet cigarettes sales. Details of the laws are provided in Table M-3. Highlights of this analysis are that 31 states have provisions designed to reduce youth access, 32 states have tax evasion provisions, and 2 states totally ban all Internet and mail order tobacco sales. Details on the number and percentage of states with specific provisions within

these categories are listed in the table and not described here. The two rightmost columns denote whether these specific provisions are recommended in model legislation from the Campaign for Tobacco Free Kids (Lindblom 2005a; Lindblom 2005b; Lindblom 2005c) and Philip Morris.

Effectively regulating Internet cigarette sales is difficult for many reasons (Ribisl 2003), including its supergeographical reach, complexities related to regulation of interstate commerce, tribal sovereignty and overseas vendors, and the fact that case law is still being formed (Banthin 2004). Given these challenges, we propose a framework (see Figure M-10) with multiple strategies that may effectively regulate Internet cigarette sales. The main goal of the Q.U.I.T. (Quarantine of Unhealthy Internet Trade) Framework is to go beyond simply regulating the vendor, and to involve other members of the supply chain starting at the beginning of the distribution process where Internet cigarette vendors (ICVs) first acquire their cigarettes to the final culmination of the sale when consumers receive their cigarette deliveries. In this model, we propose several regulatory strategies that intervene along the sales and delivery process in order to “quarantine” online vendors who are not compliant with existing tobacco tax collection and age verification laws. The vendors are essentially quarantined by disrupting the distribution process, which prevents Internet cigarette vendors from selling their product to consumers. The approach can be applied to other potentially harmful products sold over the Internet, such as firearms, illicit drugs, or child pornography.

One strategy would be to block or regulate the supply of cigarettes to Internet cigarette vendors from tobacco manufacturers, distributors, or retailers (Step 1, Figure M-10). For example, suppliers could be required to sell only to Internet cigarette vendors who are compliant with existing youth access and taxation laws. This strategy requires that tobacco manufacturers, distributors, and retailers keep detailed documentation of their inventories of tobacco products, which shows the route from manufacturer to distributor and retailer. Although some Native American Internet vendors manufacture their own brands of cigarettes, most carry other brands made by the major cigarette manufacturers and thus depend on an outside distributor. Native American cigarette vendors file paperwork when buying cigarettes that allows them to purchase cigarettes without payment of state excise taxes, as long as the cigarettes are for sale to other tribal members. Many tribal vendors claim that their sovereignty rights permit them to sell to anyone from their reservation (where their website is located). New York State has been planning efforts to cut off the supply of tax-free cigarettes to the Seneca nation and other tribes by requiring suppliers to sell cigarettes only where all state taxes are paid. This approach tends to work better when the supplier is based in the United States and may not work as well for cigarettes being shipped from overseas from a vendor that also acquires them overseas.

A second strategy is to block a vendor from hosting its website by seizing the domain name and shutting down the online storefronts of noncompliant Internet vendors (Step 2, Figure M-10). This strategy was employed by UK customs authorities who seized the URLs of websites such as www.cigarettesfromeurope.com for not charging appropriate cigarette taxes to UK customers. Although the reasons were for trademark infringement and other violations, Philip Morris successfully seized the domain name www.yesmoke.com, which now redirects to its corporate website (Dunai 2004). Although Yesmoke migrated its online business to another website address (www.yesmoke.ch), the domain name seizure likely caused significant difficulties for the vendor and some customers may not know of the new website address. Although there are many complexities in the field of domain name law (Moringiello 2004), states have several legal rationales that would allow them to seize the domain name of Internet vendors and perhaps replace the website content with a message of their choosing (Burstein In press).

A third strategy would be to prevent the major payment-processing companies such as Visa, MasterCard, American Express, Diners Club, Discover, or PayPal from approving transactions for Internet cigarette sales (Step 3, Figure M-10). In March 2005, all of the companies listed above reached a landmark voluntary agreement with state attorneys general and the Bureau of Alcohol, Tobacco, Firearms and Explosives to stop processing credit card payment of Internet cigarette orders because Internet vendors were conducting illegal business by not charging appropriate state cigarette excise taxes and not verifying the age of buyers (AP 2005; Tedeschi 2005). The negotiations were led by attorneys general from California, New York, and Oregon, and several other attorneys general also participated.

Restricting credit card payment does not entirely prevent all Internet cigarette sales because vendors can still utilize alternative payment methods such as money orders or personal checks, but nevertheless, according to media reports this policy has already caused scores of Internet vendors to lose business or shut down their operations (Tedeschi 2005). Credit cards are the most commonly used payment method offered by Internet cigarette vendors (Ribisl et al. 2001). The agreement applies to virtually all credit cards and affects websites based in the United States and abroad that sell to U.S. customers. Internet vendors that can document that they comply with all relevant laws will be allowed to accept credit cards under conditions of the agreement.

A fourth strategy would be to regulate delivery services such as the UPS or a postal service such as the U.S. Postal Service. For example, the vendor could be required to ship using a service that verified the age and identity of the buyer at the point of delivery. Moreover, cigarettes could be declared non-mailable matter, and delivery services could be banned from picking up packages of cigarettes from Internet cigarette vendors that appear on a "Do Not Ship" list comprised of vendors that do not comply with existing tax collection or youth access laws (Lindblom 2005c) (Step 4, Figure M-10). These provisions have been proposed as part of two federal legislative bills, the Green-Meehan Internet Tobacco Sales Enforcement Act (H.R. 2824) and the Prevent All Contraband Tobacco Act (PACT ACT, S. 1177), but neither bill has made it to the floor of the U.S. Congress. A spokesperson for UPS opposed any regulation that would require it to refuse packages from Internet tobacco vendors that violated tobacco tax laws (Campaign for Tobacco Free Kids 2005). However, in October 2005, UPS joined shipping carriers DHL and Federal Express involuntarily agreeing to cease shipping cigarettes to consumers (Gormley 2005), leaving the U.S. Postal Service as the only viable shipping option available to Internet cigarette vendors.

The final step in the distribution process would be to educate consumers about their requirement to pay taxes on cigarettes purchased from out-of-state Internet vendors (Step 5, Figure M-10). Although educational efforts might deter some customers from buying cigarettes online, this strategy is onerous because of the difficulty in reaching the nearly 50 million smokers in the United States. Instead, intervening upstream in the distribution process with several major manufacturers, distributors, Internet service providers, payment processing companies, or delivery companies can probably have greater impact than individually focused educational efforts.

In conclusion, the goal of the Q.U.I.T. framework is to disrupt one or more steps in the distribution channel that occur between the time cigarettes are manufactured and when they are delivered to the door of the smoker. The idea is that regulating vendors is not enough—so far, the overwhelming majority of Internet vendors have violated one or more laws designed to require tax reporting, prevent cigarette sales to minors, or ban the sale of imported duty-free cigarettes. Therefore, the focus is upon entities that do business with the Internet vendor. The goal is to prevent the noncompliant vendor from hosting a website, receiving payment from credit card com-

panies, and shipping its product to customers. There are weaknesses in any one approach; however, it is likely that the combination of strategies will be effective. Addressing the problems posed by Internet cigarette sales will require a collaborative effort among public health researchers, tobacco control advocates, state departments of revenue, attorneys general, policy makers, and legislators. Policies are needed that require Internet cigarette vendors to comply with the same provisions as brick-and-mortar retail vendors by charging appropriate state and local cigarette excise taxes and verifying the age of buyers. Until such policies are in place, online cigarette sales will undermine the public health benefit of raising cigarette prices.

FINAL RECOMMENDATION

For all Internet, mail order, and delivery tobacco sales, federal legislation is needed to ensure that customer ages and identities are verified at both the point of ordering and the point of delivery and that appropriate local, state, and federal taxes are collected. This legislation should include strong federal penalties for noncompliance while permitting state governments to have enforcement authority and the ability to pass stricter laws. The legislation should be written to effectively regulate the sales practices of tobacco vendors shipping to U.S. customers regardless of their physical location (i.e., vendors located on tribal lands or outside the United States). Moreover, all Internet and mail order vendors should be licensed at the federal level by an organization such as the Bureau of Alcohol, Tobacco, Firearms and Explosives. Vendors that violate youth access and tax laws should be placed on a do-not-ship list, and delivery services should not be allowed to transport their products.

TABLE M-1 Country and Region Locations of Internet Cigarette Vendor Websites, January 2005

Country	N=775 <i>Number (%)</i>
United States	323 (41.7)
Switzerland	118 (15.2)
International (outside the U.S., country not specified)	86 (11.1)
Europe (country not specified)	59 (7.6)
Spain	17 (2.2)
Panama	16 (2.1)
Indonesia	11 (1.4)
United Kingdom	6 (0.8)
Gibraltar	5 (0.7)
Asia	4 (0.5)
South Africa	4 (0.5)
Virgin Islands	3 (0.4)
Andorra	2 (0.3)
Canada	2 (0.3)
Russia	2 (0.3)
Other*	12 (1.5)
Location could not be determined	105 (13.5)

*Other category includes one vendor located in each of the following countries: Belize, Bulgaria, Dominican Republic, Germany, Mauritius, Malaysia, Netherlands, New Zealand, Romania, and Zimbabwe.

TABLE M-2 Sales and Marketing Practices of Internet Cigarette Vendor Websites, January 2005

N=664	
Number (%)	
Types of tobacco products sold	
Cigarettes	
Premium/value/discount brands	770 (99.3)
Duty-free	189 (28.5)
Clove	151 (22.7)
Bidis	10 (1.5)
Herbal	21 (3.2)
Cigars	280 (42.2)
Smokeless tobacco	186 (28.0)
Loose tobacco	153 (23.0)
Tobacco paraphernalia	128 (19.3)
Other tobacco-related products	49 (7.4)
Number of cigarette brands sold*	
1-20	158 (23.8)
21-40	217 (32.7)
41-60	145 (21.8)
61+	144 (21.7)
Non-tobacco products	82 (12.3)
Price-related promotions	
Reduced price special	211 (31.8)
Tax-free prices advertised	253 (38.1)
Gift with purchase	15 (2.3)
Multi-pack special	58 (8.7)
Special contest	26 (3.9)
Peer-to-peer promotions	
Refer-a-friend	200 (30.1)
Add to favorites/link to us	111 (16.7)
Wish list	26 (3.9)
Customer testimonials	77 (11.6)
List of most popular/top selling cigarettes	188 (28.3)
Customized services	
Register/create an account	295 (44.4)
Mailing list	269 (40.5)
Automated shipping program	121 (18.2)
Other promotions [^]	47 (7.1)

* Number of cigarette brands ranged from 1 to 107.

[^] Examples of other promotions include: free samples of cigarettes and continuity programs.

TABLE M-3 Summary of the Components of State Cigarette Delivery Sales Laws^a by Area of Emphasis (as of December 31, 2005)

Component Description	Number of States	% states with laws (N=33)	% all states ^b (N=51)	PM ^c Model Provision	CTFK ^d Model Provision
Preventing Youth Access to Cigarettes	25	76	49	Yes	Yes
Age/ID verification of purchaser	25	76	49	Yes	Yes
Required one time/first purchase only	11	33	22	Yes	No
Required at all times/every sale	13	39	26	No	Yes
Types of Age/ID Verification	22	67	43	Yes	Yes
Requires customer attestation only	4	12	8	No	No
Requires any 2: customer attestation, check govt. ID, or check age and/or ID against commercial database of government ID's	16	49	31	Yes	No
Requires all 3: customer attestation, check govt. ID, and check age/ID against commercial database of government ID's	4	12	8	No	Yes
Vendor required to use carrier that will:	19	58	37	Yes	Yes
Verify purchaser ID at delivery time	18	55	35	Yes	Yes
Obtain adult signature	16	49	31	Yes	Yes
Delivery only to address on ID	6	18	12	No	Yes
Preventing Tax Evasion	30	91	59	Yes	Yes
Requires delivery sales vendors to be licensed ^e	23	70	45	Yes	Yes
Sale considered delivery sale regardless of seller location (i.e., outside/inside state or tribal)	17	52	33	Yes	Yes
Registration and reporting requirements and/or Jenkins Act (15 U.S.C. 326) compliance	22	67	43	Yes	Yes
Tax collection and remittance requirements	21	64	41	Yes	Yes
Preventing Youth Access and Tax	31	94	61	Yes	Yes

^a For this analysis, "laws" was defined to include statutes, administrative rules and regulations, and case law, as appropriate.

