

The Effects of Tobacco Control Policies on Smoking Rates: A Tobacco Control Scorecard

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This article reviews studies of the effect of tobacco control policies on smoking rates with the aim of providing guidance on the importance of different policies. Based on past studies, we estimate the magnitude of effects of major tobacco control policies, how their effects depend on the manner in which the policies are implemented, the relationship between the different policies, and the barriers to implementation. The most successful campaigns have implemented a combination of tobacco control policies. Of those policies, substantial evidence indicates that higher taxes and clean air laws can have a large impact on smoking rates. Evidence also indicates that media campaigns when implemented with other policies are important. Research on greater access to treatment and telephone support hotlines indicates a strong potential to increase quit rates and may be important in affecting heavier smokers. Direct evidence on the effects of advertising bans and health warnings is mixed, but these policies appear to be important in some of the countries that have had success in reducing smoking rates. School education programs and limits on retail sales are not likely to have much impact if implemented alone, but may be more important when combined with other policies.

KEY WORDS: smoking, tobacco control policy

Smoking is the single most preventable cause of premature mortality. Approximately 440,000 deaths are attributable to smoking each year in the United States alone, and considerable medical costs are associated with morbidity.¹ Globally, it is estimated that there are currently 4 million tobacco attributable deaths each year, with current trends driving a rise to 10 million deaths per year by the 2030s.²

Substantial evidence indicates that tobacco control policies, especially when combined in a comprehensive program, can substantially reduce smoking rates.³⁻⁶ A number of papers and government reports suggest concurrently adopting a group of policies.³⁻⁷ Although these reports review and document the evidence, they do not attempt to prioritize different policies or discuss how the various policies interrelate.

This article provides an evidence-based review of the various tobacco control policies that contribute to reduced smoking initiation and increased quitting behavior and success. The goal is to provide guidance on the importance and limitations of different policies in order to help government planners and advocates focus their efforts and best utilize their scarce resources. Based on past studies, we provide estimates of the magnitude of effects of major tobacco control policies on smoking rates, how the effects depend on the manner in which the policies are implemented, and the barriers to implementation. We also consider the relationship between the different policies, including the different populations that they affect, with a view toward developing an effective overall tobacco control strategy.

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● Methods

We consider nine types of tobacco control policies that have been examined empirically and can be directly implemented by national or subnational government agencies: (1) taxation, (2) clean air laws, (3) restrictions on advertising, (4) anti-smoking media campaigns, (5) health warning labels, (6) the enforcement of youth access laws, (7) school education programs, and (8, 9) policies to increase the utilization of cessation treatments and services.

The ultimate goal of tobacco control policies is to improve health by reducing tobacco use. One commonly used measure is the number of cigarettes smoked per capita. It is useful to decompose this measure into the number of individual smokers and the quantity smoked per smoker. The adult prevalence rate is usually measured in terms of those who have smoked at least 100 cigarettes in their lifetime and are currently smoking. Changes in prevalence rates over time occur through smoking initiation and cessation, and we will highlight when studies use these specific measures. Also considered are how policies affect the quantity smoked per smoker, because quantity smoked is correlated with health outcomes and may also affect the progression to more established smoking and the likelihood of cessation activity and success.⁸

Unless otherwise indicated, the results are presented in terms of the relative reduction in smoking rates (eg, the change [in percentage points] in the smoking rate divided by the prepolicy or comparison group smoking rate). Standardizing to prepolicy levels is useful in translating results to populations with different smoking rates.

In the review of the studies, we attempted to provide an overview of the studies of policy effectiveness. Rather than provide an exhaustive listing or evaluation of all studies, we rely mostly on past reviews that have systematically and critically examined the research and consider more recent studies not included in these reviews. The largest number of studies of tobacco control policies has been conducted for the United States. We examine studies of other countries, but unless otherwise indicated, the reader should presume that the study is for the United States.

Much of the review is drawn from analyses used to develop the computer simulation model *SimSmoke* (Pacific Institute for Research and Evaluation, Calverton, MD). This model predicts US smoking rates

and smoking-attributable deaths and considers the effect of tobacco control policies on those outcomes. It also considers differential effects on age, gender, and racial/ethnic group, and how the effect of policies depends on the manner in which they are implemented and the length of time period considered. The predicted effects are based on reviews of the literature and the advice of an expert panel.^{9–14}

● Taxes

Tax increases generally yield at least commensurate increases in cigarette price,^{15,16} which, in turn, reduces cigarette consumption.

