SMOKING AND TOBACCO CONTROL

MONOGRAPH

Population Based Smoking Cessation

Proceedings of a Conference on What Works to Influence Cessation in the General Population

U.S. DEPARTMENT OF HEALTH
AND HUMAN SERVICES
Public Health Service
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Smoking and Tobacco Control Monographs Issued to Date

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Acknowledgments

Population Based Smoking Cessation: Proceedings of a Conference on What Works to Influence Cessation in the General Population was developed under the editorial direction of **Donald R. Shopland**, Special Expert, Tobacco Control Research Branch, National Cancer Institute, Bethesda, Maryland.

This monograph is the result of a conference and set of analyses commissioned and funded jointly by the National Cancer Institute and the Tobacco Control Section of the California Department of Health Services. The conference was held on June 8 and 9, 1998 in San Diego, California. Draft sections of this volume were subjected to peer review and revision, and the resultant draft of the entire volume was also subjected to peer review and revision.

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We gratefully acknowledge the following distinguished scientists, researchers, and others, both in and outside the Government, who contributed critical reviews or assisted in other ways:

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The editors and STCP staff members gratefully acknowledge the following individuals at the **Tobacco Control Policies Project**, **University of California San Diego**, San Diego, California, for their assistance with the scientific data and preparation of the manuscript:

Sharon Buxton
Administrative Assistant

Robert W. Davignon, M.S.
Production Editor

Don F. Harrell
Administrative Assistant

Kristina M. Webb
Project Assistant

Finally, the editors and the STCP staff members would like to acknowledge the contributions of the following staff members at **KBM Group, Inc.**, Silver Spring, Maryland, who provided technical and editorial assistance in the preparation of this monograph:

Brian E. Steyskal
Editor/Graphic Designer

Cynthia M. DeLano
Assistant Editor

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Analyses of the data presented in this volume were supported, in part, by a contract from the Department of Health Services, Tobacco Control Section (Contract #96-26468). The analyses, interpretations, and conclusions are those of the authors, editors and are the result of the peer review process used to produce this volume. They are not necessarily those of the California Department of Health Services.

Contents

Smoking Cessation: Recent Indicators of What's Working at a Population Level

David M. Burns

INTRODUCTION AND OVERVIEW

Smoking cessation is the principal means by which a current cigarette smoker can alter his or her future risk of disease (U.S.DHHS, 1990). Prevention of smoking initiation among adolescents can reduce smoking prevalence, but adolescents contribute little to rates of smoking-related illness until they have been smoking for 30 or more years.

Cessation is often examined at the individual level in order to determine the effects of cessation interventions or to define individual predictors of who will or will not be successful in their cessation attempts. However, for these individual effects to create a substantive public health benefit, they must sum to create a significant change at the population level. Powerful interventions that affect only a few individuals will have little impact on disease rates, whereas weaker interventions that impact large numbers of smokers will have important and cumulative effects on disease rates. In addition, many interventions (*e.g.,* price increases, changes in social norms, etc.) are delivered to the population as a whole rather than to individual smokers one at a time, and it is these population-based interventions that have formed the core of the tobacco control efforts currently underway in California, Massachusetts, and several other states.

This volume examines cessation at the population level. By population level, we mean that all segments of society form the denominator for evaluation of the effectiveness of tobacco control interventions. Therefore, this volume relies heavily on representative surveys of smoking behaviors in state and national populations. By doing so, it defines measures of cessation that can be used to assess the effects of tobacco control programs or public policy changes on smoking behavior. It then uses those measures to identify who is quitting, who is being successful, who is being exposed to various tobacco control interventions, and which tobacco control interventions are proving effective.

Can We Change Cessation Rates in the Population?

A persistently high smoking prevalence (CDC, 2000), coupled with the low rates of success of those trying to quit, is discouraging to those interested in tobacco control and has led to suggestions that tobacco control efforts should be redirected to focus predominantly on preventing smoking initiation during adolescence. This pessimism is not supported by actual experience with smoking cessation over the past several decades. Currently, almost 50 percent of all of those who have ever smoked are former smokers (CDC, 2000).

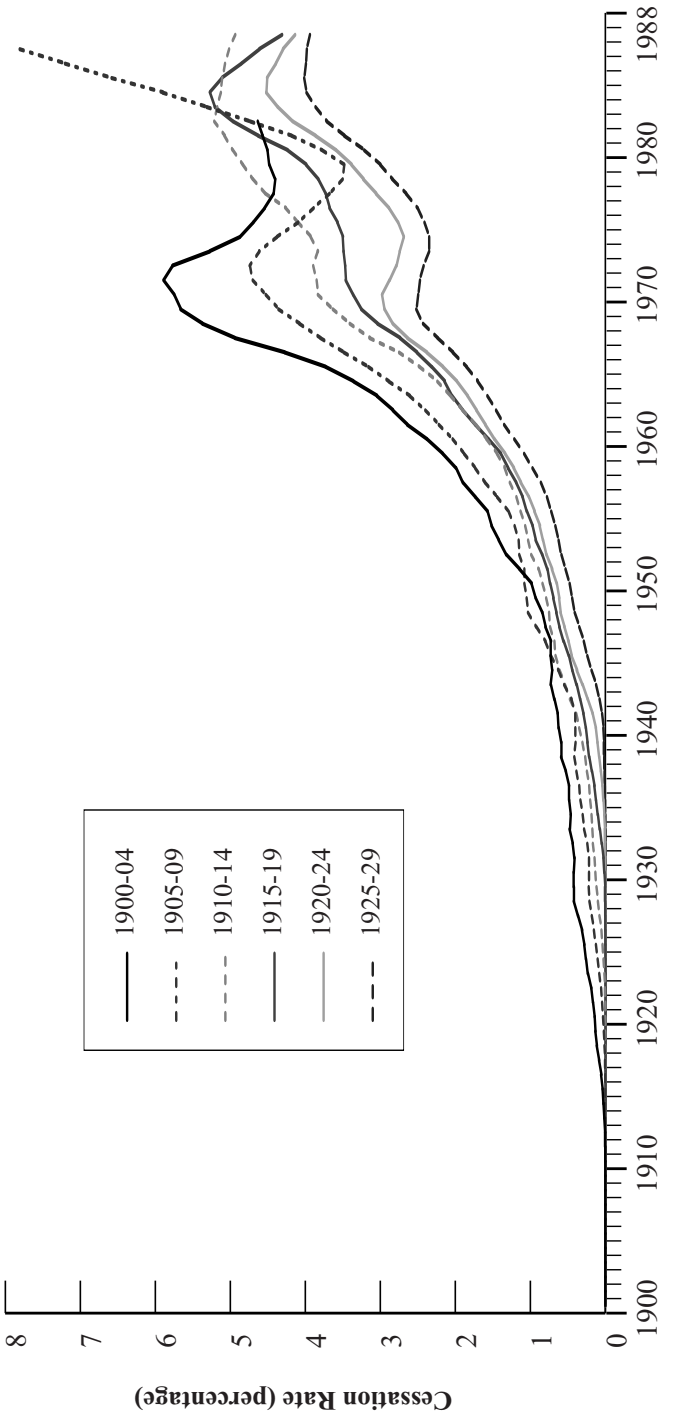
This high rate of cessation is neither accidental nor a result of the aging of the smokers in the population, nor is it due to other demographic shifts. Figure 1-1 presents cessation rates for White males born during sequential 5-calendar-year periods (birth cohorts) as they advance in time (and age) over the period from 1940 to 1988. Prior to the mid 1950s, cessation was uncommon at any age. With the scientific demonstration of the risks associated with smoking during the mid-1950s, and with widespread press coverage of lung cancer risks for smokers, cessation rates began to increase (Figure 1-1).

These observations provide strong evidence that cessation is not simply a naturally occurring consequence of aging. It has changed dramatically across all age groups following identification of, and widespread education about, the risks caused by smoking. Some individuals clearly do respond to risk information with a change in behavior, and the number of individuals responding is sufficient to influence cessation rates in the population; but the size of the effect on the population is modest and leaves the vast majority of smokers continuing to smoke.

Data on cessation rates over time also suggest that public health efforts to change smoking behavior can have an effect above and beyond the effect of information on risk alone. During the period from 1967 to 1970, anti-smoking television spots were broadcast in large numbers as a result of an FCC ruling that required the spots as a fairness doctrine in response to broadcast cigarette advertising (U.S.DHHS, 1989; Warner, 1989). Together with this counter-advertising, there was a substantial effort on the part of many professional and voluntary health organizations to help smokers quit. The result of this media-led activity was a substantial increase in cessation rates across all age and racial groups and in both genders (Burns *et al.*, 1997). When cigarette advertisements were removed from the broadcast media, and anti-smoking spots nearly disappeared as well (Lewit *et al.*, 1981), cessation rates leveled off or declined. The temporal association of change in cessation rates with these events strongly suggests that deliberate programmatic efforts *can* alter smoking behavior at the population level and provides one cornerstone of the foundation for current comprehensive tobacco control campaigns.

Since the 1970s, our understanding of effective tobacco control strategies has gradually shifted away from a focus solely on the individual smoker and toward a focus on changing the environment within which the smoker smokes (NCI, 1991). Initial efforts focusing on educating the smoker and providing clinic-based cessation assistance have been augmented by efforts to change community norms, increase the cost of cigarettes, restrict where smoking is allowed, and provide societal based persistent and inescapable messages to quit coupled with support for cessation. This shift is toward -multi-component programs that address norms as well as the needs of individuals. These concepts are reflected in the current state-based comprehensive tobacco interventions funded by the NCI, Centers for Disease Control and Prevention (CDC), and Robert Wood Johnson Foundation (CDC, 1999a). In California and Massachusetts, these comprehensive approaches have been funded at substantial levels for several years

Figure 1-1
Annual Smoking Cessation Rates by Calendar Year for 5-Year Birth Cohorts of White Males Born between 1900 and 1929



NHIS Data
Burns et al., 1997

(since 1989 in CA, and 1993 in MA). More recently, Arizona, Oregon, and Florida have developed programs, and the Master Settlement Agreement between the State Attorneys General and the tobacco industry will provide resources that some other states may use to initiate their own programs.

The programs in California and Massachusetts have been associated with reductions in various measures of smoking behavior (Biener *et al.*, 1997; Pierce *et al.*, 1998), and their program elements are being replicated in other states. This volume examines what we know about the components and the effects of these existing programs in an effort to provide guidance to states as they develop or modify their own tobacco control campaigns. The analyses presented here are limited to the areas where we have data, and this limitation makes it difficult to evaluate every aspect of the current programs. In particular, the community organization components of the programs—widely accepted as a critical foundation for any successful tobacco control effort—are difficult to quantify and, therefore, are examined only in passing in this volume.

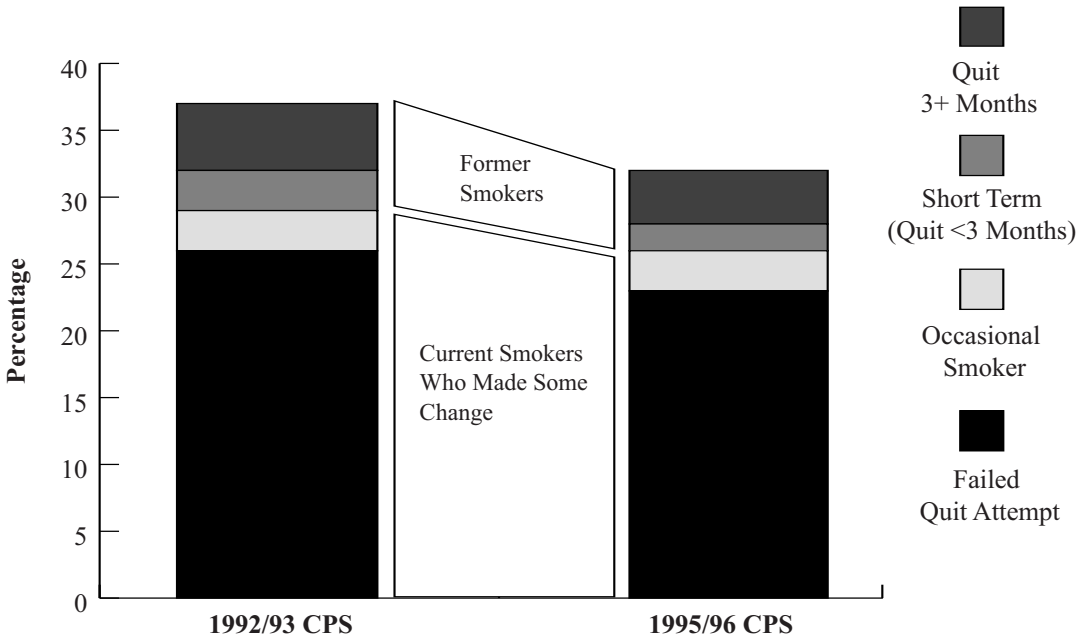
Measures of Cessation and Changes in Cessation Nationally

Traditional measures of cessation include cessation attempts, and measures of cessation success for various periods of time following a quit attempt, as well as cumulative measures of cessation such as the fraction of ever smokers who are currently former smokers. The cessation measures presented in this monograph differ somewhat from these traditional measures in order to improve their utility in evaluating different components of tobacco control programs. Traditional survey measures of cessation are intended to measure rates of cessation in the entire population of smokers and, therefore, must include all smokers in the denominator. We limit our analyses to those smokers of age 25 and older to ensure that changes in observed behavior are not related to the smokers still being in the process of becoming regular smokers. For similar reasons, and because occasional smokers may respond differently to a question about being off cigarettes for 24 hours or more (the definition of a quit attempt), we eliminate all those who were not daily smokers 1 year prior to the survey.

The goal of these limitations is to relate recent exposures to tobacco-control influences to recent cessation behavior; thus, cessation activity within the last year is the focus of all of the measures. During the year preceding the survey, individuals who were daily smokers 1 year prior to the survey may have quit and relapsed, may have become an occasional smoker, may have become a former smoker, or may have become a former smoker of 3 or more months' duration. This set of measures allows examination of cessation attempts and cessation success as separate measures, and it allows independent assessment of those factors that promote cessation activity and those factors that enable cessation success.

Figure 1-2 presents the above measures for the United States as measured by the Current Population Survey (CPS) for the years 1992/93 and 1995/96 (see Chapter 2). There is a clear and statistically significant decline in cessation activity and cessation success between these two surveys. The decline is statistically significant for each of the measures of cessation activ-

Figure 1-2
1992/93 and 1995/96 CPS: Percentage of Daily Smokers (Age 25+ Years) 1 Year Prior to the Survey Who Reported Some Change in Their Smoking Status during that Year



ity and cessation success, with the exception of "becoming an occasional smoker." The decline is present for both genders and for all age, race, and educational groups. The decline in cessation is proportionately greater among those with higher levels of income. This decline in cessation contributes to the observed absence of a decline in per-capita cigarette consumption in the United States during those same years and is a major public health concern (CDC, 1999b).

When the demographic correlates of cessation are examined in the CPS (see Chapter 2), smokers aged 65 years and older are much less likely to make a cessation attempt than younger smokers, but they are much more likely to be successfully quit for 3 or more months. Thus, older smokers appear to be less likely to attempt to change their smoking behavior, but when they do, they are substantially more likely to be successful. Differences between racial and ethnic groups are less pronounced. African-Americans have significantly higher rates of cessation activity than non-Hispanic Whites, but they also have significantly lower rates of being quit for 3 or more months. Asian/Pacific Islanders also have significantly higher rates of cessation activity compared to non-Hispanic Whites, with a non-significant lower rate of 3+ month cessation success.

Rates of both cessation activity and 3+ month cessation success are significantly higher among smokers with higher levels of educational attainment. A similar pattern is seen with level of income, where both cessation activity and 3+ month cessation success are significantly higher among

smokers with higher family incomes. The percentage of all cessation activity that has resulted in 3+ months of successful cessation is relatively uniform across the middle strata of family income, but it is higher for the top income stratum and lower for the lowest income stratum.

There is a clear decline in cessation activity with increasing number of cigarettes smoked per day; however, the picture for cessation success is less clear. Those who reported smoking 1-4 cigarettes per day 1 year prior to the survey were significantly more likely to be successfully quit for 3+ months than were smokers who reported smoking 5-14 or 15-24 cigarettes per day. However, once the category of 1-4 cigarettes per day is excluded, there is no trend of lower likelihood of 3+ month successful cessation with increasing number of cigarettes smoked per day across the remaining number of cigarettes per day categories. These data suggest that, within that group of smokers who are likely to be dependent smokers (those who smoke 5+ cigarettes per day), heavier smokers are less likely to attempt to quit. However, when these heavier smokers do attempt to quit, they may be as likely to be successful in that attempt (*i.e.*, quit for 3 or more months) as those who smoke less than one pack per day. These cross-sectional data need to be interpreted with caution in the light of other data from a 5-year longitudinal follow-up of current smokers in the COMMIT study (Hymowitz *et al.*, 1997), which show a consistent decline in successful cessation with increasing number of cigarettes smoked per day. The reasons for the differences between these two forms of analyses are unclear.

Comparison of California and Massachusetts to the Remaining States

Since California and Massachusetts have conducted large, well-funded tobacco control interventions over the period covered by the Current Population Surveys, one measure of the success of these tobacco control efforts is to examine whether cessation rates are higher in these states compared to the remaining states where interventions have been more modest. Because smoking prevalence and cessation are influenced by differences between states in demographic characteristics and number of cigarettes smoked per day, we examined measures of cessation using multivariate logistic regression analyses to control for those variables (see Chapter 2).

Both California and Massachusetts had statistically significantly higher cessation activity compared to other states. Massachusetts had an increase in cessation attempts, and California had an increase in the likelihood of becoming an occasional smoker. Both Massachusetts and California also had increases in the likelihood of becoming a former smoker in the last year compared to other states. The likelihood of achieving 3+ months of cessation success was also significantly higher in California, and higher with borderline significance ($p = 0.051$) for Massachusetts, when compared to the remaining states.

These analyses demonstrate that California and Massachusetts had higher rates of cessation activity and cessation success when compared to the remaining states, and that the decline between surveys in cessation rates (particularly 3+ month successful cessation) is less in California than in the remaining states. While a national trend toward lower cessation

activity occurred between 1992/93 and 1995/96, the impact of this trend was less pronounced in California and Massachusetts than in the remaining states. The higher rates of cessation activity and cessation success in California and Massachusetts provide evidence for a substantial impact of the tobacco control programs on cessation in these two states.

WHAT WORKS The differences in cessation activity and success that exist in California and Massachusetts may support an overall effect of tobacco control programs on cessation, but they do little to define which components of the programs are working. In reality, it is probably never possible to definitively define the specific causal effects of a specific component of any of these programs because they are not delivered in isolation and because many of their effects may be created by synergistic interactions between program elements. However, by examining differences in cessation behaviors among individuals exposed or not exposed to different program elements, it is possible to identify those program components associated with increases in cessation activity and success. In addition, there are substantial variations across the states in public policies on tobacco, including taxes and restrictions on where people can smoke, and these differences can be compared to differences in rates of cessation to examine the association of these public policies and cessation.

Demonstrations of association do not meet traditional standards for defining causal relationships. The randomized controlled trials needed to define a cause-and-effect relationship are impossible to undertake for most public policy changes, especially taxation. However, the linkage of policy/program exposure to successful cessation provides valuable assistance to those developing and refining tobacco control programs. Analyses can define both the reach of these components into the smoking population and the ability of the programs to affect under-served segments of the population. They also define the changes in the smoking behavior of smokers exposed to each policy. The combination of reach and effect generates an estimate of the likely public health impact of each component, and estimating the impact for the population can aid those who are responsible for program design in allocating resources across the various components of a comprehensive tobacco control strategy.

Public Policy Components Changes in public policies on tobacco can affect large numbers of individuals at minimal cost. Increasing the cost of cigarettes through taxation (Chapter 6) and restrictions on smoking in the workplace (Chapter 3) are two public policy changes for which substantial bodies of information exist to define their effectiveness.

Changes in the cost of cigarettes repeatedly have been demonstrated to be associated with a reduction in measures of total and per-capita consumption of cigarettes, and most studies have shown a relatively consistent 4 percent decline in consumption for each 10 percent increase in price. More limited data are available for cessation, but there is a similarity in the annual changes in sales-weighted price of cigarettes and changes in calendar-year rates of 1 year successful cessation. In addition, when differences across states in cost of cigarettes are compared to differences in state-specific rates

of cessation activity and success, controlling for differences in demographic factors and number of cigarettes smoked per day, there is a statistically significant association between higher cost and higher rates of both cessation activity and cessation success. These observations support the probability that an increase in the cost of cigarettes can influence not only short-term cessation attempts but also long-term cessation success.

Recently, there has been a dramatic increase in the fraction of the working population protected by total bans on smoking in the workplace—from 3 percent in 1986 to 64 percent in 1996. Multiple workplace observations have demonstrated that instituting a change in workplace smoking restrictions is accompanied by an increase in cessation attempts and a reduction in number of cigarettes smoked per day by continuing smokers. Once restrictions on smoking in the workplace have been successfully implemented, they continue to have effects. Observations from the longitudinal follow-up in the COMMIT trial and from cross-sectional data from the CPS both demonstrate that being employed in a workplace where smoking is banned is associated with a reduction in the number of cigarettes smoked per day and an increase in the success rate of smokers who are attempting to quit (see Chapter 3). There may also be a small effect of increasing the frequency with which smokers attempt to quit. General environmental norms about smoking may also play a role in promoting smoking cessation, since multivariate logistic regression analyses of the effect of workplace restrictions on smoking show small independent effects on cessation activity and success for both the actual restrictions in the smoker's workplace and for the average level of workplace restrictions in the state as a measure of the social norms regarding smoking (Figure 1-3).

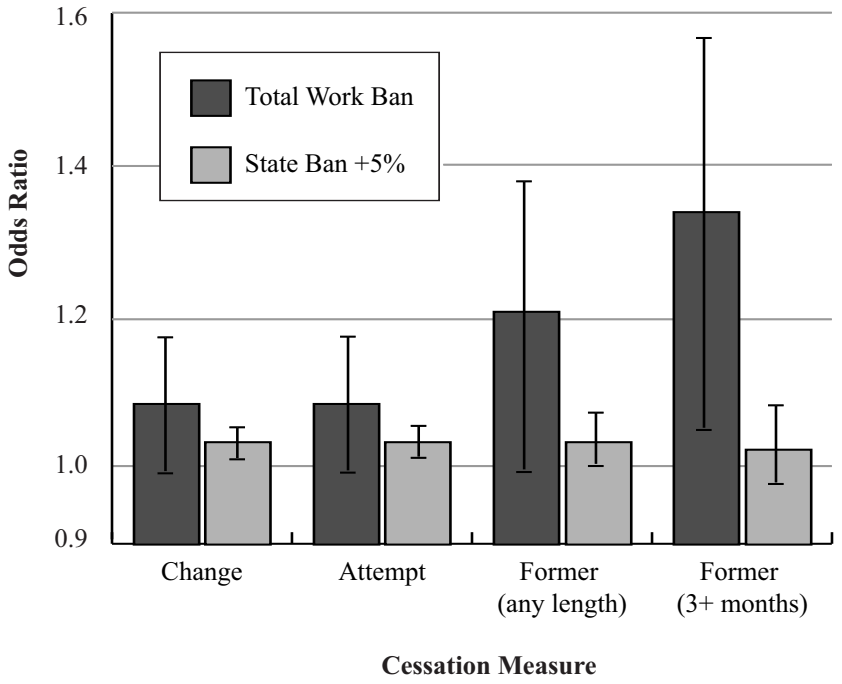
Pharmacological and Health Care Systems Interventions

The health care system has long been recognized as a logical and potentially productive means of reaching smokers with a cessation message and promoting their successful cessation. Approximately 70 percent of smokers see a physician each year, creating the potential to reach large numbers of smokers with a cessation message. The fraction of patients who report having been advised in the last year by their physician to quit smoking remains too low, but it has been increasing over time and now exceeds 50 percent of smokers.

A variety of pharmacological approaches to smoking cessation have been approved by the FDA over the last two decades, including nicotine replacement therapy with gum, patches, nasal and oral inhalers, and bupropion. The patch and gum have been approved for over-the-counter sale since 1996.

Both physician advice and pharmacological treatment have been established in controlled clinical trials to have a substantive effect on long-term smoking cessation, and this volume addresses the evidence for an effect at the population level. Once these interventions move beyond the controlled investigational setting where there is careful attention to the intervention protocol, it is likely that they are used in isolation, without the additional support provided in the clinical trial, and without such support, they may be less effective. Analyses of cessation activity and success among those

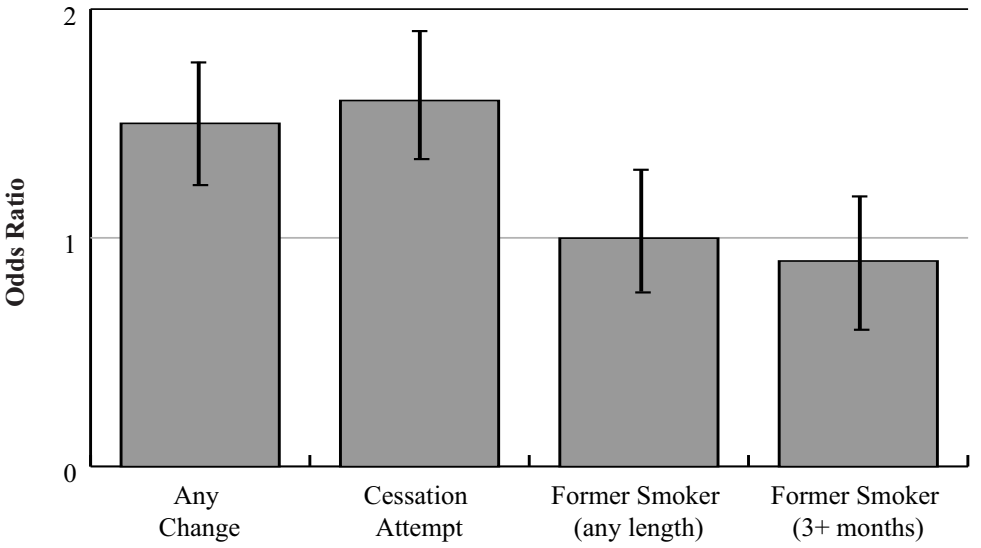
Figure 1-3
Odds Ratios for Cessation Activity and Cessation Success for Smokers Working in Workplaces where Smoking Is Banned or Living in States where there Is High Prevalence of Workplace Smoking Bans—Data Source: 1995/96 CPS



who were daily smokers 1 year prior to the 1996 California Tobacco Survey suggest that this may indeed be the case. When multivariate logistic regression analyses are performed on physician advice to quit, controlling for age, gender, level of education and income, race/ethnicity, and number of cigarettes smoked per day, there is a significant increase in the likelihood of making any change or making a cessation attempt among those receiving physician advice to quit, but there is no effect on likelihood of being successfully quit or being quit for 3 or more months (Figure 1-4). These data suggest that physician advice to quit in the real world is having an effect on cessation attempts, but little effect on long-term cessation success.

A similar, but more encouraging, picture is evident when population data on the effect of nicotine patches and gum on cessation activity and success are examined. About 21 percent of those who tried to quit during the year previous to the 1996 California Tobacco Survey reported using nicotine patches or gum. When the current smoking status of all those who had made a quit attempt in the last 12 months is examined by the method of cessation assistance they reported using, 17 ± 2 percent of those who reported using no cessation assistance were former smokers at the time of the 1996 California Tobacco Survey. Of those who reported using patch or gum, either alone or in combination with other methods, 32 ± 5 percent were former smokers at the time of the survey. When the data were ana-

Figure 1-4
Multivariate Logistic Regression Analysis of Physician Advice to Quit on Cessation Activity and Success, Controlling for Gender, Race/Ethnicity, Education Level, Income Level, and Number of Cigarettes Smoked per Day—Data Source: 1996 CTS



lyzed for those who had been quit for 3+ months at the time of the survey, results were less impressive (11.2 ± 2.6 percent for any use of patch or gum versus 9.7 ± 0.7 percent for no methods). The results for 3+ month cessation were not statistically different, possibly due to the small number of observations. Thus, examination of population-based data on gum and patch use suggest that they are a part of a large number of cessation attempts and are likely to make a substantive difference in the success rate of those attempts. However, the rates of success in the California population are well below those demonstrated in clinical trials, which suggests that there is substantial potential to increase both utilization of nicotine replacement products and the impact of these products on the success rate of smokers trying to quit.

The gap between the effect achieved in clinical trials and the population data defines the potential that can be achieved if these modalities are delivered in a more comprehensive and organized manner and integrated with the other available cessation resources. If physician advice achieves the effectiveness demonstrated in clinical trials, it could result in as many as 750,000 additional quits among the 35 million smokers who visit their physicians each year. If the success rate of pharmacological interventions matched that in the clinical trials, as many as 500,000 additional quits each year could be achieved, and an even greater number could be expected if larger numbers of smokers who are trying to quit could be persuaded to use pharmacological methods.

One approach to improving the results seen with physician advice and pharmacological interventions is to increase the fraction of smokers who receive advice or use cessation assistance. However, a great deal of research and programmatic support has already been committed to increasing the frequency with which physicians advise their smoking patients to quit, and this effort has shown a substantial increase in the fraction of patients who report that their physicians have advised them to quit. Independently, pharmaceutical companies have advertised the availability of cessation treatments extensively, which has resulted in substantial demand for and use of these interventions. Both of these efforts should continue, but it is not clear that additional resources would add to the number of individuals encountering either of these interventions, and given the limited evidence for a population-based effect on long-term cessation for either of these interventions as they are currently practiced, allocation of additional resources may not be appropriate.

The principal limitation for these two interventions is not simply that they are utilized by too few individuals, but rather that the promise of these interventions as established in clinical trials is not fulfilled in their real-world applications. One of the differences between the clinical trials and real-world applications is that in clinical trials, the investigatory team ensures that the intervention is delivered according to the research protocol. These protocols often specify the content and extent of physician advice, directions on how to best use the medications, an offer of additional support if desired, and an expressed intent to follow up on the individual's cessation effort. Many of these components may be lacking in the real-world application of these clinically proven interventions, and this lack may explain at least part of the difference in effectiveness between the clinical trials and the population-based data.

The answer to improving the effectiveness of these interventions may not lie in providing additional resources into the health care system to change physician behavior or additional promotional activity for pharmaceutical assistance with cessation. The answer may be to try to supplement these interventions by linking them with other components of comprehensive tobacco control interventions to improve their effectiveness. For example, linking physician advice with telephone hotline counseling, providing information on how to effectively utilize over-the-counter medications at community cessation events, and encouraging healthcare systems to view cessation as a population-based intervention delivered across all interactions with the system rather than as a process initiated exclusively by physicians.

If other components of a comprehensive tobacco control program can be linked to physician advice and pharmacological assistance, it may be possible to provide the enhanced level of support and follow-up that characterized the delivery of these interventions in the clinical trial setting as these interventions are delivered to large segments of the population. When this was done within a large HMO setting (Curry *et al.*, 1998), and when the barriers to accessing these modalities were reduced by lowering or eliminating the cost to smokers, cessation results were consistent with those

achieved in clinical trials. This experience suggests that the limited population effects of physician advice and pharmacological assistance represent limitations in the integration of the support provided to smokers who are trying to quit rather than absolute limitations of these approaches when they are utilized in the general population. The frequency with which physician advice is provided to smokers as well as the frequency with which smokers are using pharmacological assistance are both increasing, and these increases should be supported and encouraged. To obtain the maximal benefit from these effective interventions, we need to integrate them into health care delivery systems, link them to community cessation resources, and create an environment that encourages their access. Once these steps have been taken, dramatic improvements in population-based rates of cessation are possible (Curry *et al.*, 1998). Moreover, it is reasonable to expect that the experience could be replicated in other settings.

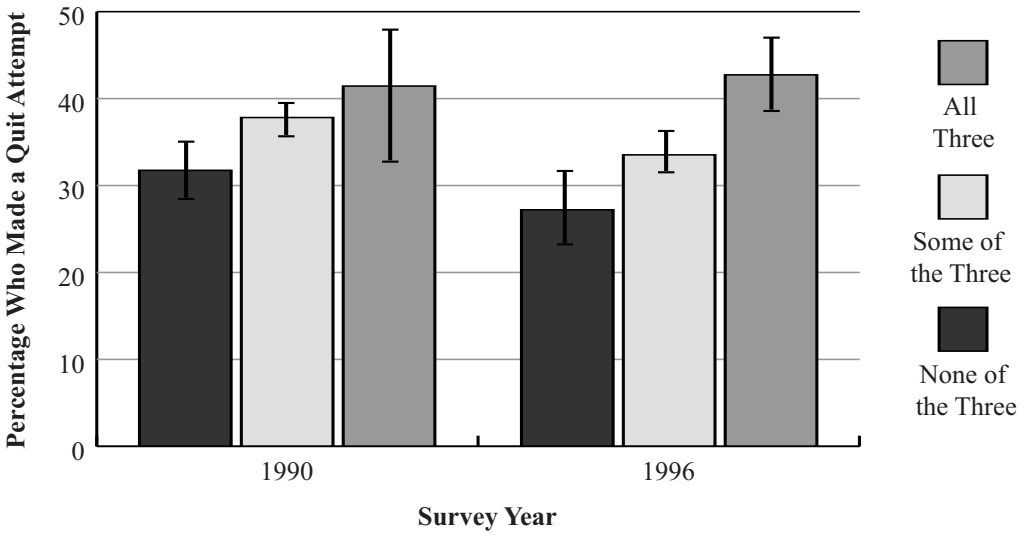
Self-Help Materials and Media

Two common components of most comprehensive tobacco control programs are mass media messages and self-help materials. They share the ability to reach large numbers of individuals at relatively low cost. However, they are not autonomous interventions wherein goals are achieved simply by delivering the self-help materials to the smoker or by having the smoker exposed to the media message. Chapters 7 and 9 make it clear that both of these tobacco control channels are just that, channels. They are methods by which other tobacco control interventions can be facilitated, reinforced, and publicized and by which agendas can be set; but in isolation, without integration into a more comprehensive approach to cessation, they have little effect.

Evidence reviewed and presented in this volume supports the effectiveness of tobacco control programs that are media led and media intensive. It is impossible to separate the effect of the media from that of the rest of the program in those programs conducted in California and Massachusetts. This is partly due to the difficulty of causal attribution intrinsic to a multicomponent program conducted with a non-experimental approach. However, the media component of these programs was never conceptualized as an independent intervention, but rather was integrated into the overall campaigns to support multiple program goals. Both California and Massachusetts use media as one of several integral components of the programs targeting each of their major tobacco control campaign goals, rather than viewing media as a single independent intervention. As a result, the effects of media are melded with the impacts of the other components used to accomplish their goals. Media messages and strategies are defined by, and customized for, each of the campaign goals, and there is no single, independent, and unified media intervention that can be evaluated for its contribution as a separate tobacco control intervention.

California and Massachusetts, and those media-led tobacco control trials that have demonstrated positive results, have used media in conjunction with community-based programs and public policy interventions. Media outlets have been used to set agendas for changing the restrictions on where smoking is allowed by educating smokers about the risks of second-

Figure 1-5
Percentage of Current Smokers Making a Quit Attempt by Number of Media Modalities in which Smoking Messages were Recalled



1990: Television, radio, or newspaper/magazine in the last week
1996: Television, radio, or billboard in the last month
Source: 1990, 1996 California Tobacco Surveys

hand smoke exposure, to trigger contemplation of cessation and cessation attempts in conjunction with referral to telephone counseling cessation services, and as one component of a multilevel campaign to de-normalize tobacco use.

Figure 1-5 demonstrates an association between media recall and cessation attempts for the 1990 and 1996 California Tobacco Surveys as support for the role of media in triggering cessation attempts as part of an overall campaign to promote cessation and facilitate cessation success through community organization, referral to telephone counseling and other cessation assistance, and de-normalization of tobacco use. In this context, the role played by the media campaign is to encourage smokers to consider quitting and to trigger quit attempts. The media is supported by the changing community norms about smoking and by other persistent and inescapable messages to quit in the smoker's environment.

Cessation success is facilitated by referral to cessation assistance and by other factors including restrictions on smoking in the workplace; therefore, media used in this way might not have a direct role in facilitating cessation success. Indeed, the same California surveys that showed an association between media exposure and cessation attempts, found no association with cessation success. Thus, were the media campaign to be viewed as a stand-alone intervention, it would be judged a failure, whereas, when the data are examined from the perspective of the media campaign as a component

intended to trigger cessation, with other aspects of the cessation intervention facilitating cessation success, the evidence is suggestive of a positive effect for those components of the overall media campaign that were targeting the smoker to promote cessation.

A similar perspective emerges when the evidence on self-help programs is evaluated. When self-help programs are looked at as independent tobacco control interventions, multiple trials and several meta-analyses have demonstrated that they have little independent effect (see Chapter 7). However, the role of self-help materials may not be as an independent intervention, but as a component of other interventions. Self-help materials can provide information on the availability of assistance or on appropriate use of medication, or they can translate advice into different languages and initiate or maintain contact between smokers and those offering cessation assistance, among other roles.

Community-Wide Approaches and Interaction across Channels

Changing the environment in which the smoker lives and smokes to provide persistent and inescapable messages to quit coupled with support for cessation have been goals of most comprehensive tobacco control approaches to cessation (NCI, 1991). But accomplishing these goals has been problematic. Approaches that attempted to stimulate communities into promoting smoking cessation, such as COMMIT (see Chapter 10), have yielded only modest results among light to moderate smokers and have had no effect on heavy smokers. The limited impact of these community activation approaches may be due to an underestimate of the time required for them to be implemented sufficiently enough to impact smoking behavior and by their decision to intervene at the level of small communities, rather than at the state level where more powerful policy options such as tax increases are possible.

However, almost all of the population-based interventions described in this volume impact smokers within their own communities, and all of the interventions are felt to be critically dependent on community norms about smoking behavior for their success. For example, changes in workplace restrictions are most often implemented in individual workplaces, and their passage into law is most often accomplished in local, rather than state jurisdictions. In addition, effective enforcement of restrictions on smoking in public locations and workplaces is dependent on the norms and expectations of smokers and nonsmokers alike.

In California, where the largest number of local ordinances has been implemented, it has been community organization in support of these ordinances that has allowed for their successful adoption and implementation. It is impossible to conceive of this success taking place without the activation of the local communities, and this local community activation has resulted in the adoption of comprehensive restrictions on smoking at the state level in all workplaces, including bars. The evidence contained in this volume suggests that restrictions on smoking in the California workplaces play a substantive role in the higher rates of successful cessation in California, as compared to other states. However, even with this operational success at the community level, it would be difficult, given current designs,

to demonstrate a direct association between the community activation that yielded the change in smoking restrictions and community-specific cessation rates.

Telephone counseling services—first demonstrated to be effective in clinic settings—have also been provided in California, and there is considerable data supporting their effectiveness in promoting long-term successful cessation (see Chapter 8). However, these services are implemented over large areas, and it is difficult to see their impact in population-based surveys. Clearly, their utility is dependent on the resources provided in terms of the number of smokers that can be reached, but even more critically, their success is dependent on their links to other community organizations for referrals and to media- and community-based promotions for self-referral of smokers. Absent these community-based roots, telephone counseling services are of very limited utility, and their success must be attributed to their associated community-level programs as much as to the counseling itself.

Several new approaches to providing individualized counseling have been developed, approaches that offer the potential to provide assistance to the general population of smokers. Interventions based on computer-driven algorithms that tailor the intervention and counseling provided to the individual smoker have been developed. The potential to provide this kind of tailored intervention over the internet—accessible in public locations where smokers would have access, on home computers, or on handheld devices provided to smokers—could overcome some of the resistance smokers traditionally have to more intensive, but more effective, smoking cessation interventions.

As Chapter 11 demonstrates, there are synergies created across tobacco control intervention channels, and the matrix for those synergies is local programmatic activity. Exposure to individual tobacco control program elements was associated with changes in anti-smoking attitudes and behaviors, and these effects were significantly greater among those who were exposed to more than one component.

What Works at the Population Level

Any analytic approach is limited by the tools it uses and also by its perspective on the problem it studies. This volume is no different; we have chosen to utilize a set of measures of smoking cessation activity and success, and we have linked them to various measures of policy and programmatic tobacco control interventions. These associations provide measures of the independent relationships between exposure to tobacco control interventions and changes in smoking behavior, and these associations provide useful insights into what components of tobacco control program are working. However, this approach is less able to examine the interactions and synergies across these programmatic elements, synergies that may be critical for their success.

With these caveats in mind, what can we say about what works? If the transtheoretical model of smoking behavior change (Prochaska and DiClemente, 1991) is used as a framework for examining population-based smoking cessation activity and success, one synthesis of how programmatic elements impact cessation is presented in Figure 1-6. This model postulates that smokers cycle through stages where they are disinterested in cessation, contemplate quitting, make a quit attempt, and are either successful or relapse to smoking. The relapse to smoking may be followed by a period of disinterest in cessation, or the smoker may think about making an additional cessation attempt. In the figure, cessation influences are at the stage of the process they are likely to influence, with internal personal characteristics presented inside the circle and external environmental influences presented outside the circle.

Together, the formulation in Figure 1-6 and the evidence presented in this volume suggest that individual components of a comprehensive tobacco control program may affect the process of cessation at different stages. For example, mass-media campaigns may get smokers to think about the need to quit, physician advice may trigger a cessation attempt, and working in a smoke-free environment may facilitate cessation once a cessation attempt is made. An additional advantage of the formulation is that it facilitates identification of potential synergistic interactions among different program components.

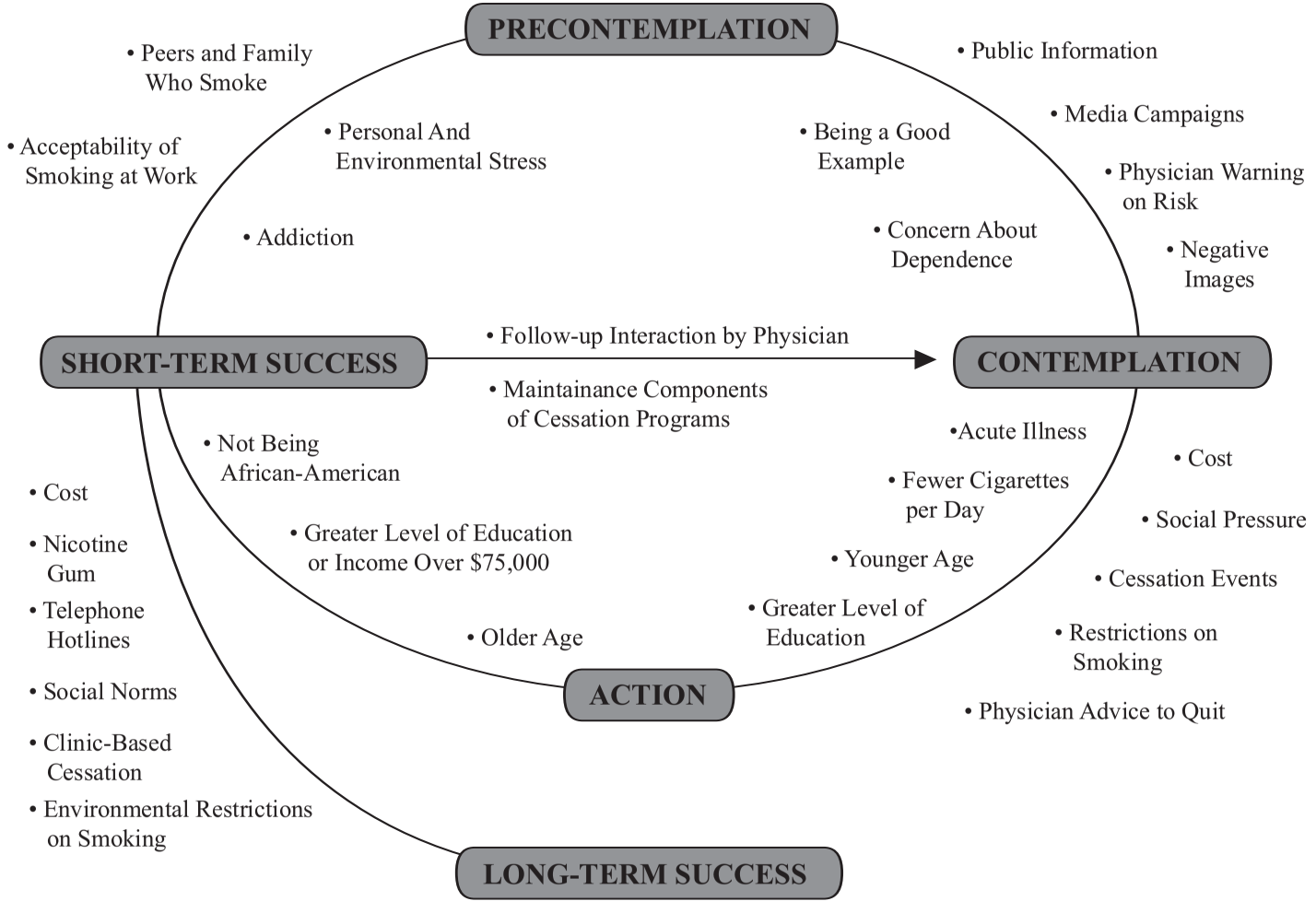
For example, physician advice seems to have a significant impact on the likelihood of a smoker making a quit attempt, but little effect on long-term cessation success; so as an isolated cessation intervention, it has little impact on smoking prevalence. But if the smokers who are attempting to quit can be linked to interventions that have their effect predominantly on improving long-term success (*e.g.*, telephone counseling, clinic-based cessation assistance, or pharmacological treatment), the net effect on long-term cessation is likely to be substantially greater that the sum of the effects of these interventions offered independently.

Public information about the risks of smoking, negative images about being a smoker, and physician warnings about the risk of smoking can all convert a smoker who is not interested in quitting into one who is considering a cessation attempt. Both the desire to set a good example for children and concerns about being dependent on smoking are reasons smokers give for wanting to quit; acute illness can often trigger cessation activity as well.

Data presented in this volume demonstrate that smokers of younger ages, with higher levels of education and income, and who smoke fewer cigarettes per day are more likely to try to quit. In addition, this volume provides evidence to support the impact of media campaigns, restrictions on smoking in the workplace, physician advice to quit, and increased cost of cigarettes as population-based influences increasing cessation activity.

The forces influencing smoking cessation attempts are different from those leading to longer term cessation success. For example, older smokers are less likely to report making a cessation attempt in the last 12 months,

Figure 1-6
The Process of Cessation



but they are more likely to be successfully quit for 3 or more months based on that cessation attempt, suggesting that efforts to promote cessation among older smokers can yield important cessation benefits. In contrast, African-American smokers report rates of cessation activity in the last 12 months similar to those of other racial and ethnic groups, but their likelihood of being successfully quit for 3 or more months based on that activity is significantly lower.

A variety of environmental and interventional influences have substantial impacts on successful cessation. Evidence provided in the remaining chapters of this volume supports an effect of changes in cost and environmental restrictions on smoking in the workplace on long-term success. Nicotine replacement therapy is shown to be associated with improved cessation success at the population level, confirming its demonstrated effect in clinical trials. Telephone counseling and clinic-based cessation efforts have been established as effective interventions for those who receive them, but there is little evidence that they are reaching a sufficient proportion of the smoking population to effect cessation at the population level. Physician advice—which has also been demonstrated effective for long-term cessation in clinical trials and shows a strong association with cessation activity in population data—appears to have little effect on cessation success in the overall population, at least as it is currently being practiced.

Quantifying the Effect of Population-Based Cessation Interventions

Figure 1-7 presents a simplified model of the cessation process, focusing on those interventions examined in subsequent chapters of this monograph. The evidence presented suggests that the principal population-based cessation effect of physician advice and media campaigns is on promoting cessation attempts, with less evidence supporting an effect of these interventions on longer term cessation success. In contrast, the predominant effects of restrictions on where smoking is allowed, increasing cost of cigarettes, pharmacological interventions, and comprehensive tobacco-control campaigns seem to be in promoting longer term cessation success.

The analyses presented in subsequent chapters are often formulated as odds ratios for cessation activity or success, and therefore it is possible to estimate the population-based impact of these interventions using the fraction of the population exposed to the intervention and the difference in cessation attempts or success between the exposed and non-exposed populations. Estimates derived from the subsequent chapters in this monograph are presented in Table 1-1 for comprehensive tobacco-control programs, physician advice, and bans on smoking in the workplace. In addition, estimates developed in subsequent chapters are utilized for physician advice (Chapter 4), use of medication (Chapter 5), and increases in taxes (Chapter 6). The goal is to provide a rough comparison of the effects on cessation across these modalities, with the understanding that effects presented for one intervention may contain direct and synergistic effects from other interventions, and therefore, the numbers presented are not mutually exclusive cessation effects.