^b "All states" includes the 50 states and the District of Columbia.

^c PM=Philip Morris model law provision (Rubin et al. 2001).

^d CTFK=Campaign for Tobacco-Free Kids model law provisions (Lindblom 2005a; Lindblom 2005b; Philip Morris USA 2003).

^e Vendor licensure provisions were captured if specifically referenced in the delivery sales statutes. In other words, a state received credit for requiring delivery sales vendors to be licensed if they explicitly stated this requirement in the delivery sales law OR indicated that delivery sales vendors must comply with existing licensure provisions.

Component Description	Number of States	% states with laws (N=33)	% all states ^b (N=51)	PM ^c Model Provision	CTFK ^d Model Provision
Evasion					
Ban shipping/delivery of cigarettes directly to consumers	4	12	8	No	Yes
Requires adherence to do not ship to list	4	12	8	No	Yes
Requires customer prior notification/disclosure	15	46	29	No	Yes
Payment Issues					
Required Payment Types	19	58	37	Yes	Yes
Credit card, debit card, OR check	11	33	22	Yes	No
Credit or debit card	4	12	8	No	Yes
Check or credit card	4	12	8	No	No
Payment type (credit card, debit card, or check) must be in buyer's name	15	46	29	Yes	Yes
Credit/debit card billing address must match shipping address/government identification, and/or database address	2	6	4	No	No
"Tobacco product" language to be printed on credit card statement	1	3	2	No	Yes
Vendor to provide carrier with evidence of compliance with:	11	33	22	Yes	Yes
Licensure requirements	2	6	4	No	Yes
Tax collection/remittance provisions	10	30	20	Yes	No
Shipping document and/or packaging requirements	28	85	55	Yes	Yes
Specify tobacco product content	27	82	53	Yes	Yes
Specify minimum age of sale language	18	55	35	Yes	Yes
Specify tax collection/remittance obligation	18	55	35	Yes	Yes
Product quantity order/shipping restrictions	4	12	8	No	Yes
Specifies minimum amount	1	3	2	No	No
Specifies maximum amount	3	9	6	No	Yes
Penalties and Enforcement					
Penalty Provisions	31	94	61	Yes	Yes
Penalties to Vendor	31	94	61	Yes	Yes
Penalties to Carrier	11	33	22	No	Yes
Penalties to Purchaser	13	39	26	Yes	Yes
Enforcement provisions and authority	24	73	47	Yes	Yes

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Media Campaigns and Tobacco Control

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OVERVIEW

Media-based efforts to promote non-use of tobacco products have become an increasingly prominent feature of the tobacco control landscape over the past decade, with aggressive and well-funded efforts having taken place under the auspices of the American Legacy Foundation as well as in California, Massachusetts, and Florida, among other states. These campaigns typically make considerable use of highly visible and dramatic advertising in television and other media. They are sometimes referred to as “counter-advertising,” because such campaigns are seen in the public health community as efforts to provide even a modest counterweight to the very extensive marketing efforts of tobacco companies in the United States, which spent \$8.24 billion on advertising and promotion in 1999 (FTC 2001). It should be noted that, like tobacco company marketing efforts, such campaigns often are not confined to the use of advertising, but also involve a wide range of educational, promotional, and social marketing activities in a comprehensive program.

In this appendix, we briefly review highlights of laboratory and field research concerning effects of media and advertising efforts to influence tobacco-related attitudes and behavior (see Agostinelli and Grube 2002; Friend and Levy 2002; and Wakefield et al. 2003b for more detailed reviews). We focus in particular on evaluations of the recent major efforts by Massachusetts, Florida, and California (because these states had the most ambitious and the best-evaluated media efforts), and on the national efforts of the American Legacy Foundation. Based on such evaluations and on meta-analytic work previously published, we suggest effect size ranges that might be anticipated from appropriate national campaign efforts, as well as noting the particular concerns and obstacles associated with successful implementation of such efforts. Issues regarding media campaigns and smoking cessation are addressed briefly at the end of this section.

It should be noted that the different authorities cited report effect sizes in one of two ways: as absolute percent change or as relative percent change. For example, a change from 20 percent youth smoking prevalence to 18 percent prevalence would be described as a 2 percent change effect size. Others would instead report this effect size as a 10 percent reduction in prevalence. This is referred to as relative percent change.

EVALUATIONS OF RECENT MAJOR MEDIA-BASED EFFORTS

California

In 1988, California passed a citizen-supported initiative to raise cigarette taxes and use funds to support a comprehensive tobacco control initiative. Funds for the program fluctuated between

\$54 million and \$140.7 million over the next 10 years depending largely on the extent of political support from the governor and the legislature (Independent Evaluation Consortium 2001; Pierce et al. 1998b). An ambitious media campaign began in 1990 that addressed secondhand smoke issues, youth prevention (largely through ads critical of the tobacco industry), and smoking cessation (Independent Evaluation Consortium 2001); only a minority of media expenditures were directed at youth.

Evaluations of the California effort suggested that the campaign had an impact on smoking prevalence in the first 3 years of the effort. Adult smoking prevalence dropped from 22.7 percent to 18 percent from 1989 to 1993, a rate of decline that was about double that of the United States as a whole (Pierce et al. 1998b). According to Friend and Levy (Friend and Levy 2002), similar effect estimates were based on analyses by the Centers for Disease Control and Prevention (CDC 1996). Subsequently, prevalence rates flattened, with no evidence of declines, suggesting that the effects occurred in the first 4 years of the campaign or that the effects were dampened due to reductions in expenditures by California.

Complicating the overall picture, based on self-reported exposure to the campaign, several studies did not find clear evidence for reductions in prevalence associated with campaign exposure (Pierce et al. 1998a; Popham et al. 1994), although another study suggested that the media campaign influenced decisions to quit smoking in California (Popham et al. 1993). It also should be noted that this California campaign was not primarily youth-focused, in contrast to the Massachusetts and Florida efforts (see below).

Massachusetts

Massachusetts has been engaged in an ambitious tobacco control program since January 1993, which includes increased taxes that have been used to fund an extensive paid media campaign. Amounts available for these efforts were as high as \$43 million in 1995, but have declined since. Strong population-based evidence exists for the effectiveness of this comprehensive effort in reducing adult smoking prevalence (Biener et al. 2000). Media efforts included television, radio, and billboard antismoking advertising, directed primarily at youth. The effectiveness of the media component of this effort was evaluated based on a 4-year longitudinal panel survey of 592 youth (ages 12–15 years at baseline), conducted from 1993 to 1997. Campaign impact was assessed by measuring recall of campaign advertising and comparing progression to established smoking among nonsmoking youth who recalled campaign advertisements to those who did not. A variety of control variables were applied, including parental smoking at home, hours of television watched, and so forth. Results suggested that younger adolescents (ages 12–13 years) reporting exposure to television advertisements at baseline were only about half as likely to progress to regular smoking as were the unexposed (odds ratio [OR] = .49, $p < .05$). No such differences were found for older adolescents (OR = .94) and no effects of radio or billboard exposure were found for either group (Biener and Siegel 2000).

Limitations of this study include the limited control over possible variables that might be confounded with exposure at baseline. Moreover, measures of campaign message recall or recognition are inherently subject to problems of endogeneity, in which propensity to attend to and recall such messages may be related—positively or negatively—to a possible interest in smoking (Slater 2004). However, the prospective design, lack of consistency of results for older versus younger adolescents, and lack of evidence for effects due to susceptibility differences or differential attrition argue against attributing results to confounding relationships. It should also be noted that the effects of the campaign on adults, as opposed to youth only, are not assessed in

this analysis. Friend and Levy (2002) also reexamined these data, adjusting for price effects, and estimated a 6 percent (relative percent) change effect size attributable to this campaign (Friend and Levy 2002).

Further evidence for the impact of antismoking advertising in Massachusetts is provided in a quasi-experimental evaluation of advertisements directed against light cigarettes (Kozlowski et al. 2000). Randomly sampled respondents in Massachusetts ($n = 500$) were less likely than respondents from elsewhere in the United States ($n = 501$) to believe that “light” cigarettes might reduce the risks of health problems (32 percent versus 49 percent, $p < .05$). Within Massachusetts, smokers who reported having seen the ads were less likely to believe that “light” cigarettes decreased health risks (26 percent for exposed versus 44 percent for unexposed smokers, $p < .05$). The advertising also appeared effective in increasing knowledge concerning filter vents. Behavioral or sales data are not reported.

Florida

Florida initiated its \$25 million “truth” campaign in 1998, a campaign that, at first, focused on attacking the tobacco industry but was later obliged to refocus message strategies (Zucker et al. 2000). It should be emphasized that the “truth” campaign not only was an industry attack effort, but also can be understood as a campaign that endeavored to provide youth with a distinctive attitude of independence and control with respect to smoking and tobacco products. The so-called “truth” brand is designed to appeal to “edgy,” trend-setting youth who are influential with their peers and who also may be at risk for smoking (Farrelly et al. 2002). Smoking rates after the first year dropped from 18.5 percent to 15 percent among middle school youth, and from 27.4 percent to 25.2 percent among high school students, based on independently-collected data from Monitoring the Future (Friend and Levy 2002). Friend and Levy (2002) calculate the overall decline in youth prevalence to be a 5 percent (relative percent) change (Friend and Levy 2002).

Evidence also supports dose–response effects as estimated from advertisement recognition self-reports ($n = 1820$) (Sly et al. 2001a; Sly et al. 2001b). It appears that smoking rates remained lower among Florida youth than among youth nationally in the 2001–2002 school year (excluding youth from states with similar comprehensive tobacco control efforts), and that abstention from smoking was well predicted by awareness of the “truth” campaign whereas these rates were comparable prior to the campaign effort (Niederdeppe et al. 2004). It does not appear that possible confounding effects of tax and price changes in states under study were controlled in analyses of results, however, somewhat decreasing confidence in the precision of these results. Evaluators argue that the sizes of the Florida prevalence declines were too great to be attributable to the price increase, especially in 1998, the first year of the campaign (Farrelly et al. 2002).

National truth® Campaign

The American Legacy Foundation launched a national antismoking advertising effort, an extension of the “truth” campaign described above, in February 2002. An initial evaluation was conducted using nationally representative samples of adolescents, with a baseline pretest survey ($n = 6,897$) and a follow-up survey ($n = 10,692$) 10 months into the campaign (Farrelly et al. 2002). Results suggested statistically significant shifts in attitudes opposed to smoking and decreases in attention to smoke. Dose–response analyses indicated that greater self-reported recognition of truth® campaign advertising was associated with greater agreement with critical statements about cigarette companies, with an interest in taking a stand against smoking, and with the statement that not smoking was a way to express independence. Recognition of the so-called

truth advertisements was negatively related to agreement that smoking helped young people look cool or fit in (all $p < .05$ or better). Dose–response effects on intentions to smoke were in the predicted direction but were only marginally significant ($p < .10$).

This study also examined the impact of Phillip Morris USA’s “Think. Don’t Smoke” campaign, which began in 1998. Unsurprisingly, this campaign did not negatively impact perceptions of the tobacco industry and in some cases improved such perceptions. Exposure to the “Think. Don’t Smoke” advertisements was associated with agreement that not smoking was a way to express independence. However, the greater the self-reported exposure to the “Think. Don’t Smoke” campaign, the greater was the intention to smoke in the next year ($p < .02$). From a methodological perspective, using the same method (self-reported recognition of television anti-smoking advertising) and finding opposite results with two campaigns reduce concerns that such self-reporting might be confounded with preexisting attitudes or behavior about tobacco use.