Evidence

Estimates of price elasticity of demand for US cigarettes typically range between -0.3 and -0.5 , meaning that a 10% increase in cigarette prices would produce a decrease in demand for cigarettes per adult of 3–5%.^{6,17–20} The addictive aspects of smoking imply that long-term responses to permanent price increases will be about twice as large as short-run effects.²¹

Studies of price elasticity have been conducted for other high-income countries and a growing number of low- and middle-income countries.²² The results for higher income countries, including Canada, the United Kingdom, Austria, Finland, Switzerland, and New Zealand,³ consistently find that price affects cigarette consumption with price elasticities comparable to those in the United States.²³ Estimates from low- and middle-income countries indicate greater responses to price with elasticity estimates about double those from high-income countries.²²

Recent studies have decomposed the effects of price on consumption into the effects on prevalence rates and the effects on the quantity of cigarettes consumed by those who continue to smoke.^{24–26} They have generally found that at least half of the decrease results from reduced prevalence, which may reflect higher rates of cessation or lower rates of initiation. Several studies directly examined the relationship of price to cessation rates, generally concluding that higher prices raise the likelihood of cessation.^{23,27–29} Tauras,²⁸ for example, estimated that a price elasticity of smoking cessation is in the range from 0.3 to 0.5, whereas Douglas²⁹ estimated that a 10% increase in the price of cigarettes reduces the duration of smoking by about 10%.

Although estimates vary, many studies indicate that youth and young adults are more sensitive to price than adults.^{3,5,6,30} Chaloupka and Grossman²⁴ concluded that a 10% increase in cigarette prices would reduce the number of young smokers by nearly 7% and their

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average quantity smoked by more than 6%. Emery et al,³¹ Ross et al,³² Tauras et al,³³ and Liang and Chaloupka³⁴ have found that higher prices mostly affect the progression to established smoking. Prices also have strong effects on 18–24 year olds,^{25,35} the age group when smoking habits often become firmly established. In considering other sociodemographic factors, there is no clear pattern of gender differences.^{36–38} Townsend³⁹ and the Centers for Disease Control and Prevention (CDC)²⁶ found that price elasticity is greatest in low-income populations.

Implementation issues

The impact of a tax change will depend on the initial price of cigarettes relative to the price of other goods, the size of the tax relative to the initial price, and the average income of the smoking population. The effect of a tax will erode over time unless it is indexed to inflation or is levied as a percent of the wholesale cost, especially in economies with high inflation rates.

The effects of a cigarette tax might also be reduced through the purchase or sale of untaxed (smuggled) cigarettes as smokers substitute lower price cigarettes. However, the scale of any problem is often overstated. Countries have significantly increased taxes without experiencing dramatic increases in smuggling.^{19,40} Stricter penalties and stronger enforcement efforts, including improved tracking of cigarette consignments, may reduce the smuggling problem.

Because higher taxes are such an effective policy for reducing smoking, they have been strongly opposed by tobacco manufacturers and growers.^{41–43} Smokers may also oppose the higher costs, although some actually support tax increases when tied to funding comprehensive programs.¹⁹ Because of its impact on smoking rates, a tax increase may be politically acceptable as a means to reduce health costs or a relatively painless way to raise government revenues.¹⁹

Besides reducing smoking rates, tax increases may also be used to finance broader tobacco control campaigns. Earmarking taxes has been an important part of tobacco control policy in the states of California and Massachusetts and the countries of Canada, Poland, and Finland.^{19,44}

Bottom line

Cigarette excise taxes are widely considered one of the most important tobacco control policy tools, based

on the many studies using a variety of statistical techniques.^{3,6,19} For the United States, *SimSmoke* assigns a larger prevalence elasticity for those below age 20 (–0.6) than for those age 36 and above (–0.2).²⁰ *SimSmoke* predicts that a tax increase of \$1.00 (indexed to inflation) with prices initially \$4.00 (a 25% price increase) would reduce smoking prevalence by 7% within three years, increasing to 14% over time as the younger smokers who are most affected by price grow older and more smokers quit due to the reduced quantity smoked.

● Clean Indoor Air Laws

Clean indoor air laws may prohibit smoking in a range of public places. The more comprehensive laws also include restaurants, bars, and private workplaces. Clean indoor air laws may make smoking less attractive by reducing opportunities to smoke and by supporting social norms against smoking. The implementation of clean indoor air laws has been motivated by substantial evidence of the harms of environmental tobacco smoke (ETS) to nonsmokers.^{45,46}

Evidence

Extensive clear air laws have been generally found to be associated with lower smoking rates for the United States.⁹ Studies have found between 5% to 20% lower per capita cigarette consumption in states with comprehensive clean air laws. Fewer studies have examined prevalence and cessation rates. Emont et al⁴⁷ and Ohsfeldt et al⁴⁸ found that states with extensive clean air laws had at least 10% lower prevalence rates than other states. Emont et al⁴⁷ found 12% higher rates of former to current smokers and Moskowitz⁴⁹ found 38% higher 6-month cessation rates in areas with strong worksite laws.

The importance of clean air laws is also indicated by studies that examine the effect of private work-site policies on the smoking rates of their workers.^{3,9,45,50–54} Studies of bans by firms within a particular industry sector, as well as studies over a broader population of firms, have generally reported reductions in quantity smoked in the range of 5% to 25% and reductions in prevalence rates of 0% to 20%, with less consistent effects for quit rates.⁵⁵ Longo et al⁵⁶ found that quit rates over the 6 years following a ban more than doubled compared to those in firms without bans. Population-based studies have reported about 10% to 15% higher quit rates in firms with bans. Levy and Friend⁵⁵ observed that studies indicate more pronounced effects on the quantity smoked in the year after smoking restrictions are implemented and increased cessation in later years.