Figure 1-7
Population Based Smoking Cessation

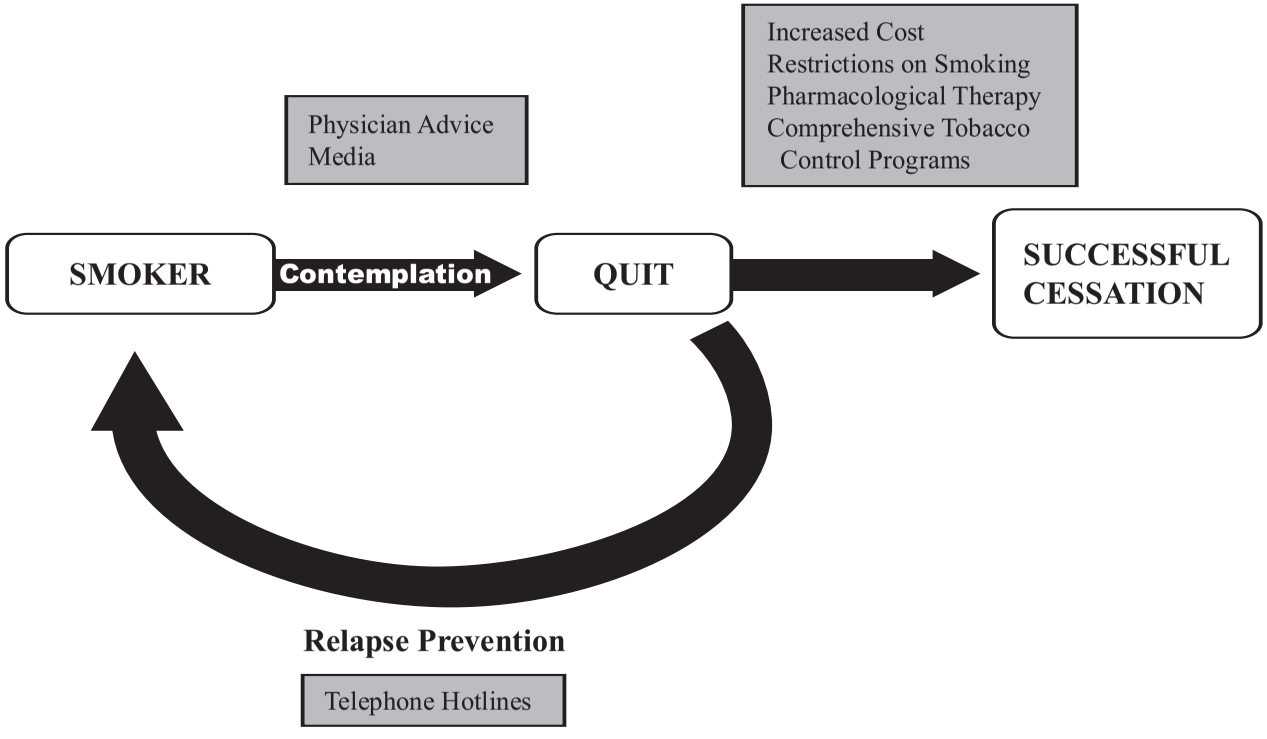


Table 1-1
Current and Potential Impact of Population-Based Smoking Cessation Interventions

	Cessation Attempt			Former, 3+ Months			
	Odds Ratio	Current Effect	Potential Effect	Odds Ratio	Current Effect	Potential Effect	Conditions Required for Potential Effect
Comprehensive Tobacco Control Program	1.04	57,049	506,360	1.32	57,246	508,111	All states have tobacco control programs comparable in scope to California and Massachusetts
Advised by Physician to Quit	1.60	2,276,986	3,497,231	0.91	0	189,000	Effect of physician advice in the real world matches that in trials (Odds ratio for cessation = 1.3)
20% Increase in Cigarette Cost	—	—	1,139,309	—	—	222,298	Cost Increases 20 percent from 1996 values
Total Work Ban	1.09	312,112	576,918	1.34	119,828	221,493	All workplaces are smoke free
Medication	—	—	—	—	150,000	500,000	Effect of medication in the real world matches that in trials
Optimal Health Care System Intervention						756,000	At least 90 percent of all patients are advised to quit and at least 45 percent are provided with optimal counseling

In the United States, the CPS estimates that there are approximately 44 million smokers, and about one-third of them (14 million) attempt to change their smoking behavior each year. Only 3.6 percent (about 1.5 million) of those who were smoking every day 12 months ago are successful for 3 or more months at the time of the survey.

The estimates in Table 1-1 utilize the odds ratios for cessation attempts and cessation success presented in Chapter 2 for the state of California, as compared to other states, with the exclusion of Massachusetts. The numbers are estimates of the difference in cessation produced by these two well-funded tobacco control programs. Since most other states also have substantial tobacco control efforts underway (funded by ASSIST, IMPACT, and other sources), these estimates underestimate the true effect of tobacco control campaigns; and they estimate only the increment in effect that would be expected from the difference in intensity and funding between the programs in Massachusetts and California and those in the remaining states. The column in the table labeled *Potential Effect* presents an estimate for the effect expected if all states adopted programs similar to those of California and Massachusetts. It would appear that tobacco control programs have a modest effect on the already high rate of cessation attempts among smokers, but a much larger proportional effect on successful cessation. If comprehensive tobacco control programs were implemented nationally, rates of successful cessation might be increased by one-third, approaching 500,000 additional smokers who were abstinant for at least 3 months.

The largest current contributions to successful cessation come from total bans on smoking in the workplace (119,828 quits) and from pharmacological interventions (150,000 quits). If all workplaces were smoke-free, the rate of cessation lasting at least 3 months might increase by more than 100,000 quits per year, and if the success of pharmacological interventions in the general population matched that of clinical trials, an additional 350,000 quits might be achieved.

Physician advice to quit, as it is currently practiced in the general population, appears to have a large effect on cessation attempts, but little effect on long-term cessation success. If the success of physician advice were comparable to that found in clinical trials, an additional 189,000 successful quits might be expected. This number represents a substantial number of quits, but is only a small fraction of the increase in quit *attempts* promoted by this modality. In contrast, approximately 750,000 additional successful quits might be achieved if the health care delivery system were to deliver optimal cessation assistance to all of their insured population.

An increase in the cost of cigarettes could also increase both cessation attempts and cessation success, with a 20 percent increase in cost generating an additional 222,000 successful quits. The increase in cost of cigarettes ($0.45 per pack) that may, over time, result from the Master Settlement Agreement of the state Attorneys General lawsuits would be approximately a 20 percent increase. If and when it is translated into an actual change in the price of cigarettes to the smoker (*i.e.,* when the additional discounting

that accompanied the increase in cost is no longer reducing the actual price paid by the consumer), this price increase may result in an increase in the number of cessation attempts and successful quits.

Summary and Synthesis of Policy Effects

Examination of the numbers in Table 1-1 suggests that there are powerful current and potential effects of existing tobacco control interventions for smoking cessation. However, it also demonstrates that there are significant gaps in their interactions with one another. The most obvious of these gaps is between the enormous number of estimated quit attempts generated by physician advice and the absence of an effect on successful cessation. However, there are also significant gaps between what is currently being realized with medication and what might be expected to be achieved—the same is true for comprehensive tobacco control programs. These gaps offer opportunities to improve tobacco control programs, particularly by taking advantage of synergies that might exist across these independent interventions.

Physician advice to quit is associated with over 2.2 million quit attempts currently and has the potential to be associated with almost 3.5 million quit attempts. However, these attempts are not translating into cessation success in large numbers. A substantial research and programmatic effort has been made by the NCI, CDC, and other professional and voluntary organizations to train physicians to intervene and provide cessation advice to all of their smoking patients. As Chapter 4 demonstrates, this effort has resulted in a substantive increase in the fraction of smoking patients who report that their physicians have advised them to quit smoking. These efforts to encourage physicians to provide cessation advice have been quite successful, with the fraction of patients reporting cessation advice from physicians more than doubling since 1974. However, this effort may not have improved successful long-term cessation rates substantively in the population, and the potential for cessation when this channel is utilized alone is a modest 189,000 quits.

The lesson from these estimates is not that more effort should be devoted to encouraging physicians to provide advice to quit, but rather that there is a substantial number of cessation attempts currently being generated by physician advice that are not being translated into successful cessation. This group of cessation attempts represents an enormous opportunity if we can link those making cessation attempts with other tobacco control interventions that can facilitate long-term success.

The simplest of these interactions would be linking physician advice to quit with telephone counseling or other community or health care system cessation assistance. An example of what might be possible to achieve through these linkages is provided at the bottom of Table 1-1, where increased physician advice is coupled with optimal cessation interventions to generate a 2.3-fold increase in the rate of successful spontaneous cessation (see Chapter 4). The potential for this linked approach is estimated to be over 750,000 successful quits, and these kinds of linkages have been demonstrated to be effective within a single health care delivery system (Curry *et al.*, 1998).

A second association with large numbers of cessation attempts can be found with an increase in the cost of cigarettes. Adding media messages promoting cessation, linking to telephone counseling services, energizing health care systems to provide cessation messages and assistance, and timing community and other local tobacco control efforts to coincide with and take advantage of the increased cessation activity provided by an increase in the cost of cigarettes may help convert more of the cessation attempts into cessation successes.

Table 1-1 provides estimates for those tobacco control interventions where there are sufficient data to generate estimates. It is likely that many of the community activation strategies and local lead agency efforts in California provide a critical foundation for implementation of some of the public policy interventions (*e.g.*, restrictions on smoking in the workplace). But the difficulty in quantifying and measuring these activities makes them less visible to the analytic approach used in this monograph. It is also likely that these program areas offer great opportunities for synergy in enhancing cessation success with the policy interventions described above. For example, linking local cessation assistance activities with workplaces who have made voluntary changes in smoking restrictions would increase the efficiency of the efforts to recruit smokers into these programs and would increase the effectiveness of the workplace change in creating successful cessation.

SUMMARY Approximately one-half of current ever-smokers have become former smokers, and most of this cessation activity has coincided with a 40-year effort to educate and inform smokers about the risks of smoking. Large media-led tobacco control programs have also coincided with increases in smoking cessation, suggesting that tobacco control approaches *can* alter smoking behavior. This volume presents evidence supporting the effects of restrictions on where people can smoke, of increasing the cost of cigarettes, of providing physician advice to quit coupled with cessation assistance, of pharmacological assistance, and of telephone hotlines on cessation among smokers in the general population. It also provides evidence that many of these interventions are being implemented in the general population in ways that are less effective than expected based on clinical trials. Increasing the effectiveness of these interventions and linking multiple interventions to provide synergy offer great opportunities to improve rates of population-based smoking cessation.

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Cessation and Cessation Measures among Adult Daily Smokers: National and State-Specific Data

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Reducing initiation rates of cigarette smoking and encouraging smoking cessation are principal goals of tobacco control programs, including those in California, Massachusetts, Arizona, Florida, Oregon, and other states. This volume focuses on cessation, and more specifically on population measures of progress in cessation rates. Its objectives are to examine what we know about what drives cessation on a population basis and to offer our best judgements on what approaches appear to be working and what approaches appear to have less impact.

CESSATION

Cessation is a process rather than a specific event. It begins with a decision to stop smoking and ends with abstinence from cigarettes maintained over a long period of time (U.S.DHHS, 1990). Cessation occurs at the individual level, and a substantial body of science examines the processes that individuals go through as they become former smokers—the individual determinants of success or failure in the process of cessation are also well described (U.S.DHHS, 1990). Several staged measures of change in individual cessation have been developed to link measures of intention to quit and actual cessation behavior in order to define where smokers are in their individual cessation efforts and to predict the likelihood of future cessation activity and success (Prochaska *et al.*, 1991; Pierce *et al.*, 1998a & b; U.S.DHHS, 1990). This volume recognizes and draws upon this important body of work, but the focus here is on examining the impact of programs and strategies that change cessation in the general population, rather than on an examination of the dynamics of the cessation process itself.

Since measurement of programmatic effect is the goal in this work, measures of cessation are selected with the following criteria in mind:

1. The measures should reflect as narrowly as possible the target population of most cessation interventions—*i.e.*, regular daily smokers who have completed the process of taking up cigarette smoking. Other groups, including occasional smokers and young adults still in the process of becoming addicted to cigarettes, are important segments of the smoking problem, but they are often quite different from regular daily smokers in their smoking behaviors. Including them in measures of cessation can lead to confusion in the evaluation of the results. In addition, different cessation intervention strategies are often utilized with these populations.

2. Measures should allow for the establishment of a close temporal link between a programmatic intervention and the cessation measure. For example, the quit ratio (the ratio of former smokers to ever-smokers) may be a good measure of total cessation in a population, but it is a cumulative measure of all successful cessation in a population over time and is therefore less useful in examining the effect of recent programmatic efforts on cessation activity.
3. The measures should also examine both cessation activity and cessation success as separate entities. Some programmatic activity may have an effect principally by stimulating cessation attempts, while not significantly increasing longer term cessation success. Other actions may have their effect predominantly in enabling those who are trying to quit to be more successful in the long term.

None of these criteria require that the chosen measures cover all segments of the smoking population or all stages of cessation in smokers.

We are attempting to analyze the effect of programs on as clean and unambiguous a measure of cessation as possible. As is often true, it is necessary to narrow the population in which a measurement is made in order to improve the ability to identify an effect and to decrease the "noise" in the measure. Those who are still in the process of becoming regular cigarette smokers, and those who do not smoke daily, may respond to the questions on quit attempts (being off for 24 hours or more) with positive answers that reflect variations in their current pattern of use rather than a clear attempt to alter their future smoking behavior. Lumping these two groups together may confuse analyses of the effects of tobacco control programs on cessation rates.

Among smokers who do not smoke every day, it is more difficult to know what measures of voluntary 24-hour cessation (a cessation attempt) mean relative to their future smoking behavior, and it is even more difficult to relate that change in behavior to programmatic-driven cessation.

While still under the age of 25, some smokers are likely to be in the process of developing their addiction to cigarettes. Some of the change in their smoking behavior is due to real cessation activity, but some is due to smokers who are still experimenting with smoking and who will not be progressing to become regular smokers. As it is impossible to determine which of these phenomena are driving the change in behavior, measures that include those smokers under age 25 mix changes due to experimentation with those that are due to actual cessation activity. Elimination of smokers under age 25 from the measure essentially eliminates most of those who are still experimenting with cigarettes and thus makes the measure a cleaner measure of cessation activity. Additionally, someone who is in the process of beginning to smoke and who does not go on to become a regular smoker is likely to have been influenced by quite a different set of factors than someone who was a regular smoker and who has now successfully quit.

In the set of measures presented in this volume we have decreased the "noise" in the measure of cessation behavior by limiting the measure to those who are regular daily smokers and to those who are old enough to have completed the process of smoking uptake (age 25 years and older).

MEASURES OF CESSATION

A variety of cessation measures are used in this report, but much of the analysis of national and state-specific data uses a set of measures designed to meet the criteria described above.

The denominator for all of these cessation measures is that group of smokers who reported that they were daily cigarette smokers 1 year prior to the survey and who were 25 years of age or older at the time of the survey. The broadest measure of cessation activity used for this group is one that includes any change in smoking behavior (a cessation attempt, becoming an occasional smoker, or currently being a former smoker). This is a measure of cessation activity without regard to whether the cessation effort led to a successful change in smoking behavior, and this measure is termed cessation activity in this chapter.

The Current Population Survey (CPS) did not ask current occasional smokers whether they had made a quit attempt in the last 12 months, and so change from being a current daily smoker 12 months prior to the survey to being a current occasional smoker at survey time is reported as a separate measure or as part of the change measure for this survey. It was not possible to measure cessation attempts among current occasional smokers using the CPS data. However, analyses of the California Tobacco Survey (CTS) data, where occasional smokers *were* asked about cessation attempts, reveal that three-quarters of those who reported being daily smokers 1 year prior to the survey, but who reported being occasional smokers at the time of the survey, also reported making a quit attempt in that 12-month period. We therefore included those who changed from being daily smokers to being occasional smokers in the group of smokers who were attempting to change their smoking behavior.

The cessation attempt measure includes all those who have made a successful or unsuccessful cessation attempt in the last 12 months, but excludes current occasional smokers for analyses. A cessation attempt is defined by the question: "During the past 12 months, have you stopped smoking for 1 day or longer because you were trying to quit smoking?"

We also use two measures of cessation success. The first is all those who were daily smokers 1 year prior to the survey and former smokers at the time of the survey. This is a measure that includes former smokers of all durations, and it is the broadest measure of cessation success, but it includes large numbers of individuals who will relapse back to smoking. To more accurately assess the impact of cessation interventions on longer term cessation success, we also calculated the percentage of those who were daily smokers 1 year prior to the survey and were former smokers of 3 or more months duration at the time of the survey. This group contains a much higher fraction of those who will be successful in staying off cigarettes long-term and has been used as a reasonable measure of successful cessation by

numerous smoking cessation interventions. In some instances the fraction of cessation activity that has resulted in successful cessation of 3 months or more (percentage of 3+ month success over percentage with some cessation activity) is calculated to estimate the fraction of cessation activity that results in successful cessation overall. This fraction is called the fraction of cessation activity that has resulted in long-term success.

The numerator for both of these measures of 3+ month cessation success automatically excludes that fraction of daily smokers 1 year prior to the survey who quit within the 3 months immediately preceding the survey, since they cannot have been successfully quit for 3+ months when surveyed. Some of these individuals who are excluded from the numerator will be successful in their efforts to quit, and their exclusion leads to an underestimate of the fraction of the population that will be successful. Correspondingly, some of those who were successfully quit for 3+ months at the time of the survey will relapse to smoking, and their inclusion in the denominator leads to an overestimation of the true rate of successful long-term cessation. The effects of these two sources of error will tend to offset one another, and the purpose of developing these measures is to evaluate the effects of tobacco control interventions on the population, rather than to measure cessation success at the level of the individual. Approximately 65 percent of all quitters relapse in the first 3 months, with 10 percent more relapsing from 3 to 6 months after quitting and an additional 3 percent relapsing between 6 months and 1 year following a quit attempt (Hunt *et al.*, 1971; U.S.DHHS, 1988). As a result, these measures of 3+ month success are useful approximations of actual rates of long-term successful cessation rates in the population and can be used to evaluate the relative impact of tobacco control interventions on rates of long-term cessation in populations of smokers.

Analyses of national and state-specific data are presented for the Current Population Survey Tobacco Use Supplement, which was conducted in the months of September, January, and May during 1992/93 and 1995/96. Analyses are also presented for the California Tobacco Surveys carried out in 1990, 1993, and 1996, as well as for the Massachusetts Tobacco Surveys.

Table 2-1
Current Population Survey: Cigarette Prevalence among All Adults, 18 Years and Older

	Smoking Status								Sample Size
	Daily		Occasional		Former		Never		
1992/93	%	± CI	%	± CI	%	± CI	%	± CI	(n)
Total	19.61	0.18	4.23	0.09	22.49	0.19	53.67	0.22	275,895
Male	21.86	0.27	4.61	0.14	26.99	0.29	46.54	0.32	127,377
Female	17.57	0.24	3.89	0.12	18.39	0.24	60.16	0.30	148,518
	Daily		Occasional		Former		Never		
1995/96	%	± CI	%	± CI	%	± CI	%	± CI	(n)
Total	19.05	0.18	4.04	0.09	21.76	0.19	55.16	0.23	233,741
Male	21.19	0.28	4.47	0.14	25.80	0.30	48.54	0.34	107,527
Female	17.09	0.24	3.64	0.12	18.07	0.25	61.20	0.32	126,214

National and State-Specific Prevalence of Current and Former Smokers

The ultimate measure of success for a tobacco control program is the prevalence of smoking in the general population (Table 2-1). Smoking prevalence is the result of the combined effects of trends in smoking initiation and smoking cessation. However, prevalence is a relatively poor measure of cessation activity because initiation occurs largely during adolescence whereas cessation occurs throughout adult life, and rates of both cessation and initiation have varied markedly over time (Burns *et al.*, 1997).

There is substantial variation in current smoking prevalence in the United States, both geographically and demographically. The prevalences of daily and occasional smoking, estimated from the 1992/93 (Table 2-7) and the 1995/96 CPS (Table 2-8), are presented in Appendix 1, along with the prevalence of former and never smoking status for the major demographic groups and for each state in order of increasing daily smoking prevalence. With the exception of Utah, where a large fraction of the population is of the Mormon faith with its prohibition against smoking, California is the state with the lowest smoking prevalence in both survey years. This difference persists even when smoking prevalence for each state is standardized to the racial/ethnic distribution of the United States, indicating that the lower prevalence of smoking in California is not due exclusively to the higher prevalence of Asian and Hispanic populations in the state.

Two other potential measures of cumulative population-based cessation are presented in Table 2-9 (Appendix 1). They are the prevalence of former smokers and the quit ratio (the ratio of former smokers to ever smokers). The table is arranged in order of decreasing quit ratio. These measures estimate the cumulative cessation that has occurred over time in a population, but are less precise measures of recent cessation activity. In addition, they are heavily influenced by the age of the population and by differences in demographic factors, such as level of education, where small differences in rates of cessation accumulate to create larger differences in the prevalence of former smokers. These difficulties limit the use of former smoker prevalence and the quit ratio as measures of cessation activity in response to recent tobacco control efforts.

Measures of Cessation Activity and Success, National and by State

Table 2-2 presents smoking status at the time of the survey for those who were 25 years of age or older at the time of and who had been daily cigarette smokers 1 year prior to the survey as measured by the 1992/93 CPS. Table 2-3 presents the same measures for the 1995/96 CPS. The measures are presented for the subgroups of age, race/ethnicity, education, income, and number of cigarettes smoked per day, as well as by state.

There are five current smoking status conditions in these tables:

1. Current daily smoker who has not made a quit attempt in the last year,
2. Current daily smoker who has made a quit attempt in the last year,
3. Current occasional smoker,
4. Current former smoker who has been quit for less than 3 months, and
5. Current former smoker who has been quit for 3 or more months.

These measures of smoking status at the time of the survey can be assembled into several measures of cessation activity and success that include progressively higher fractions of those likely to experience long-term success (Figure 2-1). The broadest measure of cessation activity is defined by including all those who have made quit attempts (successful or unsuccessful) or who have become occasional smokers in the last 12 months. This measure is defined by adding together all of the categories in the table except for the first (Daily smoker, No quit attempt). This, then, is a measure of all who were daily smokers 12 months prior to the survey who have had any positive change in their smoking behavior and is presented in Figure 2-1. It is also the broadest measure of any cessation effect for a tobacco control program.

The broadest measure of cessation success is all daily smokers 1 year prior to the survey who are former smokers at the time of the survey, and it is defined by adding former smokers of less than 3 months duration to former smokers of 3+ months duration. This measure includes a substantial number of individuals who will relapse in the future, but it also excludes those who relapse early after a cessation attempt. Since a large fraction of those who relapse do so within the first several weeks of a cessation attempt (U.S.DHHS, 1990), this measure is a better measure of the rate of long-term cessation success.

Figure 2-1 presents measures of cessation for the 1992/93 and 1995/96 Current Population Surveys. There was a statistically significant decline in cessation activity between 1992/93 and 1995/96 for the nation as a whole, with the broadest measure of cessation activity among daily smokers 1 year prior to the survey declining from 36.5 percent in 1992/93 to 31.6 percent in 1995/96. This decline in cessation activity between 1992/93 and 1995/96 was evident and statistically significant in each subcomponent of the cessation activity measure, and both cessation attempts and the fraction of cessation activity that has resulted in 3+ month cessation success declined dur-

Table 2-2

1992/1993 Current Population Survey: Current Smoking Status among Self-Respondents, 25 Years and Older, Identified as Daily Smokers 1 Year Ago

	Current Smoking Status											
	Daily						Former				Population Size (N)	Sample Size (n)
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months			
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Total	63.52	0.58	25.71	0.52	3.26	0.21	2.41	0.18	5.10	0.26	31,801,272	40,321
Male	64.52	0.79	25.05	0.72	2.80	0.27	2.59	0.26	5.04	0.36	16,782,017	19,173
Female	62.40	0.85	26.45	0.77	3.77	0.33	2.21	0.26	5.17	0.39	15,019,256	21,148
Age (Years)												
25–44	61.95	0.76	28.05	0.71	3.26	0.28	2.30	0.24	4.45	0.32	18,448,325	22,937
45–64	65.10	1.00	23.70	0.90	3.00	0.36	2.70	0.34	5.50	0.48	10,309,965	13,222
65+	67.68	1.81	18.34	1.50	4.13	0.77	2.15	0.56	7.70	1.03	3,042,982	4,162
Race/Ethnicity												
Non-Hispanic White	64.11	0.64	24.98	0.57	3.06	0.23	2.56	0.21	5.30	0.30	25,995,472	34,591
Hispanic	62.47	3.55	26.92	3.26	3.65	1.38	2.01	1.03	4.94	1.59	1,573,496	1,357
African-Americ.	59.90	1.81	29.78	1.69	4.65	0.78	1.54	0.46	4.13	0.73	3,432,421	3,246
Asian/PI	58.28	4.85	31.43	4.57	3.80	1.88	2.54	1.55	3.95	1.92	483,188	592
Native Americ.	67.27	5.81	26.91	5.50	1.94	1.71	1.65	1.58	2.23	1.83	304,999	518
Other	.	.	.	.	.	.	.	.	.	.	11,697	17
Education (Years)												
<12	69.55	1.20	22.15	1.08	2.87	0.44	1.44	0.31	4.00	0.51	6,735,717	8,261
12	64.71	0.87	25.24	0.79	2.88	0.30	2.40	0.28	4.77	0.39	13,943,590	18,073
13–15	59.13	1.20	28.87	1.11	3.72	0.46	2.67	0.39	5.61	0.56	7,657,376	9,734
16+	56.72	1.80	27.54	1.62	4.51	0.75	3.77	0.69	7.45	0.95	3,464,589	4,253
Household Income												
<$10,000	68.95	1.36	23.14	1.24	3.32	0.53	1.28	0.33	3.31	0.53	5,260,222	6,572
$10,000-19,999	66.50	1.26	23.86	1.13	3.29	0.47	2.09	0.38	4.25	0.54	6,468,466	8,436
$20,000-29,999	63.37	1.36	26.57	1.25	2.77	0.46	2.27	0.42	5.02	0.62	5,742,370	7,332
$30,000-49,999	61.26	1.18	26.93	1.08	3.13	0.42	3.03	0.42	5.65	0.56	7,732,799	9,862
$50,000-74,999	58.17	1.74	27.90	1.59	3.77	0.67	3.17	0.62	6.99	0.90	3,658,500	4,527
$75,000+	55.49	2.70	29.02	2.46	4.22	1.09	3.53	1.00	7.74	1.45	1,550,783	1,869
Unknown	65.28	2.73	24.27	2.46	3.15	1.00	2.11	0.82	5.19	1.27	1,388,133	1,723

Table 2-2 (continued)

	Current Smoking Status											
	Daily						Former				Population	Sample
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months		Size	Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
States												
Alabama	67.50	4.94	24.40	4.53	1.95	1.46	1.71	1.37	4.43	2.17	554,406	580
Alaska	68.04	4.63	24.25	4.26	2.23	1.47	2.31	1.49	3.18	1.74	69,481	531
Arizona	63.45	5.03	26.97	4.63	2.77	1.72	1.88	1.42	4.92	2.26	440,379	386
Arkansas	66.13	4.61	23.85	4.15	2.22	1.44	2.89	1.63	4.90	2.10	376,141	664
California	61.68	2.20	25.67	1.98	4.00	0.89	2.25	0.67	6.41	1.11	2,779,568	2,095
Colorado	63.78	5.34	24.41	4.77	4.71	2.35	1.81	1.48	5.29	2.49	419,378	475
Connecticut	63.28	5.43	26.58	4.97	1.10	1.17	4.33	2.29	4.70	2.38	422,146	396
Delaware	66.19	5.04	25.40	4.64	2.30	1.60	1.58	1.33	4.52	2.21	92,776	329
District of Columbia	67.42	6.50	22.12	5.75	6.19	3.34	1.46	1.66	2.81	2.29	54,721	216
Florida	63.69	2.30	25.73	2.09	2.88	0.80	2.42	0.73	5.28	1.07	1,786,118	1,787
Georgia	63.16	4.76	28.85	4.47	2.95	1.67	2.52	1.55	2.52	1.55	892,435	460
Hawaii	61.70	5.55	28.14	5.14	4.16	2.28	1.45	1.37	4.55	2.38	119,260	296
Idaho	65.23	4.69	23.60	4.18	3.77	1.87	2.54	1.55	4.86	2.12	132,278	564
Illinois	62.87	2.69	26.13	2.44	3.48	1.02	2.87	0.93	4.65	1.17	1,406,702	1,526
Indiana	69.14	4.62	21.65	4.12	1.01	1.00	3.68	1.88	4.53	2.08	786,930	533
Iowa	64.62	4.94	25.50	4.50	3.21	1.82	2.37	1.57	4.31	2.10	347,097	613
Kansas	70.74	4.51	20.47	4.00	1.71	1.29	1.91	1.36	5.17	2.20	320,527	607
Kentucky	75.13	3.81	18.07	3.39	1.92	1.21	2.09	1.26	2.78	1.45	675,928	673
Louisiana	64.96	5.19	24.18	4.66	2.75	1.78	1.92	1.49	6.19	2.62	525,758	425
Maine	61.91	4.41	28.59	4.11	3.82	1.74	1.42	1.08	4.26	1.83	204,879	569
Maryland	58.29	5.15	28.55	4.72	5.24	2.33	2.68	1.69	5.23	2.33	633,135	396
Massachusetts	58.16	2.68	28.56	2.46	3.29	0.97	3.33	0.98	6.66	1.36	743,094	1,431
Michigan	60.40	2.46	29.68	2.30	2.86	0.84	2.09	0.72	4.96	1.09	1,351,737	1,944
Minnesota	59.85	5.13	27.13	4.65	4.25	2.11	2.03	1.47	6.75	2.62	564,585	523
Mississippi	61.44	5.16	29.96	4.85	2.34	1.60	2.20	1.56	4.06	2.09	338,314	615

Table 2-2 (continued)

	Current Smoking Status											
	Daily						Former				Population	Sample
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months		Size	Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Missouri	64.21	4.74	24.26	4.24	3.22	1.75	3.04	1.70	5.27	2.21	757,383	605
Montana	66.76	4.99	22.45	4.42	3.81	2.03	2.15	1.54	4.82	2.27	101,771	592
Nebraska	61.05	5.13	28.90	4.77	2.54	1.65	2.05	1.49	5.46	2.39	173,790	543
Nevada	69.29	4.12	23.87	3.81	1.91	1.22	1.32	1.02	3.61	1.66	212,335	582
New Hampshire	62.56	5.34	24.18	4.73	3.83	2.12	4.41	2.27	5.02	2.41	150,153	339
New Jersey	61.40	2.70	27.51	2.48	2.97	0.94	2.31	0.83	5.81	1.30	875,804	1,365
New Mexico	60.61	5.16	26.88	4.68	4.10	2.09	2.06	1.50	6.34	2.57	180,763	440
New York	61.26	2.05	26.68	1.86	3.36	0.76	3.32	0.75	5.37	0.95	2,074,672	2,347
North Carolina	67.51	2.25	22.80	2.01	3.08	0.83	2.49	0.75	4.12	0.95	973,548	1,900
North Dakota	62.41	5.33	26.50	4.86	5.76	2.57	2.76	1.80	2.57	1.74	67,949	512
Ohio	63.98	2.34	24.95	2.11	3.43	0.89	2.25	0.72	5.39	1.10	1,574,578	2,054
Oklahoma	66.58	4.50	21.37	3.91	2.83	1.58	2.86	1.59	6.35	2.33	471,743	611
Oregon	64.47	5.31	25.55	4.84	3.35	2.00	1.59	1.39	5.04	2.43	364,440	453
Pennsylvania	62.51	2.49	26.92	2.28	3.77	0.98	2.11	0.74	4.69	1.09	1,536,773	1,836
Rhode Island	62.98	5.37	23.47	4.71	3.46	2.03	2.51	1.74	7.57	2.94	125,657	353
South Carolina	67.85	4.23	21.99	3.75	3.16	1.59	2.64	1.45	4.36	1.85	495,343	602
South Dakota	65.63	4.80	24.68	4.36	3.18	1.77	2.23	1.49	4.28	2.05	80,533	596
Tennessee	64.72	4.30	25.70	3.94	2.75	1.47	2.01	1.26	4.83	1.93	783,596	664
Texas	63.86	2.74	25.45	2.48	3.97	1.11	2.14	0.82	4.58	1.19	2,013,625	1,694
Utah	61.89	6.20	27.56	5.70	5.20	2.83	0.74	1.09	4.61	2.68	131,888	298
Vermont	58.89	5.06	30.50	4.74	3.51	1.89	2.10	1.48	5.00	2.24	86,374	385
Virginia	62.48	4.34	26.59	3.96	3.29	1.60	2.18	1.31	5.46	2.04	852,061	614
Washington	58.67	4.96	28.33	4.53	3.31	1.80	2.06	1.43	7.63	2.67	659,444	468
West Virginia	73.28	4.09	20.54	3.74	2.16	1.35	1.17	0.99	2.84	1.54	315,718	720
Wisconsin	63.19	4.74	25.39	4.27	4.26	1.98	2.26	1.46	4.90	2.12	640,276	702
Wyoming	58.80	5.61	29.45	5.20	3.79	2.18	2.04	1.61	5.92	2.69	63,279	412

Note: CI = 95% confidence interval. Values with insufficient data are not reported.

Table 2-3

1995/1996 Current Population Survey: Current Smoking Status among Self-Respondents, 25 Years and Older, Identified as Daily Smokers 1 Year Ago

	Current Smoking Status											
	Daily						Former				Population Size (N)	Sample Size (n)
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months			
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Total	68.3	0.6	23.2	0.5	2.9	0.2	1.9	0.2	3.6	0.2	32,402,966	32,917
Male	68.7	0.8	22.7	0.7	2.7	0.3	2.1	0.2	3.8	0.3	17,058,593	15,358
Female	67.8	0.9	23.7	0.8	3.2	0.3	1.8	0.2	3.5	0.3	15,344,373	17,559
Age (Years)												
25–44	66.5	0.8	25.0	0.7	3.1	0.3	2.0	0.2	3.4	0.3	18,390,046	18,168
45–64	70.1	1.0	21.9	0.9	2.5	0.3	1.9	0.3	3.6	0.4	10,989,936	11,328
65+	72.8	1.8	16.5	1.5	3.8	0.8	1.9	0.6	5.0	0.9	3,022,984	3,421
Race/Ethnicity												
Non-Hispanic White	68.8	0.6	22.6	0.6	2.7	0.2	2.1	0.2	3.8	0.3	26,285,210	27,991
Hispanic	68.0	3.5	23.0	3.2	4.1	1.5	1.4	0.9	3.6	1.4	1,699,613	1,278
African-Americ.	65.3	1.9	26.7	1.7	4.3	0.8	1.2	0.4	2.4	0.6	3,432,483	2,681
Asian/PI	62.9	4.6	26.8	4.2	3.7	1.8	2.1	1.3	4.6	2.0	593,903	507
Native Americ.	68.1	5.4	23.3	4.9	3.2	2.1	2.7	1.9	2.6	1.9	391,757	460
Education (Years)												
<12	73.7	1.2	19.8	1.1	2.4	0.4	1.4	0.3	2.7	0.5	6,436,011	6,297
12	69.8	0.9	22.5	0.8	2.6	0.3	1.8	0.3	3.3	0.3	13,951,150	14,391
13–15	63.7	1.2	26.2	1.1	3.5	0.5	2.4	0.4	4.2	0.5	8,434,966	8,627
16+	63.8	1.8	24.8	1.6	3.7	0.7	2.5	0.6	5.2	0.8	3,580,839	3,602
Household Income (Dollars)												
<10,000	69.3	1.6	22.6	1.4	3.4	0.6	1.7	0.4	3.0	0.6	4,484,102	4,529
10,000-19,999	70.1	1.4	22.5	1.2	2.7	0.5	1.3	0.3	3.4	0.5	5,815,762	5,998
20,000-29,999	69.5	1.4	22.6	1.3	2.5	0.5	2.0	0.4	3.3	0.5	5,707,800	5,843
30,000-49,999	66.5	1.2	24.4	1.1	3.1	0.4	2.2	0.4	3.8	0.5	7,838,442	8,086
50,000-74,999	65.8	1.7	25.0	1.5	2.9	0.6	2.4	0.5	3.9	0.7	4,157,714	4,179
75,000 +	64.6	2.3	23.6	2.1	3.2	0.9	2.7	0.8	5.8	1.1	2,175,925	2,099
Unknown	73.2	2.1	19.2	1.9	2.9	0.8	1.5	0.6	3.1	0.8	2,223,221	2,183

Table 2-3 (continued)

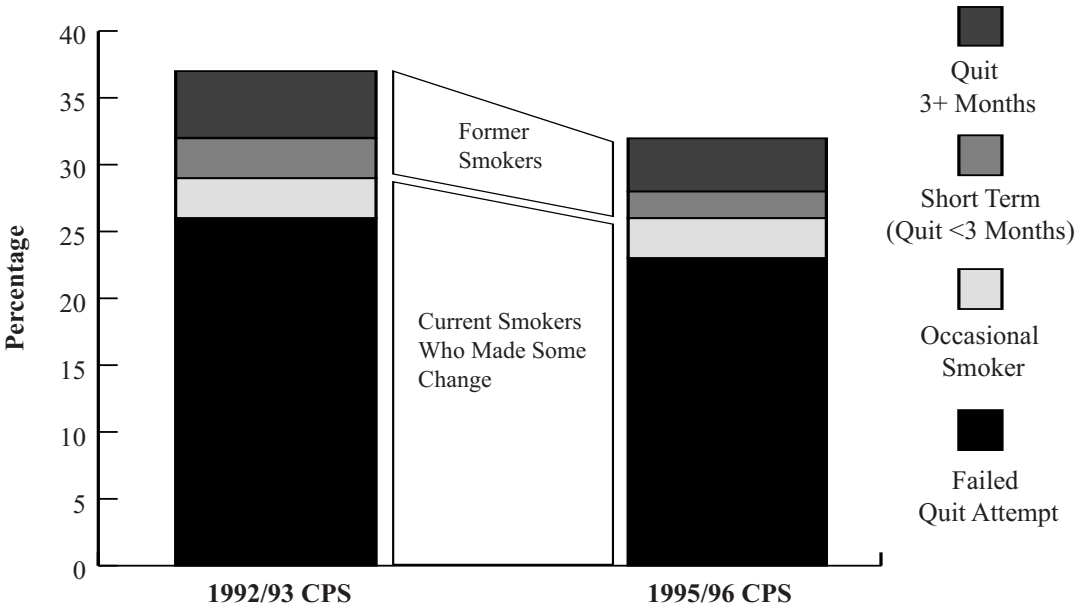
	Current Smoking Status											
	Daily						Former				Population	Sample
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months		Size	Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
States												
Alabama	65.3	5.0	27.5	4.7	3.5	1.9	1.5	1.3	2.2	1.5	523,282	462
Alaska	65.0	4.8	26.2	4.5	3.5	1.9	1.3	1.1	4.0	2.0	74,796	318
Arizona	65.0	4.9	22.6	4.3	2.8	1.7	4.0	2.0	5.6	2.4	487,618	486
Arkansas	73.7	4.1	19.2	3.7	1.8	1.3	1.6	1.2	3.8	1.8	376,963	517
California	64.3	2.3	24.2	2.1	4.4	1.0	2.1	0.7	4.9	1.1	2,784,977	1,705
Colorado	65.3	5.1	23.3	4.5	3.9	2.1	2.9	1.8	4.6	2.2	442,528	453
Connecticut	64.5	5.7	28.3	5.3	2.1	1.7	1.9	1.6	3.2	2.1	372,503	270
Delaware	73.2	4.7	19.4	4.2	2.7	1.7	1.8	1.4	2.9	1.8	97,745	363
District of Columbia	65.7	5.9	25.2	5.4	4.1	2.5	2.0	1.7	3.0	2.1	59,954	271
Florida	67.0	2.4	24.0	2.2	2.8	0.8	2.0	0.7	4.3	1.0	1,827,730	1,467
Georgia	68.9	4.5	23.7	4.1	2.2	1.4	2.9	1.6	2.3	1.4	868,971	518
Hawaii	66.3	5.6	22.1	4.9	4.3	2.4	2.4	1.8	4.9	2.6	127,499	236
Idaho	67.5	4.9	20.2	4.2	3.9	2.0	3.9	2.0	4.6	2.2	130,940	454
Illinois	70.2	2.6	22.1	2.4	3.0	1.0	1.6	0.7	3.0	1.0	1,493,937	1,356
Indiana	74.6	4.0	18.8	3.6	2.2	1.3	0.8	0.8	3.5	1.7	920,599	565
Iowa	70.5	4.8	21.8	4.3	2.2	1.5	1.8	1.4	3.6	1.9	350,680	459
Kansas	73.6	4.5	20.5	4.2	2.7	1.7	0.9	1.0	2.3	1.6	335,856	494
Kentucky	72.8	3.8	20.9	3.5	0.9	0.8	2.9	1.4	2.5	1.3	694,650	590
Louisiana	71.7	4.6	19.5	4.0	3.5	1.9	1.4	1.2	3.9	2.0	533,278	393
Maine	67.2	4.6	25.3	4.3	1.6	1.2	1.4	1.1	4.5	2.0	190,227	443
Maryland	63.9	5.5	25.7	5.0	4.5	2.4	2.3	1.7	3.6	2.1	559,659	332
Massachusetts	62.0	3.4	28.1	3.1	2.7	1.1	2.8	1.1	4.4	1.4	713,012	825
Michigan	63.1	2.8	28.0	2.6	3.2	1.0	1.5	0.7	4.2	1.1	1,329,879	1,389
Minnesota	64.6	5.2	26.6	4.8	4.1	2.1	2.0	1.5	2.6	1.7	539,599	478
Mississippi	69.0	4.7	23.9	4.3	2.0	1.4	2.1	1.5	3.0	1.7	343,817	403

Table 2-3 (continued)

	Current Smoking Status											
	Daily						Former				Population	Sample
	No Quit Attempts		Quit Attempts		Occasional		Quit < 3 Months		Quit 3+ Months		Size	Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Missouri	70.1	4.5	22.7	4.1	1.9	1.3	1.7	1.3	3.7	1.8	773,750	503
Montana	69.4	4.6	21.8	4.1	3.0	1.7	1.9	1.4	3.8	1.9	113,892	523
Nebraska	69.0	5.0	22.8	4.6	3.2	1.9	3.0	1.9	1.9	1.5	177,818	418
Nevada	70.4	4.2	23.3	3.9	1.7	1.2	1.5	1.1	3.0	1.6	247,950	451
New Hampshire	64.2	5.2	24.4	4.7	4.0	2.1	2.6	1.7	4.8	2.3	161,335	364
New Jersey	70.0	2.9	21.6	2.6	2.0	0.9	2.5	1.0	3.8	1.2	894,347	937
New Mexico	64.9	4.9	24.5	4.4	4.1	2.0	2.3	1.5	4.2	2.1	196,482	439
New York	68.0	2.1	23.3	1.9	3.1	0.8	1.9	0.6	3.8	0.9	2,040,575	1,794
North Carolina	74.2	2.8	18.2	2.5	2.8	1.1	1.8	0.8	3.0	1.1	1,035,647	1,226
North Dakota	72.7	4.8	19.7	4.3	2.8	1.8	3.1	1.9	1.8	1.5	74,276	455
Ohio	71.2	2.5	21.1	2.2	2.2	0.8	1.9	0.7	3.5	1.0	1,606,599	1,534
Oklahoma	73.8	4.2	20.8	3.9	2.6	1.5	1.0	1.0	1.8	1.3	448,326	588
Oregon	70.2	5.1	21.3	4.5	2.9	1.9	1.4	1.3	4.2	2.2	374,521	389
Pennsylvania	68.0	2.5	23.7	2.3	2.9	0.9	1.6	0.7	3.8	1.0	1,595,350	1,572
Rhode Island	60.3	5.2	30.1	4.9	3.0	1.8	2.1	1.5	4.5	2.2	137,521	345
South Carolina	77.9	4.1	16.7	3.7	2.3	1.5	1.8	1.3	1.4	1.1	508,076	393
South Dakota	64.8	4.8	25.9	4.4	4.1	2.0	2.1	1.5	3.1	1.8	84,867	494
Tennessee	71.3	4.1	20.0	3.6	2.8	1.5	1.8	1.2	4.2	1.8	823,937	510
Texas	67.8	2.6	24.4	2.4	3.2	1.0	1.5	0.7	3.1	1.0	2,125,005	1,415
Utah	69.3	6.1	23.0	5.6	3.1	2.3	2.1	1.9	2.6	2.1	132,775	265
Vermont	67.7	4.9	23.7	4.5	2.3	1.6	2.0	1.5	4.3	2.1	84,435	404
Virginia	68.9	4.3	23.6	4.0	1.8	1.2	1.5	1.1	4.2	1.9	892,527	570
Washington	64.3	5.3	26.3	4.9	2.4	1.7	3.5	2.1	3.4	2.0	645,346	398
West Virginia	71.5	3.9	20.6	3.5	2.9	1.5	1.5	1.1	3.4	1.6	295,884	628
Wisconsin	64.2	4.8	25.1	4.3	4.5	2.1	2.4	1.5	3.7	1.9	686,410	551
Wyoming	70.7	4.8	20.0	4.2	2.6	1.7	2.0	1.5	4.8	2.3	64,619	504

Note: CI = 95% confidence interval.

Figure 2-1
1992/93 and 1995/96 CPS: Percentage of Daily Smokers 1 Year Prior to the Survey Who Reported Some Change in Their Smoking Status during that Year, Age 25+ Years



ing this period. It is disconcerting that the largest proportionate decline in the subcomponents of the cessation activity measure was for those who had been quit for 3 months or more (5.1 ± 0.3 percent in 1992/93 declining to 3.6 ± 0.2 percent in 1995/96), since that is the measure with the greatest likelihood of predicting long-term successful cessation.

The 10 states with the highest rates of any cessation activity in 1992/93 were Massachusetts, Maryland, Washington, Wyoming, Vermont, Minnesota, Michigan, New Mexico, Nebraska, and New York. Massachusetts, Maryland, Washington, Minnesota, and Michigan repeated their appearance among the top 10 states in 1995/96. The states with the lowest rates of cessation activity in 1992/93 were the District of Columbia, Alabama, North and South Carolina, Alaska, Indiana, Nevada, Kansas, West Virginia, and Kentucky. The states of Kentucky, Kansas, North and South Carolina, and Indiana were also among the bottom 10 states in 1995/96.

The 10 states with the highest rates of 3+ month successful cessation in 1992/93 were Washington, Rhode Island, Minnesota, Massachusetts, California, Oklahoma, New Mexico, Louisiana, Wyoming, and New Jersey. California, Wyoming, Rhode Island, and Massachusetts were again among the top 10 states in 1995/96. The state with the highest rate of 3+ month cessation in 1995/96 was Arizona, which implemented a tax-funded tobacco control program in 1995. States with the lowest rates of 3+ months of cessation in 1992/93 included North Carolina, Mississippi, Nevada, Alaska,

West Virginia, District of Columbia, Kentucky, North Dakota, and Georgia. Only Kentucky, Georgia, and North Dakota were in the bottom group again in 1995/96.

Extrapolation of differences in these cessation measures between states to differences in the success of tobacco control programs is problematic for several reasons. Small differences between states are often within the confidence intervals of the estimates, and so the relative ranking of states with similar measures has little legitimacy. In addition, population differences between the states in age, education, and racial/ethnic composition can confound the use of these estimates as outcome measures for tobacco control programmatic activity. However, the range of values for these measures across the states is broad relative to the confidence intervals. Therefore, states at the higher end of each measure's range are statistically different from the states at the lower end of the range, and the differences are large enough that they are unlikely to be explained by differences in population demographics alone. For example, when the prevalence estimates for the different states are standardized to the racial and ethnic distribution of the United States, there is little difference in the relative ranking among the different states (unpublished analyses). In order to control for the influence of these demographic differences across the states on the measures of cessation we are using, we will first present analyses of the measures stratified by each demographic factor and then combine these factors in a multivariate logistic regression analysis. This analysis will allow us to examine the influence of the variables on cessation and to examine whether California and Massachusetts have greater rates of cessation activity and success than the remaining states.