A subsequent study provides more compelling evidence of the impact of the national truth® campaign on youth smoking (Farrelly et al. 2005). Unlike evaluation studies described above, this study examines actual variability in exposure to the ads that can occur in each major media market. Variability is substantial because the truth® campaign places its ads on cable channels. Cable penetration, or the number of households in which cable is viewed, varies substantially between markets in the United States. To the extent that variables that might influence both cable penetration and youth smoking prevalence can be controlled, differences in youth smoking prevalence by market that can be associated with market-level exposure differences can be especially persuasive. Such estimates are an excellent complement to other study designs because they are not dependent on self-reported exposure and thus they are not subject to possible confounding due to propensity to pay attention to and recall antismoking advertising because of existing attitudes and smoking-related behavior.

Results, utilizing multilevel modeling and national data ($n = 50,000$) from the Monitoring the Future study of adolescent substance use, indicated a significant relationship at the media market level, in which media markets receiving greater doses of the truth® campaign had at aggregate levels less smoking prevalence than markets receiving smaller doses of the campaign. Additional analyses were conducted to estimate effect size on youth smoking prevalence after accounting for other influences such as price on changes in prevalence. These estimates suggested that, of the 7.8 percent change in youth smoking prevalence between 2000 and 2002 (from 25.8 percent to 18 percent), an absolute percent change of 1.64 percent (or a relative percent of about 6 percent) could be attributed to the national truth® campaign. It is also likely that this analysis produced a conservative effect size estimate, because individual variability in exposure to campaign messages was ignored in this design in favor of market-level variability in advertising intensity.

One possible concern with the Farrelly and colleagues (2005) evaluation is the close relationship of the evaluators to the truth® campaign (Farrelly et al. 2005). Another regards limitations on the assessment of exogenous factors and other issues affecting the nature of the relationship between market-level exposure differences and effects. These limitations have been in many respects addressed in recent evaluations of state-sponsored anti-tobacco advertising efforts (Emery et al. 2005). This research used a similar multi-level approach, examining market-level differences in expected exposure to anti-tobacco advertising rather than individual self-reports of exposure, and associating this with *Monitoring the Future* data. An innovative element of this research was the inclusion of controls for expected exposure to tobacco-related advertising as well as other tobacco control policies. Significant effects for exposure to state-sponsored anti-tobacco ads were found on probability of being a smoker (OR = .74, 95 percent confidence interval [CI]

= .63–.88). Wakefield and colleagues (2003a) used this same approach to analyzing effects of industry-sponsored youth antismoking ads (Wakefield et al. 2003a). Consistent with the results discussed earlier, this research found no evidence for the impact of these ads in reducing youth smoking or related variables, and there was evidence among 10th–12th graders for increased likelihood of smoking and smoking intentions as well as and reduced perceived harm as a function of exposure to industry-sponsored antismoking ads.

Possible Additional Beneficial Effects of Media Campaigns for Tobacco Control Efforts

This effect size estimate focuses on effects of a campaign on youth uptake. These, in some respects, may underestimate the utility of such campaigns for tobacco control efforts. For example, impact on uptake among young adults typically is not measured. There is also evidence that such campaigns may encourage cessation attempts among adult smokers (Netemeyer et al. 2005). Such effects are not incorporated in these estimates.

In addition, the visibility of such campaigns is likely to maintain or increase the salience of tobacco control as a public priority—a phenomenon known as agenda setting (McLeod et al. 1991). Such salience is typically a necessary prerequisite for the willingness of public officials to pursue tobacco control policies in legislation, regulation, and enforcement. The possible impact of media campaigns on the public opinion climate for tobacco control policy has largely been unresearched and is not accounted for in the estimates made here.

EFFECTS OF ALTERNATIVE MESSAGE AND DELIVERY STRATEGIES: EVIDENCE FROM CONTROLLED EXPERIMENTS AND FIELD STUDIES

Message Strategies

Several studies have examined the effectiveness of alternative message strategies for anti-smoking efforts (see Agostinelli and Grube 2003; Kelder et al. 2002; Pechmann and Reibling 2000 for reviews, including discussion of possible psychological mechanisms for the effects of antismoking advertisements). For example, a field study using panel data ($n = 618$) from Massachusetts found evidence supporting the use of strong negative emotion over normative influence or humor messages (Biener et al. 2004). In a controlled lab study ($n = 1,667$) conducted in secondary schools in California, results indicated that message themes associated with endangering others, the negative life circumstances of smokers, and refusal skills outperformed control messages with respect to post-test smoking intentions. Messages about health consequences of smoking, about the tobacco industry's marketing tactics and how it profits from a product that causes disease and death, and about the cosmetic effects of smoking were not significantly different from controls, although all tended in the desired direction (Pechmann and Reibling 2006). Another study by the same group conducted in California ($n = 2,194$) found that ads of the type used by the Massachusetts campaign that focused on true stories of the negative impact of smoking reduced intent to smoke 35 percent. Effects of advertisements that focused on criticism of the tobacco industry did not have a statistically significant effect on intention to smoke (Pechmann and Reibling 2006). The authors attributed their findings to possible wear out of the industry criticism strategy among California youth in the study, as well as the novelty and effectiveness of the ads portraying true stories of negative impacts.

Such experiments that compare strategy effectiveness should be interpreted with caution. While in principle they test strategies against one another, in practice they must test selected examples of those strategies. Differences in executional quality may substantially influence results. Moreover, controlled experimental tests, while relatively rigorous, also exclude the social influence processes of discussion among youth that might have a substantial impact on reception of advertisements. In any case, given the above findings and the professional wisdom in the advertising community concerning wear out of a given advertising strategy, it is likely that ongoing campaign efforts would be well advised to explore at least several strategies. A given strategy may lose its novelty and effectiveness over time and need to be replaced, perhaps to be returned to in somewhat different ways in a few years.

There is also some evidence regarding ineffective strategies. As Green and colleagues (2002) point out, portraying tobacco use as attractive but not permitted (known in psychology as a “forbidden fruit” strategy) may be likely to make smoking seem more rather than less desirable (Cummings and Clarke 1998; Green et al. 2002; Malone et al. 2002). Green and colleagues (2002) suggest this might be an explanation for boomerang effects found by Farrelly and colleagues (2002) in the Philip Morris “Think. Don’t Smoke” campaign, and might be anticipated as a consequence of Lorillard’s “Tobacco Is Whacko If You Are a Teen” campaign (Farrelly et al. 2002).

It is encouraging that several strategies appear to have shown effectiveness, given that advertisements critical of the industry have come under considerable legal and political pressure (Healton 2001). However, there is no guarantee that any antismoking campaign will show comparable effects. Each of the major strategies reported above was developed after extensive formative research and message testing. Moreover, there are antismoking campaigns in the literature that show no evidence of impact, although often these involve rather brief or low-intensity efforts. As noted above, findings by Farrelly and Colleagues (2002) suggest that a high production quality, nationally-distributed, paid campaign (produced by Phillip Morris) failed to show any evidence of positive effects and indeed appeared to have increased intentions to smoke, underscoring the dependence of campaigns on well-conceived, well-executed, and well-tested strategies (Farrelly et al. 2002). Any assumptions about positive effects of such initiatives must assume comparable care and skill in development and implementation. Uncertainties about successful implementation include effects of political and legal pressures constraining advertising content, such as pressures that have precluded the use of ads critical of the tobacco industry in several campaigns or that, as in Arizona, have limited expenditures on the campaign (Bialous and Glantz 1997).

Delivery in Conjunction with School-Based Prevention Efforts

The foregoing discussion has focused on the independent effects of media campaigns, particularly using television advertising. Many of these efforts have taken place in conjunction with various school- and community-based intervention activities, including school prevention curricula. Several studies have provided evidence suggesting that there can be a synergistic effect of school-based media and media advertising or other media messaging (Flynn et al. 1992; Flynn et al. 1994; Perry et al. 1992); there is also evidence suggesting that such effects can be additive at least in the cases of alcohol and marijuana, with school and local community media efforts influencing prevalence above and beyond the effects of school prevention curricula (Slater 2004). Such strategies remain options for states and communities in conjunction with state or national media efforts.

ESTIMATING EFFECT SIZES IN THE ABSENCE OF RANDOMIZED, CONTROLLED TRIALS

Randomly controlled trials (RCTs) are generally not feasible in these national and regional efforts. It is more costly to buy advertising for individual markets in random assignment than to do a national media buy; therefore, the costs of a fully deployed RCT would be comparable to a national media effort. Moreover, such an RCT would demonstrate in principle the effectiveness of antismoking advertising but would not necessarily result in a campaign that then can be rolled out to a full national population. By the time the RCT is completed, it would be necessary to revise ads anyway given changes in youth culture (clothes, music, visual style, etc.). An RCT is highly desirable to demonstrate the effectiveness of an intervention strategy in the absence of strong evidence of effectiveness. In the presence of such evidence, it may be hard to justify the costs of an RCT and the delay in providing intervention approaches with good evidence of impact.

Strengths of the evidence in favor of the effectiveness of these media campaigns involve triangulated results—the consistency of results across different analytic and evaluation design strategies, different advertising executions and strategies, and implementation in multiple locations. As cited above, there are a variety of quasi-experimental studies comparing behavioral outcomes, dose–response studies looking at the relationship between self-reported exposure to the campaign and behavior or behavioral intent, and market-level studies associating media markets that give greater exposure to antismoking campaigns but lower levels to smoking among youth. One type of study that is feasible, but has not yet been conducted, which would further reinforce such triangulation, would be a controlled quasi-experimental test in only a few markets, using a crossover design rather than a large number of community replicates to control for community differences (Palmgreen et al. 2001).

Many field studies have been conducted, several state-wide and others on a community-wide or regional basis, in addition to the major campaigns discussed above. Most of those on which adequate evaluation data are available have been incorporated in a major meta-analysis of media behavior change campaign effects by Snyder and colleagues (2004). This meta-analysis incorporates a total of 17 studies relative to smoking with a total (n) of almost 80,000; 13 of the studies, with a total (n) of more than 75,000, include change data (Snyder et al. 2004).

The Snyder and colleagues (2004) estimate of 6 percent absolute change effect size for prevention campaigns (4 percent for smoking cessation campaigns) is somewhat higher than the major studies described above (only California data, from the campaigns described above, were included in this meta-analysis, representing one of the studies and less than 15 percent of the total (n) (Snyder et al. 2004). As with any meta-analysis, this effect size may be inflated due to ineffective campaigns that remain unpublished. Moreover, these data also include smaller, controlled trials that are likely to be relatively more intensive, less subject to measurement error, and to show larger effect sizes than one finds in field evaluations. These effect sizes are for the duration of a campaign and are not annualized.

Friend and Levy (2002) estimate a 6 percent relative effect for a major, highly publicized youth prevention media effort, consistent with findings for the American Legacy Foundation truth® campaign (Farrelly et al. 2005) and with several of the regional studies mentioned above (Friend and Levy 2002). It would seem therefore that such an effect size estimate for continuing national campaigns that adapt proven strategies, utilize appropriate development and testing strategies for youth tobacco use prevention (Pechmann and Reibling 2000), and are funded well

enough to provide substantial levels of exposure (e.g., equivalent to or greater than that achieved by the recent national truth campaign effort) is reasonable.