Studies of work-site restrictions have been conducted for other countries, including Australia,^{57,58} Canada,⁵⁹ Germany,⁶⁰ and Switzerland.⁶¹ Even though effect sizes have varied, they generally obtain significant effects that are roughly similar results to those for the United States. In a study of clean air laws, Stephens et al⁶² found that stricter laws in Canada were associated with nearly the same reduction in prevalence rates as large price increases. Following the implementation of a national smoke-free law in Finland, Heloma et al³² found 16% to 17% declines in smoking prevalence and the number of cigarettes smoked per smoker in firms previously without bans.

Several studies have found that clean air laws reduce youth smoking,⁵⁵ but effects may only apply to males. Wakefield et al¹³⁰ found that bans on smoking in schools and other public places primarily affected the transition to more established smoking. Ohsfeldt et al⁴⁸ found more prominent effects of smoking bans on males and on those aged 25–44, and Farrelly et al⁶⁴ observed smaller reductions in smoking rates among low income compared to high income and among those aged 18–24 compared to those aged 40–65.

Implementation issues

The effectiveness of clean air restrictions will depend on how easily they may be circumvented by the smoker.⁶⁵ Glasgow et al⁶⁶ and Farrelly et al⁶⁴ have found that companies allowing smoking only in designated areas had substantially smaller effects on smoking behaviors than firms with a total ban, and Brauer and Mannetje⁶⁷ obtain consistent results for clean air laws.

Greater government enforcement and media publicity may also increase compliance with the law.⁹ Whereas voluntary compliance appears high in the United States,⁶⁸ compliance problems may arise in countries without a firm base of public support for the law.⁴⁵ Nations with high smoking rates and a lack of anti-smoking norms (especially regarding the effects of ETS) may find that compliance with strict bans is low.

Store, bar, hotel and restaurant owners, as well as tobacco manufacturers and growers, may challenge clean air laws due to a perceived negative economic impact on trade, although studies indicate minimal to non-existent impact.⁹ State laws may be used to preempt communities from implementing strict policies. There are some costs associated with enforcement, but smoking bans may reduce the number of fires, cleaning costs, and lower absenteeism and health-related costs.⁹

Clean air laws may provide a rallying point for organizing nonsmokers to lobby for policies that reduce ETS exposure. Community mobilization may increase firm compliance with strict smoking bans and provide impetus for broader tobacco control programs. Grass

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roots support for the Massachusetts and California campaigns focused on clean air issues.^{69,70}

Bottom line

A multitude of studies, using a variety of different methodologies, have found that strong smoking restrictions, whether imposed by public laws or private firms, reduced smoking behaviors. The clean air module in *SimSmoke* predicts an 11% reduction in smoking prevalence from comprehensive bans implemented with strong enforcement and media publicity.¹⁰ Work-site laws have the biggest effect, comprising 7% to 8%, with restaurant laws comprising 2% to 3%, and the school and other public places laws each comprising about 1%. A partial ban is predicted to have less than 50% the effect of a strict ban. A 60% smaller effect is predicted for smokers less than 24 years of age and older than 65 years of age than for those aged 24–65. The effects of clean air laws will also depend on how many firms already have smoking restrictions and the percent of the adult population that does not work indoors or does not work at all.

● Advertising Restrictions

Advertising and promotions can increase the attractiveness of smoking by creating an image favorable to those considering or already engaged in smoking. In the United States, policies to control the advertising and promotion of tobacco products include a federal ban on radio and television advertising, attempts to limit promotions aimed at youth, state and local bans on advertising in particular locations (eg, billboards), and on particular promotion practices (eg, distributing free samples). Other countries have had policies ranging from bans on electronic/print media to bans on outdoor and point-of-purchase advertising, as well as bans on sponsorship and other activities and strong limits on how tobacco products can be displayed.⁷¹

Evidence

Most US studies examine the impact of overall cigarette advertising expenditures on total cigarette sales, and obtain mixed results. The effects are generally not statistically significant or indicate a small effect on

smoking.^{27,71} These conclusions also apply to studies from other countries (eg, Australia, Spain, New Zealand, and the United Kingdom). Data problems and the inability to examine large changes in advertising may preclude studies from distinguishing the effects.

A separate group of studies of the US television and radio bans have again obtained mixed results,^{71,72} as have studies of other countries, most notably Organization for Economic Cooperation and Development (OECD) countries.⁷³⁻⁷⁵ However, a recent study of OECD nations by Saffer and Chaloupka⁷⁶ found that partial bans were not associated with reductions in tobacco use, but comprehensive bans on advertising and promotions were associated with a significant (6.3%) reduction in tobacco consumption.

A number of studies have found that cigarette advertising is effective in getting children's attention and in youth recall of ads.^{5,6} However, these studies may not adequately distinguish prior susceptibility to smoking as a cause of interest in ads.