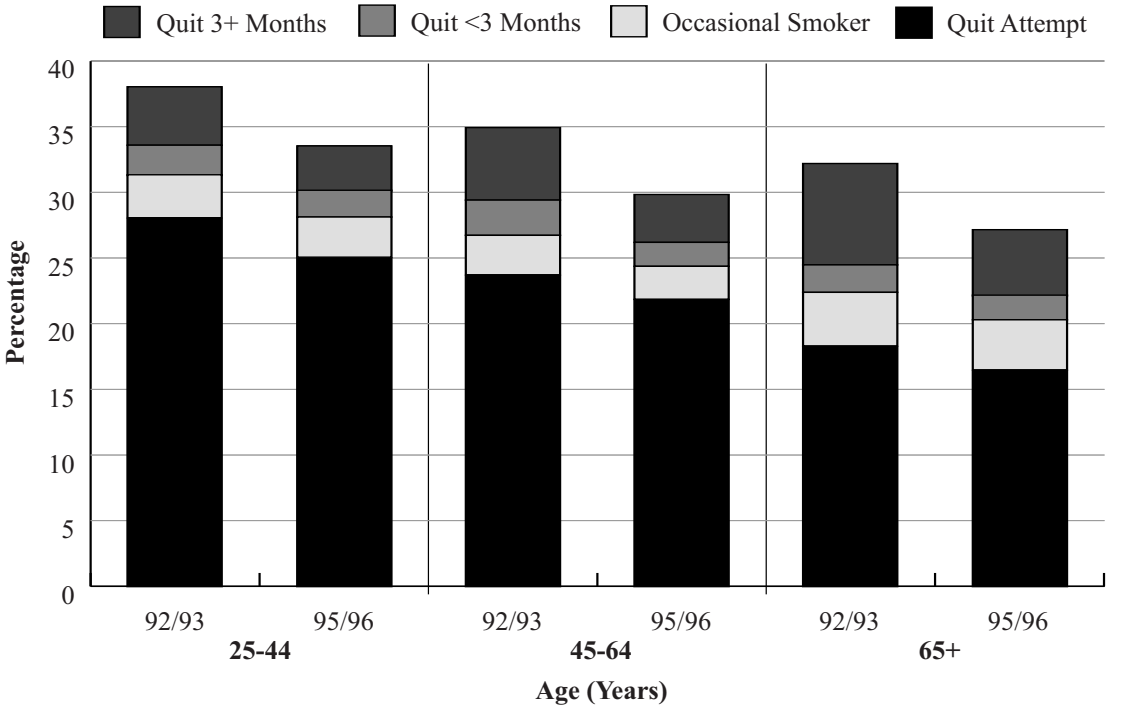
Differences in cessation activity by age, race/ethnicity, education, income, and number of cigarettes smoked per day

There are dramatic differences in cessation activity and success with age (Figure 2-2). Older smokers are much less likely to make a cessation attempt, but are much more likely to be successfully quit for 3 or more months. Both the absolute fraction of daily smokers 1 year prior to the survey who are now former smokers of 3 or more months duration and the fraction of those who have had any cessation activity who are now former smokers of 3 or more months duration are higher at older ages. Thus, older smokers appear to be less likely to attempt to change their smoking behavior; but when they do, they are substantially more likely to be successful. The decline in cessation activity between 1992/93 and 1995/96 as noted in Figure 2-1 is evident for each of the age groups.

Differences among racial and ethnic groups are less pronounced (Figure 2-3). African-Americans have significantly higher rates of cessation activity than non-Hispanic Whites, but they also have significantly lower rates of being quit for 3 or more months. Asian/Pacific Islanders also have significantly higher rates of cessation activity compared to non-Hispanic Whites, with a nonsignificant lower rate of 3+ month cessation success.

Figure 2-4 presents the cessation measures by level of educational attainment and demonstrates that both cessation activity and 3+ month cessation success are significantly higher among smokers with higher levels

Figure 2-2
1992/93 and 1995/96 CPS: Percentage of Daily Smokers 1 Year Prior to the Survey Who Report Some Change in Their Smoking Status during that Year, by Age



of educational attainment. The largest proportional differences across strata of educational attainment are for former smokers and former smokers of 3+ months' duration, where there is almost a doubling in rates from the lowest to the highest level of education. The percentage of all cessation activity that has resulted in 3+ months of successful cessation also increases with increasing level of educational attainment

A similar pattern is seen with level of income (Tables 2-2 and 2-3), where both cessation activity and 3+ month cessation success are significantly higher among smokers with higher family incomes. The percentage of all cessation activity resulting in 3+ months of successful cessation is relatively uniform across the middle strata of family income, but it is higher for the top income stratum and lower for the lowest income stratum.

Table 2-4 shows the current smoking status of individuals who reported that they were daily smokers 1 year prior to the California Tobacco Survey. It presents the change in smoking behavior that occurred over that year, both for changes in number of cigarettes reported and for becoming a former smoker. Most smokers (almost three-quarters) of more than five cigarettes per day continued to smoke the same number of cigarettes, even though many had made a quit attempt during that year. Smokers of 1-4 cigarettes per day were less consistent, with 14.2 percent increasing the amount that they smoked, 18.3 percent becoming occasional smokers, and

Figure 2-3
1992/93 and 1995/96 CPS: Percentage of Daily Smokers 1 Year Prior to the Survey Who Report Some Change in Their Smoking Status during that Year, Age 25+, by Racial or Ethnic Group

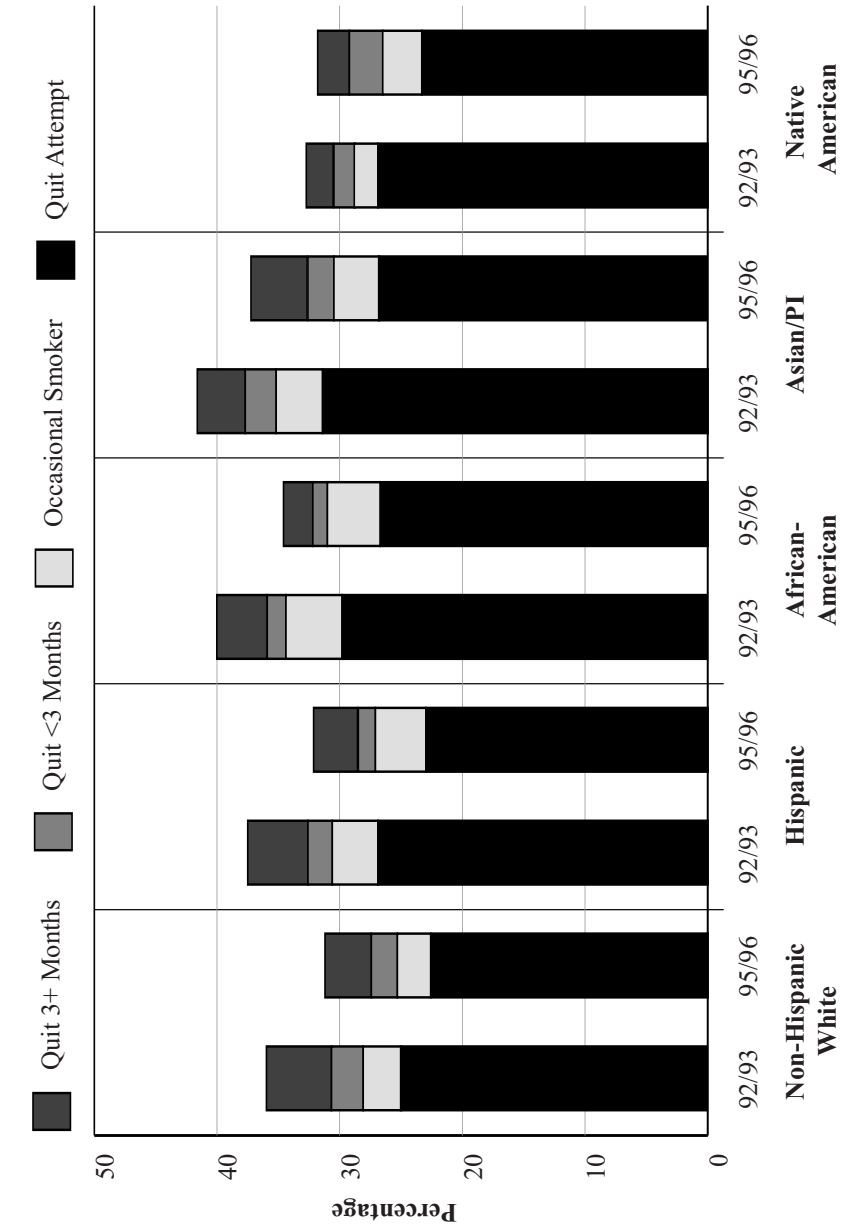


Figure 2-4
1992/93 and 1995/96 CPS: Percentage of Daily Smokers 1 Year Prior to the Survey Who Report Some Change in Their Smoking Status during that Year, Age 25+, by Level of Education

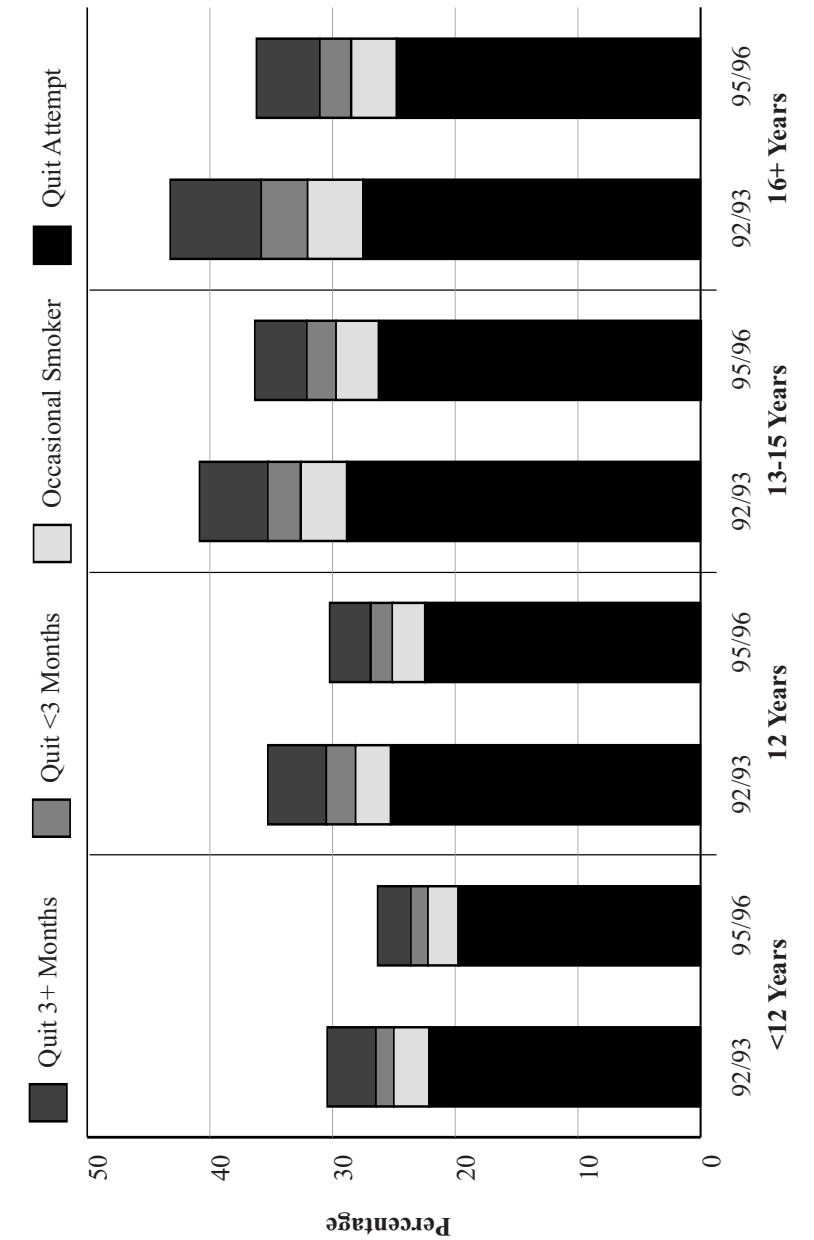


Table 2-4

California Tobacco Survey: Current Smoking Status Compared to Smoking Status 1 Year Ago for Daily Smokers 1 Year Ago, 25 Years and Older

# Smoked 1 Year Ago	Current Smoker: Cigarettes Smoked per Day										Occasional Smoker		Former Smoker: Quit Duration						Pop. Size (N)	Samp. Size (n)
	25+		15–24		5–14		1–4		Unknown				<3 Months		3+ Months		Unknown			
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Overall	18.3	1.1	37.6	1.3	26.0	1.5	2.9	0.5	0.3	0.2	4.6	0.7	4.8	0.7	5.0	0.8	0.4	0.2	2,894,421	6,211
25+	69.5	2.8	13.2	1.8	3.9	1.1	0.6	0.6	0.0	0.1	1.8	0.6	5.2	1.4	5.5	1.1	0.3	0.3	703,264	1,542
15–24	2.7	0.7	74.4	1.6	10.1	1.4	0.8	0.5	0.0	0.0	3.2	0.9	4.2	0.8	4.2	0.9	0.4	0.3	1,266,356	2,835
5–14	0.5	0.4	5.6	1.3	74.1	2.8	1.8	0.7	0.1	0.2	7.0	1.6	5.0	1.3	5.6	1.6	0.4	0.3	779,441	1,560
1–4	0.5	1.1	1.1	1.0	12.6	8.1	50.7	11.0	0.4	0.7	18.3	8.2	8.3	5.9	6.8	3.5	1.3	1.6	106,769	203
Unknown	9.5	8.9	26.1	12.3	20.3	9.6	2.6	3.5	20.8	9.7	11.3	8.5	2.7	3.0	6.7	8.3	.	.	38,593	71

Note: CI = 95% confidence interval; "." = insufficient data.
Data Source: 1996 CTS

16.4 percent quitting. With the exception of this lowest number of cigarettes per day category (1-4 cigarettes per day), there was little difference in the prevalence of being a former smoker or a former smoker of 3+ months duration with increasing number of cigarettes per day. However, the prevalence of being a current occasional smoker declined significantly when those who smoked 5-14 cigarettes per day 1 year prior to the survey were compared to those who smoked 25 or more cigarettes per day, suggesting that heavy smokers are less likely to become occasional smokers as a change in smoking behavior.

MULTIVARIATE LOGISTIC MODELING OF CESSATION DATA

As described above, smoking prevalence and cessation rates vary substantially with age, race/ethnicity, and other demographic characteristics; and income and educational attainment are not evenly distributed across racial and ethnic subgroups of the population. This makes it difficult to evaluate the actual influence of these characteristics on cessation rates from stratified analyses alone. Multivariate logistic regression modeling techniques allow the effects of each characteristic to be estimated while controlling for the influence of the other characteristics in the model. The results of this approach can be expressed as a set of odds ratios which estimate the ratio of a given cessation measure—*e.g.*, 3+ month successful cessation—among individuals with different levels of a characteristic—*e.g.*, level of income—while controlling for the effects of the other characteristics—*i.e.*, gender, age, race/ethnicity, education, and number of cigarettes smoked per day. This form of analysis gives a much clearer picture of the real influence of these demographic characteristics on the smoking cessation measures. These analyses were performed on the CPS data for 1992/93 and for 1995/96, and the complete results for each of the cessation measures are presented in Appendix 1 as Tables 2-10 and 2-11. A more complete description of these methods is presented as Appendix 2.

The discussion that follows is largely confined to an examination of "Any cessation activity" (the measure labeled change in the tables, which includes those who make a cessation attempt, become occasional smokers, or are former smokers of any duration) and the measures of "Cessation of any length" and "Cessation of 3+ months."

Figure 2-5 presents the odds ratios from a multivariate logistic regression analysis of the 1992/93 CPS data for any cessation activity (quit attempt, becoming an occasional smoker, or successful quitting) in the prior year among those who were daily cigarette smokers 1 year prior to the survey and who were at least 25 years of age. Figure 2-6 presents that same analysis for the 1995/96 CPS. It is clear that the independent effects of race and ethnicity on cessation activity seen in Figure 2-3 are much less dramatic once adjustments are made for the differences in education, income, and number of cigarettes smoked per day across the different racial and ethnic groups. African-Americans have a slightly higher rate of cessation activity compared to non-Hispanic Whites in 1992/93, but not in 1995/96; whereas Hispanic smokers have minimally lower rates of cessation activity in 1995/96, but not in 1992/93.

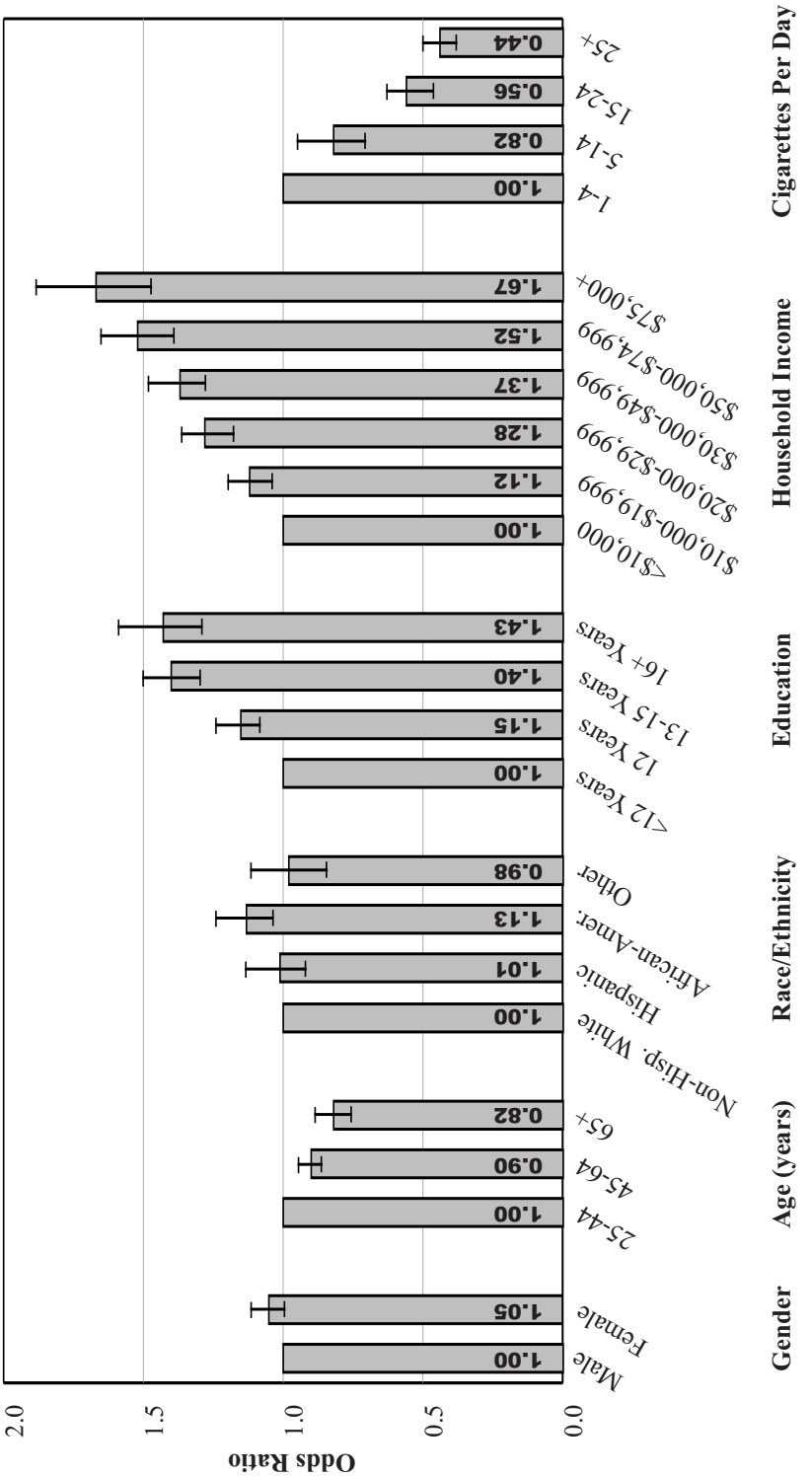
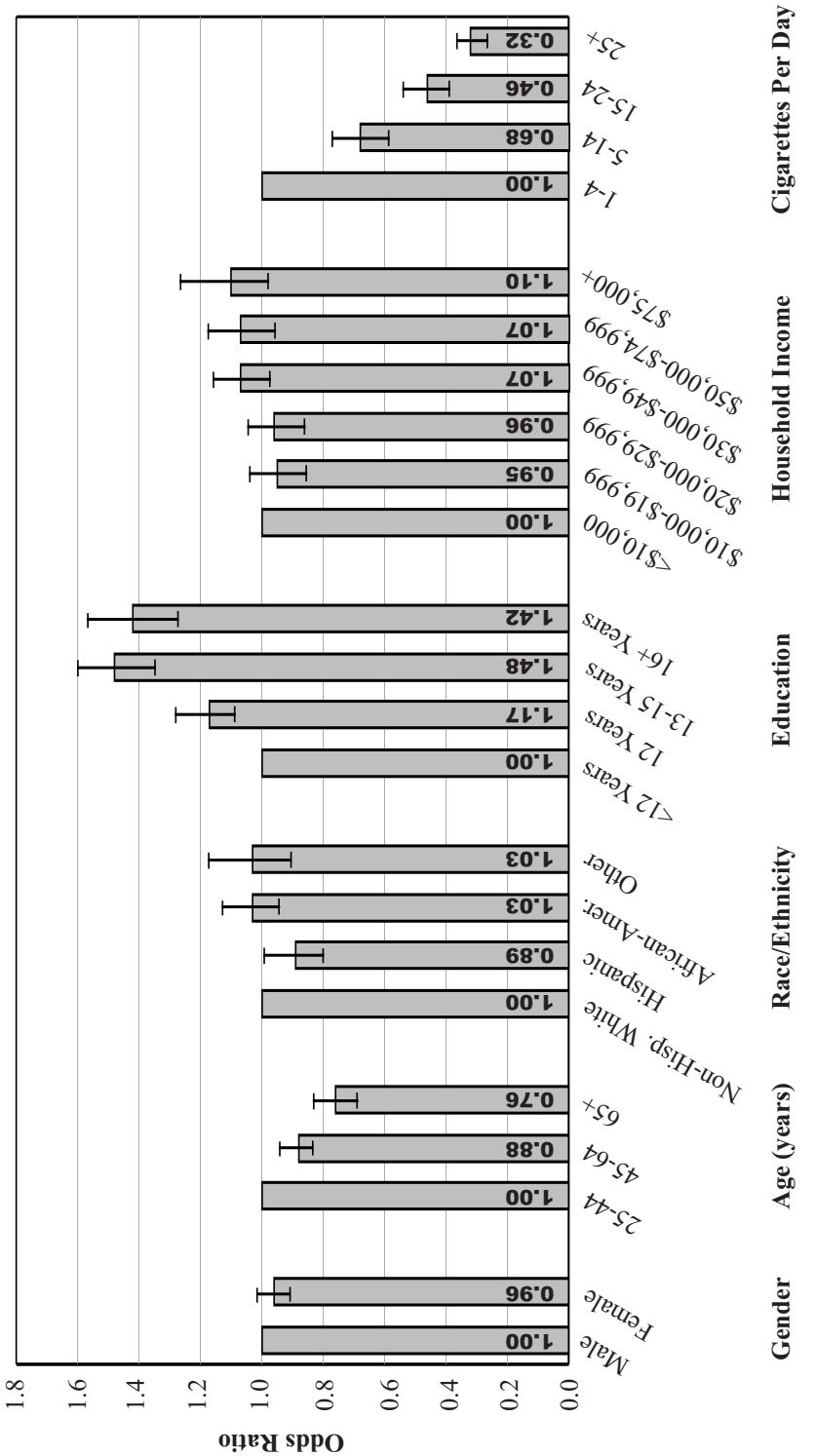


Figure 2-5
Current Population Survey 1992/93: Odds Ratios for Any Cessation Activity

Figure 2-6
Current Population Survey 1995/96: Odds Ratios for Any Cessation Activity



In contrast to the similarity of cessation activity across racial and ethnic groups, there are substantial effects of age, education, income, and cigarettes smoked per day. In both surveys, rates of any cessation activity decline with increasing age and number of cigarettes smoked per day. However, cessation activity increased with increasing level of educational attainment in both surveys. The effect of income was different between surveys. In 1992/93, there was a dramatic and consistent increase in cessation activity with increasing level of income, but in the 1995/96 survey there was no income effect. When similar multivariate logistic analyses are performed on the 1990 and 1996 California Tobacco Surveys (Tables 2-12 and 2-13 in Appendix 1), there are also no consistent effects with level of income. This suggests that there may be no continuing effect of level of income on cessation activity once age and level of education are controlled for in the analyses, but that there *was* an effect in 1992/93, possibly due to a reduction in cigarette price during that period. Philip Morris reduced the price of Marlboro cigarettes in 1993, and the other manufacturers followed suit. The effect found in the analyses of the 1992/93 CPS data may have been due to higher cessation activity among higher income groups during these years, but a more likely explanation would be a reduction in cessation activity among lower income smokers for whom price can more reasonably be argued to have an effect.

Figures 2-7 and 2-8 present multivariate logistic regression analyses of the 1992/93 and 1995/96 CPS for the measure of successful cessation (3+ month former smokers). The odds ratios for 3+ month cessation success presented in Figures 2-7 and 2-8 are a result of the cessation activity presented in Figures 2-5 and 2-6. One might expect that those factors that lead to higher rates of cessation activity might also lead to higher rates of 3+ month successful cessation because one must make a quit attempt in order to become a former smoker. This pattern is indeed present for the relationship with educational attainment, where both cessation activity and 3+ month cessation success increase with increasing level of education. However, a quite different pattern emerges when the effects of age or cigarettes smoked per day are examined.

The odds ratios for cessation activity decrease significantly with increasing age for both the 1992/93 and 1995/96 CPS (Figures 2-5 and 2-6, change measure in Tables 2-9 and 2-10). However, the odds ratios for 3+ month successful cessation increases with increasing age (Figures 2-7 and 2-8, Tables 2-10 and 2-11), even in the face of fewer attempts to quit. This suggests that the factors that drive cessation attempts may differ from the factors that determine cessation success. It also suggests that older smokers may be less likely to try to change their smoking behavior, but when they do try to quit, they are far more likely to be successful. Similar results were seen for the 1990 and 1996 CTS (Tables 2-12 and 2-13), but the results were not always statistically significant.

The pattern of cessation with increasing number of cigarettes smoked per day is also complex. There is a clear decline in cessation activity (change measure in the tables) with increasing number of cigarettes smoked per day. However, the association with cessation success is less clear (Figures

2-7 and 2-8). Those who reported smoking 1-4 cigarettes per day were significantly more likely to be successfully quit for 3+ months than were smokers who reported smoking 5-14 or 15-24 cigarettes per day. Successful cessation was less likely for those smoking 25+ cigarettes per day than for those smoking 1-4 cigarettes per day, but the difference was not statistically significant. However, once the category of 1-4 cigarettes per day is excluded, there is no trend of lower likelihood of 3+ month successful cessation with increasing number of cigarettes smoked per day across the remaining number of cigarettes per day categories.

It is possible that overreporting of the number of cigarettes smoked per day by former smokers may contribute to the absence of a progressive decline in the likelihood of successful cessation, but the absence of any suggestion of a trend would be difficult to explain by overreporting alone. Additionally, a follow-up of respondents to the 1990 California Tobacco Survey was conducted in 1992, and the rates of 3+ month cessation at the time of follow-up for those who reported smoking different numbers of cigarettes per day in 1990 are as follows: 25+ cigarettes/day, 7.25 percent; 15-24 cigarettes/day, 6.60 percent; 5-14 cigarettes/day, 10.7 percent; 1-4 cigarettes/day 23.53 percent. These rates are based on small numbers of observations and are not representative of the population, but they suggest that even when number of cigarettes smoked per day is recorded before a cessation attempt, there is little variation in rates of cessation lasting 3+ months or more among those who smoke five or more cigarettes per day. The high rates of cessation among those who smoke 1-4 cigarettes per day may reflect a substantial number of smokers in this category who are smoking this low number of cigarettes per day because they are actively attempting to change their smoking behavior.

In contrast to the CPS data, a logistic regression performed on data from a 5-year longitudinal follow-up of 13,415 current smokers from the COMMIT Study (Hymowitz *et al.*, 1997) revealed a consistent trend in declining cessation success with increasing number of cigarettes smoked per day. It is unclear whether the differences between the results of these two studies are due to differences in their data collection design (longitudinal vs. cross-sectional), differences in the calendar years in which the data were collected, or differences in the outcome measures recorded. These data taken together suggest that smokers of 25 or more cigarettes per day are less likely to attempt to quit. It is less certain whether those who have made an attempt to quit are less likely to be successful if they are heavy smokers.

Cessation in states with large tobacco control programs (California and Massachusetts) compared to the rest of the United States

Recent evidence has demonstrated a slowing of the rate of decline in cigarette consumption and smoking prevalence for both the nation and for California. Analyses of these trends have raised questions about the recent effectiveness of the California Tobacco Control Campaign (Pierce *et al.*, 1998a & b), with the suggestion that reductions in funding have dramatically reduced the effectiveness of tobacco control effort during the 1993-1996 period. Cessation is one measure of the effectiveness of tobacco control programs; and various cessation measures for California and Massachusetts—two states with large,

Figure 2-7
Current Population Survey 1992/93: Odds Ratios for Successful Cessation of 3+ Months Duration

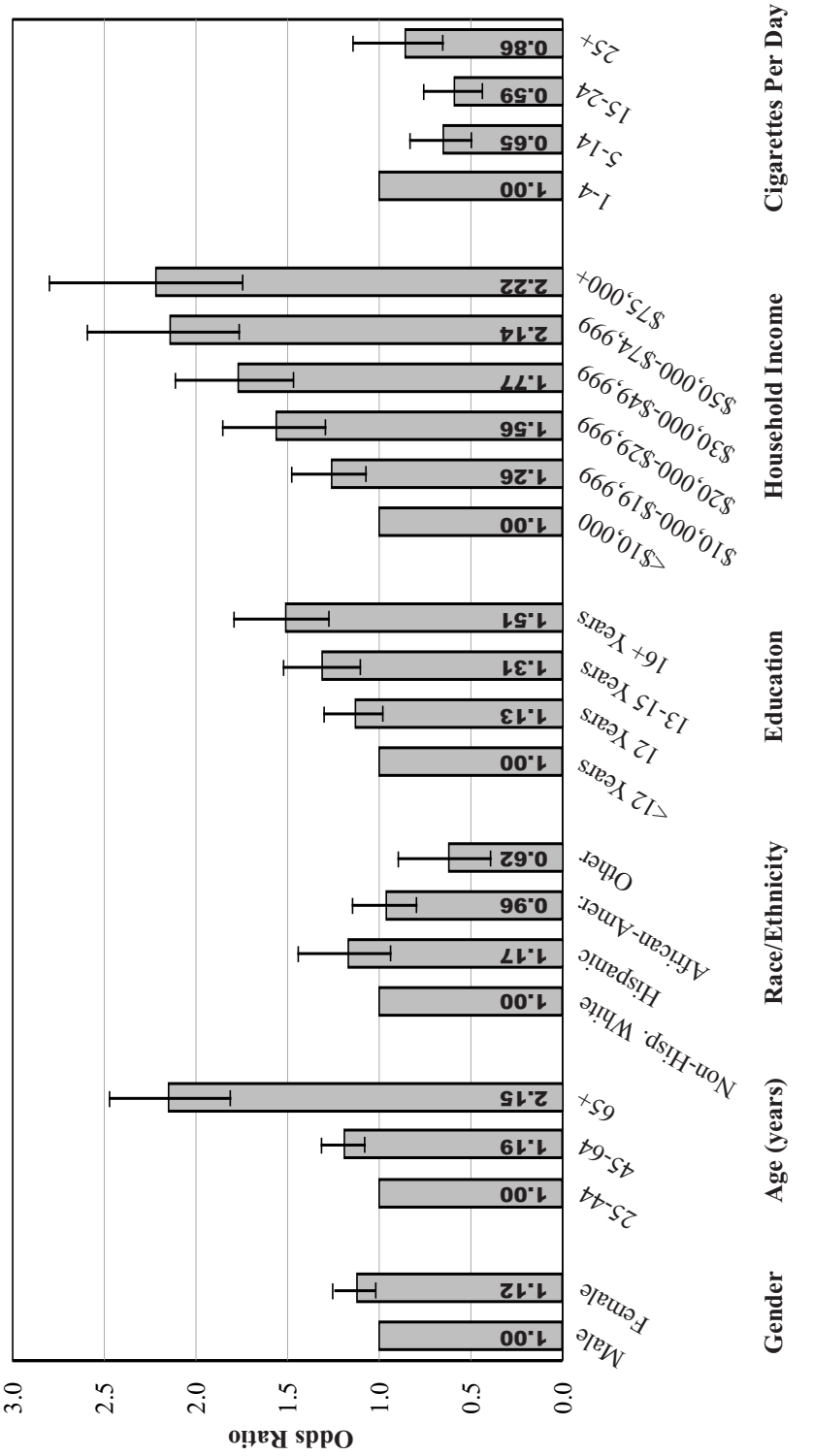
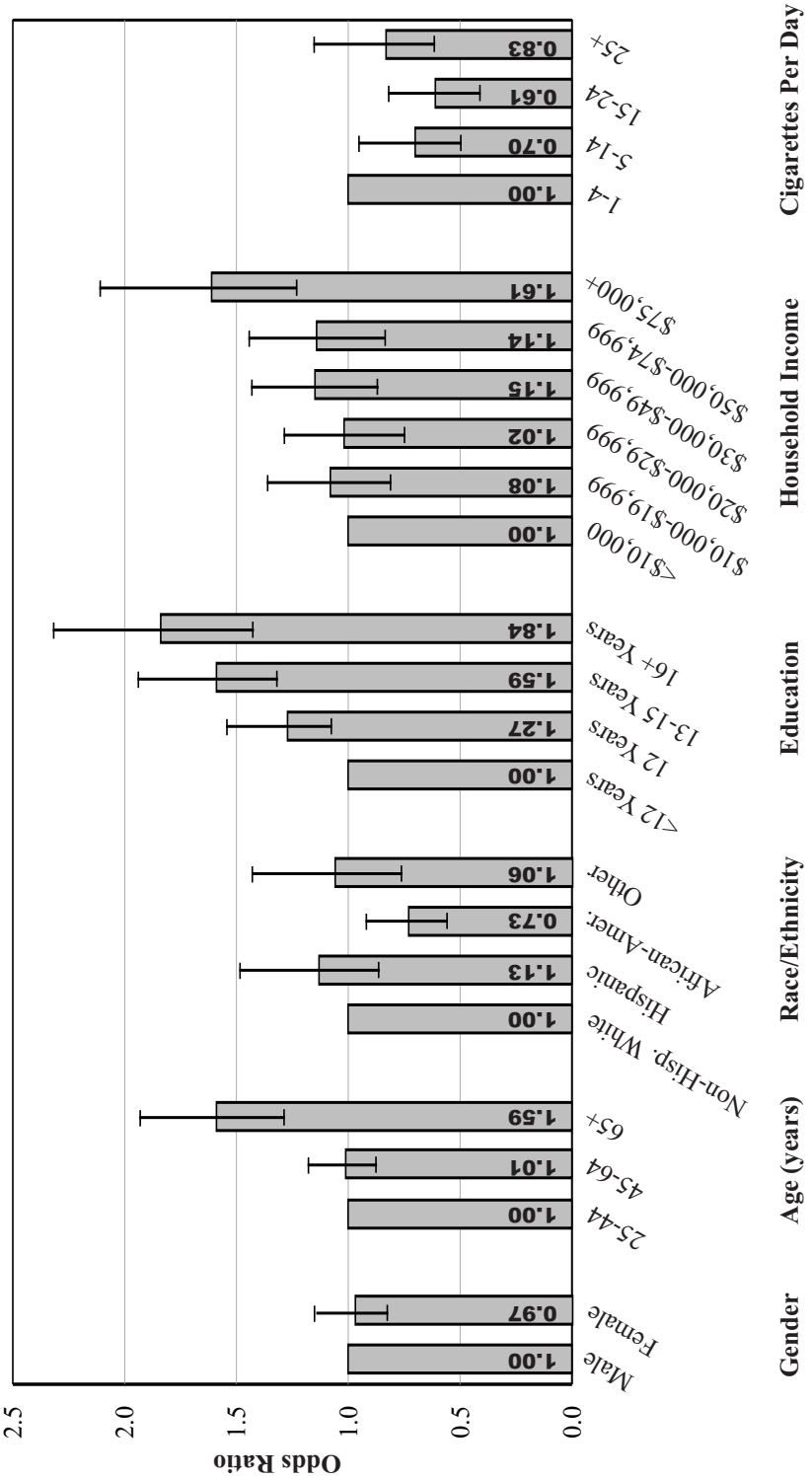


Figure 2-8
Current Population Survey 1995/96: Odds Ratios for Successful Cessation of 3+ Months Duration



well-funded tobacco control programs—can be compared to the remaining 48 states using the two sets of CPS survey data. Because smoking prevalence and cessation are influenced by differences between states in demographic characteristics and number of cigarettes smoked per day, it is difficult to directly compare population prevalence measures of current smoking or of cessation as an evaluation of the differences in the effectiveness of various states' tobacco control efforts. We examine measures of cessation among adults as one direct measure of the success of these tobacco control efforts using multivariate logistic regression analyses to control for demographic differences and differences in number of cigarettes smoked per day. We compare measures of cessation among California and Massachusetts adults with those of the remaining states.

To control for differences between California and the remaining states in demographic composition and numbers of cigarettes smoked per day, multivariate logistic regression modeling of the cessation measures was conducted for each of the surveys and then for the combined survey data set, with survey year and geographic location (California, Massachusetts, or other states) as variables in the analysis. The odds ratios for these analyses are presented in Table 2-5, and the complete results of the analysis are presented in Table 2-14.

The results demonstrate a clear time trend across the two surveys. There was a significant decline in the prevalence of any cessation activity and of 3+ month cessation success between the 1992/93 and 1995/96 surveys, with no significant change in the likelihood of becoming an occasional smoker.

Both California and Massachusetts had statistically significantly higher cessation activity (the change measure in the tables) compared to other states. Massachusetts had an increase in cessation attempts, and California had an increase in likelihood of becoming an occasional smoker. Both Massachusetts and California also had increases in the likelihood of a current daily smoker becoming a former smoker in the last year, compared to other states. The likelihood of achieving 3+ months of cessation was also significantly higher in California—and higher with borderline significance ($p = 0.051$) for Massachusetts—when compared to the remaining states.

These analyses demonstrate that cessation activity declined in Massachusetts, California, and the rest of the states between 1992/93 and 1995/96. However, California and Massachusetts had higher rates of successful cessation and cessation activity when compared to the remaining states. The higher rates of cessation activity and cessation success in California and Massachusetts provides evidence for a substantial impact of the tobacco control programs on cessation in these two states.

CESSATION IN CALIFORNIA

Michael Johnson and Jacqueline Major

In 1988, California passed Proposition 99, which increased the taxes on cigarettes by 25 cents per pack, and a part of that tax increase was used to fund a tobacco control program. As part of that program, detailed surveys of smoking behavior were conducted in 1990 and 1996, with more limited surveys conducted in 1992 and 1993.

Table 2-5

Odds Ratios* and 95% Confidence Intervals for Measures of Cessation in California and Massachusetts Compared to the Remaining States

	Cessation Activity[1]		Cessation Attempt[2]		Occasional[3]		Former (any length)		Former, 3+ Months	
Variable	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Survey Year										
1992/3	1.00		1.00		1.00		1.00		1.00	
1995/6	0.80	(0.78 -0.83)	0.80	(0.77 -0.82)	0.94	(0.86 -1.03)	0.73	(0.68 -0.77)	0.70	(0.65 -0.76)
Region										
Rest of USA	1.00		1.00		1.00		1.00		1.00	
California	1.06	(1.00 -1.12)	1.04	(0.98 -1.10)	1.30	(1.13 -1.49)	1.20	(1.09 -1.33)	1.32	(1.17 -1.49)
Massachusetts	1.28	(1.15 -1.42)	1.30	(1.17 -1.45)	1.00	(0.74 -1.34)	1.31	(1.09 -1.56)	1.24	(1.00 -1.55)

[1]Cessation Activity: Includes those who have made a quit attempt, have become occasional smokers, or have become former smokers.

[2]Cessation Attempt: Includes those who have made a quit attempt or have become former smokers. Occasional smokers are excluded from both the numerator and denominator.

[3]Occasional: Includes those who reduced from smoking everyday, to smoking some days.

**Also adjusted for gender, age, race/ethnicity, education, household income, and number of cigarettes per day.*

Differences between the CPS for California and CTS Data

When the results of the 1996 California Tobacco Surveys are compared to the 1995/96 CPS data for the state of California, some differences in the cessation measures are evident. The CPS data estimate that a higher fraction of those who were daily smokers 1 year prior to the survey had not made an attempt to quit (64.3 ± 2.4 percent, Table 2-3; compared to 53.6 ± 1.4 percent, Table 2-16), and the fraction who were former smokers of less than 3 months duration was lower in the CPS (2.2 ± 0.7 percent) than in the CTS (4.8 ± 0.7 percent). The rates for occasional smoking and for cessation of 3+ months' duration are essentially identical. It is unclear whether the differences between these two surveys in frequency of these cessation measures relate to the survey designs, the populations sampled, or the timing of the surveys.

Distribution of the Cessation Measures in the CTS Data

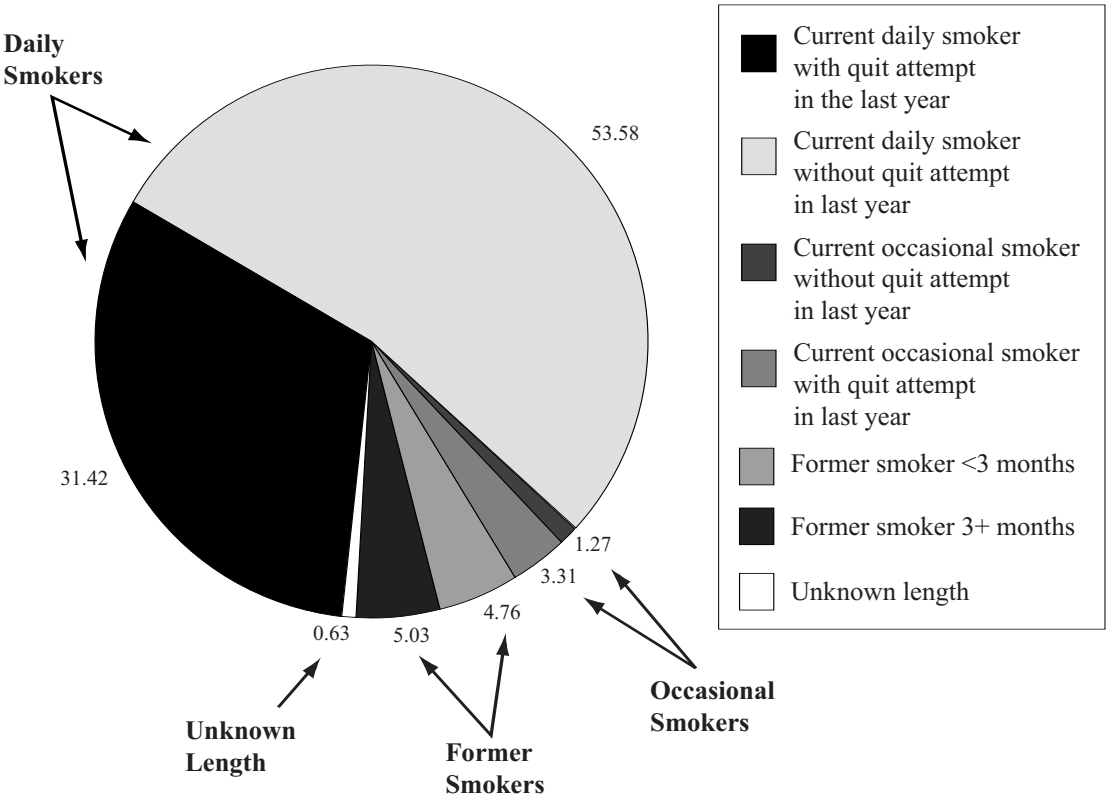
Figure 2-9 and Table 2-6 present the current smoking status among those age 25 and older who were daily smokers 1 year prior to the survey for the 1996 California Tobacco Survey. Because this survey asked occasional smokers about cessation attempts in the last year, it is possible to demonstrate that nearly 75 percent of those smokers who reported shifting from daily smoking to occasional smoking also made a quit attempt in the previous year. This suggests that many of these former daily smokers who are current occasional smokers are either in process of cessation or in the process of relapsing from a cessation attempt.

Incorporating the cessation attempt information for occasional smokers into the cessation attempt measure allows estimation of the frequency of cessation attempts for all those who were daily cigarette smokers 1 year prior to the survey, including those who had become occasional smokers. Using the 1996 CTS data, approximately 45 percent of those who were daily smokers 1 year prior to the survey made cessation attempts and almost 10 percent were successfully quit at the time of the survey.

Change in Cessation between 1990 and 1996

Cessation measures for the California surveys were calculated using the same approach that was utilized for the CPS data, as presented in the first section of this chapter. Table 2-6 presents the measures of cessation for the 1990 and 1996 CTS. There is a small and not statistically significant decline in the fraction of former daily smokers who have been quit for 3 or more months—consistent with that seen in the CPS. However, there is little suggestion from these data of a substantial decline in rates of cessation success or cessation attempts in California between 1990 and 1996. There is a small increase in the prevalence of occasional smoking between these two surveys, but this difference is probably due to a change in the definition of current smoking used in the CTS. Current smokers of at least 100 lifetime cigarettes were defined by the question “Do you smoke everyday, some days or not at all?” in the 1996 CTS and in the 1990 survey by the question “Do you smoke cigarettes now?” followed by “Do you smoke everyday or some days?” for positive answers to the first query. Tables 2-15 and 2-16 present the cessation measures for California by demographic characteristics for the 1990 and 1996 CTS.

Figure 2-9
California Tobacco Survey 1996: Current Smoking Status among Those who were Daily Cigarette Smokers 12 Months Ago, Ages 25 and Older



Multivariate logistic regression analyses were also performed on the 1990 and 1996 CTS in order to examine the influence of demographic characteristics and number of cigarettes smoked per day on the measures of change, and they are presented as Tables 2-12 and 2-13. In general, the results of these analyses were similar to those found when the analyses were performed on the CPS data. There was an increased likelihood of cessation activity (the change variable in the table) and cessation success with increasing levels of education in 1990, but the effect of education was markedly reduced or eliminated in the 1996 data. A decreasing likelihood of cessation activity, but greater likelihood of cessation success, was evident with increasing age in both surveys, although the effect was not statistically significant in the 1996 survey. There was also a decline in cessation activity with little falloff in cessation success for increasing number of cigarettes smoked per day in both surveys.

In 1990, there was a higher likelihood of cessation activity among African-American and Hispanic smokers when compared to Non-Hispanic Whites, and Hispanic smokers had a significantly higher likelihood of successful cessation and of being successful for 3 or more months. By 1996, the

Table 2-6

Current Smoking Status among Self-Respondents, Age 25 and Older, Identified as Daily Smokers 1 Year Ago by the 1990 and 1996 California Tobacco Surveys

	Daily				Occasional				Former					
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Quit Unknown Duration		Population Size	Sample Size
Year	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
1990	32.67	1.72	53.20	1.72	2.64	0.51	0.84	0.32	4.15	0.68	5.56	0.73	0.95	0.50	3,419,535	7,260
1996	31.42	1.28	53.58	1.40	3.31	0.53	1.27	0.45	4.76	0.66	5.03	0.79	0.63	0.22	2,894,421	6,211

Note: CI = 95% confidence interval.

cessation activity measure for Hispanic smokers had a lower odds ratio but was still statistically significant; however, their likelihood of successful cessation was no longer statistically significantly different from those of Non-Hispanic White smokers.