However, effects over an extended period are hard to estimate. Campaigns gain increased awareness and penetration over time, but the youth most prone to influence may be reached early. Youth may also habituate to messages, and the effectiveness of given strategies may wane unless they are skillfully revised and updated. Impact on the most receptive youth in a cohort and campaign novelty may mean that effects tend to be stronger in the first year or two. However, the usual target ages of 12–16 years means that the cohort is replaced every 5 years, reducing the impact of habituation and an increasingly resistant core of smoking-susceptible youth. Perhaps a cycle of reduced effect in years 3 to 5 of an effort, followed by a return to greater effectiveness with a new cohort of younger teens might be a reasonable hypothesis, but few or no hard data exist with respect to this issue. It also may be that what continued media efforts do is sustain reductions after the initial impact of a campaign, slight, continued increments may be possible, but the primary effect of continuing is preventing movement of prevalence back to original levels. (Levy and Friend 2002).

In projecting the effects of continued media efforts, a 6 percent relative effect would decrease youth prevalence from 18 percent presently to about 17 percent. Conversely, the removal of national and major statewide media efforts would likely negate within a few years the approximately 2 percent absolute prevalence decrease that appears reasonably and conservatively attributable to the antismoking media efforts conducted to date. Clearly, use of evaluation designs that track effects in more detail over time, involving strategies such as rolling cross-sections and time-series analyses, would help inform such estimates (Hornik 2002; Palmgreen et al. 2001; Slater 2004). In the absence of such data, it seems both reasonable and conservative to assume a difference in youth prevalence in absolute numbers of at least 3 percent (17 percent to 20 percent). It is also quite possible that the absence of major media efforts, given the continued relative visibility of tobacco marketing efforts, might lead over time to continued erosion of recent tobacco control gains among youth. Such effects, however, are difficult to quantify with confidence. Finally, these assessments do not include effects of the campaigns on adult uptake or on encouraging adult cessation (either directly through campaign efforts targeting cessation, or indirectly as a result of exposure to prevention-oriented messages).

Media campaign effect sizes are modest. At the same time, it should be recalled that these interventions are assessed against an entire population and that these effects are found not merely in controlled test studies, but also in state-wide and national implementations. Therefore, such interventions may be quite cost-effective. In state campaigns described above, per capita costs per year varied from \$0.50 to about \$2.00 (Friend and Levy 2002). Costs per capita for the truth® campaign ranged from \$1.54 to \$2.92, depending on the year (information provided by the American Legacy Foundation). Moreover, if, as these estimates suggest, the absence of ongoing national or statewide media campaigns would mean about a 3 percent absolute difference in youth prevalence relative to continuing such efforts, then that would represent almost an 18 percent relative increase in youth prevalence relative to what would be anticipated with continuing media efforts.

At the same time, it must be emphasized again that a media campaign is not a vaccine. Campaign effectiveness, as discussed above, is highly dependent on conceptualization, testing, and execution as well as adequate funding to achieve necessary levels of audience exposure (Hornik 2002). Effects of a national effort may be considerably better or worse than our estimates depending on these factors, and boomerang effects of such campaigns are possible (Hornik et al.

2001; Pechmann and Slater 2005). Uncertainties would be minimized if the effort is directed by organizations and associated advertising agencies, with an empirical record of successful impact on youth smoking behavior via media efforts and with a policy commitment toward appropriate development, testing, support for adequate levels of exposure, and careful evaluation.

MEDIA AND SMOKING CESSATION

With the exception of the California campaign, the recent major media-based tobacco control efforts have not focused on encouraging smoking cessation efforts. As noted above, there was some evidence for the impact of the California smoking cessation campaign (Popham et al. 1993). Snyder and colleagues (2004) found an absolute effect size of 4 percent for such campaign. Again, the Snyder and colleagues (2004) meta-analysis included controlled studies that may have increased effect sizes relative to what might be found in large-scale field evaluations (Snyder et al. 2004). The outcome measures for what constituted cessation or cessation attempts also varied between studies. Nonetheless, these are encouraging findings, especially given the point made elsewhere in this report regarding the potential of smoking cessation programs and the importance of increasing quit attempts in order to realize this potential, especially if cessation programs are made less expensive and more widely available.

Given that the available data on smoking cessation media campaigns are less complete than those for youth prevention efforts, it may be premature to recommend a national, large-scale media campaign. The Snyder and colleagues (2004) meta-analysis suggested that cessation campaign effects were about two-thirds the size of prevention campaign effects on uptake (Snyder et al. 2004). However, many of the studies included in this meta-analysis were conducted prior to the availability of more recently developed cessation technologies and generally did not also increase access to these technologies. The combination of increased access and increased marketing has substantial potential, as noted in the appendix on smoking cessation. The potential is such that large-scale trials, supported either by states or by the National Institutes of Health, would be worthwhile as the basis for such a recommendation for national cessation media and social marketing efforts in the not-too-distant future.

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Advocacy as a Tobacco Control Strategy

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Public advocacy for a tobacco-free society has been a national tobacco control strategy in the United States for the past 15 years. This appendix discusses the rise of advocacy as a public health intervention strategy to reduce tobacco use and assesses the evidence that may indicate whether advocacy should be considered a best practice for tobacco control. This review is not a formal meta-evaluation, for there are too few studies that directly link advocacy to decreases in tobacco-related morbidity or mortality or tobacco use prevalence. It is, instead, an attempt to guarantee that when we review the formal evidence that links various tobacco control policies that are now considered “best practices” to changes in prevalence and consumption, we recognize that such policy changes were achieved only through advocacy by state tobacco control coalitions and the thousands of citizens that made those policy changes possible.

RISE OF COMMUNITY LEVEL INTERVENTIONS TO CONTROL TOBACCO

During the early days of tobacco use prevention, after the publication of the 1964 Surgeon General’s Report linking smoking to health problems (Public Health Service 1964), many state health departments relied on funds in state budgets for tobacco control and treatment. Interventions tended to be targeted toward smoking cessation for individuals. However, by the late 1980s, beginning with California and then expanding to all states, funding for comprehensive state tobacco control programs increased. With this funding came a shift from individual tobacco control interventions toward population-based interventions to alter the social and environmental conditions that contribute to tobacco use (Stillman et al. 1999). From the beginning, policy advocacy was an integral part of these comprehensive tobacco control programs, and as state programs matured, it became an increasingly important focus of state tobacco control efforts. Community-level interventions may seem the norm to many tobacco control veterans today but they were not the norm just 15 years ago and the effort to support them in many state and federal programs today is still a difficult task. The complexity of interactions within communities, the political realities, and the resource demands of such programs make them costly to support.

EVOLUTION OF COMPREHENSIVE STATE TOBACCO CONTROL PROGRAMS

California launched the first statewide comprehensive tobacco control program in 1988 using funds from Proposition 99, the law that devoted 20 percent of an increase in state tobacco taxes to tobacco control programs (Bal 1998; Glantz and Balbach 2000). At that time, the National Cancer Institute (NCI) was already preparing to launch the 7 year national American Stop Smok-

ing Intervention Study (ASSIST). In 1991, the ASSIST program funded community-level interventions to prevent tobacco use in 17 states.

By the mid-1990s, every state in the United States had some funding for comprehensive tobacco control either from ASSIST or from the Centers for Disease Control and Prevention (CDC) Office of Smoking and Health's (OSH) Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program. Additional funding for tobacco control was available for some states, from 1994 to 2000, from the Robert Wood Johnson Foundation's (RWJF) SmokeLess States (SSI) program (Gerlach and Larkin 2005; Tauras et al. 2005). In addition to educational and cessation programs, the funds from all three of these national programs—ASSIST, IMPACT and the SmokeLess States program—supported statewide coalitions of individuals and organizations that pursued action strategies toward strengthening tobacco control policies. The ASSIST program funded state health departments' work with coalitions (NCI 1991). The IMPACT program required state health departments to establish state-level tobacco control coalitions and to build capacity for comprehensive tobacco control programs in the 33 state health departments that participated in this cooperative agreement (Federal Register 1993). SmokeLess States was the only program that funded state coalitions whose lead agencies were outside of state health departments (RWJF 1993).

The state tobacco control coalitions focused from the beginning on public policy advocacy as an important strategy. Their plans reflected the shift away from interventions aimed at individuals toward interventions to change social norms and environmental conditions. By the late 1980s, NCI staff were aware that most intervention research showed that individual approaches to tobacco use prevention were not effective in reducing smoking prevalence and were ready to sponsor social and environmental approaches (NCI 1991). The planners of the ASSIST program recognized that promoting changes in public policy was consistent with a population-based solution to a population-wide epidemic of tobacco use (NCI 2005). The shift in focus enabled tobacco control advocates to pursue population-based solutions to the tobacco epidemic on a national scale for the first time in U.S. history. It was a bold initiative on the part of two federal agencies, a private foundation, state health departments, and nonprofit health organizations that deserves recognition and analysis in any effort to formulate future initiatives.

The ASSIST program promoted three types of interventions: (1) program services, (2) policy, and (3) mass media. However, ASSIST guidelines stated that "efforts to achieve priority public policy objectives should take precedence over efforts to support service delivery" (NCI 2005). Mass media initiatives were intended to support those policy changes, which meant that media advocacy that engaged the news media in support of prevention policies was the focus of media initiatives rather than social marketing. The four ASSIST priority policy areas were: (1) eliminating environmental tobacco smoke, (2) higher tobacco taxes, (3) limits on tobacco advertising and promotion, and (4) reducing youth access to tobacco (NCI 2005).

Evaluation of Comprehensive State Programs

The evidence that the ASSIST, CDC, and SSI programs were effective must be based on whether change occurred in the priority policy areas listed above. The CDC OSH released a summary in 2005 of the literature on the evidence of the effectiveness of state tobacco control programs (Kuiper et al. 2005). Organized by major reviews and five outcome indicators (tobacco-related mortality, prevalence, consumption, cessation, and smoke-free legislation and policy), the results are presented generally by state. The evidence provided can be considered a guide for state health departments to measure the success of their comprehensive tobacco control

programs. Of the five indicators of success, one is a health outcome—tobacco-related mortality—and three are markers that lead to improved health outcomes—decreases in prevalence, decreases in consumption of tobacco products, and smoking cessation.

The fifth indicator, smoke-free legislation and policy, is an intermediate outcome that alters the environment that supports tobacco use. This outcome should be considered the endpoint for the intervention strategy of policy advocacy. In the ASSIST evaluation, changes in policy were, in fact, considered part of an Initial Outcome Index that represented initial outcomes of advocacy efforts (Gilpin et al. 2000). While we can link smoke-free policies, such as high tobacco excise taxes, to changes in prevalence, consumption, and cessation, it is more difficult to link advocacy action directly to these intermediate outcomes or to the long-range health outcome. This may be a reason why discussions of best practices generally list a range of smoke-free policies while ignoring or obscuring advocacy as a best practice in tobacco control. If we are not alert, policies can be treated as strategies instead of endpoints, without acknowledging that policy change in most cases cannot occur without public advocacy campaigns. The best practice must be considered an active, effective tobacco coalition with a focus on policy change.

As an example of the lack of attention to the importance of an advocacy strategy, the Task Force on Community Preventive Services (2001) did not list community advocacy or media advocacy in its 14 recommendations for interventions to reduce tobacco use and exposure to environmental tobacco smoke (Task Force on Community Preventive Services 2001). Yet, the advocacy work of tobacco control coalitions has been critical to the success of tobacco control policies.

To what extent does a comprehensive tobacco control program make a difference in a state? To what extent does a state coalition's policy advocacy work make a difference within a comprehensive tobacco control program? The first question seems easier to answer than the second. A number of authors have tried to assess the contribution of state comprehensive programs to policy change and/or reductions in smoking (Elder et al. 1996; Public Health Service 2000; Siegel 2002; Stillman et al. 2003; Tauras et al. 2005; Wakefield and Chaloupka 2000; Warner 2000). There is evidence that states with the most money for comprehensive programs have lower prevalence and consumption rates (Tauras et al. 2005).