Implementation issues

For advertising bans to be effective, they must be comprehensive. If applied to a small number of media, tobacco manufacturers will use a variety of other communication channels. The range of media is broad (television, radio, print, billboard, in-store displays), and may include other marketing strategies such as sponsoring sports events.

Bans on advertising have been opposed by some tobacco manufacturers,⁶ and may be opposed by organizations concerned about government restrictions on advertising. However, debates surrounding their implementation may educate the public and gain political support for other tobacco control policies.

Bottom line

Studies of the effect of advertising bans yield mixed results. *SimSmoke* predicts that a comprehensive ban will reduce smoking prevalence by 4% and reduce initiation by 6%, whereas a partial ban reduces prevalence and initiation by 2%. The larger effects on initiation reflect evidence that youth are particularly amenable to advertising.

● Product Labeling

Governments may require that manufacturers supply information about their product. A primary example is tobacco health warnings labels on the package of cigarettes. The labels may extend beyond

product packaging to print, billboard, or point-of-purchase advertising.

Evidence and implementation issues

Studies of health warnings (of the type used in the United States) indicate limited (short term) or no effects on cigarette use.^{4,77} Adults and youth were often not able to recall or ignored the messages, perhaps distracted by other imagery on the package. However, a study⁷⁸ found that tobacco sales decreased in South Africa after warning labels were required.

Canada, Australia, New Zealand, and Poland have recently required large, graphic warnings displayed on cigarette packages. Evidence from Australia⁷⁹ and Canada⁸⁰ indicates that the more prominent warnings effectively attract attention. Borland⁸¹ found a doubling of quit attempts. Less research has been conducted for low-income countries, where populations may be less informed of the health risks. Based on the effectiveness of health information policies where smoking rates are growing, Kenkel and Chen⁸² suggest coupling health warnings with other information policies (eg, government sanctioned health reports or media campaigns) in low-income countries.

Bottom line

Weak warnings appear to have little or no effect, but *SimSmoke* predicts that large, graphic warnings may reduce smoking prevalence and increase promote cessation rates by 2%. Studies have been conducted mostly for high-income countries, and effects may differ in lower income countries and for different demographic groups.

● Mass Media Policies

Anti-tobacco media campaigns were originally focused on educating consumers on the health risks of smoking. More recent campaigns have attempted to target cessation or to change social norms through generating public support for tobacco control policies. They have made use of television, radio, billboards, and print.

Evidence

Studies found that adult and youth tobacco use declined following initiation of national media campaigns launched under the Fairness Doctrine in 1966,^{6,71,83} with reductions in per capita consumption as high as 4% per year. More recent studies have examined statewide media campaigns funded by tobacco tax revenues, such as those in Arizona, California, and Massachusetts.

They have generally found declines in smoking rates and increased health-enhancing attitudes and quit attempts following implementation of anti-smoking media campaigns,^{71,83-86} although the effect sizes vary. Hopkins et al,³ in a systematic review for the US Task Force on Community Preventive Services, found that per capita consumption reductions ranged from 9.8% to 17.5%, with a median of 13%. Studies of media campaigns indicate similar success for countries other than the United States, notably Greece, Finland, Turkey, the United Kingdom, and Australia,⁷¹ but some earlier studies indicate less promising results.⁸³ Based on 7 studies of media campaigns (including from Australia and one from Finland), Hopkins et al³ reported substantial variation in the change in prevalence rates.

Some studies have examined the effect of media-based campaigns on quit rates. Burns et al⁸⁷ found higher rates of quit attempts and quit success for California and Massachusetts in the years after their tobacco campaigns began, but trends over time yielded inconclusive results. The recent cessation-oriented Arizona campaign was associated with a 20% drop in adult prevalence, some of which could be attributed to a tax hike.⁸⁶ Hopkins et al³ reported on 5 studies (including for Scotland and the Netherlands) of mass media campaigns with additional interventions for increasing cessation among recruited tobacco users. The effects varied considerably, but the median absolute change in cessation was +2.2 percentage points, which translates to a relative increase of 40% when quit rates are 5%. Hopkins et al³ found insufficient evidence of effectiveness for mass media education programs that use recurring instructional segments and (short-lived) mass media campaigns coupled with cessation contests.

Some studies have explored media campaigns directed at youth. National and state-level mass media and educational campaigns were often related to decreased smoking and/or increased health-enhancing attitudes among minors.^{3,63,66,83} Bauer et al⁸⁸ found use among Florida middle-schoolers declined by 40% and among high-schoolers by 16% over two years. Some studies of state and community level youth campaigns, however, have shown less promising results.^{83,89}

Implementation issues

The more effective campaigns appear to be those conducted in conjunction with other tobacco control policies.³ Policies such as tax increases and clean air initiatives may have a synergistic effect with mass media policies because of the media publicity (eg, in the newspaper or television) that they generate.³⁶

Farrelly et al⁹⁰ found that the amount of program expenditures reduced smoking rates above and beyond the effect of taxes, but they did not distinguish the role

of media campaigns from other expenditures. The effectiveness of a mass media campaign depends on its scale and duration.^{3,91,92} Advertising must reach smokers a sufficient number of times. Reduced effectiveness after some level of expenditures may be lessened by targeting different audiences and changing ad content. CDC⁷ recommends that states spend between \$1 and \$3 per capita per year over a sufficient period of time (eg, 3 years). Effectiveness will depend on the cost and reach of media channels.