Among African-Americans, the odds ratio for cessation activity (change) was statistically significantly higher when compared to Non-Hispanic White smokers for both the 1990 and 1996 CTS, but their likelihood of cessation success was significantly lower than for Non-Hispanic Whites in 1996. It is clear that there has been a decline in cessation activity and cessation success among both African-American and Hispanic smokers in California between 1990 and 1996. In 1990, both groups had increased rates of cessation activity, and Hispanic smokers had increased rates of cessation success, but by 1996 odds ratios for cessation activity among Hispanic smokers had fallen, and the likelihood of cessation success was significantly lower among African-Americans when compared to non-Hispanic Whites. These analyses control for differences in education and income as well as for number of cigarettes smoked per day among the different racial and ethnic groups. When the effects of poverty and low educational attainment are added to the effects of race and ethnicity, the picture of cessation for these groups becomes even more bleak. The magnitude of the change in California and the absence of similar changes in the CPS data suggest that the California Tobacco Control program may have preferentially reached African-American and Hispanic smokers in the early years of the program, but the effect appears to have largely disappeared by 1996.

SMOKING BEHAVIOR IN MASSACHUSETTS: 1993 TO 1997

Lois Biener

A 25-cent per pack tax on cigarettes was implemented in January of 1993 in Massachusetts. A mass media campaign was launched in October of that year, but most of the other interventions associated with the Massachusetts Tobacco Control Program were not fully operational until well into 1994. Evaluation activities have consisted primarily of population-based surveys conducted by the Center for Survey Research at the University of Massachusetts and an independent evaluation based at Abt Associates, which assembles program information from a management information system, tobacco consumption information based on tax data, and other relevant information that becomes available from a variety of sources (such as the Behavioral Risk Factor Survey, the tracking research conducted by a market research organization, and independent research projects). Assembling data from all of these sources, including the population-based surveys, Abt publishes an annual report each fiscal year describing the impact of the Massachusetts Tobacco Control Program. The most recent report covers fiscal year (FY) 1997 and includes data from July 1996 through June of 1997 (Hamilton, 1998). That report summarizes the data relevant to adult smoking behavior in Massachusetts as follows:

- Cigarette consumption in Massachusetts has fallen by 31 percent since 1992, compared with a drop of 8 percent in the rest of the United States.

- Smoking prevalence among adults is declining slowly (from 22.6 percent in 1993 to 20.6 percent in FY 97), but the difference is not statistically significant.
- The number of cigarettes smoked per day by adult smokers has declined significantly from 20 cigarettes per day in 1993 to 16 per day in FY 97.
- The rate of cessation and cessation attempts among past-year smokers has risen from 1993 to FY 97, but not significantly.
- Significantly more smokers are considering quitting in the next 30 days.

The analyses presented in this paper were undertaken shortly after data for the calendar year 1997 became available for analysis, and they cover the same variables summarized above (with the exception of tax data on consumption). Whenever possible, analyses have been designed to correspond with those being produced from the CPS and include demographic breakdowns to determine whether changes in any particular population group are apparent. The CPS analyses usually focus on daily smokers rather than both daily and occasional smokers. Because the Massachusetts surveys did not question recent quitters on their previous smoking patterns, we cannot distinguish between those quitters who were occasional smokers prior to quitting in the past year and those who were daily smokers prior to quitting.

Cross-sectional Surveys of Adults

The baseline Massachusetts Tobacco Survey was a probability sample of Massachusetts housing units that used random-digit-dial techniques to contact subjects by telephone. Initial brief interviews were carried out with an adult household informant in 11,463 households. The informant provided information about the other residents of the household—the age, gender, ethnic and racial background of all residents, and the smoking status of each adult resident. Based on the household enumeration, a representative sample of adults was selected for extended interview. The adult sampling design oversampled smokers and minority-group members. Adult interviews were conducted in English, Spanish, and Portuguese. Interviewing was conducted between October 1993 and March 1994, with 70 percent of the interviews completed by January 31, 1994. The response rate was 78 percent for the household interviews and 78 percent and 75 percent for the eligible adults and teens, respectively.

Follow-up cross-sectional data are available for adults from the Massachusetts Adult Tobacco Survey (MATS), which is an ongoing monthly Random Digit Dial survey. Beginning in March 1995, MATS samples approximately 225 adults per month. Like the baseline survey, MATS includes a screening interview and an extended interview, with one adult selected for extended interview from among adults living in the household. The annual samples for MATS are about half the size of the baseline, and the MATS sample design does not oversample smokers or minority group members. Consequently, data on changes among smokers tend to have lower statistical power. Detailed information about the methodology of these surveys has been published elsewhere (Biener *et al.*, 1994; Biener and Roman, 1996).

Estimates of smoking prevalence are derived from the household screener, who provides information on smoking prevalence for many more adults than are interviewed personally. Although much of the information is based on proxy report, these reports of current smoking status have been determined to correspond with self-report more than 90 percent of the time (Biener *et al.*, 1994; Gilpin *et al.*, 1994).

Progress toward smoking cessation

When considering whether progress has been made toward smoking cessation in Massachusetts, we examined several different self-report indicators from the cross-sectional surveys—changes in smoking prevalence over time, changes in rates of successful quitting among those who were smoking during the prior year, and changes in rates of attempting to quit among the same group. Next we examined changes in smoking patterns of current daily smokers—the number of cigarettes being smoked each day, the proportion who waited more than 30 minutes after waking to light their first cigarette, and the proportion who report intending to quit in the next 30 days. In addition to examining overall statewide estimates, we examined these variables for men and women separately and for different age, education, ethnic, and income groups.

RESULTS

Smoking Prevalence

Smoking prevalence as estimated by the screening instruments has declined by about 2 percentage points from 1993 to 1997. The drop is somewhat greater among men (23.6 to 20.9 percent) than among women (21.8 to 20.4 percent). Consistent declines from year to year can be seen among those in the 25- to 44-year-old age group, the largest segment of the adult population—overall drop, 26.3 to 22.7 percent; men, 27.2 to 24.8 percent; and women, 25.3 to 20.8 percent. The largest declines can be seen among the least-educated groups, those with less than 12 years of education—overall drop, 30.5 to 24.6 percent; men, 34.1 to 29.8 percent; and women, 26.7 to 20.5 percent. None of these changes, however, reach statistical significance.

Estimates of smoking prevalence derived from the extended interview are very similar to those derived from the screener. Although estimates diverged a bit during 1995 and 1996, the overall trends are quite consistent for all smokers (*i.e.*, both daily and occasional smokers). The prevalence of daily smoking dropped by almost 4 percentage points between 1993 and 1995/96, but increased again in 1997.

We see very minor declines in smoking prevalence. The drop in the poorly educated group, if reliable, may be a result of the price increase or the media campaign.

Cessation Rates

Cessation rates were computed as the proportion of past-year smokers who reported having quit smoking regularly in the year prior to being interviewed. Both daily and occasional smokers are included because the MATS did not query quitters about their smoking levels prior to quitting. A quitter is defined as a person who reported having smoked 100 cigarettes in his/her lifetime, currently smokes "not at all," and quit smoking regularly less than 1 year ago. We are unable to distinguish between quitters who were abstinent for more than or less than 3 months in 1993 due to difficulties with the dating function on our computer assisted telephone inter-

viewing program. Therefore, all estimates are for those who reported being nonsmokers on the day of the interview. The overall cessation rate increased by 2.8 percentage points between 1993 and 1997 (from 8.1 ± 2.6 percent to 10.9 ± 4.8 percent). The largest increase in cessation rates was among the 25- to 44-year-old age group (from 4.1 ± 2.1 percent to 10.0 ± 6.0 percent), although the group shows a curvilinear rather than a linear trend over time. These rates are presented by demographic subgroups in Table 2-17.

Quit Attempts Another indicator of cessation activity is the attempt to quit. The variable under examination is the proportion of past-year smokers who report having quit smoking for at least 24 hours during the past year. This includes those who reported being abstinent at the time of the interview (*i.e.*, those who succeeded in quitting). The overall rate is about the same in 1997 as it was in 1993, although it rose by 5 percentage points in the intervening years. Women show a generally increasing rate of quit attempts. Again the 25- to 44-year-old age group shows the greatest improvement in quit attempts. These rates are presented by demographic subgroups in Table 2-18.

Intentions to Quit All current smokers were asked whether they were planning to quit smoking within the next 30 days. The proportion of all smokers who answered "yes" increased from 1993 (28.6 ± 5.2 percent) to 1997 (33.3 ± 6.6 percent). The proportion of daily smokers who reported planning to quit in the next 20 days also increased from 23.8 ± 4.9 percent to 29.3 ± 6.6 percent. These rates are presented by demographic subgroups in Tables 2-18 and 2-19.

These data from the Massachusetts surveys are consistent with the data from the CPS, which show higher cessation rates for Massachusetts when compared to other states.

SUMMARY Cessation is one of the principal goals of tobacco control programs, both nationally and for individual states. Cessation is a process of individual change where many individuals are interested in quitting, a large number attempt to change their behavior, and a relatively small number are successful in quitting over the long term.

A cessation attempt is clearly a necessary step on the path to successful cessation, but rates of cessation attempts are not necessarily good predictors of rates of cessation success. Cessation attempts are substantially lower among older smokers and among smokers of higher numbers of cigarettes per day, but the likelihood of successful cessation lasting 3 or more months is higher among older smokers and changes little between smokers of 5-14 cigarettes per day and smokers of 25+ cigarettes per day. In contrast, both cessation attempts and cessation success are increased with higher levels of educational attainment. Many of the differences among racial and ethnic groups in cessation are diminished when differences in education, income, and number of cigarettes smoked per day are controlled for in the analysis. However, African-Americans appear to have lower rates of successful cessation lasting 3 or more months, even when these factors are considered.

Between 1993 and 1996, rates of cessation activity declined in the United States, as did rates of 3+ month successful cessation. These changes are consistent with the observation that per-capita consumption of cigarettes has remained constant for the nation over this period.

Two states, Massachusetts and California, have conducted large tobacco control programs, each with the goal of increasing adult cessation. When cessation measures for these states are compared to those for the remaining 48 states—controlling for differences among the states in age, race/ethnicity, education, income, and number of cigarettes smoked per day—California and Massachusetts have higher rates of both cessation activity and successful cessation. These analyses support an effect of these tobacco control programs in creating successful adult cessation.

Appendix 1

Tables 2-7 through 2-20

Footnotes to Tables 2-10 through 2-14:

1. *Cessation Activity*: Includes those who have made a quit attempt, have become occasional smokers, or have become former smokers.
2. *Cessation Attempt*: Includes those who have made a quit attempt or have become former smokers. Occasional smokers are excluded from both the numerator and denominator.
3. *Occasional*: Includes those who reduced from smoking everyday to smoking some days.

Table 2-7
1992/1993 Current Population Survey: Cigarette Prevalence among All Adults, 18 Years and Older

	Smoking Status								Population	Sample
	Daily		Occasional		Former		Never		Size	Size
Nation	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Total	19.61	0.18	4.23	0.09	22.49	0.19	53.67	0.22	185,341,585	275,895
Male Total	21.86	0.27	4.61	0.14	26.99	0.29	46.54	0.32	88,350,523	127,377
Female Total	17.57	0.24	3.89	0.12	18.39	0.24	60.16	0.30	96,991,062	148,518
Age (Years)										
18–24	17.59	0.46	4.96	0.26	6.09	0.29	71.35	0.55	25,314,984	33,537
25–44	22.98	0.28	5.15	0.15	17.07	0.25	54.79	0.34	81,699,173	119,901
45–64	21.09	0.36	3.62	0.16	31.66	0.41	43.63	0.44	48,177,432	73,698
65+	9.82	0.33	2.10	0.16	36.27	0.53	51.82	0.55	30,149,997	48,759
Race/Ethnicity										
Non-Hispanic White	20.75	0.21	3.73	0.10	25.31	0.22	50.21	0.26	141,799,567	222,163
Hispanic	12.04	0.67	6.17	0.50	13.30	0.70	68.49	0.96	16,240,415	18,067
African-Amer.	19.40	0.54	6.17	0.33	13.68	0.47	60.75	0.66	20,574,151	24,492
Asian/PI	11.09	0.83	3.59	0.49	11.28	0.84	74.05	1.16	5,397,590	8,259
Native Amer.	31.64	2.71	7.28	1.52	15.76	2.13	45.32	2.91	1,117,516	2,586
Other	9.94	4.01	4.52	2.78	15.92	4.90	69.62	6.16	212,346	328
Education (Years)										
<12	24.61	0.45	4.58	0.22	21.37	0.43	49.44	0.53	33,519,656	48,611
12	24.19	0.32	4.44	0.15	21.93	0.31	49.44	0.37	67,364,829	101,699
13–15	18.19	0.34	4.40	0.18	21.88	0.37	55.53	0.44	46,824,878	69,259
16+	8.73	0.28	3.33	0.18	25.24	0.43	62.69	0.48	37,632,222	56,326
Household Income (Dollars)										
<10,000	26.38	0.55	5.42	0.28	15.99	0.45	52.21	0.62	24,210,219	35,730
10,000-19,999	22.84	0.44	4.69	0.22	21.12	0.43	51.36	0.53	33,448,107	50,259
20,000-29,999	21.61	0.46	4.23	0.22	22.35	0.46	51.81	0.56	29,875,514	45,054
30,000-49,999	18.99	0.36	4.05	0.18	23.29	0.39	53.67	0.46	44,519,871	66,724
50,000-74,999	14.93	0.42	3.74	0.22	25.41	0.52	55.92	0.59	26,511,902	38,987
75,000 +	10.32	0.45	3.08	0.26	28.03	0.67	58.57	0.74	16,667,077	24,205
Unknown	17.17	0.72	3.88	0.37	22.64	0.80	56.31	0.95	10,108,895	14,936
States										
Utah	13.64	1.32	3.26	0.68	16.95	1.44	66.14	1.82	1,179,841	2,952
California	14.40	0.51	4.54	0.30	20.88	0.59	60.17	0.71	22,249,501	20,809
District of Columbia	15.89	1.62	7.34	1.15	18.27	1.71	58.51	2.18	437,103	2,209
N. Jersey	16.57	0.72	3.81	0.37	23.40	0.82	56.23	0.96	5,824,375	11,313
N. York	17.36	0.56	4.16	0.30	22.20	0.62	56.28	0.74	13,380,928	18,356
N. Dakota	17.43	1.47	4.75	0.83	23.16	1.64	54.66	1.93	443,503	3,805
Massachusetts	17.74	0.76	3.67	0.37	28.33	0.90	50.26	1.00	4,486,537	10,528
Arizona	17.91	1.43	4.46	0.77	24.06	1.60	53.56	1.86	2,793,746	2,786
Maryland	17.99	1.51	5.60	0.91	23.88	1.68	52.53	1.97	3,621,008	2,616
Hawaii	18.38	1.53	3.79	0.76	20.62	1.60	57.21	1.96	808,387	2,535

Table 2-7 (continued)

States	Smoking Status: Daily %	± CI	Occasional %	± CI	Former %	± CI	Never %	± CI	Population Size (N)	Sample Size (n)
Texas	18.39	0.80	5.06	0.45	20.01	0.82	56.53	1.02	12,556,301	12,459
Nebraska	18.59	1.45	3.38	0.67	21.10	1.52	56.93	1.84	1,131,857	4,024
Connecticut	18.63	1.65	3.68	0.80	23.92	1.81	53.78	2.11	2,427,232	2,755
N. Mexico	18.72	1.50	5.27	0.86	23.82	1.64	52.19	1.92	1,108,244	3,052
Rhode Island	18.75	1.62	4.45	0.85	27.92	1.86	48.89	2.07	736,986	2,468
Pennsylvania	19.03	0.76	4.31	0.39	23.35	0.82	53.30	0.96	8,898,952	12,950
Colorado	19.33	1.61	4.83	0.87	25.56	1.78	50.28	2.04	2,528,960	3,253
Oregon	19.42	1.60	3.51	0.75	26.99	1.80	50.08	2.03	2,216,870	3,127
Montana	19.59	1.58	3.94	0.77	24.85	1.72	51.61	1.99	588,805	3,780
Iowa	19.65	1.53	3.85	0.74	22.01	1.59	54.49	1.91	2,041,504	3,990
Illinois	19.65	0.81	4.82	0.44	22.02	0.85	53.51	1.02	8,402,459	10,849
Idaho	19.95	1.49	3.66	0.70	23.02	1.57	53.37	1.86	747,016	3,545
Delaware	19.95	1.64	3.34	0.74	24.01	1.75	52.70	2.05	509,081	2,236
Washington	19.96	1.52	4.17	0.76	27.85	1.71	48.01	1.91	3,731,411	3,014
Florida	20.07	0.72	3.82	0.34	24.39	0.77	51.71	0.90	10,226,811	12,270
Georgia	20.21	1.53	4.11	0.76	19.85	1.52	55.83	1.89	4,855,056	3,124
Minnesota	20.46	1.59	4.65	0.83	24.00	1.69	50.89	1.98	3,214,673	3,333
S. Dakota	20.62	1.50	4.90	0.80	21.86	1.53	52.63	1.85	486,703	4,058
N. Hampshire	20.67	1.73	4.02	0.84	29.73	1.95	45.58	2.13	816,350	2,244
Wisconsin	20.79	1.51	5.36	0.84	25.20	1.62	48.66	1.86	3,606,127	4,405
Virginia	20.86	1.41	4.61	0.73	23.09	1.47	51.44	1.74	4,598,847	3,917
Kansas	20.90	1.54	3.33	0.68	23.08	1.60	52.70	1.89	1,783,399	3,695
Wyoming	21.05	1.84	3.77	0.86	23.69	1.92	51.49	2.26	328,343	2,489
Mississippi	21.20	1.67	4.26	0.83	17.29	1.55	57.25	2.02	1,845,081	4,097
Louisiana	21.34	1.70	4.03	0.81	21.04	1.69	53.59	2.06	2,950,556	2,825
S. Carolina	21.98	1.48	3.73	0.68	20.28	1.44	54.01	1.79	2,576,960	3,818
Vermont	22.15	1.74	4.11	0.83	28.93	1.90	44.80	2.08	424,902	2,240
Ohio	22.19	0.81	3.77	0.37	22.31	0.81	51.73	0.98	8,005,894	12,426
Alabama	22.24	1.69	3.50	0.75	21.04	1.66	53.22	2.03	3,027,336	3,765
N. Carolina	22.88	0.80	4.05	0.38	21.34	0.78	51.73	0.95	4,997,190	11,850
Michigan	22.99	0.85	4.21	0.41	23.68	0.86	49.11	1.01	6,807,057	11,688
Missouri	23.07	1.69	3.17	0.70	22.78	1.69	50.98	2.01	3,727,394	3,354
Oklahoma	23.21	1.65	3.54	0.72	21.70	1.61	51.55	1.96	2,282,823	3,536
Alaska	23.24	1.62	4.38	0.78	24.69	1.65	47.69	1.92	379,350	3,459
Indiana	23.79	1.68	4.02	0.78	20.48	1.59	51.71	1.97	4,100,287	3,307
Nevada	23.83	1.59	4.53	0.77	23.17	1.57	48.46	1.86	991,796	3,003
Tennesee	24.21	1.60	4.32	0.76	20.05	1.50	51.41	1.87	3,694,775	3,784
Maine	24.55	1.67	3.96	0.76	27.00	1.73	44.49	1.93	909,532	2,917
Arkansas	24.98	1.77	3.75	0.78	20.67	1.65	50.60	2.04	1,738,687	3,658
West Virginia	26.81	1.77	3.44	0.73	20.55	1.62	49.20	2.00	1,369,311	3,719
Kentucky	29.16	1.79	2.82	0.65	21.01	1.61	47.01	1.97	2,745,738	3,503

Note: CI = 95% confidence interval.

Table 2-8
1995/1996 Current Population Survey: Cigarette Prevalence among All Adults, 18 Years and Older

	Smoking Status								Population	Sample
	Daily		Occasional		Former		Never		Size	Size
Nation	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Total	19.05	0.18	4.04	0.09	21.76	0.19	55.16	0.23	191,073,943	233,741
Male Total	21.19	0.28	4.47	0.14	25.80	0.30	48.54	0.34	91,207,802	107,527
Female Total	17.09	0.24	3.64	0.12	18.07	0.25	61.20	0.32	99,866,141	126,214
Age (Years)										
18–24	18.07	0.50	5.31	0.29	5.95	0.31	70.68	0.59	24,553,115	26,448
25–44	21.97	0.29	4.89	0.15	15.57	0.26	57.58	0.35	82,861,971	99,671
45–64	20.66	0.36	3.38	0.16	30.12	0.41	45.83	0.45	52,233,863	66,149
>64	9.43	0.34	1.89	0.16	36.55	0.56	52.13	0.58	31,424,993	41,473
Race/Ethnicity										
Non-Hispanic White	20.46	0.22	3.59	0.10	24.63	0.23	51.32	0.27	143,857,651	185,654
Hispanic	11.43	0.66	6.02	0.50	12.80	0.70	69.75	0.96	17,862,544	17,130
African-Amer.	17.61	0.54	5.43	0.32	13.63	0.48	63.34	0.68	21,553,073	21,322
Asian/PI	10.81	0.80	3.16	0.45	10.88	0.80	75.15	1.11	6,443,983	7,307
Native Amer.	30.98	2.60	7.39	1.47	16.51	2.09	45.12	2.80	1,356,691	2,328
Education (Years)										
<12	23.87	0.48	4.28	0.23	20.78	0.46	51.06	0.57	32,521,554	38,561
12	24.19	0.34	4.11	0.16	21.49	0.33	50.21	0.40	65,924,580	81,861
13–15	18.23	0.35	4.44	0.19	21.51	0.37	55.82	0.45	50,560,922	61,512
16+	8.24	0.27	3.25	0.18	23.24	0.42	65.27	0.47	42,066,887	51,807
Household Income (Dollars)										
<10,000	24.97	0.62	5.62	0.33	15.59	0.52	53.81	0.71	20,702,223	25,171
10,000-19,999	22.99	0.51	4.37	0.25	20.84	0.49	51.81	0.61	28,512,812	35,227
20,000-29,999	22.21	0.50	4.33	0.25	21.65	0.50	51.80	0.61	28,393,827	35,079
30,000-49,999	19.79	0.39	3.93	0.19	22.10	0.41	54.18	0.49	43,128,189	53,811
50,000-74,999	15.59	0.43	3.49	0.22	23.26	0.50	57.66	0.59	29,582,858	36,172
75,000+	10.22	0.40	3.29	0.24	25.67	0.58	60.82	0.65	23,940,952	28,067
Unknown	16.47	0.59	3.32	0.28	22.03	0.65	58.17	0.78	16,813,081	20,214
States										
Utah	12.03	1.25	3.02	0.66	14.73	1.36	70.23	1.76	1,275,888	3,162
California	13.54	0.53	4.39	0.32	20.65	0.62	61.43	0.75	22,521,022	17,647
District of Columbia	15.32	1.54	6.93	1.08	18.72	1.66	59.03	2.10	414,451	2,275
Connecticut	16.02	1.54	3.79	0.80	25.15	1.83	55.04	2.10	2,405,332	2,325
N. Jersey	16.55	0.84	3.95	0.44	22.30	0.94	57.20	1.11	5,873,687	7,795
N. York	16.87	0.61	4.00	0.32	20.63	0.66	58.50	0.80	13,404,633	15,075
Maryland	17.11	1.50	3.97	0.78	23.84	1.69	55.08	1.98	3,713,252	2,631
Massachusetts	17.13	0.94	3.54	0.46	26.84	1.10	52.49	1.24	4,511,380	6,503
Nebraska	17.39	1.46	4.08	0.76	18.98	1.51	59.55	1.89	1,162,549	3,273
Hawaii	17.86	1.61	3.90	0.81	20.21	1.69	58.03	2.07	830,154	2,149

Table 2-8 (continued)

States	Smoking Status: Daily %	± CI	Occasional %	± CI	Former %	± CI	Never %	± CI	Population Size (N)	Sample Size (n)
Colorado	18.10	1.50	4.45	0.80	23.57	1.65	53.88	1.94	2,732,339	3,219
Texas	18.14	0.77	5.18	0.44	18.73	0.78	57.94	0.99	13,293,119	10,585
Oregon	18.20	1.53	4.32	0.81	24.76	1.71	52.72	1.98	2,361,048	2,801
Arizona	18.32	1.44	4.48	0.77	23.14	1.57	54.06	1.85	3,053,062	3,289
Florida	18.49	0.74	3.75	0.36	23.78	0.81	53.98	0.94	10,721,274	10,714
Minnesota	18.53	1.52	4.33	0.80	23.70	1.67	53.45	1.95	3,329,386	3,300
N. Mexico	18.69	1.46	5.26	0.84	22.07	1.55	53.99	1.87	1,192,081	3,130
S. Dakota	18.69	1.46	4.04	0.74	23.33	1.59	53.94	1.87	504,763	3,382
Washington	18.95	1.58	4.33	0.82	24.52	1.74	52.20	2.02	3,991,919	2,890
Idaho	18.99	1.48	3.33	0.68	22.21	1.57	55.47	1.87	824,393	3,290
Georgia	19.04	1.39	3.75	0.67	18.81	1.38	58.40	1.74	5,229,881	3,942
N. Dakota	19.08	1.57	4.66	0.84	22.06	1.65	54.20	1.99	447,176	3,218
Alabama	19.20	1.52	4.01	0.76	19.57	1.53	57.21	1.91	3,114,758	3,173
Illinois	19.56	0.86	4.11	0.43	21.21	0.89	55.12	1.08	8,571,555	9,553
Mississippi	19.73	1.55	3.50	0.72	17.86	1.49	58.91	1.92	1,896,081	2,893
Iowa	19.85	1.56	3.55	0.72	21.11	1.59	55.48	1.94	2,063,388	3,116
Montana	20.07	1.53	3.86	0.73	27.45	1.70	48.61	1.91	633,417	3,391
Pennsylvania	20.14	0.83	3.94	0.40	24.53	0.89	51.40	1.04	8,919,897	10,924
Rhode Island	20.20	1.68	3.57	0.77	26.34	1.84	49.89	2.09	720,021	2,322
Wisconsin	20.28	1.57	4.76	0.83	23.23	1.65	51.72	1.95	3,690,849	3,499
N. Hampshire	20.43	1.72	3.24	0.76	29.40	1.95	46.93	2.13	848,541	2,357
Delaware	21.16	1.67	3.67	0.77	23.00	1.72	52.17	2.04	528,094	2,302
Alaska	21.16	1.63	4.14	0.79	23.05	1.68	51.64	1.99	395,832	2,252
Louisiana	21.37	1.56	4.45	0.78	18.57	1.48	55.60	1.89	3,079,727	2,842
Virginia	21.41	1.50	3.54	0.67	22.95	1.53	52.09	1.82	4,817,098	3,634
Michigan	21.46	0.93	4.21	0.45	22.55	0.95	51.78	1.13	6,872,437	8,896
Vermont	21.48	1.72	3.41	0.76	27.35	1.87	47.75	2.09	430,119	2,445
S. Carolina	21.83	1.60	3.32	0.69	17.94	1.48	56.92	1.91	2,690,982	2,534
Oklahoma	21.94	1.58	3.59	0.71	20.15	1.53	54.33	1.90	2,330,200	3,591
Ohio	22.11	0.91	3.96	0.43	22.28	0.91	51.65	1.09	8,117,837	9,516
Wyoming	22.12	1.72	2.94	0.70	22.13	1.72	52.81	2.07	340,426	3,162
Kansas	22.12	1.66	3.75	0.76	20.64	1.62	53.49	2.00	1,798,120	3,064
N. Carolina	22.63	1.07	3.58	0.48	19.90	1.02	53.89	1.28	5,286,952	7,715
Missouri	22.70	1.64	3.27	0.70	23.06	1.65	50.97	1.96	3,866,274	2,890
Maine	22.78	1.69	2.96	0.68	27.68	1.80	46.58	2.01	928,793	2,692
Arkansas	22.95	1.62	3.62	0.72	19.74	1.54	53.68	1.92	1,827,297	3,129
Tennesse	23.69	1.59	3.52	0.69	22.50	1.56	50.29	1.87	3,916,392	2,889
Nevada	23.96	1.65	4.13	0.77	21.76	1.59	50.15	1.93	1,154,576	2,455
W. Virginia	24.62	1.56	3.20	0.64	22.78	1.52	49.39	1.81	1,396,823	3,736
Indiana	25.17	1.67	3.75	0.73	20.39	1.55	50.69	1.92	4,210,920	3,096
Kentucky	26.92	1.69	2.76	0.62	21.66	1.57	48.66	1.90	2,833,747	3,078

Note: CI = 95% confidence interval.

Table 2-9
1995/1996 Current Population Survey: Prevalence of Former Cigarette Smokers among All Adults, 18 Years and Older

	Former Smoker			
	%	±	CI	Quit Ratio
Total	21.76		0.19	0.49
by State				
Massachusetts	26.84		1.10	0.56
Connecticut	25.15		1.83	0.56
New Hampshire	29.40		1.95	0.55
California	20.65		0.62	0.54
Montana	27.45		1.70	0.53
Maryland	23.84		1.69	0.53
Rhode Island	26.34		1.84	0.53
Oregon	24.76		1.71	0.52
Vermont	27.35		1.87	0.52
New Jersey	22.30		0.94	0.52
Maine	27.68		1.80	0.52
Florida	23.78		0.81	0.52
Washington	24.52		1.74	0.51
Colorado	23.57		1.65	0.51
Minnesota	23.70		1.67	0.51
South Dakota	23.33		1.59	0.51
Pennsylvania	24.53		0.89	0.50
Arizona	23.14		1.57	0.50
Idaho	22.21		1.57	0.50
New York	20.63		0.66	0.50
Utah	14.73		1.36	0.49
North Dakota	22.06		1.65	0.48
Hawaii	20.21		1.69	0.48
Wisconsin	23.23		1.65	0.48
Delaware	23.00		1.72	0.48
New Mexico	22.07		1.55	0.48
Virginia	22.95		1.53	0.48
Alaska	23.05		1.68	0.48
Iowa	21.11		1.59	0.47
Illinois	21.21		0.89	0.47
Missouri	23.06		1.65	0.47
Nebraska	18.98		1.51	0.47
Wyoming	22.13		1.72	0.47
Michigan	22.55		0.95	0.47
Ohio	22.28		0.91	0.46

Table 2-9 (continued)

	Former Smoker			
	%	±	CI	Quit Ratio
Alabama	19.57		1.53	0.46
District of Columbia	18.72		1.66	0.46
Tennessee	22.50		1.56	0.45
Georgia	18.81		1.38	0.45
West Virginia	22.78		1.52	0.45
Texas	18.73		0.78	0.45
Kansas	20.64		1.62	0.44
Oklahoma	20.15		1.53	0.44
Nevada	21.76		1.59	0.44
Mississippi	17.86		1.49	0.43
North Carolina	19.90		1.02	0.43
Arkansas	19.74		1.54	0.43
Kentucky	21.66		1.57	0.42
Louisiana	18.57		1.48	0.42
South Carolina	17.94		1.48	0.42
Indiana	20.39		1.55	0.41

Note: CI = 95% confidence interval.

Table 2-10

1992/1993 Current Population Survey: Multivariate Logistic Regression Models of Cessation Measures for Adults who were Daily Smokers 1 Year prior to the Survey, Ages 25 and Older

	Cessation Activity[1]		Cessation Attempt[2]		Occasional[3]		Former (any length)		Former, 3+ Months	
Variable	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Gender										
Male	1.00		1.00		1.00		1.00		1.00	
Female	1.05	(1.01-1.10)	1.04	(0.99-1.09)	1.21	(1.07-1.36)	1.05	(0.97-1.14)	1.12	(1.02-1.23)
Age (Years)										
25–44	1.00		1.00		1.00		1.00		1.00	
45–64	0.90	(0.85-0.94)	0.89	(0.85-0.94)	0.95	(0.83-1.08)	1.19	(1.10-1.30)	1.19	(1.08-1.32)
65+	0.82	(0.76-0.89)	0.79	(0.73-0.86)	1.21	(1.00-1.47)	1.82	(1.60-2.06)	2.15	(1.86-2.49)
Race/Ethnicity										
Non-Hispanic White	1.00		1.00		1.00		1.00		1.00	
Hispanic	1.01	(0.91-1.12)	1.01	(0.91-1.12)	1.04	(0.80-1.36)	1.09	(0.90-1.31)	1.17	(0.94-1.46)
African-American	1.13	(1.05-1.21)	1.10	(1.03-1.19)	1.29	(1.08-1.53)	0.89	(0.77-1.03)	0.96	(0.81-1.14)
Other	0.98	(0.85-1.12)	0.99	(0.86-1.13)	0.89	(0.61-1.29)	0.67	(0.50-0.89)	0.62	(0.43-0.90)
Education (Years)										
< 12	1.00		1.00		1.00		1.00		1.00	
12	1.15	(1.08-1.22)	1.15	(1.08-1.23)	1.09	(0.92-1.30)	1.24	(1.10-1.40)	1.13	(0.99-1.30)
13–15	1.40	(1.31-1.50)	1.38	(1.29-1.48)	1.44	(1.19-1.74)	1.41	(1.24-1.60)	1.31	(1.12-1.52)
16+ Years	1.43	(1.32-1.56)	1.40	(1.28-1.52)	1.65	(1.32-2.06)	1.72	(1.49-2.00)	1.51	(1.27-1.80)
Household Income (Dollars)										
<10,000	1.00		1.00		1.00		1.00		1.00	
10,000-19,999	1.12	(1.05-1.21)	1.13	(1.05-1.22)	1.01	(0.83-1.23)	1.33	(1.15-1.55)	1.26	(1.05-1.50)
20,000-29,999	1.28	(1.19-1.38)	1.31	(1.22-1.41)	0.88	(0.72-1.09)	1.57	(1.35-1.83)	1.56	(1.31-1.86)
30,000-49,999	1.37	(1.28-1.47)	1.40	(1.30-1.50)	1.03	(0.85-1.25)	1.85	(1.60-2.13)	1.77	(1.49-2.10)
50,000-74,999	1.52	(1.39-1.65)	1.54	(1.41-1.67)	1.19	(0.95-1.50)	2.11	(1.79-2.47)	2.14	(1.77-2.59)
75,000+	1.67	(1.49-1.87)	1.69	(1.51-1.89)	1.25	(0.94-1.67)	2.16	(1.78-2.62)	2.22	(1.77-2.80)
Cigarettes smoked per day										
1–4	1.00		1.00		1.00		1.00		1.00	
5–14	0.82	(0.72-0.94)	0.87	(0.76-1.01)	0.61	(0.47-0.80)	0.66	(0.53-0.82)	0.65	(0.50-0.85)
15–24	0.56	(0.49-0.64)	0.60	(0.52-0.69)	0.38	(0.29-0.49)	0.58	(0.47-0.72)	0.59	(0.46-0.76)
25+	0.44	(0.38-0.50)	0.48	(0.42-0.56)	0.24	(0.18-0.32)	0.84	(0.67-1.05)	0.86	(0.66-1.11)

[1–3] See footnotes at beginning of table section for explanation.

Table 2-11

1995/1996 Current Population Survey: Multivariate Logistic Regression Models of Cessation Measures for Adults who were Daily Smokers 1 Year prior to the Survey, Ages 25 and Older

	Cessation Activity[1]		Cessation Attempt[2]		Occasional[3]		Former (any length)		Former, 3+ Months	
Variable	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Gender										
Male	1.00		1.00		1.00		1.00		1.00	
Female	0.96	(0.92-1.01)	0.96	(0.91-1.01)	1.01	(0.89-1.16)	0.93	(0.84-1.03)	0.97	(0.86-1.09)
Age (Years)										
25–44	1.00		1.00		1.00		1.00		1.00	
45–64	0.88	(0.83-0.93)	0.88	(0.84-0.93)	0.86	(0.74-1.01)	0.97	(0.87-1.08)	1.01	(0.89-1.15)
65+	0.76	(0.70-0.84)	0.74	(0.67-0.81)	1.14	(0.91-1.44)	1.40	(1.19-1.66)	1.59	(1.31-1.94)
Race/Ethnicity										
Non-Hispanic White	1.00		1.00		1.00		1.00		1.00	
Hispanic	0.89	(0.80-1.00)	0.88	(0.79-1.00)	1.03	(0.78-1.37)	0.96	(0.76-1.22)	1.13	(0.86-1.49)
African-American	1.03	(0.95-1.12)	1.00	(0.92-1.09)	1.30	(1.06-1.58)	0.67	(0.55-0.82)	0.73	(0.57-0.92)
Other	1.03	(0.90-1.18)	1.03	(0.90-1.19)	1.01	(0.70-1.45)	1.07	(0.82-1.40)	1.06	(0.76-1.48)
Education (Years)										
< 12	1.00		1.00		1.00		1.00		1.00	
12	1.17	(1.09-1.26)	1.16	(1.08-1.25)	1.22	(0.99-1.50)	1.25	(1.07-1.45)	1.27	(1.06-1.54)
13–15	1.48	(1.37-1.60)	1.45	(1.34-1.58)	1.55	(1.25-1.94)	1.58	(1.34-1.86)	1.59	(1.31-1.95)
16+	1.42	(1.29-1.57)	1.39	(1.26-1.54)	1.56	(1.20-2.04)	1.77	(1.46-2.14)	1.84	(1.46-2.32)
Household Income (Dollars)										
<10,000	1.00		1.00		1.00		1.00		1.00	
10,000-19,999	0.95	(0.88-1.04)	0.97	(0.89-1.06)	0.83	(0.66-1.04)	0.93	(0.77-1.12)	1.08	(0.87-1.35)
20,000-29,999	0.96	(0.88-1.05)	0.98	(0.89-1.07)	0.79	(0.63-1.01)	1.03	(0.86-1.24)	1.02	(0.81-1.28)
30,000-49,999	1.07	(0.98-1.16)	1.08	(0.99-1.18)	0.97	(0.77-1.20)	1.13	(0.95-1.34)	1.15	(0.93-1.42)
50,000-74,999	1.07	(0.97-1.17)	1.08	(0.98-1.20)	0.88	(0.68-1.14)	1.15	(0.95-1.40)	1.14	(0.90-1.45)
75,000+	1.10	(0.98-1.24)	1.12	(0.99-1.26)	0.98	(0.72-1.34)	1.48	(1.19-1.84)	1.61	(1.24-2.10)
Cigarettes smoked per day										
1–4	1.00		1.00		1.00		1.00		1.00	
5–14	0.68	(0.59-0.79)	0.80	(0.68-0.93)	0.38	(0.29-0.48)	0.81	(0.60-1.08)	0.70	(0.50-0.98)
15–24	0.46	(0.39-0.53)	0.55	(0.47-0.64)	0.20	(0.15-0.25)	0.66	(0.50-0.88)	0.61	(0.44-0.85)
25+	0.32	(0.28-0.37)	0.39	(0.34-0.46)	0.12	(0.09-0.16)	0.90	(0.67-1.21)	0.83	(0.59-1.16)

[1–3] See footnotes at beginning of table section for explanation.

Table 2-12

1990 California Tobacco Survey: Logistic Regression Models of Cessation for Daily Smokers 12 Months Ago, Ages 25 and Older

Variable	Cessation Activity[1] OR	95% CI	Cessation Attempt[2] OR	95% CI	Occasional[3] OR	95% CI	Former (any length) OR	95% CI	Former 3+ Months OR	95% CI
Gender										
Male	1.00									
Female	1.00	(0.90-1.11)	1.00	(0.90-1.11)	0.86	(0.64-1.15)	1.23	(1.04-1.45)	1.41	(1.13-1.76)
Age (Years)										
25-44	1.00									
45–64	0.75	(0.67-0.85)	0.75	(0.67-0.85)	0.95	(0.69-1.31)	1.21	(1.01-1.45)	1.47	(1.16-1.86)
65+	0.74	(0.62-0.90)	0.76	(0.63-0.91)	0.73	(0.40-1.31)	1.40	(1.04-1.88)	1.70	(1.18-2.45)
Race/Ethnicity										
Non-Hispanic White	1.00									
Hispanic	1.60	(1.35-1.90)	1.55	(1.30-1.84)	2.02	(1.35-3.01)	1.69	(1.31-2.20)	1.54	(1.09-2.17)
African-American	2.05	(1.66-2.54)	1.89	(1.52-2.35)	2.99	(2.00-4.46)	1.19	(0.86-1.65)	1.33	(0.89-2.00)
Other	1.07	(0.87-1.32)	1.09	(0.88-1.35)	0.78	(0.40-1.55)	0.72	(0.49-1.07)	0.77	(0.47-1.29)
Education (Years)										
<12	1.00									
12	1.10	(0.95-1.27)	1.10	(0.95-1.27)	1.08	(0.72-1.63)	1.28	(0.99-1.66)	1.44	(1.03-2.01)
13–15	1.34	(1.14-1.57)	1.32	(1.12-1.55)	1.50	(0.97-2.34)	1.64	(1.24-2.15)	1.68	(1.17-2.40)
16+	1.26	(1.04-1.51)	1.26	(1.05-1.53)	1.06	(0.61-1.85)	1.91	(1.41-2.59)	1.66	(1.11-2.49)
Household Income (Dollars)										
<10,000	1.00									
10,001-20,000	1.32	(1.09-1.60)	1.32	(1.08-1.61)	1.20	(0.74-1.96)	1.48	(1.03-2.13)	1.03	(0.67-1.59)
20,001-30,000	1.22	(1.01-1.48)	1.25	(1.02-1.52)	0.75	(0.44-1.27)	1.69	(1.19-2.42)	1.27	(0.83-1.92)
30,001-50,000	1.30	(1.08-1.57)	1.31	(1.08-1.58)	1.08	(0.67-1.76)	1.76	(1.24-2.48)	1.11	(0.74-1.68)
50,001-75,000	1.38	(1.12-1.70)	1.39	(1.13-1.72)	1.02	(0.57-1.80)	2.12	(1.46-3.06)	1.29	(0.83-2.02)
75,000+	1.16	(0.92-1.46)	1.13	(0.89-1.43)	1.44	(0.78-2.66)	2.35	(1.58-3.49)	1.85	(1.16-2.95)
Cigarettes Smokd per Day										
1–4	1.00									
5–14	0.75	(0.55-1.02)	0.78	(0.57-1.08)	0.63	(0.39-1.01)	0.52	(0.36-0.75)	0.49	(0.31-0.77)
15–24	0.41	(0.30-0.55)	0.46	(0.34-0.62)	0.22	(0.13-0.37)	0.38	(0.26-0.55)	0.34	(0.22-0.54)
25 +	0.39	(0.28-0.53)	0.44	(0.32-0.60)	0.13	(0.07-0.25)	0.46	(0.31-0.67)	0.52	(0.32-0.83)

[1–3] See footnotes at beginning of table section for explanation.

Table 2-13

1996 California Tobacco Survey: Logistic Regression Models of Cessation for Daily Smokers 12 Months Ago, Ages 25 and Older

Variable	Cessation Activity[1] OR	95% CI	Cessation Attempt[2] OR	95% CI	Occasional[3] OR	95% CI	Former (any length) OR	95% CI	Former 3+ Months OR	95% CI
Gender										
Male	1.00									
Female	0.96	(0.86-1.07)	0.94	(0.83-1.05)	1.26	(0.97-1.65)	1.23	(1.03-1.48)	1.17	(0.91-1.49)
Age (Years)										
25–44	1.00									
45–64	0.65	(0.58-0.73)	0.65	(0.58-0.74)	0.83	(0.61-1.11)	0.78	(0.64-0.95)	0.97	(0.75-1.27)
65+	0.63	(0.51-0.77)	0.62	(0.50-0.77)	0.88	(0.52-1.51)	1.25	(0.92-1.70)	1.43	(0.96-2.15)
Race/Ethnicity										
Non-Hispanic White	1.00									
Hispanic	1.22	(1.04-1.46)	1.18	(0.99-1.40)	1.68	(1.16-2.43)	1.12	(0.86-1.48)	1.15	(0.79-1.66)
African-American	1.29	(1.04-1.60)	1.24	(0.99-1.55)	1.54	(1.00-2.35)	0.47	(0.30-0.75)	0.66	(0.38-1.15)
Other	0.93	(0.77-1.12)	0.95	(0.79-1.15)	0.69	(0.41-1.17)	0.72	(0.52-1.00)	0.73	(0.47-1.15)
Education (Years)										
<12	1.00									
12	0.73	(0.62-0.85)	0.71	(0.61-0.84)	1.08	(0.71-1.65)	0.76	(0.58-1.00)	0.80	(0.55-1.15)
13–15	0.95	(0.80-1.11)	0.89	(0.75-1.05)	1.96	(1.31-2.95)	1.04	(0.79-1.36)	1.04	(0.72-1.50)
16+	1.16	(0.95-1.40)	1.11	(0.91-1.35)	1.65	(1.02-2.67)	1.40	(1.03-1.88)	1.39	(0.93-2.08)
Household Income (Dollars)										
<10,000	1.00									
10,001-20,000	1.18	(0.96-1.44)	1.20	(0.98-1.48)	0.87	(0.54-1.39)	1.23	(0.86-1.77)	0.98	(0.60-1.61)
20,001-30,000	0.96	(0.79-1.17)	1.00	(0.81-1.22)	0.67	(0.41-1.09)	1.22	(0.85-1.74)	1.21	(0.76-1.93)
30,001-50,000	1.05	(0.87-1.27)	1.07	(0.88-1.30)	0.89	(0.57-1.38)	1.44	(1.03-2.01)	1.24	(0.79-1.93)
50,001-75,000	1.10	(0.89-1.35)	1.11	(0.90-1.38)	0.94	(0.59-1.51)	1.26	(0.87-1.82)	1.45	(0.90-2.32)
75,000+	1.08	(0.86-1.35)	1.12	(0.89-1.41)	0.72	(0.41-1.26)	1.87	(1.29-2.71)	1.60	(0.98-2.62)
Cigarettes Smoked per Day										
1–4	1.00									
5–14	0.77	(0.56-1.06)	0.99	(0.71-1.39)	0.34	(0.22-0.51)	0.64	(0.42-0.98)	0.88	(0.49-1.60)
15–24	0.48	(0.35-0.66)	0.65	(0.46-0.90)	0.17	(0.11-0.26)	0.50	(0.33-0.77)	0.62	(0.34-1.13)
25 +	0.40	(0.29-0.55)	0.54	(0.38-0.77)	0.11	(0.06-0.20)	0.67	(0.43-1.04)	0.83	(0.45-1.54)

[1–3] See footnotes at beginning of table section for explanation.

Table 2-14

Current Population Survey: Odds Ratios and 95% Confidence Intervals for Measures of Cessation in California and Massachusetts Compared to the Remaining States

Variable	Cessation Activity[1] OR	95% CI	Cessation Attempt[2] OR	95% CI	Occasional[3] OR	95% CI	Former (any length) OR	95% CI	Former 3+ Months OR	95% CI
Survey Year										
1992/3	1.00		1.00		1.00		1.00		1.00	
1995/6	0.80	(0.78-0.83)	0.80	(0.77-0.82)	0.94	(0.86-1.03)	0.73	(0.68-0.77)	0.70	(0.65-0.76)
Region										
Rest of USA	1.00		1.00		1.00		1.00		1.00	
California	1.06	(1.00-1.12)	1.04	(0.98-1.10)	1.30	(1.13-1.49)	1.20	(1.09-1.33)	1.32	(1.17-1.49)
Massachusetts	1.28	(1.15-1.42)	1.30	(1.17-1.45)	1.00	(0.74-1.34)	1.31	(1.09-1.56)	1.24	(1.00-1.55)
Gender										
Male	1.00		1.00		1.00		1.00		1.00	
Female	1.01	(0.98-1.05)	1.00	(0.97-1.04)	1.13	(1.03-1.23)	1.01	(0.95-1.07)	1.06	(0.98-1.14)
Age (Years)										
25–44	1.00		1.00		1.00		1.00		1.00	
45–64	0.89	(0.86-0.92)	0.89	(0.86-0.92)	0.91	(0.82-1.00)	1.10	(1.03-1.17)	1.12	(1.03-1.21)
65+	0.80	(0.75-0.85)	0.77	(0.72-0.82)	1.17	(1.01-1.36)	1.63	(1.48-1.81)	1.91	(1.70-2.14)
Race/Ethnicity										
Non-Hispanic White	1.00		1.00		1.00		1.00		1.00	
Hispanic	0.95	(0.88-1.03)	0.95	(0.88-1.03)	0.98	(0.81-1.20)	1.01	(0.87-1.17)	1.10	(0.93-1.31)
African-American	1.09	(1.03-1.15)	1.06	(1.00-1.12)	1.29	(1.13-1.47)	0.80	(0.71-0.90)	0.87	(0.76-1.00)
Other	1.00	(0.90-1.10)	1.01	(0.91-1.12)	0.90	(0.69-1.17)	0.81	(0.67-0.99)	0.76	(0.59-0.97)
Education (Years)										
< 12	1.00		1.00		1.00		1.00		1.00	
12	1.16	(1.11-1.21)	1.16	(1.10-1.21)	1.14	(1.00-1.31)	1.24	(1.13-1.36)	1.18	(1.05-1.32)
13–15	1.43	(1.36-1.51)	1.41	(1.34-1.49)	1.47	(1.27-1.70)	1.46	(1.32-1.61)	1.38	(1.23-1.56)
16+	1.43	(1.34-1.52)	1.40	(1.31-1.49)	1.60	(1.35-1.90)	1.73	(1.54-1.95)	1.62	(1.40-1.86)

Table 2-14 (continued)

Variable	Cessation Activity[1] OR	95% CI	Cessation Attempt[2] OR	95% CI	Occasional[3] OR	95% CI	Former (any length) OR	95% CI	Former 3+ Months OR	95% CI
Household Income (Dollars)										
<10,000	1.00		1.00		1.00		1.00		1.00	
10,000-19,999	1.05	(0.99-1.11)	1.07	(1.01-1.13)	0.93	(0.80-1.08)	1.16	(1.03-1.30)	1.18	(1.03-1.36)
20,000-29,999	1.14	(1.07-1.20)	1.16	(1.10-1.23)	0.84	(0.72-0.98)	1.34	(1.19-1.50)	1.33	(1.16-1.53)
30,000-49,999	1.24	(1.17-1.31)	1.26	(1.19-1.33)	1.00	(0.86-1.16)	1.53	(1.37-1.71)	1.50	(1.31-1.71)
50,000-74,999	1.30	(1.22-1.39)	1.32	(1.24-1.41)	1.04	(0.88-1.23)	1.66	(1.47-1.88)	1.68	(1.45-1.95)
75,000+	1.38	(1.27-1.49)	1.40	(1.29-1.52)	1.10	(0.89-1.36)	1.85	(1.60-2.14)	1.95	(1.64-2.32)
Cigarettes smoked per day										
1–4	1.00		1.00		1.00		1.00		1.00	
5–14	0.76	(0.68-0.84)	0.84	(0.75-0.93)	0.48	(0.40-0.57)	0.71	(0.60-0.85)	0.67	(0.55-0.83)
15–24	0.51	(0.46-0.56)	0.58	(0.52-0.64)	0.28	(0.23-0.33)	0.61	(0.52-0.73)	0.60	(0.49-0.74)
25+	0.38	(0.34-0.42)	0.44	(0.40-0.49)	0.17	(0.14-0.21)	0.87	(0.73-1.04)	0.86	(0.70-1.06)

[1–3] See footnotes at beginning of table section for explanation.
Note: Model also adjusted for gender, race/ethnicity, education, household income, and daily cigarette consumption.