The CDC concluded, on the basis of analyses of the excise tax-funded state programs in California, Massachusetts, Oregon, and Maine as well as on the agency's experience in providing assistance to four other states (Florida, Minnesota, Mississippi, and Texas), that the evidence was sufficiently compelling to encourage all states to pursue comprehensive programs. After the end of the ASSIST program in 1999, when the responsibility for tobacco prevention shifted from NCI to the CDC OSH, the OSH implemented a tobacco control program to sustain state comprehensive programs. Under that program each state can receive approximately \$1 million per year for comprehensive tobacco control (CDC 2003). On the basis of the evidence, the agency issued guidance for states in 1999 in a document titled *Best Practices for Comprehensive Tobacco Control Programs* (CDC 1999a). The guidance lists nine areas of activity that should be included as best practices because the complexity of changing the social environment "must be addressed by multiple program elements working together in a comprehensive approach" (CDC 1999a). Suggested levels of funding per capita are included to assist states in allocating funds from various sources.

The first area of best practice—community programs—includes promoting government and voluntary policies to promote clean indoor air, restrict access to tobacco products, and achieve other policy objectives. As evidence for this as a best practice, the document cites the success of

the California, Massachusetts, and Oregon coalitions in achieving policy and program objectives (CDC 1999a;b). Statewide programs that promote media advocacy and counter-marketing campaigns are also cited among the best practices, based on the CDC's review of core documents from the California and Massachusetts campaigns.

There have been few efforts to analyze the contribution of the state tobacco control coalitions within comprehensive state programs, especially their advocacy initiatives. Most of the authors cited above acknowledge that state coalitions have played a key role in the achievement of policy changes that reduce tobacco consumption while at the same time commenting on the difficulty of measuring the extent to which coalition activities at the state or local level were responsible for either policy change or health outcomes. For example, in an article about the connection between total tobacco control spending in the states and reduced tobacco consumption, Tauras and colleagues (2005) acknowledged that no data were available that would allow them to analyze which specific programs in the states are responsible for reduced consumption (Tauras et al. 2005). Elder and colleagues' (1996) evaluation of the California comprehensive program noted the shift from individually focused programs to community coalition and advocacy work, but they had no means of quantitatively documenting the contribution of those programs to the decline in smoking prevalence in the state. According to Nelson, one of the authors of the Kuipers and colleagues (2005) literature review from the OSH (Kuiper et al. 2005), the greatest research need is a multistate evaluation study of the impact of state programs (Personal Communication, Nelson, June 2005). If the CDC would fund a new initiative based on the ASSIST model, such a study could extend our understanding of statewide comprehensive tobacco control programs, refine evaluation measures, and help clarify the impact of such programs on changes in smoking prevalence.

WEAKNESS IN PUBLIC HEALTH METHODS FOR MEASURING PRIMARY PREVENTION STRATEGIES

One reason that the link between community action and reductions in tobacco use is difficult to document is that public health methodology is not as well developed for measuring complex community- and population-based social and policy change as it is for individual and small group change. This difficulty in public health methods has been noted by McKinley and Marceau (2000) in a critique of the current research paradigm in public health and their call for the development of multi-level research methods (McKinley and Marceau 2000). The ASSIST planners noted a lack of developed methods for evaluating large-scale, multisite demonstration projects (NCI 2005). The difficulty was also noted in a report of a workshop on tobacco control interventions sponsored by the Johns Hopkins Bloomberg School of Public Health (Johns Hopkins 2002). Public health experts in attendance noted that the complexity of comprehensive tobacco control programs and the contributions of specific programs cannot be evaluated using conventional experimental designs. They unanimously concurred that the current state of evaluation research has to be improved in order to evaluate higher-level public health initiatives, such as comprehensive tobacco control programs.

It is easier to track the direct influence of a policy change than to track the influence of advocates in achieving that policy. For example, an economist can track declines in cigarette purchases in the years following an increase in the tobacco tax in a state, so the excise tax may then be considered a best practice. It is more difficult for a public health researcher to show that a state coalition's activities are responsible for a change in the social climate that led to increased support for the higher tax. Most people in the tobacco control field know that a tax increase does

not occur without decision makers considering whether there is public support for such a measure. However, the link between tobacco coalition activities and the tax increase is hard to prove. As a result, even after years of citizen advocacy for tobacco control, we have a lot of anecdotal evidence but slim quantitative evidence that such coalition advocacy is essential to the process of change.

A search for evidence that would meet rigorous experimental or quasi-experimental standards for cross-study comparisons cannot yet yield enough studies for a meta-evaluation of the impact of advocacy initiatives. While many members of tobacco control coalitions can point to achievements in which their coalitions participated in educating the public or in supporting strong tobacco control policies, these achievements are documented in coalition reports and case studies that do not meet conventional standards for causality. Most of these case studies have not been able, or have not attempted, to parse out or compute the contribution of coalition advocacy action to tobacco control efforts so that we can generate effect sizes for such interventions. An evaluation of the impact of California's Proposition 99 program covering the period 1990–1994, for example, was primarily a process evaluation (Elder et al. 1996). The researchers noted their frustration at not being able to relate specific program efforts to local impact on tobacco use, even though it was clear that overall from 1988 to 1994, smoking declined by 28 percent in California. A team of researchers did attempt to measure a link between program exposure among adults and youth to the California Tobacco Control Program and reductions in smoking prevalence in counties from 1996 to 1998 (Rohrbach et al. 2002). The program design included cross-sectional surveys of random telephone samples of adults and youth at two points in time. Program exposure included community programs, community and media programs, and community and school programs. The evaluators found that 80 percent of adults reported exposure to community programs and that counties with the highest multicomponent exposure rates had the greatest reductions in adult smoking prevalence, the largest increases in home smoking bans, and the greatest reductions in workplace no-smoking policy violations. None of the changes in youth outcomes were associated with multicomponent exposure.

The single national study to date that reports an attempt to document a link between state-wide coalition efforts and decreasing prevalence of smoking is an evaluation of the ASSIST program (Stillman et al. 2003). For this study, the evaluators constructed an index of change in adult smoking prevalence and per capita cigarette consumption as outcome variables and compared the outcomes to tobacco control policies in the 17 ASSIST states and 33 non-ASSIST states and the District of Columbia (Gilpin et al. 2000). They computed a "strength of tobacco control index" (SOTC) for every state based on earlier concept mapping work (Trochim et al. 2003) as a means of computing tobacco control scores by state (Stillman et al. 1999). The evaluators found a small but statistically significant difference in reduction of adult smoking prevalence (-0.63 percent, $p = .049$), but not in per capita cigarette consumption, in ASSIST states compared to non-ASSIST states. However, per capita consumption was affected by the SOTC in the states. As the authors reported, "states with larger changes in IOI [initial outcomes index] score over time were associated with lower per capita cigarette consumption than states with smaller changes in IOI (-0.32, $p < .001$). For a state, per capita consumption decreased by .57 packs per person per month as the IOI values increased from the 25th to the 75th percentile over the intervention period" (Stillman et al. 2003). This decrease in consumption was largely due to the component of IOI that represented cigarette price. The authors estimated that if all 50 states had implemented ASSIST, the decrease in adult smoking would have been 1,213,000 smokers. They concluded that investing in state-level tobacco control capacity and promoting tobacco control policies are effective strate-

gies. The authors discuss the limitations of the study, especially their inability to develop an overall measure for the strength of the tobacco industry's opposition in the states. They acknowledged that the complex political and socioeconomic variability among states that probably affected implementation of the ASSIST program was beyond the control of the ASSIST intervention (NCI 2006).

The Tobacco Control Branch of the NCI published a monograph in 2005 that documents the history of the ASSIST program (NCI 2005). The authors discuss lessons learned and describe in detail the extent to which policy advocacy was a core feature of the innovative ASSIST program. The NCI's ASSIST evaluation, not yet available but to be published in late 2006, may add to public understanding of the impact of ASSIST on tobacco policy outcomes.

If we consider documented changes in tobacco control policy to be the initial endpoint of coalition advocacy initiatives, then we do have evidence of the effectiveness of citizen advocacy. Even without data that directly link citizen advocacy to reductions in tobacco use, the evidence of the effectiveness of advocacy as a strategy, for now, rests in the large number of documented changes in law and policy that have occurred in the states. For example, members of statewide coalitions were often the primary movers in countering the marketing techniques of the tobacco industry and in developing counter campaigns that reframed the positive spin on smoking of the tobacco companies. Much of this report focuses on the impact of tobacco policy changes on smoking rates. It is important to remember that strong tobacco control policies are an outcome of hundreds of local and state citizen campaigns. While we must hone our ability to measure the contribution of advocacy initiatives, we must be careful not to obscure the importance of continued advocacy work as a public health strategy.

In discussing the SmokeLess States program, Gerlach and Larkin (2005) link citizen campaigns to policy change, although they do not document it quantitatively (Gerlach and Larkin 2005). These authors discuss the success of the SmokeLess States program in terms of the policy changes that states adopted over the 10 years of the program. Even without quantitative studies of the efficacy of advocacy, most people in the tobacco control community make a reasonable assumption, based on their experiences, that without citizen advocacy it is doubtful that the changes in tobacco taxes, smoke-free workplace laws, restrictions on smoking in public accommodations, and restrictions on sales to youth would have occurred. This assumption is reasonable because decision makers do not decide to strengthen tobacco control policies unless an active citizenry, working through state and national tobacco control coalitions to create tobacco-free environments, demands such policies. In 2002, by the end of the decade of coalition advocacy, the Surgeon General's report, *Reducing Tobacco Use in 2000*, called the emergence of statewide coalitions the most important advance in comprehensive programs and concluded that comprehensive state programs, such as those in California and Massachusetts, provide evidence that such programs reduce smoking (Public Health Service 2000).

TOBACCO INDUSTRY ATTACKS ON PUBLIC POLICY ADVOCACY

Certainly, even without proof that coalition advocacy could change tobacco use, the potential power of an advocacy strategy by state coalitions was immediately recognized by the tobacco industry. The industry attacked the ASSIST program from its inception (NCI 2005; Trochim et al. 2003; White and Bero 2004) in order to reduce the threat of citizen action. In an industry document from 1995, a Phillip Morris consultant, objecting to the activities in the Community Environment Channel of ASSIST, wrote that "the most effective way of reaching low-educated

populations will be through policy and media advocacy” (National Institute of Health Publication 2005).

An analysis of tobacco industry internal documents indicates that the tobacco industry deliberately pursued a campaign to derail ASSIST by equating citizen advocacy efforts with illegal lobbying. The tobacco industry successfully pressured the federal legislature to add prohibitions on such efforts at the state and local levels (NCI 2005; White and Bero 2004). For the first time in U.S. history, it became illegal for anyone receiving federal funds to lobby state and local governments (Federal Acquisition Regulation 2005). A Tobacco Institute document of December 15, 1994, stated: “This Fall we were able to attach an amendment to the Federal Acquisition Streamlining Act legislation . . . which—for the first time—would prohibit federal funds from being used to lobby a local legislative body” (National Institute of Health Publication 2005).

The tobacco industry used the Freedom of Information Act to divert state health department resources and threatened lawsuits against state health departments and individual state employees as a scare tactic (NCI 2005). The industry continued its opposition to advocacy by ensuring that the national tobacco settlement included language that prohibited the national foundation that was created from engaging in any political activities or lobbying (National Association of Attorneys General 1998). The industry’s attack equates advocacy with lobbying and cites Internal Revenue Service regulations that forbid public agencies from using public money for lobbying (White and Bero 2004).