Ad content may also affect campaign success.⁷ Studies of the Massachusetts and California media campaigns indicate that different contents have proven successful.⁸³ The more successful interventions employ a “social marketing approach” in which multiple themes are directed at specific demographic groups, followed by consumer testing and feedback, and responsiveness to that feedback.^{93,94}

Bottom line

Many studies have been conducted on media campaigns, but estimated effects vary and may depend on content, scale, and other policies in effect. *SimSmoke* predicts that well-financed, long-term media programs reduce smoking prevalence by 7% when combined with other policies,¹¹ but the effects vary with the scale and duration of the campaign. Youth-oriented campaigns may reduce youth prevalence by as much as 6.5%, but the effects are small for the overall population. Media campaigns linked to other policies, such as clean air laws or telephone hotlines, may act synergistically to help increase support for those policies and enhance their effects.

● School Education Programs

Like early mass media campaigns, early school education programs were often geared toward educating students about the harms of smoking. More recent programs have focused on teaching life skills and about the sociopolitical climate surrounding tobacco use.

Evidence

Studies of school education policies at a program level yield mixed results.^{5-7,30,95,96} Some studies find reductions in prevalence rates as high as a 50% and effects sustained as long as 5 years, but many of the better studies fail to find any long-term beneficial effect.⁹⁷ Those that indicate success generally find that they affect attitudes and lead to some short-term change in use. Most of the studies that found success examined younger students (ages 12-15) and did not examine later smoking

behaviors, including those after graduating from high school.

Implementation issues

The effects of school education programs appear to vary with the format, scope, and delivery methods. CDC⁷ and USDHHS⁶ recommend programs that focus on the social influences on tobacco use and that teach the skills to resist those influences. They also recommend that students have booster programs to maintain the effects over time. Those programs in states with active tobacco control policies or in communities with other activities or mass media campaigns appear to be more successful.^{6,7,98}

CDC⁷ estimates that the cost per student of school education programs is \$4 to \$6. School programs are not likely to face strong political opposition, except possibly with regard to content, and have sometimes been endorsed by tobacco manufacturers (www.pmusa.com).

Bottom line

Although educational programs have been strongly recommended,^{6,7} the evidence on their effectiveness is mixed and it is difficult to estimate their effect on smoking rates from current studies. *SimSmoke* does not indicate that education programs are effective except insofar as they are a part of a broader campaign (eg, with media). School educational programs may help to reinforce norms in those communities with more extensive tobacco control policies.

● Youth Access Enforcement

Youth access policies aim to reduce the sales of cigarettes to minors. They require the passage and enforcement of laws that prohibit the cigarettes sales by retailers to minors (usually individuals under age 18). Enforcement may involve compliance checks, penalties, publicity, and bans on self-service displays or vending machines.

Evidence

Reviews by Levy and Friend^{11,12} and Forster and Wolfson⁹⁹ report consistent evidence from a large number of studies that youth access policies reduced the percentage of stores selling to youth, but a smaller number of studies indicate that the effect of youth access policies on prevalence rates has been mixed. Overall, the studies provide little evidence that youth access policies are effective in terms of reducing smoking prevalence.^{100,101} However, some studies find limited success among

smokers below age 16 when retail compliance is high (ie, above 90%).

Implementation issues

Studies indicate greater retail compliance rates when there are self-service and vending machine bans, sufficient compliance checks, strict penalties, merchant awareness programs, and community mobilization. Two of the studies reporting reductions in smoking rates involved programs with heavy community participation.^{102,103} Youth get much of their cigarettes from nonretail sources, such as theft, older peers, and parents.^{83,104} As retail sales to youth are reduced, youth further switch to nonretail sources,^{83,101} suggesting the need for other policies to also target these sources.

Whereas cost may provide a barrier to implementation, the money collected through fines may help offset such concerns. Youth access policies are likely to receive little political opposition, except possibly from retail merchants. The tobacco companies have generally supported youth access policies (www.pmusa.com), but state laws may be used to preempt communities from implementing strict policies.

Studies of youth access policies provide, at best, limited support for their effectiveness. Since youth substitute nonretail sources (older peers, parents, theft) when retail access is made more difficult, *SimSmoke* predicts a maximum 25% reduction in youth prevalence with strong enforcement, stiff penalties, and heavy community participation.¹⁰⁵ However, it still takes 15 years before there are large reductions in adult prevalence.^{12,13}

● Access to Cessation Treatments

Behavioral therapies and pharmacotherapies alone have been found to roughly double, and together roughly quadruple, the likelihood of successful quitting.¹⁰⁶ Government may subsidize (eg, federal-level Medicare or state-level Medicaid in the United States or through nationalized insurance in the United Kingdom) or mandate that private insurers financially cover cessation pharmacotherapy and/or behavior treatments to increase access to these treatments.