Table 2-15

1990 California Tobacco Survey: Cessation of Adult Daily Smokers 12 Months Ago, Ages 25 and Older

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size (N)	Sample Size (n)
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Total	32.7	1.7	53.2	1.7	2.6	0.5	0.8	0.3	4.2	0.7	5.6	0.7	0.9	0.5	3,419,535	7,260
Age (Years)																
25–44	36.3	2.4	49.8	2.3	2.9	0.6	0.9	0.5	4.6	1.0	4.6	0.8	1.1	0.9	1,988,278	4,127
45–64	28.0	2.4	57.6	3.0	2.5	1.0	0.8	0.6	3.6	1.1	6.9	1.8	0.5	0.5	1,091,469	2,383
65+	26.5	4.7	58.9	5.0	1.8	0.9	0.7	1.1	3.3	1.5	7.2	2.8	1.7	0.9	339,788	750
Race/Ethnicity																
Non-Hispanic White	30.4	1.8	56.9	1.8	1.8	0.3	0.4	0.2	4.1	0.8	5.6	0.8	0.9	0.7	2,423,696	5,879
Hispanic	37.2	5.9	41.9	7.1	4.7	2.3	2.8	1.8	5.6	2.2	5.9	3.2	1.8	1.6	472,194	632
African-American	41.1	8.6	39.9	8.1	8.2	4.0	1.6	1.9	3.5	2.0	5.7	4.7	0.1	0.1	258,685	373
Asian/PI	37.4	9.6	49.4	10.0	1.5	1.0	0.2	0.4	4.5	3.0	6.0	3.3	1.0	1.4	170,449	235
Native American	37.4	10.1	57.0	9.9	2.1	1.8	0.4	0.8	0.7	1.0	2.3	2.8	0.2	0.4	79,916	121
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	14,595	20
Education (Years)																
<12	31.0	4.4	56.1	5.4	2.8	1.5	1.2	0.9	3.0	1.4	4.0	1.7	2.0	2.1	852,503	933
12	32.9	2.5	54.4	2.3	2.4	0.8	0.6	0.4	3.4	0.9	5.6	1.4	0.6	0.4	1,264,846	2,664
13–15	34.6	2.7	49.4	2.7	3.0	0.8	1.1	0.7	4.9	1.4	6.5	1.5	0.5	0.2	824,213	2,389
16+	31.6	3.4	51.5	3.4	2.4	1.1	0.4	0.4	7.0	1.8	6.5	2.0	0.6	0.4	477,973	1,274
Household Income (Dollars)																
≤10,000	33.3	5.1	54.4	5.2	3.8	2.8	0.6	0.7	1.3	0.6	4.7	3.1	1.8	1.5	386,961	634
10,001-20,000	34.5	4.7	51.7	5.2	2.8	1.6	1.8	1.5	3.9	1.7	4.8	1.8	0.6	0.5	487,674	938
20,001-30,000	33.8	3.6	53.6	3.7	1.9	0.9	0.6	0.6	4.0	1.5	5.8	2.4	0.2	0.2	558,699	1,193
30,001-50,000	33.3	2.7	51.1	3.3	3.0	1.4	0.4	0.3	5.0	1.4	5.1	1.1	2.1	2.1	798,429	1,841
50,001-75,000	33.0	5.5	51.6	4.9	2.2	1.0	0.5	0.5	6.3	2.6	6.0	2.6	0.3	0.3	462,432	1,103
75,000+	26.4	3.7	55.9	4.6	3.0	1.3	0.6	0.6	5.5	2.4	8.4	3.4	0.2	0.3	294,790	721
Unknown	31.1	5.1	57.1	6.2	1.9	1.3	1.7	1.4	2.4	1.3	5.3	2.0	0.6	0.4	430,550	830

Table 2-15 (continued)

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size (N)	Sample Size (n)
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Male Total	32.9	2.1	53.4	2.4	2.7	0.9	0.9	0.5	4.2	1.0	4.6	0.6	1.3	0.9	1,872,737	3,535
Age (Years)																
25–44	36.5	2.9	50.0	3.2	2.7	1.0	0.9	0.7	4.6	1.3	3.7	1.0	1.5	1.5	1,137,256	2,110
45–64	26.5	3.4	58.8	4.6	3.2	1.9	0.9	0.9	3.5	1.3	6.3	2.3	0.7	0.9	571,016	1,126
65+	29.8	7.5	58.5	7.0	0.7	0.9	.	.	4.1	2.7	5.1	2.9	1.8	1.3	164,465	299
Race/Ethnicity																
Non-Hispanic White	30.7	2.0	57.5	2.2	1.4	0.4	0.3	0.2	4.1	1.1	4.8	0.9	1.3	1.3	1,269,736	2,771
Hispanic	38.3	6.6	40.7	7.5	5.7	3.3	3.8	2.7	4.7	2.7	4.7	2.2	2.2	2.3	308,363	379
African-American	41.1	12.4	39.9	11.3	10.1	7.6	0.4	0.6	5.0	3.6	3.5	3.8	.	.	130,061	173
Asian/PI	34.0	12.5	52.5	14.0	1.3	1.3	0.3	0.6	5.9	4.4	4.9	3.5	1.1	1.4	115,393	148
Native American	.	.	.	.	1.5	2.2	.	.	0.6	1.2	1.4	2.8	.	.	39,317	53
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9,867	11
Education (Years)																
<12	32.4	6.1	52.5	7.7	3.5	2.1	1.9	1.6	3.5	2.2	2.9	1.4	3.3	3.6	505,692	487
12	33.9	3.7	54.9	3.7	2.5	1.5	0.2	0.2	3.4	1.2	4.5	1.3	0.7	0.6	617,688	1,160
13–15	33.4	3.3	52.3	3.7	2.4	1.4	1.0	1.0	5.1	2.0	5.3	1.7	0.4	0.4	451,212	1,148
16+	30.9	3.9	53.9	4.0	2.0	0.9	0.2	0.3	5.9	2.9	6.6	3.0	0.5	0.4	298,145	740
Household Income (Dollars)																
≤10,000	34.4	9.2	53.6	9.9	4.4	3.6	0.8	1.0	0.9	0.7	3.7	3.5	2.3	2.9	174,363	245
10,001-20,000	36.9	5.7	47.3	6.9	3.1	3.1	2.2	2.7	5.5	3.2	4.2	2.5	0.8	0.8	250,518	430
20,001-30,000	33.3	4.5	56.8	4.2	1.2	0.9	0.4	0.4	4.2	1.9	4.0	2.0	0.1	0.1	299,922	566
30,001-50,000	33.7	3.8	50.2	4.6	3.4	2.3	0.5	0.5	4.4	1.5	4.6	1.6	3.3	3.5	480,032	978
50,001-75,000	33.1	6.5	53.1	5.8	1.9	1.4	0.5	0.6	5.6	3.9	5.6	4.0	0.2	0.3	255,706	551
75,000+	24.4	4.8	60.0	6.0	2.6	1.5	0.2	0.4	5.4	3.7	7.3	3.6	0.1	0.2	177,145	382
Unknown	31.6	7.2	57.7	8.0	2.4	1.9	1.8	2.2	2.6	1.9	3.3	2.1	0.6	0.7	235,051	383

Table 2-15 (continued)

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size	Sample Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Female Total	32.4	2.8	52.9	2.7	2.6	0.6	0.8	0.4	4.0	0.8	6.7	1.3	0.5	0.3	1,546,798	3,725
Age (Years)																
25–44	35.9	3.3	49.5	3.1	3.1	0.9	0.8	0.5	4.5	1.4	5.8	1.5	0.5	0.4	851,022	2,017
45–64	29.7	4.1	56.3	3.9	1.7	1.0	0.7	0.7	3.8	1.4	7.5	3.2	0.2	0.2	520,453	1,257
65+	23.3	5.6	59.3	6.7	2.8	1.7	1.3	2.1	2.6	1.7	9.1	4.3	1.5	1.2	175,323	451
Race/Ethnicity																
Non-Hispanic White	30.1	2.5	56.1	2.6	2.2	0.6	0.6	0.4	4.1	0.9	6.5	1.2	0.5	0.2	1,153,960	3,108
Hispanic	35.2	9.7	44.2	10.9	3.0	2.1	1.0	1.6	7.2	4.2	8.3	7.9	1.1	2.0	163,831	253
African-American	41.0	10.9	39.8	11.4	6.3	4.6	2.7	3.8	2.0	2.1	8.0	8.6	0.1	0.3	128,624	200
Asian/PI	44.6	14.9	43.0	16.0	1.7	2.0	.	.	1.8	1.8	8.1	7.0	0.8	1.5	55,056	87
Native American	.	.	.	.	2.6	2.8	0.7	1.5	0.9	1.7	3.2	3.8	0.4	0.7	40,599	68
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4,728	9
Education (Years)																
<12	29.0	6.6	61.3	7.2	1.8	1.7	0.2	0.3	2.1	1.7	5.5	3.7	0.2	0.3	346,811	446
12	32.1	4.0	54.0	3.6	2.2	0.8	1.0	0.8	3.4	1.3	6.8	2.1	0.5	0.5	647,158	1,504
13–15	36.1	4.0	45.8	3.7	3.8	1.3	1.1	1.0	4.5	1.4	8.0	2.5	0.7	0.4	373,001	1,241
16+	32.7	5.2	47.5	5.8	3.0	2.2	0.7	1.0	8.9	3.2	6.3	2.7	0.8	0.9	179,828	534
Household Income (Dollars)																
≤10,000	32.5	6.7	55.0	6.4	3.4	2.7	0.5	1.0	1.6	1.0	5.6	4.9	1.4	1.7	212,598	389
10,001-20,000	32.1	6.0	56.3	6.4	2.4	1.3	1.2	1.6	2.2	1.2	5.4	3.0	0.4	0.4	237,156	508
20,001-30,000	34.5	6.2	49.9	6.1	2.6	1.6	0.9	1.1	3.8	1.9	7.9	4.6	0.4	0.4	258,777	627
30,001-50,000	32.8	3.9	52.5	4.4	2.5	1.1	0.4	0.3	5.9	2.2	5.9	2.7	0.2	0.3	318,397	863
50,001-75,000	33.0	7.0	49.8	6.6	2.7	1.7	0.4	0.8	7.1	3.1	6.5	3.0	0.4	0.7	206,726	552
75,000+	29.3	5.9	49.6	6.9	3.7	2.2	1.2	1.4	5.7	3.7	10.0	5.4	0.4	0.5	117,645	339
Unknown	30.6	5.8	56.3	7.8	1.3	1.0	1.5	1.9	2.1	1.3	7.6	3.9	0.6	0.5	195,499	447

Note: CI = 95% confidence interval; "." = insufficient data.

Table 2-16
1996 California Tobacco Survey: Cessation of Adult Daily Smokers 12 Months Ago, Ages 25 and Older

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size (N)	Sample Size (n)
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI		
Total	31.4	1.3	53.6	1.4	3.3	0.5	1.3	0.4	4.8	0.7	5.0	0.8	0.6	0.2	2,894,421	6,211
Age (Years)																
25–44	35.9	2.0	48.6	2.1	3.5	0.7	1.6	0.7	5.2	0.9	4.8	0.9	0.5	0.2	1,636,213	3,438
45–64	26.6	1.9	60.3	2.1	2.9	0.8	0.8	0.5	3.8	0.8	4.8	1.3	0.7	0.4	979,379	2,190
65+	22.3	3.9	59.3	4.2	3.5	1.6	0.7	0.7	5.8	2.9	7.3	2.9	1.1	1.1	278,833	583
Race/Ethnicity																
Non-Hispanic White	29.1	1.5	56.4	1.5	2.7	0.5	0.8	0.3	5.1	1.0	5.4	0.9	0.5	0.2	1,941,696	4,661
Hispanic	35.6	4.5	44.6	4.6	5.7	2.1	2.7	1.7	5.8	2.1	4.9	1.9	0.7	0.7	439,750	648
African-American	40.8	6.6	44.9	6.6	4.7	2.9	3.5	3.9	1.7	1.3	3.1	2.1	1.2	1.1	218,593	379
Asian/PI	33.1	6.1	54.7	8.0	2.4	1.8	0.8	1.1	3.5	2.1	4.3	3.1	1.2	1.8	166,128	300
Native American	33.3	7.9	54.6	8.5	2.7	1.9	0.5	0.7	3.3	2.2	4.8	3.4	0.8	1.6	128,263	223
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
Education (Years)																
<12	33.9	3.4	50.9	4.1	2.8	1.1	1.7	1.2	4.8	1.6	4.7	1.7	1.1	0.7	660,951	695
12	28.7	2.1	59.1	2.5	2.8	0.9	0.9	0.4	3.7	0.9	4.1	0.9	0.7	0.4	937,289	2,295
13–15	31.5	2.0	52.8	2.4	3.9	0.9	1.7	1.2	5.0	1.5	5.0	1.2	0.2	0.2	811,862	2,033
16+	33.0	3.4	48.0	4.0	4.1	1.3	0.7	0.5	6.3	1.8	7.3	1.9	0.5	0.4	484,320	1,188
Household Income (Dollars)																
≤10,000	32.6	4.4	53.8	4.3	3.2	1.6	2.7	2.3	3.3	1.5	4.1	1.6	0.3	0.5	370,131	621
10,001-20,000	34.8	3.9	50.8	4.2	3.6	1.4	0.7	0.8	5.1	2.0	4.5	1.5	0.5	0.5	397,523	784
20,001-30,000	31.5	4.2	54.9	3.7	3.2	1.2	0.6	0.5	4.0	1.4	4.9	1.5	1.0	0.9	444,746	949
30,001-50,000	30.5	2.8	54.1	2.7	3.2	0.9	1.2	0.8	5.4	1.5	5.1	1.8	0.4	0.5	633,126	1,431
50,001-75,000	33.1	3.4	51.9	4.5	3.4	1.3	1.6	0.9	3.6	1.5	6.0	1.9	0.5	0.4	437,041	1,024
75,000+	28.6	3.4	53.2	5.3	2.9	1.1	0.6	0.5	7.1	2.6	7.0	2.3	0.5	0.5	330,695	840
Unknown	27.7	4.3	57.2	4.7	3.8	1.6	1.5	1.7	5.1	2.2	3.3	1.7	1.5	1.0	281,158	562

Table 2-16 (continued)

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size	Sample Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Male Total	32.6	1.7	53.3	2.1	3.2	0.7	0.9	0.5	4.4	0.7	4.9	0.9	0.7	0.3	1,599,132	3,104
Age (Years)																
25–44	37.5	2.6	48.5	2.9	3.3	0.9	1.2	0.6	4.8	1.0	4.2	1.0	0.6	0.4	938,719	1,808
45–64	27.3	2.8	59.9	3.4	3.3	1.4	0.5	0.6	3.4	1.2	4.9	1.5	0.6	0.4	533,228	1,060
65+	18.8	4.5	61.3	5.8	1.8	2.0	0.5	1.1	6.0	3.7	9.8	4.6	1.9	2.4	127,184	236
Race/Ethnicity																
Non-Hispanic White	30.3	2.0	56.3	2.2	2.3	0.7	0.5	0.3	4.6	1.0	5.3	1.0	0.7	0.4	1,005,234	2,191
Hispanic	36.2	5.0	44.4	5.7	6.0	2.7	2.4	2.2	5.4	2.4	4.9	2.1	0.7	0.9	303,944	412
African-American	40.3	9.3	47.8	8.6	5.1	3.7	1.8	2.4	1.0	1.5	2.3	2.1	1.6	1.9	105,338	172
Asian/PI	37.8	7.7	52.9	8.4	2.3	2.0	.	.	3.7	2.4	3.3	2.6	.	.	115,588	211
Native American	29.3	9.5	58.7	10.6	2.5	2.5	0.5	1.0	3.5	3.4	5.5	5.3	.	.	69,026	118
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
Education (Years)																
<12	31.7	4.3	50.9	5.6	3.4	1.7	1.9	1.7	5.7	2.2	4.9	1.9	1.5	1.1	389,244	377
12	31.2	2.8	58.9	3.3	2.7	1.2	0.6	0.5	2.8	0.9	3.2	1.0	0.5	0.4	487,227	1,070
13–15	35.2	3.1	51.4	3.7	3.3	1.4	0.6	0.6	4.3	1.6	4.9	1.5	0.2	0.3	436,514	997
16+	32.2	3.8	50.1	4.8	3.5	1.9	0.6	0.7	5.5	1.8	7.5	2.4	0.6	0.5	286,144	660
Household Income (Dollars)																
≤10,000	33.4	6.7	53.8	7.2	3.2	2.7	1.3	1.6	3.8	2.4	4.1	2.4	0.4	0.9	180,241	255
10,001-20,000	37.6	6.1	49.6	5.9	3.5	2.4	0.8	1.2	4.0	2.8	3.8	2.2	0.7	0.8	205,949	355
20,001-30,000	31.0	5.2	54.9	5.4	3.0	1.6	0.7	0.9	4.1	2.1	5.2	2.0	1.2	1.5	242,397	453
30,001-50,000	31.5	3.5	54.7	4.0	3.3	1.4	0.5	0.5	5.1	2.2	4.6	1.9	0.3	0.4	348,127	716
50,001-75,000	36.2	4.0	50.9	4.3	2.4	1.5	1.7	1.4	2.3	1.1	5.8	2.2	0.6	0.6	257,188	561
75,000+	30.6	4.8	52.9	6.1	2.6	1.6	0.2	0.3	6.7	2.2	6.5	2.6	0.5	0.6	202,225	479
Unknown	26.8	5.9	56.5	6.6	4.5	2.8	2.0	2.7	5.1	3.1	3.8	2.6	1.3	1.4	163,004	285

Table 2-16 (continued)

	Daily Smoker				Occasional Smoker				Former Smoker							
	Quit Attempts		Without Quit Attempts		Quit Attempts		Without Quit Attempts		Quit <3 Months		Quit 3+ Months		Unknown Duration		Population Size	Sample Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Female Total	30.0	2.1	53.9	2.3	3.5	0.7	1.7	0.7	5.2	1.3	5.2	1.0	0.6	0.3	1,295,293	3,107
Age (Years)																
25–44	33.7	2.9	48.6	3.1	3.8	1.0	2.2	1.3	5.7	1.7	5.6	1.3	0.4	0.3	697,492	1,630
45–64	25.8	3.0	60.8	2.9	2.5	1.0	1.2	0.8	4.3	1.3	4.7	1.7	0.8	0.8	446,151	1,130
65+	25.2	6.1	57.6	7.1	4.8	2.6	0.9	1.0	5.6	3.6	5.3	2.8	0.6	0.8	151,649	347
Race/Ethnicity																
Non-Hispanic White	27.9	2.1	56.6	2.1	3.2	0.6	1.1	0.5	5.6	1.7	5.4	1.1	0.2	0.2	936,454	2,470
Hispanic	34.3	7.6	45.1	7.6	5.0	3.1	3.2	2.8	6.6	4.1	5.0	4.0	0.8	1.1	135,805	236
African-American	41.3	9.0	42.2	9.3	4.4	3.8	5.0	7.3	2.4	1.8	3.9	2.9	0.9	1.3	113,255	207
Asian/PI	22.4	12.9	58.7	18.0	2.7	3.9	2.5	3.7	3.0	3.6	6.6	7.4	4.0	6.0	50,540	89
Native American	38.0	13.2	49.8	15.2	3.0	2.6	0.5	1.1	3.1	3.1	3.9	4.1	1.7	3.4	59,237	105
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
Education (Years)																
<12	37.2	6.4	50.9	6.2	2.1	1.6	1.5	1.5	3.5	2.4	4.3	2.5	0.5	0.7	271,706	318
12	26.1	2.4	59.2	3.4	2.8	1.1	1.2	0.6	4.7	1.6	5.0	1.3	0.9	0.8	450,062	1,225
13 - 15	27.1	2.7	54.3	3.4	4.5	1.3	2.9	2.3	5.7	2.3	5.2	1.7	0.2	0.3	375,347	1,036
16+	34.3	5.8	45.0	5.6	4.9	1.8	0.8	0.8	7.6	3.8	7.1	2.7	0.4	0.7	198,177	528
Household Income (Dollars)																
≤10,000	31.8	5.3	53.7	5.9	3.2	1.9	4.1	4.4	2.9	1.5	4.1	2.3	0.3	0.5	189,890	366
10,001-20,000	31.8	5.6	52.0	5.8	3.6	1.8	0.6	0.9	6.3	3.2	5.3	2.3	0.4	0.7	191,575	429
20,001-30,000	32.0	5.1	54.9	4.3	3.4	2.1	0.5	0.5	3.8	1.7	4.6	2.1	0.8	1.1	202,350	496
30,001-50,000	29.4	4.4	53.2	4.6	3.2	1.3	2.2	1.8	5.8	2.5	5.7	2.9	0.5	0.9	285,000	715
50,001-75,000	28.5	6.9	53.2	8.0	4.8	1.9	1.6	1.2	5.4	3.3	6.2	2.9	0.3	0.5	179,853	463
75,000+	25.4	4.9	53.8	7.8	3.3	1.8	1.3	1.3	7.9	5.3	7.8	3.8	0.5	1.1	128,471	361
Unknown	28.9	5.8	58.3	6.6	2.8	2.0	0.8	0.7	5.0	3.1	2.6	1.8	1.6	1.6	118,154	277

Note: CI = 95% confidence interval; "." = insufficient data.

Table 2-17
Percentage of Former Smokers among those who Reported Smoking in the Last Year in Massachusetts

OVERALL	MTS* 1993		MATS** 1995, 1996		MATS** 1997	
	%***	N‡	%	N	%	N
Total	8.1 ±2.6	1784	10.2 ±3.9	1253	10.9 ±4.8	782
Gender						
Male	7.0 ±3.8	858	8.6 ±5.1	578	10.7 ±7.0	363
Female	9.0 ±3.7	926	11.6 ±6.0	675	10.9 ±6.8	419
Age (Years)						
18 - 24	7.5 ±7.8	255	2.5 ±1.9	156	4.7 ±3.9	98
25 - 44	4.1 ±2.1	977	13.0 ±6.5	678	10.0 ±6.0	409
45 - 64	17.9 ±8.5	402	9.8 ±7.6	308	16.7 ±11.1	209
65+	7.6 ±9.0	108	12.5 ±12.4	108	1.9 ±2.4	64
Ethnicity						
Non-Hispanic White	8.2 ±2.9	1346	11.8 ±4.8	1010	11.1 ±5.2	646
African-American	7.7 ±5.4	145	8.1 ±8.1	85	—	42
Hispanic	0 ±1.3	131	3.6 ±2.7	81	6.7 ±8.4	52
Asian/PI	—	26	0 ±2.2	11	—	4
Other	5.9 ±12.1	61	0 ±2.4	15	10.0 ±10.7	17
Education (Years)						
<12	6.8 ±5.9	288	11.7 ±10.9	193	8.7 ±6.5	113
12	8.0 ±4.2	693	5.2 ±3.6	493	15.4 ±9.1	323
13 - 15	7.8 ±5.1	460	10.4 ±8.2	344	8.3 ±7.0	209
16+	10.3 ±6.6	299	19.2 ±11.7	206	5.3 ±8.1	130
Income Level (Dollars)						
<10,000	4.2 ±5.2	221	10.6 ±9.6	154	—	70
10,000-19,000	10.4 ±9.3	238	6.9 ±9.8	152	2.3 ±1.9	113
20,000-29,000	6.0 ±5.5	311	6.1 ±5.6	230	4.9 ±6.4	129
30,000-49,000	11.5 ±6.7	417	7.9 ±7.2	324	11.2 ±9.8	203
50,000-75,000	8.2 ±5.8	237	21.5 ±14.9	142	—	102
75,000+	7.8 ±11.6	91	—	90	1.6 ±2.1	67

Table 2-17 (continued)

MALE	MTS* 1993		MATS** 1995, 1996		MATS** 1997	
	%***	N‡	%	N	%	N
Total Men	7	858	8.6	578	10.7	363
Age (Years)						
18 - 24	12.3	115	2.4	74	2.6	42
25 - 44	3.4	472	9.9	312	7.8	196
45 - 64	14	212	10.7	149	17.2	104
65+	10	51	15.2	43	10	21
Ethnicity						
Non-Hispanic White	7.3	628	11.3	452	11.2	296
African-American	7.4	69	13.3	34	0	19
Hispanic	0	63	0	38	0	22
Asian/PI	20	19	0	10	0	2
Other	0	34	0	9	11.1	11
Education (Years)						
<12	7.1	154	12.3	101	3.6	57
12	7	327	4.8	222	15.5	149
13 - 15	3.3	211	6	149	5.2	85
16+	14.7	146	17.3	99	10.6	68
Income Level (Dollars)						
<10,000	6.5	91	4	48	0	25
10,000-19,000	6.4	98	2.7	56	2.3	39
20,000-29,000	1.2	150	8	102	2.8	51
30,000-49,000	9.6	214	3.1	176	14.1	113
50,000-75,000	8.1	125	26.1	69	24.2	49
75,000+	13.2	54	9.6	55	2.4	46

Table 2-17 (continued)

FEMALE	MTS* 1993		MATS** 1995, 1996		MATS** 1997	
	%***	N‡	%	N	%	N
Total Women	9	926	11.6	675	10.9	419
Age (Years)						
18 - 24	4.4	140	1.3	82	4.3	56
25 - 44	4.8	505	15.7	366	12.3	213
45 - 64	21.1	190	9	159	16.1	105
65+	5.6	57	10.3	65	2.3	43
Ethnicity						
Non-Hispanic White	9	718	12.4	558	11	350
African-American	8.3	76	9.1	51	33.3	23
Hispanic	0	68	5.3	43	12.5	30
Asian/PI	14.3	7	0	1	0	2
Other	20	27	0	6	0	6
Education (Years)						
<12	6.3	134	11.1	92	15.8	56
12	9	366	5.1	271	15.2	174
13 - 15	12.3	249	14.2	195	10.5	124
16+	7.8	153	20.7	107	0	62
Income Level (Dollars)						
<10,000	4	130	13.3	106	33.3	45
10,000-19,000	13	140	10.6	96	2.2	74
20,000-29,000	8.8	161	3.8	128	6.7	78
30,000-49,000	14.1	203	11.9	148	8.5	90
50,000-75,000	8.3	112	14	73	20.3	53
75,000+	2	37	27.3	35	0	21

** MTS - Massachusetts Tobacco Survey.*
*** MATS - Massachusetts Adult Tobacco Survey.*
**** All % reported are weighted.*
‡ All N's reported are unweighted.

Table 2-18
Quit Attempts among those who Reported Smoking in the Last Year in Massachusetts

OVERALL	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total	47.5 ±5.0	1747	52.9 ±6.0	1245	48.2 ±7.5	776
Gender						
Male	48.6 ±7.5	839	54.4 ±8.6	574	45.6 ±10.2	360
Female	46.4 ±7.1	908	51.4 ±8.5	671	51.0 ±10.5	416
Age (Years)						
18 - 24	37.7 ±11.8	251	—	153	—	98
25 - 44	46.2 ±7.2	959	59.7 ±7.8	673	56.7 ±9.9	404
45 - 64	59.3 ±9.5	395	50.8 ±12.1	308	39.1 ±12.9	209
65+	—	104	—	108	—	64
Ethnicity						
Non-Hispanic White	47.6 ±5.4	1325	50.9 ±6.7	1004	47.5 ±8.0	643
African-American	—	140	—	85	—	41
Hispanic	—	128	—	80	—	51
Asian/PI	—	24	—	11	—	4
Other	—	61	—	14	—	17
Education (Years)						
<12	53.4 ±14.2	282	58.9 ±15.1	192	—	113
12	44.6 ±7.6	685	47.4 ±10.8	491	47.7 ±11.8	322
13 - 15	43.2 ±9.8	449	50.5 ±11.8	341	50.2 ±14.2	206
16+	56.8 ±11.1	289	62.0 ±12.7	204	—	128
Income Level (Dollars)						
<10,000	25.3 ±11.9	220	58.8 ±15.4	153	—	70
10,000-19,000	52.7 ±13.1	235	36.1 ±16.7	149	—	113
20,000-29,000	44.0 ±12.6	306	55.8 ±13.0	228	—	128
30,000-49,000	53.6 ±9.4	413	52.2 ±11.6	323	43.5 ±14.2	202
50,000-75,000	49.2 ±12.6	236	—	142	—	101
75,000+	—	84	—	90	—	67

Table 2-18 (continued)

MALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Men	48.6	839	54.4	574	45.6	360
Age (Years)						
18 - 24	38.5	112	47.2	73	57.9	42
25 - 44	46.6	465	60.7	309	46.9	193
45 - 64	65.7	206	54.9	149	41.4	104
65+	32.3	50	36.4	43	30	21
Ethnicity						
Non-Hispanic White	49.1	619	51.6	450	44.7	295
African-American	55	66	46.7	34	81.8	18
Hispanic	35.3	62	38.9	37	50	21
Asian/PI	22.2	17	88.2	10	0	2
Other	54.5	34	90	8	12.5	11
Education (Years)						
<12	60.3	149	63.2	101	32.1	57
12	44.7	324	53.4	220	47.9	148
13 - 15	38.2	204	40	147	35.5	83
16+	68.1	143	72.1	99	57.6	68
Income Level (Dollars)						
<10,000	17.4	91	44	47	50	25
10,000-19,000	54.5	96	25	55	31	39
20,000-29,000	50	147	64.4	101	27.8	51
30,000-49,000	51.2	211	58.3	175	38	113
50,000-75,000	48.2	124	50	69	62.3	48
75,000+	60.9	52	58.9	55	48.2	46

Table 2-18 (continued)

FEMALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Women	46.4	908	51.4	671	51	416
Age (Years)						
18 - 24	36.4	139	34.2	80	32.6	56
25 - 44	45.6	494	58.7	364	65.9	211
45 - 64	54.9	189	47.2	159	35.5	105
65+	48.6	54	46.2	65	38.1	43
Ethnicity						
Non-Hispanic White	46.2	706	50.3	554	50	348
African-American	58.3	74	68.2	51	66.7	23
Hispanic	60	66	50	43	62.5	30
Asian/PI	16.7	7	0	1	100	2
Other	66.7	27	14.3	6	100	6
Education (Years)						
<12	46	133	53.7	91	50	56
12	44.3	361	41.4	271	48	174
13 - 15	47.4	245	60.8	194	60.9	123
16+	48.4	146	52.3	105	38.4	60
Income Level (Dollars)						
<10,000	32.7	129	65	106	55.6	45
10,000-19,000	52.2	139	42.6	94	42.2	74
20,000-29,000	40.9	159	46.8	127	27.3	77
30,000-49,000	56.3	202	47.2	148	48.4	89
50,000-75,000	50.5	112	58.9	73	62.3	53
75,000+	45.8	32	59.3	35	42.5	21

** MTS - Massachusetts Tobacco Survey.*
*** MATS - Massachusetts Adult Tobacco Survey.*
**** All % reported are weighted.*
‡ All N's reported are unweighted.

Table 2-19
Smokers Planning to Quit in the Next 30 Days in Massachusetts

OVERALL	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total	28.6 ±5.2	1564	30.7 ±5.9	1107	33.3 ±6.6	684
Gender						
Male	31.8 ±7.2	763	34.6 ±9.4	505	36.5 ±10.1	317
Female	25.6 ±6.7	801	26.8 ±7.7	602	30.5 ±9.4	367
Age (Years)						
18 - 24	18.2 ±9.2	232	25.0 ±14.0	140	13.6 ±9.0	89
25 - 44	27.8 ±6.2	874	32.1 ±9.1	599	36.2 ±9.9	362
45 - 64	34.0 ±11.1	328	31.0 ±11.5	271	39.8 ±14.0	182
65+	—	94	—	94	—	51
Ethnicity						
Non-Hispanic White	28.6 ±5.7	1181	26.7 ±6.2	891	32.1 ±7.0	564
African-American	25.0 ±12.1	122	—	73	—	37
Hispanic	—	119	—	72	—	45
Asian/PI	7.7 ±10.2	21	—	10	—	4
Other	18.8 ±13.2	58	—	14	—	17
Education (Years)						
<12	—	254	29.4 ±14.1	168	—	98
12	23.3 ±6.8	611	32.9 ±10.1	441	30.9 ±11.1	272
13 - 15	29.6 ±9.6	404	26.8 ±10.0	306	31.1 ±12.8	190
16+	30.3 ±10.9	258	27.3 ±12.3	179	39.1 ±13.7	119
Income Level (Dollars)						
<10,000	—	198	—	136	17.6 ±12.3	58
10,000-19,000	22.2 ±13.7	220	—	138	—	100
20,000-29,000	31.1 ±12.5	280	24.5 ±12.4	207	—	116
30,000-49,000	32.7 ±9.4	360	38.4 ±12.3	286	32.3 ±13.4	179
50,000-75,000	29.0 ±12.2	210	—	127	—	85
75,000+	9.9 ±9.1	77	—	74	—	66

Table 2-19 (continued)

MALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Men	31.8	763	34.6	505	36.5	317
Age (Years)						
18 - 24	25.8	106	17.5	67	18.9	41
25 - 44	30	431	43	274	32.1	171
45 - 64	38.4	176	37.9	126	49.5	89
65+	42.9	43	28.6	38	33.3	16
Ethnicity						
Non-Hispanic White	32.4	553	31.7	393	34.8	259
African-American	23.5	58	25	26	72.7	17
Hispanic	66.7	62	52.8	37	71.4	18
Asian/PI	14.3	17	88.2	9	0	2
Other	16.7	33	10.5	8	0	10
Education (Years)						
<12	41.9	135	37	83	38.5	49
12	24.3	295	38.2	200	34.2	127
13 - 15	35.9	183	30.2	132	22.4	77
16+	38.5	131	32.9	85	51.3	61
Income Level (Dollars)						
<10,000	47.6	80	25.7	42	20	23
10,000-19,000	25	95	41.7	52	29.3	34
20,000-29,000	24.4	142	26.4	86	61.8	45
30,000-49,000	37.4	185	48.8	157	28	100
50,000-75,000	32.9	111	44.6	60	40	41
75,000+	9.3	44	27.7	44	29.1	43

Table 2-19 (continued)

FEMALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Women	25.6	801	26.8	602	30.5	367
Age (Years)						
18 - 24	12.8	126	37.3	73	8.9	48
25 - 44	25.3	443	21.1	325	40.3	191
45 - 64	30.4	152	26	145	26	93
65+	57.6	51	42.9	56	22	35
Ethnicity						
Non-Hispanic White	25.3	628	22.9	498	29.7	305
African-American	27.3	64	55	47	75	20
Hispanic	61.5	57	55.6	35	42.9	27
Asian/PI	0	4	0	1	0	2
Other	25	25	16.7	6	0	7
Education (Years)						
<12	39	119	22.4	85	20	49
12	22.3	316	27.9	241	26.9	145
13 - 15	23.5	221	22.6	174	37.5	113
16+	24.3	127	23	94	28.1	58
Income Level (Dollars)						
<10,000	14.9	118	38.5	94	18.2	35
10,000-19,000	20	125	25.9	86	29.5	66
20,000-29,000	36	138	22.7	121	12.2	71
30,000-49,000	26.2	175	28.7	129	36	79
50,000-75,000	24.7	99	16.3	67	34.5	44
75,000+	10.4	33	21.2	30	26.1	23

** MTS - Massachusetts Tobacco Survey.*
*** MATS - Massachusetts Adult Tobacco Survey.*
**** All % reported are weighted.*
‡ All N's reported are unweighted.

Table 2-20
Daily Smokers Planning to Quit in the Next 30 Days in Massachusetts

OVERALL	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total	23.8 ±4.9	1307	27.3 ±6.3	916	29.3 ±7.0	586
Gender						
Male	28.4 ±7.1	636	32.9 ±9.9	418	35.5 ±10.7	274
Female	19.1 ±6.0	671	22.2 ±8.3	498	23.0 ±9.5	312
Age (Years)						
18 - 24	10.4 ±6.2	194	—	103	11.4 ±8.3	70
25 - 44	24.5 ±6.5	718	29.3 ±9.1	501	29.6 ±10.3	306
45 - 64	27.0 ±10.8	285	24.9 ±11.7	231	37.7 ±14.4	163
65+	—	84	—	78	—	47
Ethnicity						
Non-Hispanic White	23.7 ±4.4	1000	23.1 ±6.6	751	27.6 ±7.4	486
African-American	24.0 ±12.7	98	—	54	—	30
Hispanic	—	96	—	54	—	39
Asian/PI	7.7 ±8.2	16	—	7	—	2
Other	14.3 ±13.2	50	—	10	—	13
Education (Years)						
<12	30.3 ±15.3	227	32.6 ±14.9	147	—	91
12	20.9 ±7.1	530	26.6 ±9.7	374	25.1 ±10.5	242
13 - 15	25.7 ±10.2	333	26.5 ±11.2	261	26.3 ±13.1	155
16+	23.8 ±11.5	186	18.4 ±12.0	123	38.2 ±16.9	93
Income Level						
<10,000	—	173	31.7 ±17.3	116	17.6 ±12.3	55
10,000-19,000	21.5 ±14.5	195	—	108	—	88
20,000-29,000	23.0 ±10.9	234	22.6 ±14.1	173	—	98
30,000-49,000	30.2 ±10.3	305	32.5 ±13.0	243	29.5 ±14.1	149
50,000-75,000	23.8 ±13.3	173	—	105	—	74
75,000+	11.9 ±13.0	55	—	57	—	56

Table 2-20 (continued)

MALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Men	28.4	636	32.9	418	35.5	274
Age (Years)						
18 - 24	16	90	16.3	50	15.2	32
25 - 44	29.3	350	41.4	224	29.9	146
45 - 64	29.2	148	32	110	49.5	80
65+	44.4	42	33.3	34	33.3	16
Ethnicity						
Non-Hispanic White	29.9	468	30.8	334	33.5	227
African-American	18.8	46	25	21	77.8	13
Hispanic	44.4	49	80	26	71.4	16
Asian/PI	14.3	12	33.3	6	0	0
Other	16.7	29	10.5	6	0	7
Education (Years)						
<12	33.3	120	47.5	71	41.7	46
12	22.3	255	30.1	169	30.3	113
13 - 15	33.6	149	32.4	114	20	66
16+	37.2	96	28.6	60	59.3	46
Income Level (Dollars)						
<10,000	42.4	71	42.9	35	20	22
10,000-19,000	23.8	85	30.8	39	38.7	29
20,000-29,000	18.8	119	27.4	72	57.1	37
30,000-49,000	36.2	157	38.5	131	27.4	87
50,000-75,000	25.9	88	41.2	50	40.9	36
75,000+	15	30	34	33	24.3	36

Table 2-20 (continued)

FEMALE	MTS* 1993		MATS** 1995, 1996		MATS 1997	
	%***	N‡	%	N	%	N
Total Women	19.1	671	22.2	498	23	312
Age (Years)						
18 - 24	8	104	38.8	53	7.9	38
25 - 44	18.8	368	19.1	277	28.9	160
45 - 64	25.5	137	19.4	121	21.1	83
65+	39.1	42	24	44	23.1	31
Ethnicity						
Non-Hispanic White	18	532	17	417	22	259
African-American	33.3	52	53.8	33	75	17
Hispanic	70	47	56.3	28	33.3	23
Asian/PI	0	4	0	1	0	2
Other	33.3	21	0	4	0	6
Education (Years)						
<12	27.7	107	19.6	76	20	45
12	19.4	275	23.6	205	18.7	129
13 - 15	17	184	19.5	147	30.6	89
16+	17.1	90	6.1	63	18.8	47
Income Level (Dollars)						
<10,000	12.2	102	26.2	81	18.2	33
10,000-19,000	20	110	24.4	69	28.6	59
20,000-29,000	26.9	115	17.7	101	14.3	61
30,000-49,000	20.7	148	27.4	112	31.5	62
50,000-75,000	22.4	85	15	55	14.6	38
75,000+	10	25	5.3	24	17.5	20

** MTS - Massachusetts Tobacco Survey.*
*** MATS - Massachusetts Adult Tobacco Survey.*
**** All % reported are weighted.*
‡ All N's reported are unweighted.

Appendix 2

CPS Summary of Methods Used in Logistic Regression Models for Cessation Monograph

1. BASIC CESSATION MODELS

Population

The analysis includes self-respondents from the CPS 1992/93 and 1995/96 surveys who are 25 years of age or older. These respondents must have a valid current smoking status (daily, occasional, or former) and must have been daily smokers one year ago. In other words, respondents who did not answer whether they had smoked at least 100 cigarettes (Question 32*), whether they currently smoke (Question 35), and whether they smoked daily 12 months ago (Question 61) are excluded from the analysis. Additionally, respondents are excluded from the analysis if they are

- current daily smokers with unknown quit attempts (Questions 44 and 45),
- current occasional and former smokers who have not been daily smokers for at least 6 months (Questions 39 and 55), or
- current former smokers with unknown lengths of quit time (Question 59).

Any respondents who neglected to answer questions that are used as covariates are also excluded from the analysis.

Additionally, each analysis is stratified by region—the nation, California, and the nation minus California (N–CA). Below is a summary of the number of respondents used for the analyses by region.

Region	Population	1992/93	1995/96
Nation	Respondents to Tobacco Supplement	333,909	289,704
	Self-respondents, age 25+	205,621	170,313
	Daily smokers of 1 yr (Used in analysis)	38,283	30,609
Calif	Respondents to Tobacco Supplement	25,834	23,019
	Self-respondents, age 25+	14,767	12,266
	Daily smokers of 1 yr (Used in analysis)	1,972	1,584
N–CA	Respondents to Tobacco Supplement	308,075	266,685
	Self-respondents, age 25+	190,854	158,047
	Daily smokers of 1 yr (Used in analysis)	36,311	29,025

* All question numbers refer to the 1992/93 Current Population Survey.

Outcomes Five different cessation outcomes are modeled:

Cessation Activity	Those daily smokers of 1 year ago who have either tried to quit (current daily smokers with quit attempts in the past year), have become occasional smokers, or have quit altogether (current former smokers).
Cessation Attempts	Those daily smokers of 1 year ago, save current occasional smokers, who have tried to quit or who have quit. Current occasional smokers have been excluded from the analysis of this outcome because their attempts to quit are not monitored.
Occasional	Those daily smokers of 1 year ago who have become occasional smokers.
Former	Those daily smokers of 1 year ago who have quit smoking, regardless of the length of this current quit effort.
Former >3 months	Those daily smokers of 1 year ago who quit smoking at least 3 months prior to the survey.

Weighting for Confidence Interval Calculation To estimate the standard errors for the odds ratios obtained from the logistic regression analysis, the weight of each survey respondent has been recalculated, so the sum of the new weights is the original sample size. This reweighting is obtained by dividing each respondent's original weight by the sum of all the original weights ($wt/\sum wt$ = each respondent's contribution), this quotient is then multiplied by the total sample size.

Covariates The following covariates are used to model the cessation outcomes:

Gender	Male or Female
Age	Each respondent is classified into one of three age categories: 25 – 44 45 – 64 65 +
Race	Race and ethnicity are classified into five categories—White, Hispanic, African-American, Native American, and Other. Each respondent has specified his race and presence of Hispanic ethnicity. If the respondent has indicated Hispanic ethnicity, he is classified as Hispanic; otherwise, his race response is used. For the 1992/93 survey, the category "Other" includes Asian/PI, Native American, and Other; however, for the 1995/96 survey, this category only includes Asian/PI and Native American, since the CPS reclassified respondents into one of the other race categories if they chose a race of "Other."

Education — Respondents are classified into one of four education categories:

<12	Years
12	Years (with or without a diploma)
13-15	Years
16+	Years

Income — Respondents are classified by their household income into one of six categories:

- <$10,000
- $10,000 – $19,999
- $20,000 – $29,999
- $30,000 – $49,999
- $50,000 – $74,999
- $75,000 +

Cigarettes smoked per day — Respondents are grouped differently according to their current smoking status. Current occasional and former smokers are classified into categories according to the number of cigarettes smoked per day when they were last daily smokers—presumably 12 months prior to the survey (Questions 41 and 57). Current daily smokers, however, are classified according to the number of cigarettes they are currently smoking (Question 36). The categories are

1 – 4	cigarettes per day
5 – 14	cigarettes per day
15 – 24	cigarettes per day
25+	cigarettes per day

2. CESSATION BY DOCTOR'S ADVICE

This analysis subsets the population described in #1 by deleting from that population those respondents who have unknown information regarding doctor's advice. Additionally, since information about doctor's advice is only obtained from current smokers, former smokers have been deleted from this analysis.

Population

Population used in analysis: Current smokers who were daily smokers one year ago.

Region	1992/93	1995/96
Nation	35,013	28,801
Calif	1,752	1,467
N–CA	33,261	27,334

Outcomes Since only current smokers are used in the analysis, only three cessation outcomes are modeled—change, attempts, and occasional.

Covariates Only one covariate, doctor's advice, is added to those already listed in #1. Each respondent is characterized by one of the following classifications:

- Saw a doctor and received advice
- Saw a doctor but didn't receive advice
- Didn't see a doctor

Questions 47 and 49 are used to characterize respondents.

3. CESSATION BY DOCTOR'S ADVICE FOR THOSE WHO SAW A DOCTOR WITHIN THE LAST YEAR

The population described in #2 has been further subset such that those current smokers who were daily smokers 1 year ago have been subset to those who also saw a doctor within the last year.

Population Population used in analysis: Those current smokers who were daily smokers 1 year ago and saw a doctor within the last year.

Region	1992/93	1995/96
Nation	25,155	21,147
Calif	1,275	1,029
N–CA	23,880	20,118

Outcomes The same cessation outcomes listed in #2 are used—change, attempt, and occasional.

Covariates Since all the respondents used in this analysis have seen a doctor in the past year, the covariates listed in #2 have been modified to only include

- Received doctor's advice
- Didn't receive doctor's advice

4. WHO SAW A DOCTOR IN THE PAST YEAR

Population This analysis uses a subset of the population described in #1. Those respondents whose visits to a doctor within the past year are unknown (Question 47) have been excluded from this analysis. This population is slightly different than the population described in #2 because the population used in that analysis also excluded respondents with missing information regarding doctor's advice.

Population used in analysis: Daily smokers of 1 year ago with known doctors' visits.