The Impact of Obscuring the Distinction Between Policy Advocacy and Lobbying

Federal agencies and many state health departments, for political reasons or for caution, reacted to tobacco industry attacks by severely limiting advocacy activities that were, and still are, perfectly legal. Within the public health field, advocacy is a much broader concept and set of activities than lobbying (Gerlach and Larkin 2005; Wallack et al. 1993). The definitional issue is important if advocacy strategies are to survive as important interventions. The simplest dictionary definition of advocacy is to act to persuade others to support a cause (Merriam Webster 1995). In his book on media advocacy as a public health strategy, Wallack and colleagues (1993) use a definition of advocacy as organized social action to improve social conditions (Wallack et al. 1993). They draw this definition from a 1988 Institute of Medicine report that defines the mission of public health as “fulfilling society’s interest in assuring conditions in which people can be healthy” and assumes that improving social conditions is the route to success (IOM 1988). Wallack and colleagues (1993) refer further to advocacy as a term that represents a set of skills used to create a shift in public opinion and mobilizes resources and forces to support an issue, policy, or constituency (Wallack et al. 1993). Others define advocacy specifically in terms of social change related to tobacco. Most state coalitions adopted names incorporating the words “tobacco free.” The school-based Kids Act to Control Tobacco program uses the definition of advocacy as “to act to support a tobacco free environment” (NEA HIN 2000). Gerlach and Larkin (2005), in their article on the SmokeLess States program, refer to advocacy as the process of educating policy makers and members of the community about issues and measures that can be taken to address them (Gerlach and Larkin 2005). They emphasize the importance of advocacy to change tobacco control policies and discuss how the RWJF considered such work the key to success as the SmokeLess States program matured.

Gerlach and Larkin (2005) point out that as early as the first year of the SmokeLess States program, RWJF’s support of the Coalition for Tobacco-Free Colorado was challenged as lobby-

ing by the tobacco industry (Gerlach and Larkin 2005). As a response, RWJF was careful to make a distinction between lobbying, which the SmokeLess States program would not fund, and advocacy. The foundation defined lobbying as direct communication to a legislator on specific legislation or grassroots communication to the general public urging them to take action on specific legislation. While RWJF would not fund coalitions to conduct lobbying, coalitions were free to use their own funds for such activity. Indeed, the foundation encouraged and finally insisted that coalitions find such funds. Both RWJF and the NCI ASSIST program held training workshops for state coalitions on policy advocacy. As the ASSIST report from NCI makes clear (NCI 2005, p. 352), policy advocacy and lobbying are not the same thing.

The fierce opposition of the tobacco industry to advocacy is a good indication of how important such initiatives should be in any blueprint for future tobacco control. Already, the industry attacks have weakened federal and state willingness to fund advocacy programs or, at least, have led them to obfuscate the language of advocacy while continuing to promote policy changes. The potential for future gains through this strategy is endangered if state health departments and coalitions become hesitant to openly acknowledge how critical citizen advocacy is for successful policy change. The restrictions on state and local lobbying added to the 1994 Federal Acquisitions Streamlining Act are still part of federal acquisition regulations (Federal Acquisition Regulation 2005). Unless these restrictions are rolled back, the hesitancy to engage in activities that could be confused with lobbying on the part of federal agencies and state health departments will remain.

The original funding that promoted coalition advocacy work ended in the late 1990s. It is important that new funding initiatives not equate advocacy with lobbying and not obscure the purposes of comprehensive programs and state coalitions. NCI's ASSIST program ended in 1999. The IMPACT program ended in 1998, and the CDC OSH assumed responsibility for continued funding of state health departments through the National Tobacco Control Program. While the focus is still on comprehensive tobacco programs, advocacy per se is not mentioned (Public Health Service 2000). From the ASSIST emphasis on policy advocacy as primary, the best practices recommendations have expanded to nine areas, with the potential for diluting funds for advocacy action. RWJF's SmokeLess States program funding for advocacy initiatives ended in 2004, after an investment of \$99 million over 10 years. While the foundation continues to fund tobacco use initiatives, the focus on advocacy as a strategy has diminished (Gerlach and Larkin 2005). Without further funding for state coalition advocacy initiatives and the development of evaluation methods that can measure the contribution of statewide coalitions, the potential for continued policy change may be further weakened.

THE FUTURE OF ADVOCACY EFFORTS

Although federal dollars for advocacy may be somewhat obscured by language about comprehensive state programs and although funding has decreased, promotion of tobacco control advocacy is alive and well among state and local workers in the field of tobacco control. For example, at the National Conference on Tobacco or Health held in Chicago, May 4–6, 2005, the focus on advocacy and social change was everywhere, from the keynote speakers to workshop presenters to people's discussions about action in their states (National Conference of Tobacco or Health 2005). Speakers at the conference made it clear that advocacy, even as a means to maintain funding for comprehensive state tobacco control programs, is essential for success. The advocacy focus included media and community advocacy. State health department policies toward advocacy have an influence on the extent to which these types of programs survive. Faced with

declining funds for a media campaign, one young man, who did not want to be identified as a state worker, referred to recent youth action in his home state as “guerilla advocacy,” meaning that when the state health department refused to support advocacy, the youth took advocacy out into the streets by staging events that spoke directly to community members (Personal communication, Anonymous, May 2005). He mentioned that when banned from handing out educational materials in a local mall, each member of the group wore a T-shirt with one letter so that when the members lined up the shirts spelled out “T-O-B-A-C-C-O F-R-E-E!” Such actions are cheap but effective ways of involving youth in creating anti-tobacco messages.

Training youth to become advocates was one theme at the conference. While evaluation studies of advocacy training programs are often still more qualitative than quantitative, several speakers presented results of youth training in advocacy skills at the tobacco conference. The National Education Association Health Information Network’s Kids Act to Control Tobacco (Kids ACT!) program’s outcome evaluation, conducted over 4 years by Sparks and Simmens (2005) is the first large, group-randomized trial of a school-based youth advocacy program in the United States. Based on a four-step advocacy model, the analysis of this 3-year program showed that the program produced small to moderate differences between intervention and control groups at three points in time. It should be noted that the primary outcome of this advocacy program was advocacy action rather than smoking behavior (Sparks et al. 2005). The Smokebusters advocacy training program in Missouri involves youth in 8th through 10th grades in a 3-year advocacy program. The program monitors youth participation and has data that can be used in an outcome evaluation if funds were available (Lara 2005). The Campaign for Tobacco Free Kids sponsors an action program and awards for youth advocates (Campaign for Tobacco-Free Kids 2006) and the American Legacy Foundation’s truth® campaign involves youth in a media advocacy program (American Legacy Foundation 2004). These advocacy efforts indicate that adults in tobacco control believe that training the next generation of advocates is important, not just as a smoking reduction strategy, but as a strategy for future social and policy change.

Many state activities for policy change are clearly based on increasing public support for tobacco-free environments. Even though funding for advocacy has decreased since the three national programs mentioned earlier ended, coalition action in the states has centered on grassroots advocacy for smoke-free environments in workplaces, restaurants, and bars. Americans for Non-smokers’ Rights (ANR) and other national organizations have worked with grassroots citizen coalitions to support smoke-free laws and policies. These efforts have been funded by national voluntary organizations such as the American Cancer Society, the American Heart Association, and the American Lung Association as well as by RWJF (Personal Communication, Frick, ANR, March 13, 2006). These coalition activities have had a tremendous success in decreasing environmental tobacco smoke. By April 2006, 461 municipalities in 33 states and the District of Columbia had passed smoke-free laws in workplaces, restaurants, or bars. One hundred and thirty-five of these had laws covering all three types of sites, while the others had laws covering one or more of these sites (ANR 2006). By January 2006, 11 states had passed smoke-free workplace legislation (Cherner 2006). An initiative to promote fire-safe cigarette laws has also emerged and self-extinguishing cigarettes are now required in five states—New York, California, Vermont, Illinois, and New Hampshire (Coalition for Fire Safe Cigarettes 2006). In January 2006, the California Environmental Protection Agency announced that environmental tobacco smoke is a Toxic Air Contaminant subject to state assessment for health effects (CEPA 2006).

RECOMMENDATIONS FOR FUTURE TOBACCO CONTROL

The adoption of the types of smoke-free policies mentioned above by cities and towns across America provides the most important evidence for the impact of citizen policy advocacy as a public health strategy in the first 6 years of the twenty-first century. Even as funding for coalitions has become less secure, these policy successes continue to roll forward with a momentum that was unanticipated in the late 1990s. The success of smoke-free policy change in the past 6 years illustrates the importance of continued federal and state support for community-level strategies for tobacco control and broad demonstration programs. As mentioned earlier, the CDC OSH currently offers only approximately \$1 million per state to continue comprehensive tobacco control efforts (CDC 1999b). Although the CDC recommends funding levels for each state based on smoking prevalence, state governments are not funding such efforts at the levels recommended for best practices by the CDC (Tauras et al. 2005). The Master Settlement Agreement money has been siphoned off by state governments to programs other than tobacco control. The NCI currently funds only small research projects and has no plans for funding broad community, multilevel programs such as ASSIST. Even though smoking rates are dropping, tobacco use remains the greatest preventable cause of death, continuing to kill more than 400,000 Americans every year (CDC 2004). If we expect to reduce significantly the burden of tobacco use on the health of people, we need the vision of the early planners and activists that brought ASSIST, IMPACT, and SmokeLess States into existence.

The evidence reviewed above indicates that the comprehensive approach of the 1990s, including policy advocacy, has resulted in many policy changes for tobacco control that, in turn, have had an effect on the prevalence of tobacco use. There are two main reasons to continue a comprehensive approach that focuses on policy advocacy. The first, specific to tobacco control, is that if we count all the state and local policies for tobacco control adopted in the last 15 years, the public advocacy approach has had the most effect in altering the environment that supports tobacco use. State health departments have broadened the scope of tobacco control activities and can document changes in social norms that support tobacco-free environments and public support for tobacco control and can list changes in public policy that limit tobacco use. A cadre of public health advocates was trained intensively through the ASSIST, IMPACT, and SmokeLess States coalition initiatives. Not only should this cadre be maintained, but funding and resources should be available so that they may provide training for the younger tobacco control workers in the 50 states so that the momentum of public advocacy is not lost.

The second and even more crucial reason is that continuing to implement and evaluate comprehensive social and environmental interventions is critical to the continued development of effective public health promotion. Our understanding of how to implement such interventions as well as how to develop methods for evaluating the effectiveness of such interventions cannot advance if the Federal government, state governments, and national nonprofit foundations will not take the lead in advancing public health through such initiatives. Involvement in broad initiatives is critical to the training of future public health professionals who need practice in population-based solutions to public health problems. Such initiatives, with their national focus, are so costly that they require federal coordination and support. As an example of the kind of advances the field needs, the recent OSH release of Key Outcome Indicators for Evaluating Comprehensive Tobacco Control Programs (Starr et al. 2005) illustrates how to enhance program evaluation of complex initiatives. The OSH tobacco control program requires states that receive tobacco control money to develop action plans based on logic models in which community mobilization and policy and regulatory action are interventions that lead to defined short-, intermediate-, and

long-term outcomes for tobacco control. Detailed outcome indicators then make it possible to quantitatively measure success. This approach is an example of how to train future tobacco control advocates to implement and evaluate community-level interventions.

RECOMMENDATIONS FOR FUTURE ACTION

As the ASSIST project was closing down in the late 1990s, a number of committees and task groups made recommendations for future comprehensive tobacco control programs that would continue innovative strategies and continue advocacy activities (NCI 2005). Many of those recommendations have yet to be acted upon. The 2005 Tobacco or Health Conference adopted recommendations for the future. At the World Tobacco Conference in July 2006, participants also adopted resolutions for future tobacco control. Even as citizen action continues, in this decade a lack of political will at the state and federal levels has resulted in lost time, missed opportunities, and gaps in training and continued development of advocacy research and expertise. The following recommendations, based on this review, incorporate some of the recommendations from various sources that should be part of a blueprint to advance tobacco control and public health intervention methods:

1. Federal funds disbursed to states and local communities for tobacco control activities should not be restricted from use for lobbying/advocacy efforts at the state or local level (ASSIST 1997). The government should immediately repeal language that implies that state and local citizen advocacy is illegal for recipients of federal health funding. A federal policy promoting citizen participation in the policy arena should be publicized and the distinction between legitimate citizen advocacy and professional lobbying should be made clear. A distinction can be made between corporate lobbying and citizen action.
2. The Federal government should continue to fund initiatives, such as ASSIST, in which multilevel, community-wide programs can be tested and evaluated. ASSIST should be considered only the beginning of a population approach to the national health threat of tobacco use. Similar recommendations were made by the ASSIST Coordinating Committee (ASSIST 1995).
3. State health departments should continue to position tobacco prevention as a priority in the media and through policy advocacy initiatives (ASSIST 1995). State health departments and tobacco control advocates should publicize the difference between advocacy for social change and lobbying. Comprehensive tobacco programs should encourage residents to demand their rights in a democracy to advocate for health policies that benefit the general public rather than the tobacco industry.
4. Federal and state agencies should increase funding to strengthen the ability of public health researchers to develop better methods to evaluate population strategies (Johns Hopkins 2002).
5. Far higher levels of public funding must be made available by federal and state governments to tobacco control coalitions to continue advocacy activities in their broadest sense.
6. Training grants to schools of public health should be made available to train graduate students in social and environmental approaches to public health problems.
7. The NCI and CDC should catalog advocacy training materials used in the ASSIST and IMPACT programs and make them widely available to professionals in the public health field so that training of advocates can continue.