Evidence

Based on four studies, Hopkins et al³ and Friend and Levy¹⁰⁷ found that insurance coverage of cessation treatments increased their use. Hopkins et al³ reported absolute differences in treatment use varying from 6 to 28 percentage points (with a median of 7), and that absolute differences in cessation rates ranged from 2 to 11

percentage points, with a median of 8. These studies examined varying rates of coverage, which often included restrictions on use. Schauffler et al¹⁰⁸ found that comprehensive coverage of behavioral, over-the-counter, and Rx pharmacotherapies yielded 60% higher likelihood of cessation.

Jaen et al¹⁰⁹ and Cummings et al¹¹⁰ found high rates of nicotine-patch use for low-income users in an area with community programs. Reductions in cessation treatment costs may also increase use among younger smokers who are more price sensitive.^{83,111}

The United Kingdom and New Zealand have begun to provide financial coverage of pharmacotherapies through the national health care systems. Recent evidence indicates that coverage in the United Kingdom has increased quit attempts, the use of pharmacotherapies, and successful (based on a 4-week follow-up) quits⁶¹ (www.doh.gov.uk/public/sb0132.htm). Stringent regulations of product availability (eg, limits on products, prescription requirements, etc.) may also inhibit access.¹¹² In low-income countries, higher treatment costs and a lack of information about products may inhibit the adoption of policies.¹¹²

Implementation issues

The effects of access policies may depend on the type of treatments covered and restrictions on use. Programs requiring counseling with pharmacotherapy use may provide more information, guidance, and support to the smoker, but reduce the convenience. An approach that gives the patient treatment options (eg, over-the-counter therapies alone) increases use,¹¹³ but may lack the support and guidance that could be ideally provided by a health care worker.¹¹⁴

Public policies may be implemented as mandates or through government subsidized coverage. Research on their effects is limited.¹⁰⁷ Those health care providers who begin counseling their patients under mandate may be less inclined or able to faithfully follow recommended procedures. Similarly, treatment may be less effective if less committed smokers are induced to try treatments.

Cessation policies may also be more effective when combined with other policies. Tauras and Chaloupka¹¹ have found that lower prices for cessation treatments and higher cigarette prices encourage cessation treatment use. Media campaigns that encourage treatment, use of quit lines or encourage health care providers to screen patients and channel patients to use effective treatments may also encourage cessation. Hopkins et al³ reviewed two studies that found that provider education programs alone led to 5.5 and 1.7 absolute percentage increases in the quit rate. When combined with provider reminder systems, six studies of educa-

tion programs yielded absolute percentage increases in quit rates ranging from -6 to 39 percentage points, with a median of 4.5. However, the Community Intervention Trial for Smoking Cessation, a series of community programs that encouraged interventions by health professionals, work-site activities, and community programs, yielded no effect on heavy smokers and only a 3% increase in quitting among light smokers.¹¹⁵ Studies of a cardiovascular disease prevention program in Finland and a rural program in India found more dramatic effects.¹¹²

Studies indicate that cessation treatments are cost-effective relative to other preventive treatments, yet health care payers and providers are often skeptical.⁵¹ Treatment may also be particularly important in helping low income and heavier smokers to successfully quit.

Bottom line

Although there is considerable evidence on the effectiveness of tobacco cessation treatments, direct evidence on the population effect of government policies to encourage quitting and treatment use remains at its early stages. Under current levels of US coverage, *SimSmoke* predicts a 25% increase in the quit rate with broad treatment coverage and requirements of physician involvement.¹⁴ This leads to a 2% relative reduction in the prevalence rate after 5 years and 3.5% reduction after 10 years. Policies that only mandate physician brief intervention further reduce prevalence rates by 1.5% after 10 years.

● Telephone Quit Lines

Telephone quit lines conveniently provide smokers advice and support through the quitting process. Mass media publicity may encourage participation and target specific smokers. Quit lines may be integrated into a health care system or operated as a separate program by government.

Evidence

Telephone counseling has been studied in a variety of settings with diverse populations.¹¹⁶ Hopkins et al³ identified 32 studies of quit lines, most of which had other components such as education materials or pharmacotherapy. These studies reported absolute percentage differences in cessation rates from quit line participation ranging from -3.4 to 23 percentage points, with a median of 2.6 percentage points (which imply about a 50% relative increase in quit rates if quit rates were 5% in the absence of quit lines). Six studies that compared

telephone support and patient education to patient education alone provided similar results (absolute percentage differences varying from 0.9 to 6.3 percentage points with a median of 2.4 percentage points). Five of the six studies evaluated proactive telephone support systems and obtained relative percentage differences in cessation of 41%. Fiore et al¹⁰⁶ and Lichtenstein et al¹¹⁷ found a 20% higher likelihood of successful quitting based on their meta-analyses. The studies include programs in Australia, Canada, England, and Scotland.^{116,118}

Studies also indicate quit lines are effective with smokers of all ages and most racial/ethnic groups.³ However, some groups (eg, men)^{119,120} appear to make less use of these services, and some low-income smokers may not have ready access to phones.