Region	1992/93	1995/96
Nation	35,411	28,829
Calif	1,800	1,467
N–CA	33,611	27,362

Outcomes The outcome visit to a doctor in the last year is modeled. Question 47 is used to indicate doctor's visit.

Covariates The same covariates that are used in the basic cessation models (described in #1) are used in these models.

5. RECEIVED DOCTOR'S ADVICE

Population The population modeled in this analysis is the same population described in #3 (Cessation by Doctor's Advice for those Who Saw a Doctor).

Outcomes The outcome modeled is "receipt of doctor's advice."

Covariates The same covariates used in the basic cessation models (#1) are used in this analysis.

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Restrictions on Smoking in the Workplace

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OVERVIEW One of the most dramatic social changes over the past 30 years has been the change in attitudes about public smoking and the resultant governmental restrictions on where smoking is allowed. Beginning in 1970, with then Surgeon General Jesse Steinfeld's warning that environmental tobacco smoke (ETS) exposure was likely to cause problems for nonsmokers (Steinfeld, 1972), concern about ETS exposure led to 25 years of scientific inquiry. This inquiry culminated in a series of comprehensive reviews con cluding that ETS exposure is a cause of cancer, heart disease, respiratory ill ness, and a host of other problems (U.S.DHEW, 1972, 1977, 1979; U.S.DHHS, 1982 & 1986; NRC, 1986; U.S.EPA, 1992; Cal/EPA, 1997).

Early reaction to this evidence included efforts to provide separate sec tions for smokers and nonsmokers in restaurants and workplaces (NCI, 1993). But with accumulating evidence that ETS exposure was a cause of cancer and other serious diseases, complete bans on smoking in workplaces and public places became more common. In 1986, only 3 percent of work ers nationally reported working in a smoke-free workplace (Gerlach, 1997). By the 1992/93 Current Population Survey (CPS), the fraction of indoor workers reporting a smoke-free workplace had risen to 46.7 percent. Table 3-1 presents data from the 1995/96 CPS and demonstrates that the fraction of workers covered by a 100 percent smoking ban in the workplace has risen to 64.3 percent, including more than half (54.1 percent) of all current smokers.

Males and those who were between ages 18 and 24 were less likely to work in a smoke-free workplace, as were Hispanic and Native American indoor workers (Table 3-1). The likelihood of working in a smoke-free envi ronment increases dramatically with increasing level of education and fami ly income. The fraction of workers who work in a smoke-free workplace varies across states, from a high of 84 percent in Utah and Maryland to a low of 40 percent in Nevada, but only three states (Nevada, Arkansas, and Kentucky) have less than 50 percent of their employees working in smoke-free areas.

The increasing proportion of indoor workers who are employed in smoke-free workplaces has a direct health benefit for nonsmokers due to the decreased exposure to ETS. However, restrictions on where smokers can smoke may also influence the behavior of smokers outside of the work-place. Smokers may quit smoking altogether when a policy restricting smoking in the workplace is implemented (as opposed to refraining from their habit only at work). They may reduce the number of cigarettes that

Table 3-1

Nation: Extent of Official Smoking Policy in the Workplace for Self-Respondent Adults Age 18 and Older, 1995/96 Current Population Survey

	Level of Workplace Smoking Policy										Population	Sample
	Smoke Free		Strong		Moderate		Weak		None		Size	Size
Nation	%	CI	%	CI	%	CI	%	CI	%	CI	(N)	(n)
Total	64.26	0.37	11.21	0.25	9.15	0.22	1.25	0.09	14.13	0.27	84,811,586	80,661
Smoking Status												
Never	67.65	0.48	10.58	0.32	7.83	0.28	1.01	0.10	12.92	0.35	48,086,591	44,818
Current	54.10	0.80	13.27	0.54	12.25	0.52	1.80	0.21	18.59	0.62	20,135,755	19,379
Former	66.73	0.83	10.55	0.54	9.21	0.51	1.29	0.20	12.22	0.58	16,589,240	16,464
Gender												
Male	58.67	0.56	12.04	0.37	11.38	0.36	1.80	0.15	16.11	0.42	40,089,095	33,103
Female	69.26	0.49	10.47	0.33	7.15	0.28	0.76	0.09	12.36	0.35	44,722,491	47,558
Age (Years)												
18–24	55.92	1.03	13.21	0.70	9.67	0.61	1.05	0.21	20.15	0.83	12,050,968	8,640
25–44	64.61	0.50	11.39	0.33	9.33	0.30	1.33	0.12	13.34	0.36	47,056,921	45,350
45–64	67.77	0.69	10.07	0.44	8.69	0.41	1.22	0.16	12.25	0.48	23,906,035	24,670
65+	64.12	2.57	8.35	1.48	6.91	1.36	1.07	0.55	19.55	2.12	1,797,662	2,001
Race/Ethnicity												
Non-Hispanic White	64.45	0.43	11.13	0.28	9.13	0.26	1.27	0.10	14.03	0.31	63,934,697	65,231
Hispanic	61.13	1.76	10.78	1.12	9.48	1.06	1.23	0.40	17.39	1.37	7,318,120	5,153
African-American	64.59	1.11	12.96	0.78	9.45	0.68	1.23	0.26	11.76	0.75	9,737,977	7,135
Asian/Pacific Island	67.72	1.89	8.70	1.14	7.62	1.07	1.07	0.42	14.89	1.44	3,218,613	2,461
Native American	57.65	4.62	10.33	2.85	10.70	2.89	1.48	1.13	19.84	3.73	602,179	681
Education (Years)												
<12 Years	46.29	1.37	15.41	0.99	12.17	0.90	1.60	0.34	24.53	1.18	6,836,863	5,800
12 Years	55.81	0.68	13.19	0.47	11.15	0.43	1.75	0.18	18.11	0.53	27,250,901	26,273
13–15 Years	65.88	0.67	10.89	0.44	9.00	0.41	1.17	0.15	13.06	0.48	25,668,947	24,387
16+ Years	76.68	0.61	8.24	0.39	6.30	0.35	0.71	0.12	8.07	0.39	25,054,875	24,201

Table 3-1 (continued)

Nation (continued)	Level of Workplace Smoking Policy: Smoke Free %	Smoke Free CI	Strong %	Strong CI	Moderate %	Moderate CI	Weak %	Weak CI	None %	None CI	Population Size (N)	Sample Size (n)
Household Income (Dollars)												
< 10,000	51.97	1.63	13.24	1.11	10.87	1.02	1.31	0.37	22.60	1.37	4,823,326	4,340
10,000–19,999	54.78	1.14	13.67	0.78	10.49	0.70	1.44	0.27	19.62	0.91	9,862,918	9,163
20,000–29,999	59.56	0.99	12.42	0.66	9.53	0.59	1.58	0.25	16.92	0.76	12,674,069	12,132
30,000–49,999	63.87	0.73	11.82	0.49	9.63	0.45	1.27	0.17	13.41	0.52	22,523,682	22,058
50,000–74,999	69.31	0.80	10.08	0.52	8.63	0.49	1.15	0.18	10.83	0.54	17,084,119	16,512
75,000 +	75.13	0.87	8.15	0.55	7.09	0.52	0.97	0.20	8.66	0.57	12,735,217	11,675
Unknown	63.45	1.53	10.29	0.96	8.74	0.90	1.05	0.32	16.47	1.18	5,108,254	4,781
State*												
Utah	84.21	2.21	4.31	1.23	3.17	1.06	0.42	0.39	7.88	1.63	631,295	1,193
Maryland	84.09	2.26	5.75	1.44	5.09	1.35	0.36	0.37	4.72	1.31	1,893,937	1,038
Vermont	79.22	2.72	5.65	1.55	6.51	1.65	0.59	0.51	8.03	1.82	206,509	947
California	76.88	1.12	6.82	0.67	4.98	0.58	0.70	0.22	10.61	0.82	9,258,735	5,376
District of Columbia	74.92	3.05	8.64	1.98	7.24	1.82	0.78	0.62	8.42	1.95	186,943	846
Washington	73.78	3.03	8.09	1.88	6.78	1.73	1.01	0.69	10.34	2.10	1,694,612	972
Maine	73.53	3.07	7.92	1.88	10.07	2.09	0.85	0.64	7.64	1.85	383,712	874
New Hampshire	73.51	3.08	9.67	2.06	5.34	1.57	1.37	0.81	10.10	2.10	391,078	845
Colorado	72.01	2.80	9.58	1.83	6.33	1.52	0.45	0.42	11.64	2.00	1,313,603	1,312
Massachusetts	71.56	1.82	8.38	1.12	7.67	1.07	0.58	0.31	11.82	1.30	2,117,572	2,340
Idaho	71.11	2.93	5.95	1.53	8.89	1.84	0.80	0.58	13.25	2.19	344,273	1,102
Rhode Island	70.92	3.12	7.92	1.86	6.46	1.69	1.07	0.71	13.63	2.36	326,789	786
Alaska	69.92	2.97	7.81	1.74	8.90	1.85	1.02	0.65	12.35	2.13	183,542	801
New Jersey	68.51	1.71	8.44	1.02	8.23	1.01	1.04	0.37	13.77	1.27	2,707,634	2,741
Minnesota	68.18	2.82	11.01	1.89	8.59	1.70	0.62	0.48	11.59	1.94	1,714,920	1,440
Connecticut	67.78	3.20	10.76	2.12	8.57	1.91	0.66	0.56	12.23	2.24	1,122,583	825
Oregon	67.46	3.17	11.94	2.19	9.14	1.95	0.62	0.53	10.84	2.10	1,001,932	965
Delaware	67.33	3.18	8.68	1.91	8.46	1.89	0.89	0.64	14.64	2.40	234,877	826
Florida	66.79	1.58	9.12	0.97	8.07	0.92	0.76	0.29	15.26	1.21	4,181,997	3,177
Arizona	66.13	3.01	8.73	1.80	9.03	1.82	0.84	0.58	15.26	2.29	1,284,546	1,174

Table 3-1 (continued)

State*	Level of Workplace Smoking Policy: Smoke Free %	Smoke Free CI	Strong %	Strong CI	Moderate %	Moderate CI	Weak %	Weak CI	None %	None CI	Population Size (N)	Sample Size (n)
New Mexico	65.73	3.33	10.29	2.13	9.59	2.06	0.86	0.65	13.54	2.40	418,678	913
Texas	65.56	1.60	10.43	1.03	8.26	0.93	1.48	0.41	14.26	1.18	5,815,729	3,643
New York	65.14	1.33	9.35	0.81	10.09	0.84	0.96	0.27	14.45	0.98	5,521,615	4,578
Nebraska	63.90	2.92	9.70	1.80	10.46	1.86	0.81	0.54	15.13	2.18	571,872	1,276
Kansas	63.53	3.09	9.76	1.90	11.00	2.01	1.54	0.79	14.17	2.24	862,573	1,218
Virginia	63.09	2.82	12.74	1.95	9.37	1.71	1.22	0.64	13.59	2.01	2,297,995	1,408
South Dakota	62.68	3.04	10.73	1.94	9.56	1.85	0.83	0.57	16.20	2.32	221,591	1,220
Iowa	62.55	3.06	12.27	2.07	8.86	1.79	1.20	0.69	15.12	2.26	967,618	1,208
Wisconsin	62.24	2.87	12.34	1.94	9.49	1.73	0.90	0.56	15.03	2.11	1,972,344	1,521
Hawaii	61.89	3.50	15.34	2.60	12.34	2.37	1.04	0.73	9.39	2.10	346,498	640
Wyoming	61.47	3.55	7.95	1.98	10.99	2.28	1.01	0.73	18.59	2.84	135,107	1,009
Illinois	61.26	1.71	13.59	1.20	10.57	1.08	1.47	0.42	13.11	1.19	4,047,530	3,523
North Dakota	61.22	3.32	7.10	1.75	8.86	1.94	1.36	0.79	21.46	2.80	188,307	1,119
Pennsylvania	60.38	1.72	12.34	1.16	11.07	1.10	1.35	0.41	14.85	1.25	3,835,329	3,640
West Virginia	59.82	3.45	12.95	2.36	11.35	2.23	1.31	0.80	14.57	2.48	457,077	925
South Carolina	59.15	3.08	16.08	2.30	9.74	1.86	1.09	0.65	13.93	2.17	1,257,513	922
Montana	58.90	3.44	9.54	2.06	8.59	1.96	1.63	0.89	21.34	2.87	231,352	1,029
Missouri	58.90	3.04	15.15	2.22	10.85	1.92	1.24	0.69	13.86	2.14	1,911,829	1,178
Oklahoma	58.46	3.21	10.90	2.03	12.78	2.17	1.55	0.80	16.31	2.41	982,605	1,248
Ohio	57.07	1.75	13.79	1.22	10.57	1.09	2.15	0.51	16.41	1.31	3,838,168	3,526
Georgia	57.07	2.81	15.22	2.04	10.37	1.73	0.85	0.52	16.49	2.11	2,492,669	1,401
Louisiana	56.89	3.35	10.77	2.10	10.54	2.08	1.57	0.84	20.24	2.72	1,191,607	844
Alabama	55.73	3.31	14.44	2.34	12.86	2.23	1.69	0.86	15.27	2.40	1,285,003	1,057
North Carolina	55.15	2.08	15.57	1.51	12.16	1.36	1.73	0.54	15.38	1.51	2,449,839	2,779
Mississippi	54.92	3.32	11.26	2.11	7.89	1.80	1.40	0.78	24.52	2.87	796,440	905

Table 3-1 (continued)

State*	Level of Workplace Smoking Policy										Population Size (N)	Sample Size (n)
	Smoke Free		Strong		Moderate		Weak		None			
	%	CI	%	CI	%	CI	%	CI	%	CI		
Tennessee	54.08	3.10	16.02	2.28	9.50	1.83	2.05	0.88	18.36	2.41	1,738,759	999
Michigan	53.67	1.81	14.16	1.27	12.55	1.20	2.37	0.55	17.24	1.37	3,276,689	3,294
Indiana	51.44	3.05	15.89	2.23	11.45	1.94	2.86	1.02	18.36	2.36	2,064,806	1,182
Kentucky	49.69	3.33	16.54	2.47	10.59	2.05	2.05	0.94	21.12	2.72	1,138,267	928
Arkansas	48.47	3.25	18.05	2.50	12.34	2.14	2.63	1.04	18.52	2.53	791,438	1,046
Nevada	40.91	3.12	21.04	2.59	17.63	2.42	4.11	1.26	16.31	2.34	523,649	902

** Listed in descending order of smoke-free status.*
Note: CI = 95% confidence interval.
Source: 1995/96 Current Population Survey.

they smoke per day or may shift from smoking daily to smoking occasional ly, and smokers who work in smoke-free evvironments may make more quit attempts or may be more successful in those quit attempts. Improvement in cessation may be an indirect benefit of the current trend toward smoke-free workplaces.

CHANGES IN SMOKING BEHAVIOR WITH IMPLEMENTATION OF SMOKING RESTRICTIONS

Brownson *et al.* (1997) recently reviewed much of the existing evidence on policies to reduce ETS exposure, and this chapter will update that evidence and add analyses conducted using data from the Current Population Surveys (CPS) and the California Tobacco Surveys (CTS). Changes in workplace smoking rules are often highly visible and are sometimes among the most contested shifts in workplace norms. Employers commonly make substantial efforts to inform and involve their workers as part of the introduction of these changes, and cessation assistance is fre quently made available to smoking workers at the time that the changes in workplace rules are implemented. When the smoking behaviors of workers are followed before and after the implementation of workplace restrictions, many, but not all, studies have demonstrated a fall in smoking prevalence and increased cessation rates (Brownson *et al.*, 1997). Many of the workplaces examined have been in health care settings (Table 3-2), but similar observations are evident in other settings as well (Table 3-3). These experi ences would suggest that the implementation of smoking restrictions in the workplace can trigger smoking cessation attempts among the smokers who work there, particularly if cessation assistance is a prominent part of the implementation process.

A similar picture emerges for changes in the number of cigarettes smoked per day following the implementation of restrictions on smoking in the workplace (Tables 3-2 and 3-3). Modest declines in the number of ciga rettes smoked per day are evident following implementation of workplace smoking restrictions in most of the locations where it has been examined.

Effects of Working in Smoke-free Workplaces on Smoking Behavior

Changes in smoking behavior are to be expected when there is a change in workplace restrictions on smoking due to the accompanying shift in workplace norms and the provision of cessation assistance. However, it is reasonable to expect that there may be longer term effects on smoking behavior as well. Smokers may smoke fewer cigarettes per day if smoking is prohibited in work loca tions, smokers may make more attempts to quit due to a shift in the social norms about smoking, and smokers who do attempt to quit may be more successful because they are less likely to relapse in workplaces that do not allow smoking.

Number of Cigarettes Smoked per Day

Multiple studies presented in Tables 3-2 and 3-3 observed reductions in number of cigarettes smoked per day that persisted for 12-18 months following implementation of a change in smok ing policy. One study found a decline after 6 months, with a return to prior levels of consumption after 18 months (Hudzinski and Sirois, 1994). Emont *et al.* (1992) demonstrated a nonsignificant, but suggestive, relationship between level of smoking restriction from state clean-indoor-air laws and number of cigarettes smoked per day using data from the 1989 CPS.

Table 3-2
Impact of Smoke-Free Worksites on Cigarette Consumption and Prevalence: Health Care Worksites

Author	Location	Change in Consumption	Change in Prevalence
Andrews, 1983	Hospital	NA	–8.5% at 20-month follow-up
Rosenstock, 1986	HMO	–2.0 cigarettes/day at 4-month follow-up	No significant change
Biener, 1989	Hospital	–3.9 cigarettes/day at work at 12-month follow-up	No significant change
Becker, 1989	Children's hospital	No change at 6-month follow-up	–1.2% at 6-month follow-up
Hudzinski, 1990	Hospital	25% of smokers no longer smoked at work at 12-month follow-up	NA
Mullooly, 1990	HMO	-1.4 cigarettes/day at work No effect on total daily consumption	No change
CDC, 1990	Psychiatric hospital	–3.5 cigarettes/day at work at 13-month follow-up; –1.8 cigarettes/day over 24 hours	–4.0% at 13-month follow-up
Stillman, 1990	Hospital	–3.3 cigarettes/day at 6-month follow-up	–5.5% at 6-month follow-up
Baile, 1991	Hospital	40% of smokers reduced consumption at 4-month follow-up	–1.5 % at 4-month follow-up
Stave, 1991	Medical center	–4.5 cigarettes/day at 9-month follow-up	22.5% of smokers quit at 9-month follow-up
Daughton, 1992	Hospital	–3.1 cigarettes/day at work at 12-month follow-up	No increase in quit rate
Goldstein, 1992	Hospital	57% of smokers reported cutting down	9% of smokers stated that they quit because of the ban
Offard, 1992	Hospital	NA	–2.9% at 30-month follow-up
Hudzinski, 1994	Hospital	Smokers made significant reductions in cigarettes/day at 6 months but returned to prior levels at 18 months	NA
Longo, 1996	Representative sample of hospital employees	–1.1 cigarettes/day	Quit ratio different between intervention and comparison 13% at 60 months

Table 3-3
Impact of Smoke-Free Worksites on Cigarette Consumption and Prevalence: Other Worksites

Author	Location/ Study Population	Change in Consumption	Change in Prevalence
Petersen, 1988	Insurance co.	–5.6 cigarettes/day at follow-up	–1.6% at 12-month follow-up
Scott, 1989	Insurance co.	22.5% of smokers decreased consumption at 7-month follow-up	–5.1% at 7-month follow-up
Gottlieb, 1990	Government agency	–12% reduction in consumption of 15 or more cigarettes/day	–3.4% at 6 months
Borland, 1990	Public service	–7.9 cigarettes/day in smokers of 25 or more cigarettes/day at 6-month follow-up	–1.0% at 6-month follow-up
Sorensen, 1991	Telephone co.	NA	21% of smokers quit at 20-month follow-up
Borland, 1991	Telecommunications co.	–3.5 cigarettes/day at 18-month follow-up	–3.1% at 18-month follow-up
Brenner, 1992	National random sample	–1.8 cigarettes/day in men, –1.4 cigarettes/day in women	Quit ratio of 30%
Wakefield, 1992	Representative sample	–5 cigarettes/day on work days vs leisure days	NA
Phillip Morris, 1992	Cohort of 22,500-28,000 employed smokers in companies Product Opinion Lab database followed between 1987 and 1991	-11% cigarettes/day	Quitting rates: Total database 1.00 No restrictions 0.75 Designated 0.92 Smoke-free 1.84*
Woodruff, 1993	CA Population Survey	296 packs per year in smoke-free worksites vs 341 packs per year with no restrictions	Prevalence was 13.7% in smoke-free worksites vs 20.6% with no restrictions
Jeffery, 1994	Diverse workplaces	–1.2 cigarettes/ day	–2% at 24-months follow-up
Brenner, 1994	Cross-section of Telecommunications co.	20.5 cigarettes/day without restrictions to 13.2 cigarettes/day with ban	Prevalence lower in workplaces with restrictions

Table 3-3 (continued)

Author	Location/ Study Population	Change in Consumption	Change in Prevalence
Etter, 1999	University Students and staff	Total cigarettes/day increased in intervention group from 11.4 to 11.7 (p 0.06) and in comparison group from 11.4 to 12.0 (p 0.002)	Increased among intervention group 24.7 % to 25.1 % (p 1.0)
		Cigarettes/day in university buildings increased from 5.5 to 5.7 among intervention group (p 0.14), but decreased from 5.5 to 5. 0 among comparison group (p 0.11)	Decreased among comparison group 27.2 % to 26.7 % (p 0.80)

**According to this document, the quit rate is based only on those smokers who returned questionnaires and should therefore be considered understated.*

Analyses of data from a 5-year longitudinal follow-up of 8,271 employed adult smokers conducted as a part of the COMMIT trial exam ined the change in number of cigarettes smoked per day as reported by the same individuals in two surveys conducted 5 years apart (Glasgow *et al.*, 1997). Using multiple linear regression techniques, they demonstrated a sta tistically significant greater reduction in number of cigarettes smoked per day over the 5-year period among those who worked in workplaces where smoking was restricted to designated areas (OR = -1.17), and an even greater reduction for those who worked in workplaces where smoking was banned (OR = -2.78).

An internal tobacco industry study (Heironimus, 1992) of the effects of restrictions on smoking in the workplace using a tracking database of smok ers demonstrated that smokers who work in smoke-free environments con sumed 11-15 percent fewer cigarettes per day compared to smokers who work where there are no restrictions. Lesser restrictions, such as allowing smoking only in designated sections, had little effect on consumption.

Table 3-4 presents analyses of the 1992/93 and 1995/96 CPS for those who were daily cigarette smokers 1 year prior to the survey, currently smoked some days or every day, were age 25-64, and worked in an indoor environment. When smokers who worked in smoke-free workplaces are compared to those with lesser or no restrictions, there is a statistically sig nificant ($p < 0.001$) shift in the categorical distribution of cigarettes smoked per day toward smoking fewer cigarettes per day.

The CPS did not ask a question on the number of cigarettes smoked per day 1 year prior to the survey, and therefore these analyses are limited to examination of the cross-sectional distribution of current number of ciga rettes smoked per day in relation to workplace restrictions on smoking. As a result, the analyses in Table 3-4 cannot identify whether the difference in number of cigarettes smoked per day by smokers working under different workplace smoking restrictions is due to a reduction in number of cigarettes smoked per day produced by the workplace restriction or due to workplace restrictions being more difficult to implement where there are greater num bers of heavy smokers.

The 1990 and 1996 California Tobacco Surveys (CTS) recorded the num ber of cigarettes smoked per day both at the time of the survey and for 1 year prior to the survey. Table 3-5 compares the current number of ciga rettes smoked per day by those current cigarette smokers who work indoors with that reported for 1 year prior to the survey, and the results are strati fied by the level of workplace restrictions on smoking. In the 1990 CTS, smokers who worked in workplaces with no restrictions on smoking were more likely to report smoking 25 or more cigarettes per day both at the time of the survey and for 12 months prior to the survey than were workers employed in workplaces where there were at least some restrictions. Workers who smoked 25 or more cigarettes per day 1 year prior to the sur vey were also significantly more likely to report reducing the number of cig arettes that they currently smoked if they worked in areas where smoking was banned than if they worked in areas where there were no restrictions.

Table 3-4
Percentage of Current Smokers who Smoke Various Numbers of Cigarettes per Day among Indoor Workers with Different Levels of Restriction on Smoking in the Workplace

Cigarettes Smoked per Day	Level of Workplace Smoking Restrictions				
	***Work Area*:** ***Public Area*:**	**Ban** **Ban**	**Ban** **No Ban**	**Restricted** **Ban**	**Restricted** **Restricted**	**No** **Restrictions**
1992/93 CPS*					
Occasional Smoking		3.91	2.85	3.40	2.15	2.25
1–4		2.95	1.97	2.16	0.49	1.76
5–14		28.20	21.49	18.11	16.16	17.84
15–24		48.75	53.21	48.37	40.66	48.75
25+		16.19	20.48	27.96	40.53	29.41
1995/96 CPS**					
Occasional Smoking		3.34	2.48	2.04	3.11	2.13
1–4		2.47	1.39	1.88	0.63	2.37
5–14		27.58	19.71	17.16	15.14	17.72
15–24		50.20	51.49	50.97	40.67	48.14
25+		16.41	24.93	27.95	40.45	29.64

** 1992/93 CPS. Chi-Square = 453.3; degrees of freedom = 16; probability < 0.001; N = 14,787; chi-square based on weighted sample normalized to sample size.*
***1995/96 CPS. Chi-square* = 386.8; degrees of freedom = 16; probability < 0.001; N = 12,669; chi-square based on weighted sample normalized to sample size.*
Note: Current smokers were also daily smokers 1 year prior to the survey and between ages 25 and 64 years.

We also used these CTS data to develop a logistic regression model of the effect of working in a workplace where smoking was restricted on the likelihood of current daily smokers having reduced the number of cigarettes they reported smoking per day during the period between 12 months prior to the survey and the time of the survey. Co-variates controlled for in the analyses were gender, age, race/ethnicity, education level, family income level, and number of cigarettes smoked per day 1 year prior to the survey. Current daily smokers who worked in areas where there were some smoking restrictions were more likely to have reduced the number of cigarettes smoked per day when compared to smokers who worked in areas where there were no restrictions (OR = 1.44, 95% CI = 1.06-1.96). The effect for current daily smokers working in areas where smoking was banned was even more robust (OR = 1.54, 95% CI = 1.10-2.16). Data for the 1996 CTS are also presented in Table 3-5, but the small number of smokers who work in areas that are not smoke-free (state law requires smoke-free workplaces in California) makes meaningful comparison difficult; however, there appears to be a similar trend in the 1996 CTS. These data suggest that the trend toward a reduction in number of cigarettes smoked per day among workers who work where smoking is restricted demonstrated for the CPS data is due to the effect of the smoking restrictions on smoking behavior, rather than being due to smoking restrictions being easier to implement in workplaces where there are fewer heavy smokers.

These data taken as a whole suggest that a smoke-free workplace policy results in a reduction in the number of cigarettes smoked per day by con tinuing smokers.

Table 3-5

Indoor Workers: Change in Reported Number of Cigarettes Smoked per Day from 1 Year Prior to the Survey to Time of the Survey by Current Daily Smokers, Ages 25–64, Who Smoked Daily 1 Year Ago—1990 and 1996 California Tobacco Surveys

Level of Smoking Ban		Cigs. Smoked Daily 1 Year before Survey	# Cigarettes Smoked per Day at Time of Survey: 25+ %	25+ CI	15–24 %	15–24 CI	5–14 %	5–14 CI	1–4 %	1–4 CI	Population Size (N)	Sample Size (n)
1996 CTS	None	Total	29.73	3.94	45.40	3.72	20.33	4.04	4.54	2.78	533,544	1,104
		25+	88.30	3.05	8.56	2.76	2.76	2.05	0.38	0.62	163,554	369
		15–24	4.36	2.00	90.88	2.69	4.62	1.92	0.14	0.28	239,644	517
		5–14	3.33	4.48	9.02	3.67	79.39	7.60	8.27	6.73	112,651	201
		1–4	.	.	1.44	3.19	.	.	.	.	17,695	17
	Some	Total	24.09	3.08	49.86	3.51	22.93	2.89	3.12	1.37	507,500	1,124
		25+	73.76	6.18	18.81	5.48	6.98	5.08	0.45	0.57	155,672	345
		15–24	3.07	1.83	88.78	3.17	7.58	2.52	0.57	0.67	241,848	553
		5–14	.	.	8.54	3.79	90.00	3.83	1.46	2.22	96,295	204
		1–4	.	.	6.02	12.37	3.86	8.10	.	.	13,685	22
	All	Total	19.66	3.16	46.20	4.61	31.26	5.25	2.88	1.97	397,712	986
		25+	76.31	6.20	18.04	5.85	5.39	3.13	0.26	0.50	91,684	251
		15–24	4.01	2.98	85.85	5.98	9.84	4.56	0.30	0.48	190,605	494
		5–14	0.26	0.52	2.66	2.36	95.98	2.98	1.09	1.33	104,350	219
		1–4	2.75	6.01	7.13	15.43	4.31	9.32	.	.	11,073	22

Table 3-5 (continued)

Level of Smoking Ban		Cigs. Smoked Daily 1 Year before Survey	# Cigarettes Smoked per Day at Time of Survey: 25+ %	25+ CI	15–24 %	15–24 CI	5–14 %	5–14 CI	1–4 %	1–4 CI	Population Size (N)	Sample Size (n)
1996 CTS	None	Total	29.60	7.25	41.21	7.38	27.41	7.96	1.79	2.76	84,289	173
		25+	84.88	12.31	13.89	12.15	1.23	2.45	.	.	27,575	61
		15–24	4.67	4.41	85.50	8.82	9.83	8.19	.	.	33,034	72
		5–14	.	.	12.00	15.67	88.00	15.67	.	.	22,176	38
		1–4	.	.	.	.	.	.	.	.	1,505	2
	Some	Total	20.30	6.60	39.56	9.63	36.36	10.60	3.78	4.43	69,664	144
		25+	.	.	.	.	.	.	.	.	15,616	37
		15–24	4.18	5.06	75.49	12.84	16.09	11.59	4.25	8.42	31,231	70
		5–14	.	.	5.80	6.80	94.20	6.80	.	.	20,851	34
		1–4	.	.	.	.	.	.	.	.	1,967	3
	All	Total	15.76	2.12	44.37	2.92	35.65	2.91	4.21	0.97	1,041,596	2,343
		25+	78.74	4.54	16.70	4.10	4.22	1.84	0.34	0.67	194,965	434
		15–24	1.88	0.77	84.88	2.48	12.69	2.31	0.56	0.45	486,926	1,165
		5–14	0.28	0.39	4.92	1.63	92.30	2.18	2.50	1.37	319,701	665
		1–4	1.46	2.89	1.55	1.99	15.65	16.73	81.34	16.50	40,003	79

Note: CI = 95% confidence interval; "." = insufficent data.
Source: 1990 and 1996 California Tobacco Surveys.

Table 3-6
Current Smoking Status among Indoor Workers with Different Levels of Restriction on Smoking in the Workplace, Age 18+

	Workplace Restrictions	Percentage of Smokers			
		Daily	Occasional	Former	Never
CTS 1996	100% Smoking Ban	12.21	5.23	22.09	58.47
	Some Restrictions	14.76	5.68	23.61	54.09
	No Restrictions	23.62	7.45	21.73	45.53
CPS 1992/93	100% Smoking Ban	15.33	4.50	21.91	58.26
	Some Restrictions	23.70	4.99	20.03	51.29
	No Restrictions	25.85	4.99	19.10	50.06
CPS 1995/96	100% Smoking Ban	15.97	4.02	20.31	59.70
	Some Restrictions	25.17	4.83	19.05	50.95
	No Restrictions	26.43	4.80	16.91	51.86

Source: 1996 California Tobacco Survey; 1992/93 and 1995/96 Current Population Surveys.

CESSATION Cross-sectional data from California and the CPS demonstrate that the prevalence of smoking is substantially lower among workers who are employed in smoke-free workplaces. However, the difference in current smoking prevalence across workplaces with different levels of smoking restrictions is largely due to a higher prevalence of never smokers rather than former smokers in those workplaces with greater restrictions (Table 3-6). This would suggest that the difference in smoking prevalence may be due to smokers moving to workplaces where smoking was allowed or greater ease in successfully implementing smoke-free workplaces in sites where there are fewer smokers rather than an effect of smoking restrictions on cessation.

The effect of smoking restrictions on cessation has been examined directly, however, and an effect of restrictions on cessation has been demonstrated. Data from a 5-year longitudinal follow-up of 8,271 employed adult smokers conducted as a part of the COMMIT trial examined cessation attempts and cessation success reported by the same individuals in two sur veys conducted 5 years apart (Glasgow *et al.*, 1997). Using multiple logistic regression techniques, they demonstrated a statistically significant 25 percent greater likelihood of making a cessation attempt over the 5-year period among those who worked in workplaces where smoking was banned, and workers in these workplaces had a 25 percent greater rate of having successfully quit during the 5-year period as well.

Emont *et al.* (1992) demonstrated a statistically significant relationship between the level of state clean-indoor-air laws and a higher fraction of ever smokers who were former smokers (quit ratio) using data from the 1989 CPS. An internal tobacco industry study (Heironimus, 1992) of a tracking database of smokers suggested that smokers in a smoke-free workplace quit at a rate that is 84 percent higher than smokers who work in locations where smoking is allowed. Lower levels of smoking restriction had much less effect on cessation.

Tables 3-7 and 3-8 present the results of multivariate logistic regression analyses of several measures of cessation (see Chapter 2) by level of workplace restriction of smoking for the 1992/93 CPS (Table 3-7) and the 1995/96 CPS (Table 3-8). The cessation measures are estimated for all those who were daily smokers 1 year prior to the survey, worked indoors, and were between ages 25 and 64 at the time of the survey. The results are controlled for age, gender, race/ethnicity, education and income levels, and number of cigarettes smoked per day. A term is also added to the regression that represents the average level of workplace restriction for the state in which the individual lives. This term is used to control for the influences of general environmental restrictions on smoking and of different social norms about smoking present in the environment. The intent is to remove these influences from an analysis of the effect of the specific level of restric tion present in the workplace where the individual is employed. The preva lence of each cessation measure by level of workplace restriction and by demographic characteristics of the population is included in Tables 3-9 and 3-10.

The 1992/93 CPS (Table 3-7) shows no relationship between working in a smoke-free environment and either making a cessation attempt or becom ing an occasional smoker; however, there is a significant relationship between working in a smoke-free area and becoming a former smoker (OR = 1.18) or having been quit for 3 or more months (OR = 1.39). There is also a smaller, but statistically significant, effect of the average level of workplace smoking restriction present in the state on being a former smoker of 3+ months' duration, suggesting that there may be an effect of environmental norms about smoking as well as a direct effect of the level of restriction where the smoker works.

The 1995/96 CPS (Table 3-8) analyses show similar results, with the addition of small effects of a smoke-free workplace on cessation attempts and any cessation change. Similar effects are also noted for the average level of workplace restriction in the state as a measure of the general environ mental norms on smoking restrictions.

These data suggest that there is an effect of restricting smoking in the workplace on smoking cessation, with a small increase in the number of cessation attempts when a 100-percent ban on smoking is present in the workplace. The effect is not evident for lower levels of workplace restric tion. There is no effect of smoking restrictions in the workplace on becom ing an occasional smoker, but there is a modest effect of the average level of workplace restriction for the state on becoming an occasional smoker. This result suggests that the general environmental norms may be more impor tant for becoming an occasional smoker, and that the effect of individual experience with workplace restrictions is on cessation. The principal effect of restricting smoking in the workplace appears to be an increase in the suc cess rate of those smokers who are attempting to quit. The modest effect on cessation attempts, with a much larger effect on 3+ month cessation suc cess, suggests that the effect of a smoke-free workplace may be to prevent

Table 3-7

Multivariate Logistic Regression Analyses of Measures of Cessation by Level of Workplace Restriction for Those who were Current Daily Smokers 1 Year prior to the Survey and who Worked Indoors, Age 25–64 Years, 1992/93 Current Population Survey

	Cessation Activity		Cessation Attempt		Occasional		Former (any length)		Former, 3+ Months	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Worksite Level of Ban										
Lesser Restrictions	1.00		1.00		1.00		1.00		1.00	
Total Work Ban	1.02	(0.95 - 1.09)	1.01	(0.94 - 1.09)	1.07	(0.88 - 1.29)	1.18	(1.04 - 1.33)	1.39	(1.20 - 1.62)
State % Total Ban*										
Same Ban Level	1.00		1.00		1.00		1.00		1.00	
State Ban +5%	1.02	(1.00 - 1.03)	1.01	(0.99 - 1.03)	1.05	(0.99 - 1.10)	1.02	(0.99 - 1.06)	1.06	(1.01 - 1.10)
Gender										
Male	1.00		1.00		1.00		1.00		1.00	
Female	1.00	(0.94 - 1.07)	0.98	(0.92 - 1.05)	1.35	(1.11 - 1.63)	1.05	(0.93 - 1.19)	1.16	(1.00 - 1.34)
Age (Years)										
25–44	1.00	1.00	1.00	1.00	1.00					
45–64	0.80	(0.74 - 0.85)	0.80	(0.75 - 0.86)	0.76	(0.61 - 0.94)	1.02	(0.90 - 1.16)	1.01	(0.86 - 1.18)
Race/Ethnicity										
Non-Hispanic White	1.00		1.00		1.00		1.00		1.00	
Hispanic	0.82	(0.69 - 0.96)	0.79	(0.67 - 0.94)	1.24	(0.81 - 1.90)	1.03	(0.76 - 1.38)	1.09	(0.76 - 1.57)
African-American	1.17	(1.05 - 1.31)	1.16	(1.03 - 1.30)	1.22	(0.91 - 1.63)	0.87	(0.70 - 1.08)	1.07	(0.83 - 1.39)
Other	0.84	(0.68 - 1.03)	0.84	(0.68 - 1.04)	0.91	(0.52 - 1.60)	0.73	(0.49 - 1.10)	0.76	(0.46 - 1.25)
Education (Years)										
< 12	1.00		1.00		1.00		1.00		1.00	
12	1.36	(1.21 - 1.52)	1.33	(1.18 - 1.49)	1.74	(1.14 - 2.64)	1.57	(1.24 - 1.99)	1.32	(0.99 - 1.75)
13–15	1.64	(1.46 - 1.85)	1.59	(1.40 - 1.79)	2.36	(1.54 - 3.61)	1.70	(1.33 - 2.17)	1.48	(1.10 - 1.98)
16+	1.68	(1.46 - 1.92)	1.58	(1.38 - 1.82)	3.07	(1.95 - 4.82)	2.17	(1.67 - 2.82)	1.77	(1.29 - 2.43)

Table 3-7 (continued)

	Cessation Activity		Cessation Attempt		Occasional		Former (any length)		Former, 3+ Months	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Income (Dollars)										
<10,000	1.00		1.00		1.00		1.00		1.00	
10,000–19,999	1.10	(0.95 - 1.27)	1.10	(0.95 - 1.28)	0.95	(0.61 - 1.48)	1.45	(1.05 - 2.00)	1.36	(0.91 - 2.02)
20,000–29,999	1.35	(1.17 - 1.56)	1.34	(1.16 - 1.56)	1.29	(0.84 - 1.97)	1.51	(1.10 - 2.08)	1.63	(1.10 - 2.40)
30,000–49,999	1.46	(1.27 - 1.67)	1.47	(1.27 - 1.69)	1.14	(0.75 - 1.73)	1.94	(1.44 - 2.63)	1.89	(1.30 - 2.75)
50,000–74,999	1.52	(1.31 - 1.76)	1.52	(1.30 - 1.77)	1.36	(0.87 - 2.10)	1.97	(1.44 - 2.71)	2.10	(1.42 - 3.11)
75,000+	1.82	(1.51 - 2.18)	1.81	(1.50 - 2.19)	1.45	(0.87 - 2.43)	2.06	(1.44 - 2.95)	2.38	(1.54 - 3.68)
Cigarettes Smoked per Day										
1–4	1.00		1.00		1.00		1.00		1.00	
5–14	0.85	(0.69 - 1.04)	0.84	(0.68 - 1.04)	1.01	(0.62 - 1.65)	0.51	(0.38 - 0.70)	0.51	(0.35 - 0.76)
15–24	0.55	(0.45 - 0.67)	0.56	(0.45 - 0.69)	0.59	(0.36 - 0.96)	0.48	(0.35 - 0.64)	0.55	(0.38 - 0.80)
25+	0.47	(0.38 - 0.58)	0.48	(0.38 - 0.59)	0.54	(0.32 - 0.92)	0.69	(0.51 - 0.95)	0.86	(0.59 - 1.27)

**Effect of a 5% difference between states of the average ban level for the state.*
Source: 1992/93 Current Population Survey.

Table 3-8

Multivariate Logistic Regression Analyses of Measures of Cessation by Level of Workplace Restriction for Those who were Current Daily Smokers 1 Year prior to the Survey and who Worked Indoors, Age 25–64 Years, 1995/96 Current Population Survey

	Cessation Activity		Cessation Attempt		Occasional		Former (any length)		Former, 3+ Months	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Worksite Level of Ban										
Lesser Restrictions	1.00		1.00		1.00		1.00		1.00	
Total Work Ban	1.09	(1.01 - 1.18)	1.09	(1.00 - 1.18)	1.13	(0.90 - 1.42)	1.21	(1.04 - 1.42)	1.34	(1.10 - 1.63)
State % Total Ban*										
Same Ban Level	1.00		1.00		1.00		1.00		1.00	
State Ban +5%	1.04	(1.02 - 1.06)	1.04	(1.02 - 1.06)	1.06	(1.01 - 1.12)	1.04	(1.01 - 1.08)	1.03	(0.99 - 1.08)
Gender										
Male	1.00		1.00		1.00		1.00		1.00	
Female	0.90	(0.83 - 0.97)	0.89	(0.82 - 0.96)	1.11	(0.89 - 1.39)	0.82	(0.70 - 0.96)	0.77	(0.64 - 0.93)
Age (Years)										
25–44	1.00		1.00		1.00		1.00		1.00	
45–64	0.85	(0.78 - 0.92)	0.85	(0.78 - 0.92)	0.91	(0.72 - 1.15)	0.81	(0.69 - 0.95)	0.88	(0.72 - 1.07)
Race/Ethnicity										
Non-Hispanic White	1.00		1.00		1.00		1.00		1.00	
Hispanic	0.80	(0.67 - 0.96)	0.78	(0.65 - 0.94)	1.08	(0.70 - 1.66)	0.75	(0.51 - 1.10)	0.88	(0.56 - 1.38)
African-American	1.05	(0.92 - 1.19)	1.07	(0.94 - 1.21)	0.85	(0.59 - 1.22)	0.75	(0.56 - 1.00)	0.77	(0.54 - 1.10)
Other	1.13	(0.92 - 1.38)	1.16	(0.94 - 1.42)	0.80	(0.45 - 1.42)	1.04	(0.71 - 1.52)	1.16	(0.73 - 1.82)
Education (Years)										
< 12	1.00		1.00		1.00		1.00		1.00	
12	1.17	(1.02 - 1.33)	1.17	(1.02 - 1.33)	1.03	(0.69 - 1.54)	1.00	(0.75 - 1.32)	1.11	(0.78 - 1.58)
13–15	1.40	(1.23 - 1.61)	1.36	(1.19 - 1.57)	1.69	(1.13 - 2.52)	1.31	(0.98 - 1.75)	1.30	(0.90 - 1.86)
16+	1.33	(1.14 - 1.56)	1.30	(1.11 - 1.53)	1.53	(0.97 - 2.41)	1.47	(1.07 - 2.01)	1.56	(1.06 - 2.31)

Table 3-8 (continued)

	Cessation Activity		Cessation Attempt		Occasional		Former (any length)		Former, 3+ Months	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Income (Dollars)										
<10,000	1.00		1.00		1.00		1.00		1.00	
10,000–19,999	0.87	(0.74 - 1.04)	0.90	(0.75 - 1.07)	0.69	(0.43 - 1.11)	1.00	(0.68 - 1.48)	1.00	(0.62 - 1.61)
20,000–29,999	0.85	(0.72 - 1.00)	0.86	(0.73 - 1.02)	0.75	(0.47 - 1.18)	0.99	(0.68 - 1.44)	0.96	(0.60 - 1.53)
30,000–49,999	0.99	(0.85 - 1.16)	1.00	(0.85 - 1.18)	0.87	(0.57 - 1.33)	1.31	(0.92 - 1.88)	1.27	(0.82 - 1.97)
50,000–74,999	1.01	(0.85 - 1.20)	1.02	(0.86 - 1.22)	0.84	(0.53 - 1.33)	1.38	(0.95 - 2.01)	1.21	(0.76 - 1.92)
75,000+	1.03	(0.85 - 1.25)	1.06	(0.87 - 1.29)	0.74	(0.43 - 1.26)	1.82	(1.22 - 2.71)	1.85	(1.14 - 3.00)
Cigarettes smoked per day										
1–4	1.00		1.00		1.00		1.00		1.00	
5–14	0.76	(0.61 - 0.96)	0.89	(0.70 - 1.14)	0.35	(0.24 - 0.52)	0.74	(0.49 - 1.12)	0.68	(0.42 - 1.11)
15–24	0.50	(0.40 - 0.62)	0.60	(0.47 - 0.76)	0.19	(0.13 - 0.28)	0.55	(0.37 - 0.83)	0.51	(0.31 - 0.82)
25+	0.36	(0.28 - 0.45)	0.43	(0.34 - 0.55)	0.13	(0.08 - 0.21)	0.70	(0.46 - 1.08)	0.68	(0.41 - 1.12)

**Effect of a 5% difference between states of the average ban level for the state.*
Source: 1995/96 Current Population Survey.

relapse after a cessation attempt rather than to increase the number of smokers who try to quit. It may well be that if you cannot smoke at work, it is more difficult to relapse at work.

SUMMARY There has been a dramatic increase in the fraction of the working population protected by total bans on smoking in the workplace, increasing from 3 percent in 1986 to 64 percent in 1996. These restrictions have two effects on smokers as they are implemented. They increase the rate at which smokers attempt to quit, and they reduce the number of cigarettes smoked per day. Once restrictions on smoking in the workplace have been successfully implemented, they continue to have the effect of reducing the num ber of cigarettes smoked per day, and they increase the success rate of smok ers who are attempting to quit. There may also be a small effect of increas ing the frequency with which smokers attempt to quit.