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Special Populations with Higher Rates of Cigarette Smoking: Identification and Implications for Tobacco Control

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While the overall national prevalence of cigarette smoking among American adults is about 20–22 percent (CDC 2004b), several population groups have been identified with higher than average rates. It is axiomatic in public health that attention to populations with higher levels of unhealthy exposures such as tobacco should lead to improved and more efficient population outcomes. With regard to community tobacco control programs, it is apparent that high-risk populations have received less than full attention. For example, tobacco taxation policies, elementary school education programs, and youth access regulation—three important cornerstones of community-based tobacco control—are not particularly targeted to those at special risk or exposure other than attention to one specific demographic group (youth).

The purpose of this chapter is to identify populations that either have greater than average cigarette smoking rates or are at higher risk for acquiring smoking behaviors, and to derive some implications for community tobacco control efforts. Specifically, this chapter:

- Identifies a substantial number of population groups with higher than average levels of tobacco use and attempts to assess the quality of evidence that these groups indeed possess such smoking rates;
- Addresses the overlapping nature of risk factors for higher smoking rates among these potential target populations; and
- Discusses the implications of these high-utilization or high-risk groups for tobacco control policies in the United States.

THE BASIC PREMISE: SPECIAL BEHAVIORS AND INCREASED TOBACCO USE

The basic approach to this chapter is to identify individual and group characteristics and behaviors that are empirically associated with demonstrably higher use rates for tobacco products, particularly cigarette smoking, by using a targeted but not exhaustive literature review. As discussed below, some of these groups are defined by one or more demographic features. Other groups have characteristics and “behaviors” that are regarded as psychiatric symptomatology or frank psychiatric Axis I or II disorders, with widely accepted manifestations and a clear nosologic presence (Joseph et al. 2004). Some groups with high smoking prevalence rates have been recognized for decades, such as patients with schizophrenia, who have high cigarette consumption rates (Masterson and O’Shea 1984).

However, in addition to the mental conditions that have been associated with higher smoking levels, many other “special” behaviors and behavioral characteristics not directly comprising

mental illness have been suggested to be associated with increased tobacco use, leading to research into personality traits among smokers. An example is the reported association between a personality trait, such as sensation seeking, and tobacco use among college students (Zuckerman and Kuhlman 2000). The empirical focus on particular individual behaviors is extremely important and avoids the issue of whether such behaviors necessarily represent diseases or behavioral deviations in need of clinical management per se, a potential problem with the biomedical model of health and disease (Brandt and Gardner 2000). Of course, our understanding of the genesis of these traits is often incomplete, as are the biological explanations for tobacco use rates and risks in general.

DEMOGRAPHIC CHARACTERISTICS AND SMOKING HABITS

Cigarette smoking rates differ across broad demographic groups in the United States. Rates are higher in men than in women and among younger persons than older persons. African American and Hispanic adults have similar smoking prevalence rates to whites, whereas Asians overall have somewhat lower rates than whites and American Indians/Alaska Natives have somewhat higher rates than whites (CDC 2004b). Of particular interest, smoking rates are also higher among lower-socioeconomic groups (CDC 2004a). These socioeconomic disparities in tobacco exposure have been the subject of research with respect to explaining variation in tobacco use and resulting health status (King et al. 2004). It has also been suggested that young, “working class” adults have been important targets for commercial tobacco marketing (Barbeau et al. 2004).

The themes of poverty, lower socioeconomic status (SES), and health and social disparities pervade many of the high risk groups for tobacco use. However, the relation between lower SES and higher tobacco use rates is complex and multifactorial and requires substantial further inquiry. While some tobacco control programs have attempted intervention based on SES or broad demographic characteristics per se, many high-risk populations enriched with lower-SES individuals are identified largely by their intersection with various social institutions, such as the health care system, prisons, school counseling programs, and homeless shelters.

TOBACCO USE AND PSYCHIATRIC DISORDERS

Patients and survey respondents with clinical or research diagnoses of many important major mental illnesses have been reported to have higher rates of cigarette smoking and nicotine dependence. These include schizophrenia, major depressive disorder, any alcohol use disorder, any substance abuse disorder, anxiety disorders, mania, and personality disorders (Breslau 1995; Breslau et al. 1991; Breslau et al. 1993; Breslau et al. 1994; Fagerstrom et al. 1996; Grant et al. 2004; Hughes et al. 1986; Lasser et al. 2000). Some studies find higher smoking rates with increasing severity of the psychiatric condition, and these findings have been observed in both white and non-white populations (de Leon et al. 2002). In addition, other psychiatric conditions less frequently studied have been associated with a higher prevalence of smoking, including social phobia, agoraphobia, panic disorder, panic attacks, dysthymia, antisocial behavior and conduct disorders, and post-traumatic stress disorder (Lasser et al. 2000).

Studies on the association of mental illness and smoking have varied designs, inclusion criteria, and other methods. Some are clinic-based, while others are in geographically defined populations. Participation rates vary and, in some of the clinical studies, are unspecified. Patient diagnoses in clinical studies are usually based on individual practitioner designations, without

specific attention to diagnostic criteria, while those in population studies are often based on structured, standardized instruments adopted for epidemiological study. Most studies record actual cigarette or other tobacco use, while a few focus only on defined “tobacco use disorders” or the severity of nicotine dependence (Fagerstrom et al. 1996). Studies also differ in representation of various age, gender, and racial or ethnic groups. Patients in studies comprising clinical series, while of substantial value, may vary in terms of their mental illness severity, persistence, and age at onset. Often, the relation of age at onset of the psychiatric disorder vis-à-vis age at smoking initiation is not specified, but this temporal relationship may have important implications for identifying adolescents at high risk for smoking based on emerging manifestations of psychiatric disorders.

However, despite methodological variation in studies of these mental disorders and smoking, these associations appear to be robust, reproducible, and of an important magnitude. Indeed, Grant and colleagues (2004) calculated that while nicotine-dependent adults make up only 12.8 percent of the American adult population, they consume 57.5 percent of the cigarettes sold (Grant et al. 2004). Their study also suggests that adult Americans with psychiatric morbidity or comorbidity account for 70 percent of national cigarette sales. Thus, patients with mental illness should be an important part of community tobacco control programs, for both prevention and cessation efforts.

Since psychiatric comorbidity is common among smokers, a concerted effort to apply smoking cessation programs to these individuals has been recognized. A 1996 American Psychiatric Association guideline recommended routine treatment of smoking among patients with psychiatric disorders (APA 1996). However, for both resource and other reasons, determining the optimal interventions and ultimate effectiveness of such programs and motivating health professionals to invoke cessation programs are challenging. In the National Ambulatory Medical Care Survey, a medical record-based representative survey of primary care physicians in the United States, physicians were more likely to identify smoking status among patients with psychiatric disorders than among those without (Thorndike et al. 2001), but patients with mental illness were only modestly more likely to be counseled on smoking cessation (23 versus 18 percent of visits, respectively). Smokers with psychiatric comorbidity appear to be genuinely interested in smoking cessation programs. Among 120 smoking patients in four diverse mental health treatment settings, Lucksted and colleagues (2004) reported that 82 percent desired to stop or cut down on cigarette use (Lucksted et al. 2004). Saxon and colleagues (2003) reported that in a Department of Veterans Affairs psychiatric outpatient program, many were interested in smoking cessation but the programs were only minimally successful (Saxon et al. 2003). Whether psychopathology affects the response to cessation programs is not fully studied. Cinciripini and colleagues (2003) reported that post-cessation depression was associated with increased recidivism (Cinciripini et al. 2003), while Gariti and colleagues (2000) found no association between having an Axis I or II diagnosis and smoking cessation treatment success (Gariti et al. 2000). Clearly, more research is needed to explore the methods and effectiveness of smoking cessation treatment among persons with psychiatric comorbidity.

SMOKING-RELATED BEHAVIORAL AND MENTAL HEALTH ISSUES AMONG CHILDREN AND ADOLESCENTS

Elsewhere in this volume, Flay (Appendix D) discusses the techniques and success rates for prevention of smoking initiation with general, school-based intervention programs, both free-standing and in concert with other community-based interventions. He concludes that several

middle and high school programs can lead to a significant reduction in smoking prevalence, although there is decay through the later high school years, with little evidence for continued effectiveness at the 12th grade or beyond. In general, these programs are intended for delivery to general school populations for the target age ranges. Over the past few decades it has become clear that some children and adolescents are at identifiably greater risk of initiating and maintaining smoking. Some of these groups are identified below. The following sections are devoted to the behaviors and conditions among adolescents that are associated with the risk of cigarette smoking onset and maintenance.

Attention-Deficit/Hyperactivity Disorder and Smoking

One particularly important behavioral syndrome among children is Attention-Deficit / Hyperactivity Disorder (ADHD), an important public health problem thought to occur in 3–10 percent of child populations (Daley 2004). Children with this syndrome have a higher risk of cigarette use initiation and smoking maintenance, as well as abuse of other substances, than there are in non-ADHD contrast groups (Daley 2004; Lambert and Hartsough 1998; Wilens et al. 1997), although this association may in part be due to concomitant psychiatric comorbidity (Wilens 2004). Because ADHD risk has been reported to be increased among children whose mothers smoked during pregnancy (Thapar et al. 2003), both familial and environmental causes have been invoked to explain this association. Conversely, ADHD has been reported to be more common among those with substance abuse disorders and has also been associated with antisocial behaviors and conduct disorder (Flory and Lyman 2003; Schubiner et al. 2000). The presence of these conditions in themselves has obvious and important implications for delivering successful tobacco education programs.

The ADHD syndrome extends into adulthood, and the disorder tends to impair academic, social, and occupational function, as well as frequently being associated with substance abuse (including smoking) and other psychiatric comorbidity (Wilens and Dodson 2004). Among adults with ADHD, substance abuse, including nicotine dependence, occurred more frequently than expected by chance, raising the prospect that pharmacological treatment of ADHD may reduce the risk of substance abuse in these individuals (Wilens 2004).

Childhood Behaviors, Behavioral Exposures, and the Risk of Smoking Initiation

Certain types of childhood behaviors have been associated with increased general substance use, and cigarette smoking in particular. For example, there is growing evidence that smoking rates, along with other psychiatric comorbidity, are higher among girls and women with a history of sexual abuse earlier in life (De Von Figueroa-Moseley et al. 2004; Nichols and Harlow 2004). There is also an emerging literature exploring a host of adverse experiences extending beyond direct physical or sexual abuse that are associated with substantially increased risks of smoking initiation, such as the presence of depressed affect, suicide attempts, sexually transmitted disease, and an impoverished, dysfunctional household environment (Dube et al. 2003; Mcnutt et al. 2002).