Implementation issues

Quit lines are convenient for the smoker because they require no travel and expense and may also be less intrusive to some than face-to-face counseling.¹¹⁶ They may be combined with programs that provide pharmacotherapy and an option of face-to-face counseling.¹¹⁶

Quit lines are a relatively inexpensive way to provide advice.^{3,7,118} They may be centralized to reduce costs, but use may be low in the absence of publicity³ or in populations with limited telephone access. Quit lines advertised as part of a mass media campaign appear to be most successful¹¹⁸ in reducing population quit rates.

Bottom line

Many studies have found that quit lines are effective, especially when publicized through a media campaign, but estimates of their effectiveness vary. *SimSmoke* predicts substantially increased quit rates of those who call, but relatively small effects on overall smoking prevalence due to their generally low participation rates (less than 5% of smokers). However, evidence indicates that quit lines are a cost-effective way to increase cessation.³

● Summary and Conclusions

Summary

Table 1 provides a summary of the effects of different policies, the strength of evidence, the sociodemographic groups most affected, and issues that arise in the implementation of policies. The policies are ordered in terms of their likely importance.

A large increase in cigarette taxes and the passage of comprehensive clean air laws are the cornerstone of strategies that have been successful in reducing smok-

ing rates. Each has the potential to reduce smoking prevalence by 10% or more. A substantial tax is likely to have a larger and relatively immediate effect on the young and on lower income smokers. Work-site restrictions have a more pronounced effect on male, middle age, and higher income workers, unless those workers are already working in firms covered by voluntarily imposed smoking restrictions. Concerns about ETS have been important in mobilizing nonsmokers to advocate further tobacco control policies. Tax revenues may be earmarked for other tobacco control policies.

A mass media campaign provides the third prong in successful tobacco control strategies. A campaign of large enough scale and duration has the potential to further reduce smoking prevalence by 5% to 10%. Media campaigns may also publicize other programs, such as cessation or youth policies, or target to those groups which have the highest smoking rates.

Government cessation policies, such as financial coverage of treatment or quit lines, may also play an integral role in an effective strategy. These policies, initially, may have relatively small effects on smoking prevalence, but the effects grow over time and may help heavier smokers who have the most difficulty in quitting smoking.

Evidence on the effects of advertising bans and warning labels is mixed, but a recent study indicates that comprehensive advertising bans may reduce smoking rates by 6% and that bold, large, and graphic labels may increase cessation. In addition, strict advertising bans and warning labels have been adopted in nations that have been successful in their tobacco control efforts and may be important in low- and middle-income nations with growing smoking rates.

Evidence on youth access enforcement and school education programs is mixed, but they may be easiest to get implemented. Their effect on overall smoking rates, however, is likely to be small if implemented without other tobacco control policies that affect non-retail sources of tobacco to youth.

The interrelationship of tobacco control policies

While we have focused on individual policies, the most successful tobacco control strategies appear to involve multiple policies implemented as part of a comprehensive strategy.^{6,121,122} Multiple policies may act

While we have focused on individual policies, the most successful tobacco control strategies appear to involve multiple policies implemented as part of a comprehensive strategy.

TABLE 1 ● Summary of policy effects and issues in implementation

Policy	Effect on quit rates*		Effect on prevalence rates		Strength of evidence	Subgroups affected	Implementation issues
	Strength of evidence*	Few studies	Strength of evidence*	25% price increase yields a 7% decrease in the initial years increasing over time to 14%†			
Taxes/price	10% increase in price yields a 3–5% increase in quit rates	Few studies	25% price increase yields a 7% decrease in the initial years increasing over time to 14%†	Strong, many studies, many different nations, relatively consistent evidence	Larger effects on youth and low-income smokers	Effects depend on the size of the tax hike and initial price. Generates funds that may be earmarked for other tobacco programs. Likely to be strongly opposed by tobacco industry, may be some increased smuggling for large tax increases.	
Clean Air Laws	Unclear from studies but many find significant effects	Studies obtain a wide range of results, effect appears to increase with time	7–8% decrease for work site ban, 3–4% for restaurant and other public place bans, 11% for comprehensive bans†	Moderate-strong, many studies for high income nations, studies generally find effects, but effect sizes vary	Larger effects on high income, male and ages 24–54, but depends on private restrictions in place	Strict bans may require publicity and enforcement in areas without strong anti-smoking norms. Second-hand smoke issues may mobilize political support for other programs. Likely opposition from the tobacco and some other businesses.	
Media campaigns	40% increase for cessation oriented media campaigns	Moderate, most studies obtain significant results but effect sizes vary	7% decrease when sufficiently funded and combined with other policies†	Moderate, most studies obtain significant results but effect sizes vary, and may depend on other policies in effect	Unclear, may have smaller effects on youth	Should be of sufficient scale and duration, and content should be tested. Most effective when combined with other policies. Inexpensive way to reach many people. May be challenged by tobacco interests.	
Expanding access to cessation treatment	5–25% increase depending on the breadth of coverage†	Low, especially regarding the long-term effects	1–2% reduction after 2 years depending on coverage breadth†	Low, especially regarding the long-term effects	Low income and heavy smokers	Effects may depend on the restrictions placed on users, and support to health care providers. Depends on health care payers and providers support.	