THE FOLLOWING PAGES CONTAIN

TABLES 3-9 AND 3-10

Table 3-9

Nation: Current Smoking Status among Indoor Worker Self-respondent Adults Who Were Daily Smokers 1 Year Ago, Age 25 and Older, 1992/93 Current Population Survey

	Current Smoking Status											
	Daily Smokers No Quit Attempts		Daily Smokers w/Quit Attempts		Occasional Smokers		Former Smokers <3 Months		Former Smokers 3+ Months		Population Size	Sample Size
Nation	%	CI	%	CI	%	CI	%	CI	%	CI	(N)	(n)
Total	61.29	0.93	27.96	0.86	2.88	0.32	2.84	0.32	5.04	0.42	12,575,808	16,041
Workplace Smoking Rules, listed as: Work Area Level [Public Areas Level]												
Ban [Ban]	58.93	1.54	28.62	1.42	3.50	0.58	2.63	0.50	6.33	0.76	4,661,981	5,916
Ban [No Ban]	63.48	2.04	27.01	1.89	2.61	0.68	2.82	0.70	4.08	0.84	2,537,189	3,303
Restrict [Ban]	58.66	2.22	31.06	2.09	3.12	0.78	2.92	0.76	4.24	0.91	2,250,384	2,832
Restrict [Restrict]	62.33	6.03	27.24	5.54	1.97	1.73	2.37	1.89	6.09	2.97	295,478	388
No Restricions	65.19	1.91	25.32	1.75	2.03	0.57	3.16	0.70	4.30	0.82	2,830,777	3,602
Age (Years)												
25–44	59.66	1.12	29.58	1.04	3.12	0.40	2.78	0.38	4.86	0.49	8,733,235	11,023
45–64	64.99	1.65	24.27	1.48	2.34	0.52	2.96	0.58	5.44	0.78	3,842,573	5,018
Race/Ethnicity												
Non-Hispanic White	61.76	1.02	27.37	0.93	2.76	0.34	2.99	0.36	5.13	0.46	10,463,533	13,965
Hispanic	64.58	5.86	24.74	5.29	3.21	2.16	2.65	1.97	4.83	2.62	565,382	492
African-American	55.52	3.08	34.31	2.95	3.71	1.17	1.84	0.83	4.63	1.30	1,216,283	1,145
Other	62.01	5.78	28.70	5.38	3.17	2.08	2.04	1.68	4.08	2.36	330,610	439
Education (Years)												
<12	71.82	2.46	22.26	2.28	1.38	0.64	1.36	0.63	3.19	0.96	1,526,453	1,883
12	62.98	1.37	27.14	1.26	2.38	0.43	2.88	0.47	4.61	0.59	5,691,190	7,428
13–15	57.22	1.78	31.02	1.67	3.50	0.66	2.78	0.59	5.48	0.82	3,527,323	4,522
16+	55.07	2.49	29.34	2.28	4.51	1.04	4.04	0.98	7.03	1.28	1,830,843	2,208
Cigarettes Smoked per Day												
1–4	49.66	5.97	32.67	5.60	4.77	2.54	4.80	2.55	8.10	3.26	321,024	360
5–14	52.61	1.97	35.41	1.88	4.46	0.81	3.06	0.68	4.46	0.81	2,948,752	3,594
15–24	63.13	1.30	27.46	1.20	2.46	0.42	2.46	0.42	4.49	0.56	6,321,567	8,258
25+	67.20	1.84	21.14	1.60	2.02	0.55	3.21	0.69	6.43	0.96	2,984,466	3,829

Table 3-9 (continued)

Nation	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Household Income (Dollars)												
<10,000	68.94	3.21	24.62	2.99	2.25	1.03	1.50	0.84	2.69	1.12	949,892	1,214
10,000–19,999	66.52	2.11	25.08	1.94	2.17	0.65	2.54	0.70	3.69	0.84	2,284,478	2,978
20,000–29,999	61.64	2.07	28.43	1.92	3.15	0.74	2.19	0.62	4.59	0.89	2,523,179	3,285
30,000–49,999	59.51	1.67	28.80	1.54	2.75	0.56	3.49	0.62	5.45	0.77	3,962,812	5,061
50,000–74,999	58.06	2.31	28.86	2.12	3.52	0.86	3.22	0.83	6.34	1.14	2,087,777	2,577
75,000 +	53.06	3.85	32.28	3.61	3.87	1.49	3.06	1.33	7.74	2.06	767,670	926
States												
Alabama	62.08	8.67	29.47	8.15	1.39	2.10	2.80	2.95	4.25	3.61	193,329	203
Alaska	64.03	7.61	28.50	7.15	3.02	2.71	0.94	1.53	3.51	2.92	27,314	206
Arizona	61.78	8.16	26.63	7.42	3.83	3.22	1.65	2.14	6.11	4.02	170,232	147
Arkansas	69.30	7.46	21.05	6.59	1.75	2.12	3.74	3.07	4.17	3.23	136,381	240
California	58.20	3.84	27.20	3.46	3.07	1.34	2.64	1.25	8.89	2.21	945,027	705
Colorado	61.06	8.53	24.42	7.51	4.75	3.72	2.28	2.61	7.49	4.60	169,028	190
Connecticut	60.82	8.15	27.31	7.44	0.41	1.07	5.01	3.64	6.45	4.10	191,794	181
District of Columbia	61.62	10.91	26.06	9.84	5.06	4.92	1.85	3.02	5.40	5.07	20,919	87
Delaware	71.31	7.32	18.37	6.26	2.61	2.58	2.22	2.38	5.50	3.69	40,213	141
Florida	63.44	3.84	28.55	3.60	2.33	1.20	1.70	1.03	3.98	1.56	639,167	646
Georgia	57.51	7.82	32.29	7.39	2.39	2.42	3.82	3.03	3.98	3.09	347,525	177
Hawaii	61.77	9.54	30.56	9.04	3.61	3.66	1.59	2.45	2.48	3.05	40,394	102
Idaho	60.25	8.08	27.00	7.33	4.48	3.42	2.01	2.32	6.25	4.00	47,008	200
Illinois	61.09	3.96	27.96	3.65	3.12	1.41	3.21	1.43	4.61	1.70	658,778	710
Indiana	65.78	7.08	24.36	6.40	0.83	1.35	4.76	3.18	4.27	3.02	353,669	240
Iowa	60.72	7.47	28.79	6.92	3.02	2.62	2.98	2.60	4.49	3.17	158,397	284
Kansas	71.98	6.46	19.20	5.67	1.66	1.84	2.41	2.20	4.75	3.06	152,500	288
Kentucky	71.39	7.02	21.24	6.35	2.01	2.18	2.49	2.42	2.87	2.59	218,011	218
Louisiana	64.51	9.22	27.72	8.62	2.05	2.73	1.01	1.93	4.72	4.08	167,709	138
Maine	64.20	6.94	28.29	6.52	2.67	2.33	1.75	1.90	3.09	2.51	80,702	225

Table 3-9 (continued)

State	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Maryland	55.26	7.94	29.91	7.31	6.85	4.03	4.94	3.46	3.04	2.74	270,841	169
Massachusetts	55.21	4.14	31.99	3.89	2.75	1.36	4.06	1.64	5.99	1.98	316,111	602
Michigan	56.46	3.80	33.61	3.62	2.03	1.08	2.28	1.14	5.62	1.77	583,695	833
Minnesota	58.82	7.42	28.63	6.81	5.56	3.46	1.82	2.02	5.17	3.34	271,791	253
Mississippi	62.00	8.90	29.48	8.36	1.57	2.28	2.17	2.67	4.78	3.91	112,968	208
Missouri	62.41	7.55	25.98	6.84	3.61	2.91	3.62	2.91	4.38	3.19	304,815	242
Montana	70.42	8.07	18.30	6.83	2.95	2.99	3.46	3.23	4.87	3.81	36,596	221
North Carolina	67.05	3.45	24.37	3.15	2.57	1.16	3.03	1.26	2.99	1.25	416,294	812
North Dakota	58.18	8.48	31.22	7.96	5.40	3.88	2.97	2.92	2.24	2.54	27,882	211
Nebraska	58.13	7.94	33.21	7.58	1.21	1.76	2.10	2.31	5.35	3.62	74,191	232
Nevada	65.35	6.63	28.40	6.28	0.44	0.93	1.43	1.66	4.37	2.85	87,270	241
New Hampshire	63.68	8.32	24.06	7.40	4.09	3.43	2.95	2.93	5.21	3.85	61,072	135
New Jersey	60.71	4.29	28.26	3.96	2.05	1.25	2.38	1.34	6.61	2.18	349,012	545
New Mexico	67.94	8.72	23.31	7.90	2.90	3.14	1.33	2.14	4.52	3.88	57,657	139
New York	58.99	3.39	28.14	3.10	3.09	1.19	4.41	1.41	5.38	1.55	772,360	886
Ohio	61.82	3.64	27.69	3.35	2.91	1.26	1.90	1.02	5.67	1.73	669,072	870
Oklahoma	59.04	7.74	28.19	7.08	1.74	2.06	4.30	3.19	6.72	3.94	173,599	223
Oregon	61.03	8.92	30.72	8.44	3.28	3.26	1.53	2.25	3.43	3.33	133,926	166
Pennsylvania	59.35	3.99	29.93	3.72	2.90	1.36	2.16	1.18	5.66	1.87	618,303	739
Rhode Island	61.29	8.51	25.34	7.60	3.21	3.08	3.46	3.19	6.70	4.37	50,910	143
South Carolina	65.95	6.61	23.90	5.95	2.99	2.38	3.16	2.44	3.99	2.73	209,182	256
South Dakota	61.87	7.59	25.41	6.80	3.91	3.03	1.96	2.16	6.85	3.95	33,751	257
Tennessee	60.83	7.35	30.99	6.96	2.11	2.16	3.76	2.86	2.31	2.26	280,697	241
Texas	61.75	4.50	29.49	4.22	3.02	1.59	2.27	1.38	3.46	1.69	762,515	637
Utah	69.01	8.77	22.25	7.89	3.37	3.42	0.95	1.84	4.42	3.90	59,725	134

Table 3-9 (continued)

State	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Vermont	59.75	7.62	28.89	7.04	3.26	2.76	2.79	2.56	5.30	3.48	37,915	177
Virginia	62.94	6.57	27.19	6.05	2.36	2.06	3.17	2.38	4.34	2.77	371,310	268
Washington	56.37	8.16	29.79	7.52	3.83	3.16	3.12	2.86	6.88	4.16	246,885	176
West Virginia	73.80	7.45	19.33	6.69	2.79	2.79	0.84	1.54	3.23	3.00	93,929	210
Wisconsin	60.18	6.90	27.64	6.30	5.87	3.31	2.35	2.14	3.96	2.75	310,824	338
Wyoming	58.11	9.42	31.58	8.87	2.85	3.18	3.13	3.32	4.33	3.88	22,609	149

Note: CI = 95% confidence interval.
**Source: 1992/93 Current Population Survey.*

Table 3-10

Nation: Current Smoking Status among Indoor Worker Self-respondent Adults who were Daily Smokers 1 Year Ago, Age 25 and Older, 1995/96 Current Population Survey

	Current Smoking Status											
	Daily Smokers No Quit Attempts		Daily Smokers w/Quit Attempts		Occasional Smokers		Former Smokers <3 Months		Former Smokers 3+ Months		Population Size	Sample Size
Nation	%	CI	%	CI	%	CI	%	CI	%	CI	(N)	(n)
Total	67.5	0.9	24.2	0.8	2.7	0.3	2.0	0.3	3.6	0.4	13,184,031	13,422
Workplace Smoking Rules, listed as: Work Area Level [Public Areas Level]												
Ban [Ban]	65.3	1.3	25.2	1.2	3.1	0.5	2.1	0.4	4.2	0.5	7,200,542	7,392
Ban [No Ban]	70.8	2.4	22.7	2.2	2.4	0.8	1.6	0.7	2.6	0.8	1,786,388	1,779
Restrict [Ban]	68.0	2.6	24.1	2.4	1.9	0.8	2.6	0.9	3.4	1.0	1,679,520	1,720
Restrict [Restrict]	67.6	6.8	25.5	6.3	3.0	2.5	1.6	1.8	2.3	2.2	245,711	239
No Restrictions	71.5	2.1	22.0	2.0	2.0	0.7	1.6	0.6	2.9	0.8	2,271,869	2,292
Age (Years)												
25–44	66.1	1.1	25.2	1.0	2.8	0.4	2.2	0.4	3.7	0.5	8,884,812	8,931
45–64	70.4	1.6	22.0	1.4	2.4	0.5	1.7	0.4	3.5	0.6	4,299,219	4,491
Race/Ethnicity												
Non-Hispanic White	68.2	1.0	23.4	0.9	2.6	0.3	2.1	0.3	3.7	0.4	10,839,373	11,541
Hispanic	68.1	5.7	23.5	5.2	3.8	2.3	1.3	1.4	3.3	2.2	641,866	494
African-American	63.6	3.1	29.2	2.9	2.9	1.1	1.5	0.8	2.8	1.1	1,277,602	983
Other	60.5	5.4	29.9	5.1	2.5	1.7	2.1	1.6	5.0	2.4	425,189	404
Education (Years)												
<12	73.4	2.6	20.5	2.3	1.9	0.8	1.6	0.7	2.6	0.9	1,537,128	1,473
12	69.7	1.4	23.7	1.3	2.0	0.4	1.5	0.4	3.1	0.5	5,816,058	6,014
13–15	63.9	1.7	26.0	1.6	3.6	0.7	2.5	0.6	3.9	0.7	3,959,563	4,074
16+	63.6	2.5	24.8	2.3	3.4	1.0	2.7	0.9	5.4	1.2	1,871,281	1,861
Cigarettes Smoked per Day												
1–4	52.7	6.2	28.4	5.6	10.9	3.9	2.4	1.9	5.6	2.8	336,446	318
5–14	58.4	2.0	31.0	1.8	4.1	0.8	2.3	0.6	4.1	0.8	3,229,042	3,248
15–24	68.9	1.3	24.0	1.2	2.1	0.4	1.8	0.4	3.1	0.5	6,689,405	6,885
25+	76.1	1.8	16.6	1.6	1.4	0.5	2.0	0.6	4.0	0.8	2,929,138	2,971

Table 3-10 (continued)

Nation	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Household Income (Dollars)												
<10,000	67.0	3.6	25.9	3.3	3.0	1.3	1.4	0.9	2.7	1.2	890,140	922
10,000–19,999	69.7	2.3	23.8	2.1	2.3	0.7	1.5	0.6	2.8	0.8	2,035,953	2,100
20,000–29,999	70.2	2.0	22.9	1.9	2.5	0.7	1.6	0.6	2.8	0.7	2,563,182	2,637
30,000–49,999	66.9	1.7	24.4	1.5	2.8	0.6	2.1	0.5	3.9	0.7	4,117,727	4,253
50,000–74,999	65.5	2.2	25.0	2.0	3.0	0.8	2.7	0.7	3.8	0.9	2,394,938	2,394
75,000 +	64.5	3.2	23.9	2.8	2.7	1.1	2.7	1.1	6.2	1.6	1,182,091	1,116
State												
Alabama	67.4	8.3	28.3	8.0	1.8	2.3	1.2	1.9	1.3	2.0	182,677	161
Alaska	63.0	7.6	30.4	7.2	2.1	2.3	0.6	1.2	3.9	3.0	31,231	138
Arizona	63.0	7.8	25.9	7.1	2.9	2.7	5.6	3.7	2.7	2.6	197,215	197
Arkansas	75.2	6.4	20.2	5.9	1.9	2.0	.	.	2.7	2.4	153,177	207
California	62.4	4.0	26.4	3.6	4.0	1.6	2.4	1.3	4.9	1.8	964,676	589
Colorado	61.7	7.8	25.4	7.0	3.2	2.8	4.1	3.2	5.7	3.7	198,247	206
Connecticut	67.4	8.9	27.2	8.5	1.6	2.4	1.1	2.0	2.7	3.1	144,552	108
District of Columbia	67.1	10.2	27.6	9.7	3.0	3.7	1.2	2.4	1.0	2.2	19,597	87
Delaware	70.0	7.5	18.8	6.4	4.4	3.3	3.5	3.0	3.3	2.9	40,305	149
Florida	68.4	3.9	23.3	3.5	2.4	1.3	2.0	1.2	3.9	1.6	672,955	539
Georgia	73.6	6.7	21.2	6.2	.	.	3.0	2.6	2.2	2.2	348,989	212
Hawaii	68.7	9.2	21.2	8.1	2.6	3.2	3.9	3.9	3.6	3.7	45,482	86
Idaho	64.9	8.1	22.2	7.1	5.0	3.7	2.5	2.6	5.4	3.8	50,023	165
Illinois	68.6	4.1	23.5	3.7	2.8	1.4	1.8	1.2	3.4	1.6	648,422	601
Indiana	75.3	5.9	19.4	5.4	.	.	0.8	1.3	4.4	2.8	405,977	248
Iowa	70.4	6.9	20.7	6.1	3.5	2.8	1.4	1.8	3.9	2.9	168,848	221
Kansas	75.6	6.5	18.5	5.9	1.8	2.0	1.5	1.9	2.5	2.4	154,920	228
Kentucky	69.2	7.0	25.5	6.6	1.3	1.7	1.1	1.6	2.9	2.5	222,143	197
Louisiana	77.1	7.3	14.1	6.0	2.0	2.4	2.0	2.4	4.8	3.7	182,864	136
Maine	66.7	7.7	27.5	7.3	0.8	1.4	1.6	2.0	3.5	3.0	69,418	163

Table 3-10 (continued)

State	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Maryland	62.4	8.2	27.3	7.5	4.9	3.7	1.6	2.1	3.7	3.2	253,032	146
Massachusetts	55.9	5.3	32.7	5.0	3.2	1.9	3.2	1.9	5.0	2.3	302,728	350
Michigan	62.6	4.0	29.4	3.8	2.3	1.2	2.1	1.2	3.7	1.6	622,882	649
Minnesota	63.4	7.3	24.7	6.5	5.1	3.3	3.6	2.8	3.1	2.6	274,423	243
Mississippi	65.0	8.0	27.3	7.5	1.1	1.8	3.2	2.9	3.3	3.0	126,519	151
Missouri	66.0	6.7	24.9	6.1	3.7	2.7	1.0	1.4	4.3	2.9	361,678	234
Montana	67.4	8.0	27.1	7.5	2.4	2.6	0.5	1.1	2.6	2.7	39,296	183
North Carolina	70.7	4.6	21.1	4.1	2.6	1.6	2.7	1.6	2.9	1.7	426,357	507
North Dakota	74.2	7.3	20.4	6.8	1.3	1.9	3.1	2.9	1.0	1.7	31,021	195
Nebraska	70.7	7.2	21.8	6.6	2.2	2.3	3.5	2.9	1.8	2.1	83,923	195
Nevada	67.0	7.0	25.6	6.5	3.9	2.9	1.1	1.6	2.4	2.3	95,940	171
New Hampshire	58.8	8.0	31.0	7.5	3.3	2.9	2.9	2.7	4.0	3.2	72,494	166
New Jersey	69.2	4.5	21.5	4.0	1.3	1.1	4.0	1.9	4.1	1.9	380,038	395
New Mexico	64.7	8.4	24.8	7.6	4.5	3.6	2.4	2.7	3.6	3.2	67,139	154
New York	64.5	3.7	25.8	3.3	3.1	1.3	1.6	1.0	5.0	1.7	742,585	644
Ohio	73.4	3.6	19.4	3.3	2.7	1.3	1.9	1.1	2.6	1.3	707,330	681
Oklahoma	68.5	7.0	24.8	6.5	4.1	3.0	1.8	2.0	0.8	1.3	181,739	238
Oregon	72.8	7.9	20.3	7.1	2.0	2.5	.	.	4.9	3.8	146,569	151
Pennsylvania	66.7	4.0	24.5	3.6	3.4	1.5	0.7	0.7	4.7	1.8	669,981	658
Rhode Island	61.5	7.9	31.2	7.5	1.6	2.0	2.3	2.4	3.4	2.9	59,114	145
South Carolina	77.0	6.1	17.2	5.4	2.1	2.1	1.7	1.8	2.1	2.0	237,363	182
South Dakota	62.1	7.5	26.3	6.8	5.1	3.4	2.6	2.5	3.9	3.0	36,583	210
Tennessee	72.5	6.4	21.0	5.8	2.7	2.3	1.0	1.4	2.9	2.4	327,339	204
Texas	67.3	4.1	25.7	3.9	2.6	1.4	1.8	1.2	2.6	1.4	847,183	556
Utah	68.3	9.1	21.2	8.0	5.9	4.6	1.4	2.3	3.2	3.4	60,579	120

Table 3-10 (continued)

State	Current Smoking Status: Daily Smokers No Quit Attempts %	CI	Daily Smokers w/Quit Attempts %	CI	Occasional Smokers %	CI	Former Smokers <3 Months %	CI	Former Smokers 3+ Months %	CI	Population Size (N)	Sample Size (n)
Vermont	65.8	7.5	27.2	7.1	1.4	1.9	1.4	1.9	4.2	3.2	36,771	176
Virginia	69.5	6.8	22.8	6.2	1.6	1.8	2.5	2.3	3.7	2.8	362,169	241
Washington	59.2	8.8	30.6	8.3	1.4	2.1	3.8	3.4	5.0	3.9	248,779	152
West Virginia	70.8	7.4	21.9	6.8	3.3	2.9	1.1	1.7	2.9	2.7	84,774	185
Wisconsin	65.5	6.5	26.7	6.0	3.6	2.6	1.0	1.3	3.3	2.4	370,648	299
Wyoming	71.2	7.6	21.0	6.9	1.9	2.3	1.0	1.7	4.8	3.6	25,339	203

Note: CI = 95% confidence interval; ". " = insufficient data.
**Source: 1995/96 Current Population Survey.*

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Population Impact of Clinician Efforts to Reduce Tobacco Use

Jack F. Hollis

INTRODUCTION

A large fraction of U.S. smokers visit a physician each year, creating an opportunity to alter their smoking behavior. This chapter examines 1) the proportion of U.S. smokers who are receiving recommended tobacco interventions during routine health care visits; 2) whether clinician intervention rates are increasing over time; and 3) what effect physician advice is having on cessation activity and success. We use Current Population Survey (CPS) data and meta-analyses on the efficacy of clinician interventions to estimate the number of smokers in the United States who quit each year as a direct result of current clinician counseling practices and also to determine what might be achieved through improved practice patterns. Finally, we consider office system strategies that appear necessary to integrate systematic tobacco support into routine care, making progress toward the year 2000 goals of reducing tobacco-use prevalence to 15 percent.

RATIONALE FOR CLINICIAN-DELIVERED TOBACCO INTERVENTIONS

The rationale, methods, and outcomes for brief tobacco interventions during routine health and dental care visits have been widely discussed (Lichtenstein *et al.*, 1996a; Fiore *et al.*, 2000; NCI, 1994; Ockene *et al.*, 1997a; Abrams *et al.*, 1996). Physicians, nurses, dentists, hygienists, pharmacists, and others involved in the routine delivery of health care have the opportunity, legitimacy, and professional credibility to motivate and help patients quit tobacco use. The vast majority of smokers want to quit on their own, without attending specialized intensive programs (Fiore *et al.*, 1990), and few will act on clinician referrals to groups, even with systematic recruitment efforts and convenient free access (Lichtenstein and Hollis, 1992).

Evidence-based national clinical guidelines for tobacco intervention in routine care have been published (Fiore *et al.*, 2000) that, if widely implemented, would reach a high proportion of all tobacco users on a regular basis. Brief cessation advice is easy to deliver, and is both expected and appreciated by patients if done in a caring and respectful manner (Schauffler *et al.*, 1996). When delivered, brief interventions consistently increase quit rates (Fiore *et al.*, 2000; Kottke *et al.*, 1988; Law and Tang, 1995; Ockene *et al.*, 1997a) and are highly cost-effective in terms of both cost per quit and cost per year of life saved (Cromwell *et al.*, 1997; Law and Tang, 1995; Warner, 1993). Arguments for involving clinicians in brief counseling include the following:

- Tobacco is the most important cause of preventable disease,
- Most smokers see physicians (70 percent) and/or dentists (50 percent) each year,

- Smokers view clinicians as credible and persuasive,
- Clinic visits represent teachable moments when health concerns are salient,
- Satisfaction is higher among patients receiving tobacco advice and support,
- Meta-analyses show modest, but consistent positive effects of physician advice on cessation, and
- Tobacco interventions are highly cost-effective when compared to other medical services.

While clinicians agree that patients should quit smoking, many clinicians and health system leaders remain unconvinced that significant resources should be devoted to implementing recommended interventions as a part of routine care. Busy clinicians, pressured to squeeze more and more into the typical 10-minute encounter, question whether it makes sense to devote 10-30 percent of that time to smoking when only 5-10 percent quit rates can be expected. Health system and medical office managers are unsure how to implement tobacco treatment guidelines and question whether they are practical and sustainable and whether the impact on cessation rates justifies the effort and costs of implementation. Managers of capitated managed care organizations worry that successful ex-smokers will switch plans before the plan can realize a return on its investment in tobacco control. Common concerns and barriers include the following:

- Lack of time, funding, space, and support staff,
- Reluctance to "badger" patients about an issue of lifestyle choice,
- Beliefs that intervention benefits are too uncertain or delayed,
- Inadequate training, confidence, and comfort in discussing tobacco issues,
- Lack of reminders or prompts to cue action,
- Lack of performance feedback and peer/professional support, and
- Lack of reimbursement or other incentives for delivering tobacco intervention.

Given these challenges, it is perhaps not surprising that the U.S. healthcare system has been slow to respond to calls for action in addressing tobacco during routine care. The U.S. Public Health Service Agency for Healthcare Research and Quality (AHRQ) guidelines powerfully summarized the situation by concluding, "it is difficult to identify a condition in the United States that presents such a mix of lethality, prevalence, and neglect, and for which effective interventions are so readily available" (Fiore *et al.*, 2000).

HOW MANY PATIENTS RECEIVE TOBACCO ADVICE AND ASSISTANCE, AND DO THEY QUIT?

A goal of Healthy People 2010 is to "increase to at least 75 percent the proportion of the population of primary care and oral health care providers who routinely advise cessation and provide assistance and follow-up for all of their tobacco-using patients" (U.S.DHHS, 2000). The AHRQ *Clinical Practice Guideline* recommends that clinicians identify smokers and encourage cessation as a routine part of virtually all medical and dental care contacts (Fiore *et al.*, 2000).

The frequency of physician-delivered advice to quit depends, in part, on whom one asks. When physicians are asked how they generally practice, the vast majority report that they regularly advise virtually all smokers. Patients report much lower rates of advice. The large discrepancies between clinician and patient reports are likely due to numerous factors, including incomplete patient recall, unclear or unmemorable clinician messages, and overreporting by clinicians. For example, Brink *et al.* (1994) found that 95 percent of physicians and 65 percent of dentists reported that they advised all or most of their smoking patients to quit. Their survey of patients, however, found that only 29 percent of those who had seen a physician and 7 percent of those who had seen a dentist reported receiving advice. Woller *et al.* (1995) surveyed a stratified random sample of 6,132 patients who had visits in one of 45 primary care practices in the upper Midwest. More than 90 percent of smokers said they were asked about smoking and 84 percent recalled advice to quit, but this was over a relatively long 3-year period. Only 60 percent received advice on *how* to quit, however, and only 27 percent said the clinician referred them to a stop-smoking program during the 3-year period.

It is possible that surveys understate actual practice because patients fail to recall the clinician's advice, but a recent comparison of smokers' reports of advice and tapes of clinical encounters suggests otherwise. Ward and Sanson-Fisher (1996) found that, if anything, smokers tend to over-report receipt of clinician advice to quit (sensitivity of 0.92, specificity of 0.82). Solberg (1996) notes that patient reports of advice not being delivered were quite accurate (negative predictive value of 99 percent) and that advice rates in surveys probably portray an overly optimistic picture. Even if recall of clinician advice were low, that would simply suggest that clinician interventions need to be more frequent, salient, and memorable. Data from physicians' own post-visit summaries and patients' post-visit reports are less susceptible to recall bias, and yet they confirm that most intervention opportunities are wasted.

As part of the COMMIT trial (Ockene *et al.*, 1997b), a random sample of 30 physicians in each of 11 treatment and 11 control communities were surveyed about office practices. A high percentage of treatment and control clinicians (79 percent and 80 percent, respectively) reported that they routinely ask established patients about smoking, and almost all (98 percent and 94 percent) reported that they advise smokers to quit "most or all of the time." Relatively few, however, used stickers or other chart markers (28 percent and 26 percent), set quit dates (22 percent and 14 percent), devel-

oped cessation plans (38 percent and 37 percent), made referrals (22 percent and 22 percent), or arranged follow-up visits for smoker counseling (19 percent and 18 percent). Physicians were more likely to report recommending nicotine replacement therapy (NRT) (52 percent and 42 percent) and to report recording the results of the encounter in the clinical record (66 percent and 60 percent). In contrast, a survey of 20,347 smokers from these communities found that many fewer patients reported receiving advice (42-56 percent), pamphlets (21-31 percent), or encouragement to use NRT (20-31 percent).

Others have queried patients shortly after a specific visit in order to minimize recall bias. Heywood *et al.* (1996) randomly sampled and surveyed 7,160 patients from 230 general practitioners in Australia during 1989 and 1990 and found that 49 percent received advice during a specific recent visit. Advice was more likely to be given to younger smokers, those with smoking-related health conditions or other risk factors, and those who had been counseled previously. Kottke *et al.* (1997) surveyed 7,997 randomly selected patients following visits in 44 midwestern clinics and found that 47 percent of smokers reported receipt of advice at that visit. Hollis *et al.* (1998) surveyed 20,372 patients (76 percent response rate) shortly after their routine Family Practice and Internal Medicine visits within a staff-model HMO. While 59 percent of patients reported receiving advice to quit at the visit, few received either self-help (5 percent) or referral (12 percent) materials.

The National Ambulatory Medical Care Survey (NAMCS) provides information on national trends in advice rates at specific visits since 1991 as reported by physicians themselves (Thorndike *et al.*, 1998). Between 1991 and 1995, a random sample of 3,254 U.S. physicians (response rates of 70-73 percent) completed one-page after-visit reports on all patients seen during assigned 1-week periods. This survey yielded data on 145,716 patient visits. Over the 5 years, the proportion of visits at which smoking was known (or assessment occurred) remained constant at 67 percent. This was also true for new patient visits and for general medical examinations. Physicians reported counseling at only 22 percent of visits with known smokers. Counseling rates increased from 16 percent in 1991 to a peak of 29 percent in 1993, and then decreased to 21 percent in 1995. Primary care clinicians counseled more than specialists (33 percent versus 15 percent), and counseling was more likely at visits for smoking-related conditions (35 percent) and during general medical exams (37 percent). Counseling was less likely for those over age 65 and for those with conditions unrelated to smoking. Insurance status was unrelated to counseling rates. NRT was reported for about 1 percent of visits, with the number peaking in 1993.

The Health Plan Employer Data and Information Set (HEDIS 3.0) is a measure of the quality of care in participating health plans across the country (NCQA, 1997). As part of the HEDIS 3.0, health plans contracted for standardized mailed surveys of random samples of health-plan members. The smoking measures include:

1. Have you ever smoked at least 100 cigarettes in your entire life?
2. Do you now smoke every day, some days, or not at all?
3. How long has it been since you quit smoking cigarettes?
4. During the past 12 months, how many times have you visited a doctor or other health professional in your plan (do not count overnight hospital visits)? (This is coded *None* versus *Yes*)
5. On how many of these visits were you advised to quit smoking by a doctor or other health professional in your plan? (Those responding "one or more" are classified as smokers who have received medical advice to quit.)

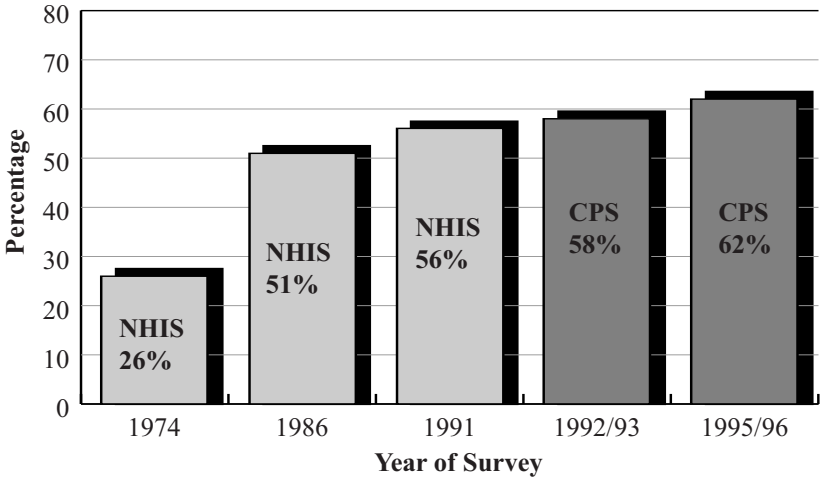
Among smokers who had seen a doctor or other health care professional in the health plan within the last year, 61 percent reported that they had received cessation advice on one or more occasions in the last year (see www.ncqa.org).

Two ongoing national population surveys provide the best picture of how patient perceptions of tobacco advice rates are changing over time (Figure 4-1). The first is the National Health Interview Surveys (NHIS), conducted periodically since the early 1970s. During each update, large national probability samples of the smokers in the U.S. population are interviewed at home. Response rates typically exceed 85 percent. Using NHIS data, Gilpin *et al.* (1992) reported that the percentage of smokers reporting that a physician had ever advised them to quit smoking rose dramatically from 26 percent in 1974 to 51 percent in 1987.

For 1991, the CDC (1993) used the NHIS to estimate that, of the 51 million smokers in the United States, 70 percent (36 million) had one or more outpatient visits with a physician or other health care professional. Most had multiple visits. About 37 percent (12.8 million) of smokers with visits reported receiving advice to quit smoking during the previous year, and a little more than half (56 percent) reported ever receiving cessation advice. Advice in the previous year was more common among those with four or more visits (45 percent) compared to those with one visit (28 percent). Rates were higher for older, non-Hispanic, and heavier smokers.

The 1992 NHIS survey asked separately about both physician and dentist visits within the previous year, and whether physicians and dentists had offered cessation advice within the previous year (U.S.DHHS, 1992). Among smokers who had physician visits (70 percent) in the previous year, 52 percent reported receiving cessation advice from physicians (Tomar *et al.*, 1996). The sharp increase from the 37 percent rate recorded for 1991 may be related to attention surrounding the marketing of NRT products. Among smokers with dentist visits (53 percent), about 24 percent reported advice from a dentist in the previous year. Those planning to quit within the next 6 months were also more likely to report having received advice to quit in the previous year. Advice was more likely for heavier and older smokers, in contrast to the lower rates of counciling for the elderly found in the NAMCS. Others have also shown that clinicians are more likely to advise heavier smokers (Cummings *et al.*, 1987) and those who are white, older,

Figure 4-1
Percentage of Smokers Reporting Ever Having Received Physician Advice, Aged 18 and Over*



** NHIS is the National Health Interview Survey, and CPS is the Tobacco-Use Suppliment of the Current Population Survey*

and in poorer health (Hymowitz *et al.*, 1996; CDC, 1993; Frank *et al.*, 1991). In summary, it appears that while the proportion of patients reporting they had ever been advised increased sharply in the 1980s, progress has been slow more recently in spite of increased attention, national guidelines, and repeated calls for action.

A comparable source of national data is the Current Population Survey (CPS), which is designed to provide labor force indicators for the U.S. Bureau of Labor Statistics. The CPS uses household interviews to gather information from a national probability sample derived from census data. For both the 1992/93 and 1995/96 CPS, NCI appended a Tobacco Use Supplement that included items about physician and dentist visits and tobacco advice that were identical to those used in the NHIS survey. We present these data here for the first time.

The determinants of who receives physician advice have two components: first are the determinants of who sees a physician at all, and second, of those who see a physician, who receives advice to quit smoking? Among daily cigarette smokers age 25 years and older surveyed by the CPS in 1992/93, 71.3 percent reported visiting a physician in the last year and 50.8 percent reported visiting a dentist in the last year. In 1995/96, 72.5 percent saw a physician and 51.3 percent saw a dentist. Table 4-1 presents the results of multivariate regression analyses of the 1992/93 and 1995/96 CPS and identifies the demographic and smoking characteristics that predict which smokers were likely to visit a physician in the year prior to the sur-

Table 4-1
CPS 1992/93 and 1995/96—Multivariate Logistic Regressions of Visits to a Physician in the Last Year (Current Smokers 25+ Years of Age Who Were Daily Smokers 1 Year Ago)

	1992/93		1995/96	
Variable	**OR**	**95% CI**	**OR**	**95% CI**
Gender				
Male	1.00		1.00	
Female	2.11	(2.01 - 2.21)	2.14	(2.03 - 2.27)
Age (Years)				
25–44	1.00		1.00	
45–64	1.19	(1.13 - 1.25)	1.34	(1.26 - 1.42)
65+	2.45	(2.21 - 2.71)	2.42	(2.16 - 2.71)
Race/Ethnicity				
Non-Hispanic White	1.00		1.00	
Hispanic	0.84	(0.75 - 0.93)	0.68	(0.61 - 0.77)
African-American	1.06	(0.98 - 1.15)	0.97	(0.89 - 1.06)
Other	0.77	(0.67 - 0.89)	0.74	(0.64 - 0.86)
Education (Years)				
< 12	1.00		1.00	
12	1.03	(0.97 - 1.10)	1.13	(1.05 - 1.21)
13–15	1.34	(1.24 - 1.44)	1.34	(1.24 - 1.46)
16+	1.20	(1.09 - 1.33)	1.37	(1.23 - 1.52)
Household Income (Dollars)				
<10,000	1.00		1.00	
10,000–19,999	0.92	(0.86 - 0.99)	0.85	(0.78 - 0.93)
20,000–29,999	1.15	(1.06 - 1.25)	0.92	(0.84 - 1.01)
30,000–49,999	1.29	(1.19 - 1.39)	1.16	(1.06 - 1.27)
50,000–74,999	1.52	(1.38 - 1.68)	1.33	(1.20 - 1.48)
75,000+	1.73	(1.50 - 1.98)	1.41	(1.23 - 1.61)
Cigarettes Smoked per Day				
1–4	1.00		1.00	
5–14	1.10	(0.93 - 1.29)	0.98	(0.82 - 1.17)
15–24	1.01	(0.86 - 1.19)	0.89	(0.75 - 1.06)
25+	0.96	(0.81 - 1.13)	0.88	(0.73 - 1.05)

vey. Female smokers, older smokers, and smokers with higher levels of education and income were more likely to visit a physician, and Hispanic smokers were less likely to see a physician, as were smokers of Asian/Pacific Islander/Native American and other races. There was no relationship between number of cigarettes smoked per day and likelihood of seeing a physician.

The frequency of reporting physician advice to quit smoking in the last year among current daily smokers who were also daily smokers 1 year prior to the survey and who saw a physician in the last year is presented in Table 4-2a. In the 1992/93 CPS 54.7 ± 0.8 percent of current daily smokers over age 25 reported that they had been advised to quit in the last year. This measure is virtually identical to that from the 1992 NHIS estimate of 52 percent reported above (Tomar *et al.*, 1996). Reported advice rates increased slightly (59.2 ± 0.8 percent; Table 4-2b) in 1995/96. Approximately 65.8 ±

Table 4-2a

CPS 1992/93—Who Received Physicians' Advice (Current Smokers 25+ Years of Age Who Were Daily Smokers 1 Year Ago and Saw a Physician in the Last Year)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size	Samp. Size	Advised Ever		Pop. Size	Samp. Size
	%	± CI	(N)	(n)	%	± CI	(N)	(n)
Total	54.7	0.8	19,630,620	25,155	61.5	0.6	27,112,558	34,450
Gender								
Male	53.9	1.1	9,381,308	10,761	56.9	0.9	14,338,239	16,382
Female	55.5	1.0	10,249,312	14,394	66.6	0.9	12,774,319	18,068
Age (Years)								
25–44	51.4	1.0	11,226,836	14,138	57.7	0.8	16,047,944	20,004
45–64	59.4	1.3	6,338,781	8,195	66.8	1.1	8,620,121	11,086
65+	58.5	2.3	2,065,003	2,822	67.3	2.0	2,444,493	3,360
Race/Ethnicity								
Non-Hispanic White	55.5	0.8	16,165,195	21,639	63.8	0.7	22,112,500	29,502
Hispanic	51.1	4.9	871,213	764	47.7	4.0	1,354,387	1,172
African-American	49.9	2.3	2,130,272	2,067	50.9	2.0	2,947,187	2,788
Asian/PI	60.7	6.7	248,080	330	54.3	5.3	416,868	512
Native American	53.8	7.5	206,805	342	61.8	6.4	269,919	459
Other	.	.	9,055	13	.	.	11,697	17
Education (Years)								
<12	56.3	1.7	4,088,973	5,077	58.5	1.4	5,867,024	7,181
12	53.1	1.2	8,465,219	11,087	59.4	1.0	11,918,478	15,506
13–15	54.5	1.5	4,955,501	6,347	65.0	1.3	6,499,453	8,290
16+	58.7	2.3	2,120,927	2,644	68.2	1.9	2,827,603	3,473
Cigarettes per Day								
1–4	43.3	4.9	467,277	569	46.4	4.2	646,372	743
5–14	49.8	1.6	4,480,652	5,540	55.8	1.4	5,956,525	7,301
15–24	54.9	1.1	9,721,488	12,677	62.1	0.9	13,365,158	17,354
25+	60.0	1.5	4,961,202	6,369	66.4	1.2	7,144,503	9,052
Household Income (Dollars)								
<10,000	55.3	1.8	3,396,384	4,303	57.8	1.5	4,783,781	5,979
10,000–19,999	52.4	1.7	3,980,854	5,282	57.6	1.4	5,848,297	7,630
20,000–29,999	53.3	1.8	3,685,840	4,740	60.6	1.5	5,134,816	6,566
30,000–49,999	55.2	1.5	5,047,152	6,472	63.4	1.2	6,843,463	8,735
50,000–74,999	56.9	2.1	2,464,475	3,076	68.0	1.8	3,179,898	3,940
75,000 +	58.9	3.2	1,055,915	1,282	69.7	2.7	1,322,303	1,600
By State								
Alabama	53.3	6.6	352,618	371	59.4	5.6	476,460	498
Alaska	53.5	6.9	36,363	304	53.6	5.3	60,870	468
Arizona	54.4	6.6	272,862	247	66.6	5.3	384,055	334
Arkansas	44.3	6.3	220,617	405	57.0	5.2	321,249	567
California	56.4	2.9	1,671,505	1,275	62.2	2.4	2,294,715	1,723

Table 4-2a (continued)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size	Samp. Size	Advised Ever		Pop. Size	Samp. Size
	%	± CI	(N)	(n)	%	± CI	(N)	(n)
Colorado	54.8	6.8	280,054	322	63.6	5.7	369,239	420
Connecticut	64.8	6.6	280,356	264	69.8	5.6	366,233	343
Delaware	67.5	6.2	59,948	211	70.5	5.2	80,090	284
District of Columbia	53.7	8.3	37,600	150	57.0	7.3	48,097	190
Florida	52.3	3.1	1,080,141	1,101	60.0	2.5	1,512,187	1,515
Georgia	57.3	6.3	537,762	278	60.2	5.2	765,068	395
Hawaii	62.5	6.8	78,484	194	72.0	5.5	102,581	251
Idaho	49.7	6.4	78,591	336	58.6	5.2	114,059	486
Illinois	54.1	3.6	817,274	898	59.2	3.0	1,169,281	1,266
Indiana	54.2	6.3	488,551	337	63.5	5.3	643,568	432
Iowa	56.0	6.5	215,431	381	58.7	5.4	307,484	543
Kansas	46.6	6.0	214,808	411	58.5	5.2	286,841	541
Kentucky	48.1	5.7	403,600	406	51.4	4.7	601,593	599
Louisiana	49.0	6.9	331,114	266	54.1	5.8	457,409	370
Maine	57.9	5.7	128,319	360	65.3	4.6	181,243	503
Maryland	62.6	6.3	409,321	256	67.9	5.2	549,267	342
Massachusetts	61.8	3.3	472,564	916	67.9	2.8	620,611	1,194
Michigan	56.6	3.1	854,047	1,241	64.4	2.6	1,183,763	1,704
Minnesota	55.8	6.5	364,871	341	65.6	5.3	489,873	454
Mississippi	47.3	6.7	213,835	392	53.5	5.6	303,055	545
Missouri	55.5	6.3	457,069	370	57.5	5.3	639,137	509
Montana	54.5	6.8	61,175	360	62.9	5.5	87,186	505
Nebraska	45.2	6.8	101,985	324	56.8	5.7	146,246	454
Nevada	52.7	5.9	123,239	342	55.9	4.7	187,585	513
New Hampshire	56.3	7.0	90,836	207	68.7	5.7	123,012	276
New Jersey	54.5	3.6	511,973	810	63.1	3.0	695,800	1,089
New Mexico	46.1	6.9	106,412	262	55.9	5.6	157,322	381
New York	58.4	2.7	1,250,852	1,434	63.9	2.2	1,679,636	1,908
North Carolina	50.3	3.0	618,572	1,220	56.4	2.6	845,241	1,648
North Dakota	47.3	6.8	43,955	329	61.1	5.7	60,764	455
Ohio	53.8	3.1	960,316	1,267	60.2	2.6	1,349,921	1,762
Oklahoma	51.2	6.1	291,434	387	61.1	5.1	394,828	516
Oregon	59.5	7.1	217,078	275	65.4	5.6	319,448	396
Pennsylvania	56.2	3.2	972,134	1,167	62.0	2.7	1,317,262	1,573
Rhode Island	58.9	7.0	76,052	216	62.9	5.9	103,363	292
South Carolina	52.6	5.9	294,520	368	55.8	4.9	418,887	511
South Dakota	52.8	6.4	50,703	373	64.8	5.2	68,680	507
Tennessee	52.6	5.7	490,221	426	59.3	4.8	669,209	570
Texas	50.9	3.6	1,229,339	1,039	58.0	3.0	1,761,601	1,481
Utah	50.8	8.2	80,470	186	62.1	6.6	114,801	261

Table 4-2a (continued)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size (N)	Samp. Size (n)	Advised Ever		Pop. Size (N)	Samp. Size (n)
	%	± CI			%	± CI		
Vermont	59.7	6.4	53,801	242	64.5	5.3	73,440	324
Virginia	58.2	5.4	564,504	414	65.7	4.6	738,659	532
Washington	57.5	6.0	460,778	335	74.2	4.7	576,018	412
West Virginia	53.5	5.7	204,358	465	57.7	4.8	280,174	636
Wisconsin	53.5	6.4	379,021	417	63.6	5.1	559,828	611
Wyoming	58.1	7.2	39,185	257	67.7	5.7	55,621	361

Note: CI = 95% confidence interval; "." = insufficient data.

Table 4-2b
CPS 1995/96—Who Received Physicians' Advice (Current Smokers 25+ Years of Age who were Daily Smokers 1 Year Ago and Saw a Physician in the Last Year)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size	Samp. Size	Advised Ever		Pop. Size	Samp. Size
	%	± CI	(N)	(n)	%	± CI	(N)	(n)
Total	59.2	0.8	20,501,925	21,147	65.8	0.6	28,261,736	28,771
Gender								
Male	57.7	1.1	9,736,220	8,823	60.6	0.9	14,867,079	13,427
Female	60.5	1.1	10,765,705	12,324	71.6	0.9	13,394,657	15,344
Age (Years)								
25–44	55.9	1.1	11,278,521	11,354	62.1	0.9	16,286,194	16,137
45–64	63	1.3	7,174,430	7,468	70.6	1.1	9,521,098	9,854
65+	63.7	2.4	2,048,974	2,325	71.6	2.1	2,454,444	2,780
Race/Ethnicity								
Non-Hispanic White	60.3	0.9	16,869,070	18,124	68.6	0.7	22,876,535	24,441
Hispanic	53	5.1	922,541	715	48.6	4	1,499,043	1,128
African-American	53.9	2.5	2,146,619	1,744	55.4	2.1	3,019,621	2,339
Asian/PI	57.6	6.5	307,782	278	52.4	5.1	512,109	440
Native American	57.9	7.1	255,914	286	65.2	5.8	354,427	423
Education (Years)								
<12	59.8	1.8	3,889,887	3,906	61.4	1.5	5,678,909	5,561
12	58.2	1.2	8,745,200	9,108	64.7	1	12,222,380	12,606
13–15	59.7	1.5	5,515,483	5,725	69.3	1.2	7,304,957	7,517
16+	60.9	2.3	2,351,356	2,408	69.9	1.9	3,055,491	3,087
Cigarettes per Day								
1–4	46.1	4.9	540,665	534	48.6	4.2	735,301	695
5–14	54.6	1.6	4,807,801	4,887	60.6	1.4	6,406,319	6,407
15–24	58.8	1.1	10,077,733	10,499	66.2	0.9	13,916,785	14,326
25+	65.8	1.5	5,075,726	5,227	71.4	1.2	7,203,331	7,343
Household Income (Dollars)								
<10,000	61	2	3,042,358	3,139	62.8	1.7	4,233,242	4,278
10,000–19,999	58.1	1.8	3,771,029	3,964	62.2	1.5	5,500,596	5,655
20,000–29,999	57.6	1.8	3,731,948	3,897	63.9	1.5	5,361,238	5,486
30,000–49,999	58.7	1.5	5,412,723	5,625	66.3	1.3	7,327,333	7,550
50,000–74,999	60.4	2	2,981,838	3,004	71.8	1.6	3,863,464	3,897
75,000 +	61.5	2.8	1,562,029	1,518	73.9	2.2	1,975,863	1,905
By State								
Alabama	56.8	6.4	340,690	305	61.4	5.4	469,368	414
Alaska	62.7	6.2	46,316	198	65.9	5.1	67,767	287
Arizona	54.5	6.7	288,696	293	65.3	5.3	418,367	418
Arkansas	49.9	6.2	214,149	300	60.3	5	321,117	441
California	61.4	3.1	1,673,921	1,029	66.9	2.5	2,397,307	1,463

Table 4-2b (continued)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size	Samp. Size	Advised Ever		Pop. Size	Samp. Size
	%	± CI	(N)	(n)	%	± CI	(N)	(n)
Colorado	62	6.4	295,562	311	69.2	5.3	382,076	393
Connecticut	66.2	6.6	271,134	200	76.2	5.3	337,897	245
Delaware	58.7	6.3	66,015	244	64.2	5.4	83,984	309
District of Columbia	51.1	7.3	43,672	203	66.2	6.3	52,512	239
Florida	57.9	3.3	1,066,392	877	61.6	2.7	1,555,314	1,244
Georgia	55.5	6.3	496,628	301	59.4	5.2	723,657	428
Hawaii	64.2	6.9	86,935	163	68.9	5.9	111,134	208
Idaho	62.1	6.5	79,583	281	69.4	5.1	115,450	402
Illinois	59.1	3.6	944,323	878	63.5	2.9	1,341,309	1,211
Indiana	56.1	5.6	601,058	371	64.8	4.7	802,909	494
Iowa	57.8	6.3	237,604	312	68	5.2	311,972	408
Kansas	55.1	6.3	221,783	331	67.1	5.1	299,636	440
Kentucky	56.9	5.2	457,874	387	66.7	4.3	605,785	512
Louisiana	54	6.5	318,972	242	59.9	5.3	465,292	343
Maine	67.2	5.9	116,971	275	74.4	4.6	168,770	394
Maryland	64.1	6.5	396,517	235	77.9	5	491,520	290
Massachusetts	66.3	4.1	462,298	538	70.5	3.4	606,617	694
Michigan	64	3.4	862,118	906	69.2	2.8	1,150,884	1,196
Minnesota	59.9	6.4	367,772	328	73.3	5	488,620	430
Mississippi	50.1	6.7	199,585	238	54.4	5.4	299,663	350
Missouri	53.9	6.2	474,933	316	65	4.9	693,826	451
Montana	57.8	6.3	70,104	327	69.2	4.8	104,079	477
Nebraska	54	6.5	123,342	293	63.2	5.5	163,531	382
Nevada	59.5	5.9	143,846	272	57.9	4.8	227,701	414
New Hampshire	70.8	6.1	104,853	240	77.1	4.9	140,290	316
New Jersey	58.7	4	562,267	601	64.3	3.3	754,241	790
New Mexico	63.7	6.2	123,751	282	66.2	5.1	174,629	393
New York	62.2	2.8	1,275,860	1,135	65.8	2.4	1,660,597	1,468
North Carolina	60	4	656,409	785	65.2	3.3	914,716	1,082
North Dakota	50.4	7	44,662	279	61.2	5.5	67,502	414
Ohio	58.4	3.4	1,023,708	986	65.3	2.8	1,393,787	1,326
Oklahoma	53.4	6	292,183	390	64.6	4.8	409,168	535
Oregon	56.8	6.8	240,543	254	70.1	5.4	328,361	343
Pennsylvania	62.6	3.2	1,066,331	1,063	68.1	2.7	1,395,358	1,377
Rhode Island	76.4	5.3	98,514	249	75.1	4.9	122,217	306
South Carolina	54.4	6	336,467	262	60.4	5.1	456,079	352
South Dakota	52.7	6.6	49,533	285	61.3	5.3	74,318	431
Tennessee	57.3	5.5	537,979	342	68.2	4.5	716,126	446
Texas	55.4	3.5	1,319,024	897	60.4	2.9	1,916,107	1,269
Utah	56.9	8.2	84,733	169	72.9	6.2	118,589	234

Table 4-2b (continued)

	Advised by Doctor to Quit Smoking							
	Current Smokers Who Saw Doctor in Last Year				All Current Smokers (Including Those Who Did Not See Doctor in Last Year)			
	Advised within Last Year		Pop. Size	Samp. Size	Advised Ever		Pop. Size	Samp. Size
	%	± CI	(N)	(n)	%	± CI	(N)	(n)
Vermont	65	6.1	56,914	274	74.3	4.9	74,293	355
Virginia	56	5.8	570,775	372	64	4.8	783,004	500
Washington	62.2	6.7	417,863	261	72.3	5.4	557,968	346
West Virginia	68.3	5	195,029	417	72.1	4.1	269,846	573
Wisconsin	58.9	6.2	438,829	358	69.3	4.9	620,298	499
Wyoming	56.5	6.9	36,903	292	62.3	5.5	56,178	439

Note: CI = 95% confidence interval.