In keeping with findings of strong associations between psychiatric conditions and an increased prevalence of smoking, various behavioral syndromes and mental disorders that are associated with increased smoking rates, in addition to ADHD, have been identified in children and adolescents. In a review of the literature through 2001, these included disruptive behaviors (e.g., oppositional defiant disorder and conduct disorder), anxiety disorders, major depression, and

drug and alcohol use disorders (Upadhyaya et al. 2002). In addition, increased smoking rates have been reported among children and adolescents with depressive symptoms or major depression; as noted above, some of these individuals had also been victims of early physical and sexual abuse (Diaz et al. 2002; Glied and Pine 2002). Eating disorders and concerns about body weight, particularly among adolescent females, also have been associated with increased smoking rates (Potter et al. 2004). In a study evaluating substance abuse screening instruments in adolescents, adolescent cigarette smoking was associated with a wide range of mental health symptoms (Chang et al. 2005). It has been observed that with the exception of ADHD, conduct disorder, and anxiety disorders, the onset of cigarette smoking generally precedes the onset of the diagnosed psychiatric disorder (Dierker et al. 2002). Thus, identifying children who smoke may have a role in the prevention or amelioration of future psychiatric morbidity.

With respect to the school environment and other social and institutional settings, the problem of conduct disorder is particularly relevant. Hyperactivity (also part of the ADHD syndrome) and socially disruptive behaviors are often identified early in school children. Conduct disorder, along with a history of parental smoking, predicts higher rates of daily adolescent smoking (Clark and Cornelius 2004; Rohde et al. 2004). Among children and adolescents with in-patient psychiatric admissions, the odds of smoking were increased thirteenfold among those with conduct disorder (Upadhyaya et al. 2003). Conduct disorder has also been associated with alcohol and other substance abuse as well as heavy smoking (Cornelius et al. 2001). Conduct disorder and antisocial personality among adolescents are associated with increased risk of substance abuse and violent crime as adults (Moffitt et al. 2002), which along with problems in cognitive development may explain in part the high rates of smoking among persons in prisons and jails (see below) (Feinstein and Bynner 2004).

DEFINED ADULT POPULATIONS WITH HIGH RATES OF CIGARETTE SMOKING

There are important and sometimes large adult populations that have been recognized to have higher than average prevalence rates for cigarette consumption; some of these groups have been approached by community-based tobacco control programs. Several of these groups have higher rates of impoverishment or at least lower SES, and some have substantial prevalence rates for psychiatric comorbidity. As noted above, both of these characteristics are associated with higher smoking rates, and the groups below are defined by their intersection with social institutions where they can be identified and potentially receive smoking cessation and other appropriate treatments.

Smoking Among Inmates in Correctional Institutions

Cigarette smoking rates are generally believed to be extremely high in correctional institutions. While there have been relatively few exhaustive quantitative surveys of smoking rates in jails and prisons, such smoking rates and concerns about health consequences among inmates have been described (Voglewede and Noel 2004). Lightfoot and Hodgins (1988) reported a 77 percent smoking rate in the past 6 months among inmates in a male penitentiary (Lightfoot and Hodgins 1988). Hughes and Boland (1992) reported a current smoking rate among American penitentiary inmates of 79 percent (Hughes and Boland 1992). Durrah and Rosenberg (2004) reported a current smoking prevalence of 71 percent among women arrested in New York City (Durrah and Rosenberg 2004). High rates of smoking among prisoners are not surprising given

the rates of incarceration for substance abuse, the generally lower SES of inmates, and the high rates of psychiatric comorbidity (Andersen 2004). The peer-reviewed literature on smoking cessation programs among prisoners is extremely limited. However, there is a report of the impact of a total smoking ban in a maximum security psychiatric hospital (Hempel et al. 2002). Ultimately, the ban was accepted by both patients and staff, and there was a post-ban decline in sick call, disruptive behavior, and verbal aggression rates among patients.

Smoking Among Military Recruits

Higher than expected rates of tobacco consumption have been reported among incoming recruits and active duty military personnel in the United States. Chisick and colleagues (1998) reported the highest rates among white males on active duty: 43 percent cigarette smoking and 24 percent smokeless tobacco use (Chisick et al. 1998). Ward and colleagues (2003) reported a smoking rate of over 24 percent among Air Force recruits (Ward et al. 2003). Among Naval recruits, Ames and colleagues (2002) reported that about half used tobacco in the year prior to enlistment (Ames et al. 2002). Shahar and Carol (1991) reported that smoking rates in one cohort actually increased during basic training (Shahar and Carol 1991). Since military recruit populations tend to be overrepresented with persons of lower educational attainment and lower SES in general, they are likely to be at greater risk for smoking.

Smoking Among Homeless Persons

It is very difficult to conduct representative surveys of homeless persons, and thus it is difficult to determine population health characteristics. In one study from Pittsburgh, comprising homeless persons receiving medical or social services at nine sites, 69 percent of the homeless clients were current smokers (Connor et al. 2002). Reports of tobacco use prevalence rates among homeless persons internationally have ranged from 75 to 85 percent, and are consistent with the high rate of mental illness and substance abuse seen among homeless patients in the United States and elsewhere (Folsom and Jeste 2002; Martens 2001). In the United States, tobacco industry documents uncovered as part of the Master Settlement Agreement (MSA) revealed a marketing program aimed in part at homeless persons (Stevens et al. 2004). No peer-reviewed reports on smoking cessation programs among the homeless were identified. However, some homeless smokers in a series from an urban academic medical center did express an interest in quitting and smoking cessation counseling (Arnsten et al. 2004).

Smoking Among Lesbian, Gay, Bisexual, or Transgender Populations

While the literature is limited, and small-area population surveys are not necessarily representative of large geographic regions, there is evidence that cigarette smoking is more common among Lesbian, Gay, Bisexual, or Transgender (LGBT) communities than among the general population (Greenwood et al. 2005; Ryan et al. 2001; Stevens et al. 2004; Tang et al. 2004). As in homeless persons, documents uncovered as part of the MSA revealed an industrial tobacco marketing program to the urban gay and lesbian community (Stevens et al. 2004). There is also an emerging and relevant literature suggesting that mental health problems may be higher among LGBTs than the general population (Cochran et al. 2003; Diamant and Wold 2003; Mays and Cochran 2001). However, no large-scale, robust, population-based surveys of this issue have been identified; most studies were conducted on clinical, network, or small-scale population samples.

Smoking and Gambling

Substantial clinical observation and a few surveys have suggested a strong positive association between smoking and gambling disorders and gambling behavior. For example, 43 percent of those calling a gambling helpline reported daily tobacco use (Potenza et al. 2004) and daily smoking was present in about two-thirds of persons seeking psychiatric treatment for gambling (Petry and Oncken 2002). In an Australian household survey, persons among households containing smokers were more likely to engage in gambling behaviors (Siahpush et al. 2004). It may be reasonable to consider screening persons for gambling behaviors or disorders within primary care or other clinical and psychiatric settings, in order to identify smokers and those with other psychiatric comorbidity, and then invoke appropriate smoking cessation programs. Of note, it has been reported that ordinances banning smoking in charitable public gaming settings had no adverse effect on the level of monetary profits (Glantz and Wilson-Loots 2003).

Smoking Among Disabled Populations

The term disability is used in several contexts, but generally refers to dysfunction, difficulty, or dependence in executing defined tasks that are associated with daily living in the community. As thus defined, having a disability may be associated with mental illness, and smoking prevalence rates are higher than among comparable populations without disabilities. Smoking rates may also be elevated among those with common chronic disabling conditions to which smoking is etiologically related, such as cardiopulmonary disease, stroke, lung disease, cancer, and intermittent claudication (Kuhn et al. 2005; Regensteiner 2004; Twardella et al. 2004). Even in the presence of overt disease and during the rehabilitation process, there are opportunities for conducting smoking cessation programs.

However, few population or geographic surveys of smoking rates among those with physical disabilities have been conducted. A survey of adults with disabilities in Massachusetts found somewhat higher smoking rates among those with disabilities related to orthopedic conditions (Brawarsky et al. 2002), but not affective or sensory conditions. In a survey of persons with major disabilities living in six independent living facilities, changes in smoking were associated with concomitant changes in health-related quality of life scores (Mittra et al. 2004). Persons with disabilities are not spared the adverse health outcomes of smoking. In addition to major chronic illnesses, for example, McGeary and colleagues (2004) found that smoking interfered with the rehabilitation of patients after spinal injuries and surgery (McGeary et al. 2004). Populations with disabilities use a substantial amount of health care, a situation that may offer an important opportunity for smoking prevention and cessation interventions.

IMPLICATIONS OF SPECIAL HIGH-RISK OR HIGH TOBACCO-CONSUMPTION GROUPS FOR TOBACCO CONTROL EFFORTS

Cigarette consumption is not distributed randomly across the American adult population. Rather, consumption rates are clearly overrepresented among those of lower SES and those with mental illness and related behavioral symptoms and behaviors. Further, adolescents evincing mental health symptoms or conditions, behavioral disruptions, or learning disorders are at greater risk of becoming regular smokers. These findings have important implications for tobacco control, although none contradicts the historically and scientifically proven general population approaches to tobacco control, such as taxation policy, indoor and outdoor smoking bans, and enhanced tobacco product labeling. Nor does this overrepresentation deny the important role of

physiological nicotine addiction as a major cause of cigarette smoking maintenance. However, it does suggest that additional approaches to tobacco control are needed as part of an effective control program, despite the existing challenges.

Since it appears that many current and future smokers have elements of impoverishment or lower SES, mental illness or abnormal behavioral symptoms, and higher rates of learning disorders or school dropout, conventional educational and advertising programs, whatever their basic efficacy, may not have the level of impact desired. Many persons in these higher-risk groups will intersect with various social and health systems and care institutions, where opportunities for more intensive tobacco prevention and treatment programs are possible, even if the fundamental missions of these institutions lie elsewhere. Most importantly, these findings suggest that community tobacco control programs must target these high-risk, high-prevalence populations in order to improve general control effectiveness beyond current achievements.

Thus, given these considerations, a number of high-priority tobacco control measures are suggested:

1. There appears to be adequate evidence that many children at high risk of later cigarette smoking can be identified through their school performance and problem behaviors. While the evidence is scant that targeted educational and social interventions directed at children with manifestations such as learning disorders, abnormal mental symptoms, overt mental illness, or conduct disorder are effective, such programs need to be investigated to determine if they can complement existing general educational activities. It is appreciated that this may require substantial resources at a time when school and child health funds are limited.

2. Efforts should be made to enhance receipt of clinical smoking cessation wherever mental health clinical treatments are undertaken. There is evidence that most patients with mental conditions are willing to accept antismoking treatments, but are not often offered such regimens. Several strategies in applying smoking cessation treatments could result in enhancing treatment effectiveness for nicotine dependence:

- Promoting clinical guideline development and enforcement within mental health settings, such as those promulgated by the American Psychiatric Association (APA 1996).
- Implementing health care institutional programs for surveillance of smokers, as contained in standards promulgated by the Joint Commission for Accreditation of Healthcare Organizations. This should specifically include psychiatric facilities.
- Training mental health professionals to attain skills in the prevention and treatment of nicotine dependence.
- Extending and enforcing policies of smoke-free psychiatric in-patient facilities. It has been noted that it is difficult to motivate patients to stop smoking unless the facility itself is smoke-free (APA 1996). Other community settings with high concentrations of smokers and those with mental illness, such as homeless shelters, should also consider smoke-free policies.
- Extending smoking cessation research to include persons with mental health diagnoses.

3. Offer smoking cessation treatments within the justice systems where institutional practices will allow it. Particularly, the maintenance of smoke-free prisons and jails, in concert with provision of resources to treat smoking behaviors, may facilitate smoking cessation in a very

hard-to-reach group. Environmental antismoking provisions should apply to staff as well as to inmates.

4. Assure that antismoking treatments are available as part of the benefit package for all state- and federally funded general health insurance or care delivery programs.

5. State and local tobacco control programs should monitor for attempts to market tobacco products to high-risk populations.

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