(continues)

TABLE 1 ● Continued

Policy	Effect on quit rates*		Effect on prevalence rates		Strength of evidence	Subgroups affected	Implementation issues
	Effect on quit rates*	Strength of evidence*	Effect on prevalence rates	Strength of evidence			
Telephone hotlines	20–40% increase by users	Moderate, effect sizes vary and long-term effects not well known	<1% reduction in the first year, but more in future years [†]	Unknown, depends on extent of reach	Affects most smokers, but may be tailored to specific groups	Most effects when well publicized. May be coordinated with more extensive cessation programs. Found to be cost effective.	
Advertising restrictions	Not studied	—	4% reduction but increasing to 6% over time [†]	Moderate-low. Studies obtain mixed results	Youth are found to recall ads, which are associated with more prosmoking attitudes	Low cost, but requires comprehensive ban. Political concerns may help mobilize support for other programs. Likely opposition from the tobacco interests.	
Warning labels	One study found that quit attempts doubled	No studies examine successful cessation	May be 2% effect for large graphic warnings [†]	Low, mixed results, and few studies in recent years	May be most effective in low-income countries	Requires large graphic warnings. May be supplemented with information campaigns. Likely opposition from tobacco interests.	
Youth access policies	Not studied		A maximum 25% reduction in youth smoking rates, but small immediate reductions in overall smoking rates [†]	Low/moderate, but stronger support for policies involving heavier community participation	Youth, especially those below age 16	Requires strong enforcement. Appears most effective when conducted with more extensive community campaigns. Costs may be impeding, likely to face little political opposition.	
School education programs	Not studied		Indeterminate	Low-moderate. Many studies, but results are mixed, and do not examine long-term effects	Below age 16	Content may be important, programs may be more effective in communities with other tobacco policies. Likely to face little political opposition.	

NR = not relevant.

*Effects are measured in percentage terms relative to the initial rates: (post-intervention rate - pre-intervention rate)/pre-intervention rate.

[†]Indicates based on *SimSmoke* computer simulation model (see references in text).

synergistically to shape individual attitudes and societal norms toward smoking. Tobacco control policies may also need to be of sufficient number and importance for smokers to overcome the addiction to smoking, so that they are able to quit. Evidence indicates that “hard-core” smokers are being affected in states with potent strategies.¹²³ One reason for implementing different policies is that they affect different demographic or smoking groups. For example, clean air laws may primarily affect adult smokers who smoke heavily, while youth access policies affect younger smokers. To the extent that there are fewer older smokers, youth may have one less source for getting cigarettes when retail sources become less accessible. By targeting different groups, they have complementary effects and reduce disparities in smoking behaviors. Although evidence indicates that there are synergies in combining policies, the number of additional smokers that are induced to quit might at some point be reduced, as new policies are implemented or existing policies are made more stringent. Some smokers may be less susceptible to quitting, because they are more addicted.

Other policies and factors

We have not considered several policies within the confines of government. For example, federal agencies in the United States currently regulate the content and marketing of pharmacotherapies. Evidence on the effects of making products more readily available (eg, as over-the-counter rather than prescription) suggests a benefit, though these benefits have not yet been observed in state-level population effects studies.^{113,124} In various countries, federal agencies have attempted to regulate the size and number of cigarettes sold in a pack, where cigarettes can be sold, and limits on tar, nicotine, and other harmful substances in the cigarettes. The desirability of allowing “safer cigarettes” has been questioned, since these products may keep smokers addicted to the products¹²⁵ and evidence to date has shed little light on the strength and character of these effects.

Certain policies often occur outside of government. For example, the effect of litigation directed against tobacco manufacturers has not been studied, but may affect smoking rates.⁶ Recent United States experience suggests that large settlements against tobacco manufacturers led to higher cigarette prices^{38,126,127} and may generate publicity that affects attitudes towards smoking.

Government may encourage private firms, households, or nongovernment community groups to voluntarily implement smoking bans. Farkas et al¹²⁸ found that home bans were associated with increased cessation and reduced quantity smoked. Pierce et al¹²⁹ and Wakefield et al¹³⁰ found that youths in homes with

smoking bans were less likely to be smokers. The effect of community education programs in encouraging these voluntary bans has received little attention.³

Tobacco control policies may generally be made more effective if they are supported by government agencies and advocacy groups. Active support by these groups may increase public support and compliance with the laws. Evaluations of existing programs may be needed to justify their continued existence or growth.¹³¹ While there is strong evidence that certain policies are generally effective, it may be necessary to show their effect on smoking rates and health outcomes in the nation, state, or community in which they are implemented. Evaluation may also help to determine which groups are being affected and how existing policies may be better implemented.

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