0.6 percent of all smokers (including those who had not seen a physician in the last year) reported ever being told by a physician to quit smoking in the 1995/96 CPS. Also in the 1995/96 CPS, Massachusetts was significantly higher than the national norm with 66.3 ± 4.1 percent of daily smokers over age 25 who had seen a physician in the last year reporting physician advice to quit within the last year, an increase from 61.8 ± 3.3 percent in 1992/93 CPS. However, California was not significantly different from other states in either survey.

Reports of tobacco advice in the previous year from patients seeing dentists also increased, from 21.9 ± 0.7 percent in 1992/93 to 26.5 ± 0.8 percent in 1995/96, and the ever-advised rate (including smokers without dental visits) rose from 19.4 ± 0.5 percent to 23.0 ± 0.6 percent.

Multivariate logistic regression analyses of the determinants of who received advice to quit smoking among those daily smokers who saw a physician in the last year (Table 4-3) reveal that women and older smokers were more likely to receive physician advice to quit smoking, as were smokers of higher number of cigarettes per day. African-American smokers were less likely to receive physician advice to quit. Level of education and household income did not influence the likelihood of receiving physician advice to quit smoking once their effect on likelihood of seeing a physician was taken into account by limiting the analyses to those who had visited a physician in the last year.

The CPS did not ask former smokers whether they had received advice to quit smoking from a physician in the last year, but the 1996 California Tobacco Survey (CTS) did. The characteristics that predicted who would receive physician advice to quit were similar in both the CPS and CTS. Measures of cessation activity and success were estimated for those who had been daily smokers 1 year prior to the survey for the 1996 CTS (Table 4-4). Those estimates show 50.0 ± 2.54 percent of those current daily smokers who were advised to quit smoking by their physician made an attempt to

quit, in comparison to 41.2 ± 3.4 percent of those smokers who did not report receiving physician advice to quit. However, the percentages of daily smokers 1 year prior to the survey who were former smokers, or former smokers of 3+ months duration, were almost identical for those who did and did not report receiving advice to quit. Table 4-5 presents the results of a multivariate logistic regression analysis of the cessation measures from the 1996 CTS with report of advice to quit by a physician in the last year included as a term in the analysis. Daily smokers who received physician advice to quit were 1.5 times more likely to make some change in their smoking behavior and 1.6 times more likely to make a cessation attempt, but they were no more likely to be a former smoker at the time of the survey (OR = 1.0) or to have quit for 3 or more months at the time of the survey (OR = 0.91). These associations may reflect both the benefits of clinician intervention and a tendency for clinicians to raise the issue with more motivated patients. Similar results were obtained for a multivariate logistic regression of the CPS data controlling for any cessation activity or cessation attempts, but no data on cessation success were available because former smokers were not asked whether they had received advice to quit.

The data suggest that physicians are effective motivators for cessation activity; but that physician advice alone, at least as it is currently being practiced in the United States, does not have a substantive effect on the likelihood of population-level cessation success. This observation is in contrast to a substantial number of well-controlled clinical trials of physician intervention that have demonstrated a modest effect on long-term smoking cessation rates, an effect that was significant both statistically and in terms of public health. The difference may reflect the quality of the advice provided in these two settings. In research settings, even minimal intervention approaches are provided in a structured way and commonly include components designed to enhance longer term success. In the real-world setting surveyed by the CTS, physician intervention may be more frequently limited to simple advice to quit without any offers of assistance or follow-up.

Even in the absence of an intervention sufficient to influence long-term cessation rates, physician advice to quit smoking does increase cessation activity by 50 to 60 percent, demonstrating the potential of physician advice as a tobacco control intervention channel. The gap represented by the absence of an effect on long-term cessation in the CTS data and the clear demonstration of a long term-effect in clinical trials define what is achievable if the AHRQ clinical practice guidelines were implemented for those patients who are currently receiving advice to quit.

Effects of current practice patterns on cessation rates in the United States

How many smokers might be influenced to quit each year if the clinical practice guidelines were implemented? We assumed that 35 million smokers, or 70 percent of the roughly 50 million U.S. smokers, see a physician each year, and that 3 percent (Hughes *et al.*, 1992) of these smokers (1,050,000) will become long-term quitters each year without clinician intervention. We further assumed that 60 percent of smokers seen by clinicians each year receive minimal advice (*i.e.*, <3 minutes), and very few receive more extensive intervention and assistance.

Table 4-3
CPS 1992/93 and 1995/96—Multivariate Logistic Regressions of who Received Physicians' Advice (Current Smokers 25+ Years of Age who were Daily Smokers 1 Year Ago and Saw a Physician in the Last Year)

	1992/93		1995/96	
Variable	**OR**	**95% CI**	**OR**	**95% CI**
Gender				
Male	1.00		1.00	
Female	1.14	(1.09 - 1.20)	1.19	(1.13 - 1.26)
Age (Years)				
25–44	1.00		1.00	
45–64	1.34	(1.27 - 1.42)	1.31	(1.23 - 1.39)
65+	1.40	(1.28 - 1.52)	1.44	(1.31 - 1.59)
Race/Ethnicity				
Non-Hispanic White	1.00		1.00	
Hispanic	0.96	(0.85 - 1.09)	0.88	(0.77 - 1.01)
African-American	0.91	(0.84 - 0.99)	0.86	(0.78 - 0.94)
Other	1.18	(1.00 - 1.40)	0.99	(0.84 - 1.17)
Education (Years)				
<12	1.00		1.00	
12	0.90	(0.84 - 0.96)	0.98	(0.90 - 1.06)
13–15	0.96	(0.89 - 1.04)	1.06	(0.97 - 1.16)
16+	1.11	(1.00 - 1.23)	1.10	(0.98 - 1.23)
Household Income (Dollars)				
<10,000	1.00		1.00	
10,000–19,999	0.89	(0.82 - 0.96)	0.87	(0.79 - 0.96)
20,000–29,999	0.93	(0.85 - 1.01)	0.85	(0.77 - 0.94)
30,000–49,999	1.00	(0.92 - 1.09)	0.89	(0.81 - 0.98)
50,000–74,999	1.05	(0.95 - 1.16)	0.94	(0.85 - 1.05)
75,000+	1.05	(0.92 - 1.20)	0.95	(0.83 - 1.09)
Cigarettes Smoked per Day				
1–4	1.00		1.00	
5–14	1.33	(1.12 - 1.58)	1.43	(1.19 - 1.70)
15–24	1.65	(1.39 - 1.95)	1.69	(1.42 - 2.01)
25+	2.04	(1.71 - 2.42)	2.31	(1.93 - 2.77)

An AHRQ meta-analysis found that minimal advice of 1-3 minutes yields a 30 percent increase in the spontaneous quit rate. With current practice patterns (Scenario 1, Table 4-6), we estimate that clinicians are responsible for helping an additional 189,000 smokers quit each year. If clinicians delivered minimal advice to 90 percent of the smokers they saw at least once over the course of a year (Scenario 2, Table 4-7), they would help an additional 283,500 smokers quit, over and above the background cessation rate. In Scenario 3 (Table 4-8), we assumed that clinicians (or their staff) would advise 90 percent of all smokers they saw at least once per year and would provide 10 minutes or more of cessation counseling and/or follow-up to the half who were considering quitting. Nationally, this would yield 756,000 clinician-generated long-term quitters each year. Thus, providing

Table 4-4

CTS 1996—Measures of Cessation Activity and Success among Current and Former Smokers 25+ Years of Age who were Daily Smokers 1 Year ago and Saw a Physician in the Last Year

Variable	Any Change[1] %	Any Change[1] CI	Attempt[2] %	Attempt[2] CI	Occasional[3] %	Occasional[3] CI	Former Smoker %	Former Smoker CI	Former 3+ Months %	Former 3+ Months CI	Population Size (N)	Sample Size (n)
Physician's Advice												
Not Advised	43.01	3.41	41.22	3.39	5.27	1.56	11.00	2.01	6.08	1.43	722,315	1,628
Advised	50.25	2.53	50.03	2.54	3.34	0.87	10.80	1.39	5.57	1.09	1,022,300	2,286
Total	47.25	1.79	46.38	1.75	4.14	0.81	10.88	1.28	5.78	0.99	1,744,616	3,914
Gender												
Male	47.81	2.80	47.25	2.85	3.51	1.02	10.75	1.70	5.56	1.29	850,010	1,721
Female	46.72	2.44	45.56	2.40	4.74	1.05	11.01	1.86	5.99	1.28	894,605	2,193
Age												
25–44	52.07	2.71	50.87	2.71	4.87	1.30	11.08	1.44	5.55	1.13	981,419	2,171
45–64	41.21	2.76	40.82	2.80	3.07	1.06	9.70	1.74	5.69	1.60	602,613	1,402
65+	40.49	6.15	39.84	5.82	3.70	2.11	14.16	6.08	7.55	4.35	160,583	341
Race/Ethnicity												
Non-Hispanic White	44.63	2.02	43.87	1.98	3.61	0.59	11.23	1.44	5.88	1.00	1,223,967	3,006
Hispanic	53.82	6.12	52.59	6.11	6.23	2.96	12.22	4.30	6.47	2.71	220,963	356
African-American	54.42	7.23	53.32	7.40	5.98	3.90	5.61	3.28	3.97	3.02	140,871	246
Asian/PI	51.06	12.69	49.59	12.23	3.88	3.12	12.89	6.10	6.60	5.31	87,442	166
Native American	53.07	10.65	52.62	10.52	3.42	2.76	8.84	4.65	4.60	3.78	71,373	140
Education (Years)												
<12	49.59	5.43	48.94	5.49	3.39	1.76	9.77	2.95	4.98	2.20	345,937	379
12	42.73	3.19	41.82	3.07	2.96	0.99	9.02	1.64	5.10	1.23	547,340	1,381
13–15	47.65	2.59	46.65	2.58	5.34	1.39	10.55	2.50	5.08	1.69	527,748	1,335
16+	51.75	3.98	50.93	4.02	4.98	1.71	15.77	2.49	8.94	2.37	323,589	819

Table 4-4 (continued)

Variable	Any Change[1] %	Any Change[1] CI	Attempt[2] %	Attempt[2] CI	Occasional[3] %	Occasional[3] CI	Former Smoker %	Former Smoker CI	Former 3+ Months %	Former 3+ Months CI	Population Size (N)	Sample Size (n)
Household Income												
≤10,000	47.31	5.21	46.25	5.44	3.44	1.91	8.90	2.87	4.83	2.10	214,655	390
10,001–20,000	50.46	5.87	50.31	5.82	4.57	1.85	10.43	3.32	5.56	2.21	243,502	491
21,000–30,000	44.67	4.54	44.20	4.61	3.28	1.40	9.37	2.59	4.32	1.88	287,691	631
30,001–50,000	45.62	2.93	44.66	2.99	4.36	1.51	10.66	2.30	5.06	1.63	449,586	1,044
50,001–75,000	49.96	5.63	48.37	5.49	5.66	2.10	11.40	3.24	7.55	2.66	309,943	733
75,000+	46.62	6.57	45.79	6.43	2.98	1.30	14.72	3.94	7.69	2.73	239,237	625
Cigarettes per Day												
1–4	59.83	10.38	57.45	10.65	10.76	5.54	17.76	9.50	8.21	5.21	54,352	122
5–14	57.41	4.07	55.86	4.12	6.27	1.79	11.83	2.38	6.43	2.02	484,224	993
15–24	45.32	2.25	44.64	2.25	3.51	1.00	9.68	1.62	5.08	1.23	782,071	1,822
25+	37.61	3.54	37.35	3.60	2.03	0.86	11.15	1.98	6.02	1.65	423,967	977

[1]Any Change: Includes those who have made a quit attempt, have become occasional smokers, or have become former smokers.
[2]Attempt: Includes those who have made a quit attempt or have become former smokers (CTS algorithm).
[3]Occasional: Includes those who reduced from smoking everyday, to smoking some days.
Note: CI = 95% confidence interval.

Table 4-5

CTS 1996—Mulitvariate Logistic Regression Analysis of Measures of Cessation Activity and Success among Current and Former Smokers 25+ Years of Age who were Daily Smokers 1 Year Ago and Saw a Physician in the Last Year

	Any Change[1]		Attempt[2]		Occasional[3]		Former Smoker		Former 3+ Months	
Variable	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Physician's Advice										
Not Advised	1.00									
Advised	1.50	(1.31 , 1.71)	1.60	(1.40 , 1.83)	0.67	(0.49 , 0.93)	1.00	(0.81 , 1.23)	0.91	(0.69 , 1.20)
Gender										
Male	1.00									
Female	0.90	(0.78 , 1.02)	0.87	(0.76 , 1.00)	1.33	(0.95 , 1.85)	1.07	(0.87 , 1.32)	1.15	(0.87 , 1.52)
Age										
25–44	1.00									
45–64	0.68	(0.59 , 0.79)	0.70	(0.60 , 0.80)	0.74	(0.51 , 1.08)	0.85	(0.68 , 1.07)	1.03	(0.76 , 1.40)
65+	0.68	(0.53 , 0.85)	0.68	(0.54 , 0.86)	0.98	(0.54 , 1.78)	1.37	(0.98 , 1.92)	1.49	(0.95 , 2.33)
Race/Ethnicity										
Non-Hispanic White	1.00									
Hispanic	1.18	(0.96 , 1.46)	1.17	(0.95 , 1.44)	1.55	(0.98 , 2.46)	1.17	(0.84 , 1.61)	1.25	(0.81 , 1.91)
African-American	1.18	(0.93 , 1.52)	1.18	(0.92 , 1.51)	1.35	(0.79 , 2.31)	0.48	(0.29 , 0.79)	0.69	(0.38 , 1.27)
Other	1.08	(0.86 , 1.36)	1.08	(0.86 , 1.36)	0.82	(0.45 , 1.50)	0.92	(0.64 , 1.32)	0.92	(0.57 , 1.50)
Education (Years)										
<12	1.00									
12	0.77	(0.64 , 0.94)	0.77	(0.63 , 0.93)	0.89	(0.52 , 1.51)	0.89	(0.65 , 1.23)	1.00	(0.65 , 1.54)
13–15	0.93	(0.77 , 1.14)	0.92	(0.76 , 1.12)	1.67	(1.01 , 2.75)	1.09	(0.79 , 1.50)	1.00	(0.65 , 1.56)
16+	1.10	(0.88 , 1.39)	1.10	(0.88 , 1.39)	1.58	(0.90 , 2.80)	1.57	(1.11 , 2.22)	1.71	(1.08 , 2.72)

Table 4-5 (continued)

Variable	Any Change[1] OR	95% CI	Attempt[2] OR	95% CI	Occasional[3] OR	95% CI	Former Smoker OR	95% CI	Former 3+ Months OR	95% CI
Household Income (Dollars)										
≤10,000	1.00									
10,001–20,000	1.19	(0.92 , 1.53)	1.23	(0.95 , 1.58)	1.45	(0.76 , 2.78)	1.11	(0.73 , 1.80)	1.10	(0.62 , 1.92)
21,000–30,000	0.90	(0.70 , 1.15)	0.92	(0.72 , 1.18)	0.94	(0.48 , 1.84)	0.99	(0.65 , 1.50)	0.84	(0.47 , 1.50)
30,001–50,000	0.92	(0.73 , 1.16)	0.92	(0.73 , 1.16)	1.34	(0.73 , 2.48)	1.10	(0.75 , 1.63)	0.98	(0.58 , 1.66)
50,001–75,000	1.07	(0.84 , 1.38)	1.05	(0.81 , 1.34)	1.65	(0.88 , 3.10)	1.19	(0.79 , 1.81)	1.51	(0.88 , 2.58)
75,000+	0.98	(0.74 , 1.28)	0.98	(0.74 , 1.28)	0.89	(0.42 , 1.89)	1.47	(0.96 , 2.25)	1.37	(0.78 , 2.43)
Cigarettes per Day										
1–4	1.00									
5–14	0.92	(0.62 , 1.36)	0.95	(0.64 , 1.40)	0.66	(0.35 , 1.25)	0.68	(0.41 , 1.13)	0.89	(0.44 , 1.79)
15–24	0.59	(0.40 , 0.87)	0.62	(0.42 , 0.91)	0.39	(0.20 , 0.76)	0.52	(0.31 , 0.87)	0.68	(0.34 , 1.38)
25+	0.44	(0.29 , 0.65)	0.46	(0.31 , 0.69)	0.27	(0.12 , 0.58)	0.63	(0.37 , 1.07)	0.84	(0.40 , 1.75)

[1]Any Change: Includes those who have made a quit attempt, have become occasional smokers, or have become former smokers.
[2]Attempt: Includes those who have made a quit attempt or have become former smokers (CTS algorithm).
[3]Occasional: Includes those who reduced from smoking everyday, to smoking some days.

Table 4-6
Scenario 1: Additional Quitters per Year with a 60% Minimal Advice Rate

60% receive simple advice to quit	21,000,000
Effect of minimal advice on probability of cessation	1.3
Expected quits for those with minimal advice (21,000,000 x 0.03 x 1.2)	819,000
Expected spontaneous quits without advice (21,000,000 x 0.03)	630,000
Expected increase in quits due to current practice (756,000 – 630,00)	189,000

Table 4-7
Scenario 2: Additional Quitters per Year with a 90% Minimal Advice Rate

90% receive simple advice to quit	31,500,000
Effect of minimal advice on probability of cessation	1.3
Expected quits for those with minimal advice (31,500,000 x 0.03 x 1.2)	1,228,500
Expected spontaneous quits without advice (31,500,000 x 0.03)	945,000
Expected increase in quits with 90% advice rate (1,134,000 – 945,000)	283,500

Table 4-8
Scenario 3: Additional Quitters per Year with 90% Minimal Advice Plus 10 Minutes of Counseling for 50% who Are Planning to Quit

45% receive simple advice to quit	15,750,000
Effect of minimal advice on probability of cessation	1.3
45% receive 10 minutes or more of cessation counseling	15,750,000
Effect of counseling on probability of cessation	2.3
Expected quits for those with minimal advice (15,750,000 x 0.03 x 1.3)	614,250
Expected quits for those with counseling (15,750,000 x 0.03 x 2.3)	1,086,750
Total expected quits for advised plus counseled patients	1,701,000
Expected spontaneous quits without advice (31,500,000 x 0.03)	945,000
Expected increase in clinician-generated quits (1,701,000 – 945,000)	756,000

brief cessation assistance to interested patients, rather than just simple advice, would increase the number of long-term quitters that can be attributed to clinicians' efforts from 189,000 per year currently to 756,000 per year—a 4-fold increase.

Implications for practice and policy

While cessation advice rates have increased substantially over the last 20 years, progress of physicians and dentists toward implementing the AHRQ guidelines or toward achieving the Healthy People Year 2010 objectives regarding tobacco services remains slow. Given multiple contacts with most patients each year, this tobacco control channel remains one where the potential effect outweighs the achieved effect. Currently, even when smokers are advised to quit, they are unlikely to receive meaningful cessation assistance in the form of self-help materials, encouragement to set a quit date, follow-up support, or pharmacotherapy; so improvement in the effectiveness of current physician-delivered cessation assistance is likely to be more important than increasing the frequency of physician-delivered advice.

Simply offering minimal, but effective, advice to 90 percent, rather than 60 percent, of smokers each year would increase the number of clinician-generated quitters to 283,500 per year. What would make a far greater difference, however, would be for clinicians and their staff to provide cessation assistance to the half of smokers who are considering quitting. Assistance goes beyond simple advice. It also includes brief discussion of quitting strategies and how to overcome barriers, encouragement to set a quit date, referral options, NRT, and follow-up support. Office staff, with the help of videos and other tools, can help clinicians offer this type of brief (10 minutes) support within an organized office system. Assistance of this sort, if delivered routinely to interested smokers, could increase clinician-generated quitters four-fold to 756,000 per year. Implementing this type of intervention should be a high priority for all routine care settings.

What does it take to improve tobacco counseling during routine care?

Altering the practice patterns of busy clinicians is never easy, but the problems appear to be particularly acute when it comes to tobacco-control efforts. Most of the studies showing positive effects on practice patterns and patient quit rates have been conducted in smaller groups of willing clinicians who are participating in a short-term study. Usually, the researchers provide high-quality training, careful monitoring, and often external support (*e.g.*, research assistants) that are rarely available in real-world practice. Under these relatively ideal conditions, patients do indeed receive more and better services, which translates to improved cessation outcomes. As the research team leaves, however, or as others disseminate the intervention in new settings, compliance drops dramatically (Kottke *et al.*, 1989; Solberg, 1996; Solberg *et al.*, 1996).

The problem may be that dissemination efforts for proven clinical interventions are inadequate. The most common implementation strategies include distributing clinical practice guidelines and offering continuing medical education (CME). In isolation, however, these approaches have little lasting effect on tobacco intervention practices or on other clinical

improvement targets. Changes in practice patterns, if they occur at all, tend to fade quickly as initial enthusiasm succumbs to the crush of patient-care demands, competing new initiatives, and administrative burdens.

Realistically, changing routine clinical practice requires both an office systems approach to delivering care, and a sustained organizational commitment to maintaining long-term success (Kottke *et al.*, 1990; Elford *et al.*, 1994; Fiore *et al.*, 1997 & 2000; Hollis *et al.*, 1993; Leininger *et al.*, 1996; Lichtenstein *et al.*, 1996a; McAfee *et al.*, 1998; Solberg *et al.*, 1990 & 1997; Ockene *et al.*, 1997a). An office systems approach includes the following elements: 1) a system for identifying and documenting smokers; 2) clinician prompts to deliver advice; 3) a means to provide assistance to smokers interested in quitting (*e.g.*, support staff); 4) appropriate training for clinicians and support staff; 5) a convenient way for staff to document the delivery of tobacco interventions; 6) clear performance objectives for all staff members; and 7) a mechanism for regular performance reporting at the individual, team, and organizational levels. Preferably, tobacco intervention quality measures should be tied to annual performance reviews and other incentive mechanisms.

Involving support staff appears essential, both to prompt clinicians to advise and to reduce demands on clinicians struggling with 10-minute encounters. For example, having staff document smoking status in the chart note has been shown to double the rate of smokers reporting that they received advice (Fiore *et al.*, 1995). Cohen *et al.* (1989) found that chart reminders increased advice rates from 41 percent to 75 percent and 1-year patient quit rates from 1.5 percent to 7.9 percent, though maintaining staff documentation efforts over time can be challenging (Cummings *et al.*, 1989). Defining specific roles for support staff (*e.g.*, assessing smoking and prompting clinicians), for clinicians (*e.g.*, advising and staging), and for nurses (*e.g.*, assisting smokers) nearly doubles the long-term quit rate over brief clinician advice alone (Hollis *et al.*, 1993). Telephone outreach systems can provide effective assistance and follow-up to patients ready to take action on smoking (Lichtenstein *et al.*, 1996b; McAfee *et al.*, 1998).

Of course, it is much easier to identify the components of a good systems approach than to actually incorporate them into real-world clinical settings. Berwick (1992) provides a model for how to conceptualize the clinical quality improvement process, but these ideas have not been systematically applied to tobacco intervention. Organized health care systems, particularly staff-model HMOs, would seem to have both the incentive and the tools to achieve systematic and lasting changes in the policies, norms, and practices of clinicians. First, they have a vested interest in reducing tobacco use and tobacco-related disease in their members and in doing well on quality performance measures (*e.g.*, HEDIS 3.0). As patients, employer groups, and purchasers intensify calls for action, the incentive for organizational change efforts will also increase. HMOs also have the ability to define system-level policies, norms, and targets; to monitor performance; and to provide feedback and incentives to staff. Indeed, many health care systems are considering or piloting approaches for systematically implementing the

Four A's—Ask, Advise, Assist, and Arrange. Success will depend on whether their organizational change efforts include the following components:

- Maintainance of a tobacco-services taskforce with high level stakeholders
- Adoption of performance quality targets for the delivery of tobacco advice and assistance
- Creation of an office system with explicit accountabilities for staff
- Development of convenient documentation procedures
- Measurement of performance and providing feedback to teams across the entire organization
- Recognition of performance and celebration of progress

The underlying challenge for most preventive interventions, particularly behavioral interventions requiring education and problem solving rather than tests, drugs, or surgery, is that they fall outside the traditional medical paradigm (Vogt *et al.*, 1998). Overcoming this last barrier will require a re-evaluation of the role of clinicians and health care systems. In short, we need to move from a health care delivery model, in which we primarily diagnose and treat presenting complaints, toward a public health model (Greenlick, 1995) with the objective of maintaining optimal health in a defined population.

SUMMARY The frequency with which smokers in the United States report receiving physician advice to quit smoking has increased substantially over the last 20 years, and in the 1995/96 CPS, approximately 60 percent of current daily smokers reported receiving advice to quit smoking from their physician in the last year. Older smokers and smokers of higher numbers of cigarettes per day are more likely to receive physician advice to quit smoking, and African-American smokers are slightly less likely to receive physician advice to quit.

Studies in research settings have demonstrated that minimal interventions by physicians and dentists can increase cessation attempt rates and long-term cessation success as well. Data from the most recent CPS suggest that physician advice to quit, as it is currently being delivered in the United States, increases cessation attempts but does not improve long-term cessation success rates.

Successful dissemination and implementation of the AHRQ clinical practice guidelines could increase the number of smokers who quit by increasing the frequency with which smokers are advised to quit, but a more effective approach might be to increase the effectiveness of interventions already provided by the physician or dentist. Enhancing the quality of the intervention provided, focusing on those smokers who are ready to quit, and implementing changes in the care delivery system that promote and support physician-based cessation interventions are all methods by which physician- and dentist-based cessation interventions can be enhanced as a tobacco control channel.

The substantial effect of physician advice on cessation attempts, with minimal or absent effects on long-term cessation rates, also suggests that strategies to improve the frequency with which physicians advise their patients should be coupled with other tobacco control channels that improve cessation success among those who make a quit attempt. Programs that link physician advice to quit with telephone counseling or other proven cessation modalities may create synergies across these separate tobacco-control intervention channels.

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Impact of Medications on Smoking Cessation

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OVERVIEW The proven pharmacotherapies for smoking cessation are nicotine gum, inhaler, nasal spray, and patch (Hughes, 1996; Hughes *et al.*, 1999) and the non-nicotine therapies bupropion (Hughes *et al.*, 1999), and perhaps nortriptyline (Prochazka *et al.*, 1998). All of these methods have been shown to double quit rates compared to placebo in several randomized controlled trials (Hughes, 1996). Because the nicotine nasal spray has had limited sales, the inhaler has just been marketed, and nortriptyline has not been marketed for cessation, the current analyses will focus on nicotine gum, the nicotine patch, and bupropion. Nicotine gum was originally approved in the United States as prescription only (Rx) medication in 1984 as a 2 mg form, and 4 mg nicotine patches were approved as Rx only in 1993. In April 1996, the nicotine gum became available for over-the-counter (OTC) sales. Nicotine transdermal patches, which became available as a prescription device in 1992, were approved for OTC sale in 1996. In May of 1997, bupropion became available as an Rx-only medication.

This paper will present two sets of data that estimate the population-based extent of medication use for smoking cessation. The first data are from the 1996 California Tobacco Survey (CTS), a large population-based survey of California adults (see Chapter 2). This survey asked all smokers over the age of 25 whether they had tried to stop smoking in the last year and, if so, whether they had used nicotine gum or patch. The survey was conducted from September 1996 through January 1997. Thus, depending on when a smoker was surveyed, the gum would have been available OTC for 5-10 months prior to the survey, the patches would still have been Rx-only, and bupropion would not have been available yet.

The second data set is from nationally representative prescription and OTC sales data and physician prescribing data obtained in the last 6 months of 1997 from audits done by, or for, the pharmaceutical companies. In this data set, the gum would have been available OTC for 14-20 months, two patches would have been available OTC for 10-17 months, and bupropion would have been available Rx-only for 5-10 months. Both sales and physician audit allow one to estimate the number of new purchases.

Writing of this article was supported by a Research Scientist Development Award from the National Institute on Drug Abuse (DA 00109).

To examine population-based efficacy of these medications, this chapter will use cessation data among users in the 1996 CTS. In addition, since sales data for 1997 do not provide cessation data, we will review Current Population Survey (CPS) data (see Chapter 2), meta-analyses (Fiore, 2000) and recent scientific studies in prescription (Rx) and over-the-counter (OTC) settings (Hughes *et al.*, 1999).

USE OF MEDICATIONS

Nicotine Gum and Patch

Table 5-1 presents the 1996 CTS data on the use of patch, gum, and counseling in various combinations among different groups. In the 1996 CTS, 45 percent of those over age 25 who were daily smokers 1 year prior to the survey reported making a quit attempt that lasted more than 24 hours during the prior year. Of those who made a quit attempt, 21 percent reported using either patch or gum. Patch and gum use was more common in older, white, more educated, and higher income smokers. The 1996 estimates for patch and gum use represent a substantial increase from those recorded in a prior CTS in 1993, when patch and gum were available only as Rx products. In that survey, 47 percent of smokers reported quitting in the prior year, but only 10 percent used a patch, and 3 percent used gum (Pierce *et al.*, 1995).

A different estimate can be derived using national pharmaceutical company sales data. A recent article estimated that in 1997, 5.8 million quit attempts were made with OTC gum and patch and 0.5 million were made with Rx gum and patch (Gilpin and Pierce, 1994). The number of smokers over age 18 nationally was estimated at 47 million in 1995 by the CDC and 44 million by the CPS (see Chapter 2). If one uses the CDC definition of a quit attempt, requiring 24 hours of abstinence, then about 17 million of those smokers made a quit attempt in 1995 (see Chapter 2). Assuming that the number of smokers and the incidence of quitting have not changed between 1995 and 1997 (see Chapter 2), and that smokers do not make more than one quit attempt using patch or gum per year, then 36 percent of all quits in 1997 involved gum or patch. Since it is likely that smokers who are trying to quit may make more than one attempt per year and may use patch or gum on one or more of those attempts, it is likely that the 36 percent figure represents an overestimate of the fraction of quit attempts in which patch or gum was utilized. In the 1990 California Tobacco Survey, approximately 36 percent of those smokers who made a quit attempt in the prior 12 months made more than 1 quit attempt in that 12-month period, and some had made as many as 15 attempts each (Gilpin and Pierce, 1994). A minimum of 57 percent of the quit attempts occurred among those who made more than one attempt. These data would suggest that the ratio between the total number of quit attempts and the number of individuals who have made a quit attempt in the last year may be approximately 1.5. Dividing the number of quit attempts estimated from sales data by this ratio would reduce the 36 percent presented above to 24 percent of all quit attempts that are accompanied by nicotine patch and gum—a number closely matching the estimate from population-based survey data (21 percent; Table 5-1).

Table 5-1

Cessation Methods Reported by Daily Smokers 1 Year prior to the Survey Who Made a Quit Attempt in the Last 12 Months. 1996 CTS*

	Single Aid Only										Combination of Aids**									
	None		Counseling		Self-Help Materials		Nicotine Patch		Nicotine Gum		Counseling		Self-Help Materials		Nic Patch or Gum		Unknown		Pop Size	Samp Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Total	72.3	2.0	1.7	0.7	2.5	0.7	4.6	0.8	3.3	0.8	7.1	1.1	9.3	1.3	21.0	1.8	0.7	0.3	1,266,663	2,680
Gender																				
Male	75.2	2.7	1.3	0.8	2.4	1.0	4.7	1.1	2.7	1.0	5.6	1.4	8.0	1.7	19.2	2.3	0.6	0.5	707,535	1,377
Female	68.5	3.4	2.2	1.1	2.7	1.1	4.4	1.2	3.9	1.4	8.9	1.6	11.0	1.9	23.4	2.9	0.7	0.5	559,127	1,303
Age (Years)																				
25–44	74.6	2.1	1.9	0.9	2.9	0.9	3.9	0.8	2.7	0.9	6.0	1.2	9.0	1.7	18.2	2.0	0.9	0.5	797,986	1,661
45–64	69.3	4.2	1.7	1.4	2.0	1.0	5.7	1.8	3.6	1.5	9.2	2.6	10.0	2.6	24.1	3.5	0.3	0.4	365,166	803
65+	64.3	7.7	0.4	0.8	1.3	1.8	6.3	2.8	6.6	5.1	7.7	3.8	9.1	4.8	32.5	7.5	.	.	103,509	216
Race/Ethnicity																				
NH White	68.4	2.2	1.2	0.6	2.6	0.7	6.1	1.1	3.5	1.1	6.8	1.1	9.7	1.4	25.1	2.1	0.7	0.4	806,518	1,930
Hispanic	80.6	4.6	2.7	2.1	2.0	1.6	2.0	1.6	2.5	1.8	6.5	3.0	7.6	2.9	13.2	4.0	0.4	0.7	224,058	332
Afric-Am	79.5	6.2	1.8	2.9	3.6	2.6	.	.	2.4	2.2	9.5	4.9	10.7	4.1	11.4	4.9	2.1	2.3	111,550	185
Asian/PI	77.9	7.7	2.6	4.1	2.2	2.4	5.7	4.1	2.9	2.9	8.0	6.4	5.9	3.9	15.5	6.1	.	.	70,309	135
Nativ Am	72.5	13.7	2.9	4.2	1.3	2.5	1.8	2.1	4.6	8.3	7.4	4.7	12.0	6.5	20.7	11.1	.	.	54,227	98
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
Education (Years)																				
<12	77.2	5.6	3.8	2.5	1.5	1.2	2.1	1.4	3.3	2.0	8.3	3.1	7.2	3.0	15.8	4.8	1.0	0.8	299,599	312
12	72.0	3.1	1.1	0.6	2.7	1.0	6.1	1.5	2.1	1.0	6.0	1.9	9.2	2.2	22.3	2.9	0.5	0.5	364,834	903
13–15	71.9	3.7	1.0	0.7	2.6	1.2	5.2	1.6	2.8	1.0	6.7	1.8	9.8	2.1	20.4	3.2	1.1	0.9	359,691	887
16+	67.1	4.8	1.0	0.8	3.4	1.5	4.6	1.6	5.5	2.4	7.7	2.5	11.3	2.7	26.5	4.2	.	.	242,537	578
Household Income (Dollars)																				
≤10K	78.2	5.3	3.0	2.7	1.9	1.5	1.8	1.9	3.2	2.5	8.3	4.0	6.9	3.3	14.8	4.7	1.2	1.3	156,924	264
10-20K	76.3	4.9	2.5	2.1	1.9	1.3	3.7	1.8	2.6	1.8	6.8	3.2	6.4	2.7	18.2	4.5	0.7	1.0	187,040	354
20-30K	78.5	4.4	0.6	0.7	3.1	1.7	3.6	1.8	1.8	1.1	4.5	2.0	9.7	2.9	14.9	4.3	0.8	1.1	190,339	398
30-50K	69.7	4.4	1.5	1.4	2.5	1.3	6.0	2.2	2.9	1.5	7.6	2.6	10.4	2.9	23.8	4.1	0.6	0.7	271,517	605
50-75K	66.9	5.7	1.6	1.5	3.6	2.0	5.4	2.1	3.3	1.7	8.6	3.1	13.5	4.1	23.9	5.0	0.7	0.9	200,708	452
>75K	64.9	5.6	2.3	2.4	1.2	1.2	6.6	2.5	5.4	3.6	7.7	3.2	6.9	2.8	29.9	5.5	0.4	0.7	148,285	377
Unknown	71.9	6.4	0.4	0.7	3.4	2.3	4.4	2.9	4.8	3.9	5.2	2.5	9.7	4.0	21.5	5.7	0.4	0.7	111,848	230

**Those 25+ years of age who have made a quit attempt in the past year and were daily smokers 1 year ago.*

***Combination includes use of the method alone or with any other method.*

The difference in usage rates (14 percent in the 1993 CTS versus 21 percent in the 1996 CTS, versus 24 percent in the 1997 U.S. sales data) could be due to several reasons. There is good evidence that the historical trend is due to increased recognition of the efficacy of patch and gum and due to their increased availability as an OTC item (Shiffman *et al.*, 1997a & b). Some smokers may have purchased gum or patch but never actually made a quit attempt; however, recent work indicates that 94 percent of OTC nicotine replacement therapy (NRT) use is for cessation purposes (Pillitteri *et al.*, 1998).

In summary, it is reasonable to estimate that between one-fifth and one-quarter of all quit attempts are accompanied by the use of nicotine gum or patch.

Bupropion Bupropion was not yet available for smoking cessation when the 1996 CTS was conducted. When the pharmacy sales data were collected in 1997, Zyban® (the trade name of bupropion when used for smoking) had only been available for smoking cessation for between 1 and 6 months. Use of Zyban® appeared to stabilize the last 3 months of these data. Projections for a full year based on these last 3 months of pharmacy audits indicate that 2.4 million quit attempts/year may involve Zyban®. In addition, it is estimated that 15 percent of Wellbutrin® use (the trade name of bupropion for depression) is actually for smoking cessation (Glaxo-Wellcome, personal communication). Adding these usage measures together results in an estimate of 3.7 million quits/year with bupropion. Using the same value of 1.5 for the ratio between quit attempts and number of individuals who have attempted to quit in the last 12 months would yield an estimate of 14 percent of all quit attempts that involve bupropion.

Any medication Although no data are available, it is thought that in 1997 there was little concomitant use of gum with patch or of bupropion with gum or patch. Recent publications suggest that combined use may improve quit rates (Hughes *et al.*, 1999; Jorenby *et al.*, 1999). But if we assume that combined use is minimal, then based on pharmacy sales data, the use of any medication would be projected to occur in 35-38 percent of all quit attempts in 1998, based on assumptions about the number of quit attempts stated above.

EFFICACY/ EFFECTIVENESS

Nicotine Gum and Patch:

The 1996 CTS asked those who were daily smokers 1 year prior to the survey whether they had made a quit attempt lasting more than 24 hours. Those who had made a quit attempt were asked what method or methods they had used (Table 5-1). Table 5-2 presents the current smoking status of those who had made a quit attempt in the last 12 months by the method of cessation assistance they reported using. Of those who reported using no cessation assistance, 17 ± 2 percent were former smokers at the time of the survey. Of those who reported using patch or gum, either alone or in combination with other methods, 32 ± 5 percent were former smokers at the time of the survey. When the data were analyzed for those who had been quit for 3+ months at the time of the survey, results were less impressive (11.2 ± 2.6

Table 5-2
Current Smoking and Cessation Status by Method of Cessation Reported by Those who were Daily Smokers 1 Year prior to the Survey and who Made a Quit Attempt in the Last 12 Months: 1996 CTS*

	Current Smoker w/Quit Attempt				Former Smoker of Any Quit Length		Pop Size	Samp Size
	Daily		Occasional					
	%	CI	%	CI	%	CI	(N)	(n)
Total	71.79	2.09	7.56	1.21	20.65	1.90	1,266,663	2,680
Single Aid Only								
None	74.59	2.30	8.35	1.60	17.06	2.20	915,186	1,886
Counseling Only	.	.	3.79	5.39	.	.	21,538	38
Self-Help Only	73.04	9.63	6.48	5.66	20.48	8.88	32,124	74
Patch Only	67.11	8.17	6.49	4.06	26.40	8.04	58,422	142
Gum Only	57.49	14.99	8.00	6.32	34.52	14.16	41,251	92
Aids in Combination								
Counseling**	71.81	7.11	3.32	2.55	24.87	7.16	89,356	189
Self-Help**	69.06	6.22	4.34	3.07	26.60	6.08	117,871	260
Patch/Gum**	62.62	4.87	5.68	1.76	31.71	4.51	266,595	612
Unknown	.	.	.	.	.	.	8,549	16

**Those 25+ years of age who have made a quit attempt in the past year and were daily smokers 1 year ago.*
***Combination includes use of the method alone or with any other method.*

percent for any use of patch or gum versus 9.7 ± 0.7 percent for no methods used). The results for 3+ month cessation were not statistically different, possibly due to the small number of observations.

In intervention studies, the one community practice Rx study found a long-term (6-12 months) quit rate with nicotine gum of 18 percent (Smith Kline Beecham, 1995). Across five studies of Rx nicotine patch (Table 5-3), quit rates ranged from 5 percent to 11 percent. In OTC settings, two gum studies reported long-term quit rates of 13 percent and 15 percent. Six studies of OTC patch reported quit rates from 5 percent to 17 percent with a median of 10 percent. Most studies that directly compared patch in Rx and OTC settings found similar quit rates (Hughes *et al.*, 1999).

In summary, a reasonable estimate for a real-world quit rate for OTC and Rx gum and patch is 10 percent. Thus, with 6.3 million uses, 630,000 successful quits/year are estimated to be associated with gum or patch use (see Table 5-4). Given that those who choose to use gum or patch are more heavily dependent than those who choose to quit on their own (Hughes *et al.*, 1997), this estimate may be biased to show smaller gum/patch effects. The difference in percentage of quit rates in which patch or gum are used between 1993 and 1996 could be because of the Rx barrier to obtaining patch or gum that existed in 1993 but did not exist in 1996.

Table 5-3
Six-Month Quit Rates in Minimal-Contact Studies of Nicotine Gum and Patches[a]

	OTC		Rx	Risk Ratio of
	NRT	Placebo	NRT	OTC NRT vs. Placebo
Nicotine Gum				
Smith Kline Beecham, 1995	15	—	18[b]	—
Schneider *et al.*, 1983	13	8	30	1.6
Nicotine Patch				
Hays *et al.*, 1997	9	4	—	2.5
Alza Corporation, 1996	9	—	7[b]	—
McNeil Pharmaceuticals, 1996	11	—	12	—
Leischow *et al.*, 1997	5	—	5	—
Sonderskov *et al.*, 1997	11	4	—	2.8

[a]Due to differences in study design and in data collection, quit rates can be compared within rows but not across rows
[b]Surveys, not experimental trials. Because so few returned for CO verification, these are self-reported quit rates. With CO verification they are likely to be somewhat lower.

Bupropion There are no community practice Rx studies with bupropion. There is one head-to-head comparison of nicotine therapy versus bupropion (Jorenby *et al.*, 1999). In this study, bupropion had higher quit rates than a nicotine patch (30 percent versus 16 percent). On the other hand, long-term quit rates for bupropion in other studies were similar to those found with gum and patch studies. In summary, because there is but one study, this paper will assume that the quit rates for real-world bupropion are similar to that for real-world gum and patch—*i.e.*, 10 percent. Thus with 3.7 million users, 370,000 quits/year are estimated to be associated with bupropion.

Any medication As discussed above, bupropion and NRT are probably rarely used together. Thus, the total number of medication-associated quits projected is 630,000 + 370,000 = 1.0 million quits for 1998.

Quits with medications from the CTS To calculate the proportion of additional successful quits (not quit attempts) associated with medication, one has to make assumptions about the quit rate in those who do not use medications to quit. We assume that the 1-year quit rate for those who do not use medication is similar to the self-quit rate. This rate has been estimated at 5 percent (Hughes *et al.*, 1992), and the 1996 CTS data (See Chapter 2) reports an 11.5 percent quit rate for 3+ months among those who were daily smokers one year prior to the survey, which, if converted to a 1-year quit rate, would approximate the 5 percent estimated rate. With this assumption of a doubling of the success rate with medication, 50 percent of all quits in which medications are used during 1998 are projected to be additional quits associated with medication use.

Table 5-4
Use of, and Cessation with, Most Commonly Used Smoking Cessation Medications*

Basis	Nicotine Gum and Patch	Bupropion	Total	National Estimates	
Use from Sales Data (millions)	6.3	3.7	10.0	Number of smokers over age 18 (1996 CPS Data)	44.1
Use (% of all quit attempts)	21–24%	14%	34–38%	Quit attempts in the last year that are currently successful for 3 or more months (% of all daily smokers age 25+) (See Table 2-2)	11.5%
Successful Quits Associated with Use (millions)	0.63	0.37	1.00	Quit attempts successful for 3+ months (millions)	2.0
Excess Quits Attributable to Medication (% of successful quits where medication is used)	15–50%	15–50%	15–50%	Number of quit attempts attributable to medication	0.15–0.50
Excess Quits Attributable to Medication (millions)	0.10–0.32	0.06–0.18	0.15–0.50	Fraction of all successful quit attempts attributable to medication	7.5%–25%

** See text for basis of calculations.*

AHRQ Analyses A recent meta-analysis of treatment patch or gum performed as part of the U.S. Public Health Service Agency for Healthcare Research and Quality (AHRQ) *Clinical Practice Guideline* suggested that there was a doubling of the cessation rate for nicotine patch therapy and a 30 to 80 percent increase in cessation with nicotine gum (Fiore, 2000). Data from the 1996 CTS suggest that patch or gum use was associated with an increased likelihood of being quit at the time of the survey—approximately twice that of no therapy (31.7 percent compared to 17.1 percent; Table 5-2)—but the likelihood of being quit for 3 or more months was increased by only 15 percent. This population estimate of a 15 percent increase is based on a small number of observations and is substantially lower than estimates of larger populations studied as part of cessation evaluations. In addition, it is based on self-selected groups and, for the reasons discussed above, it probably represents an underestimate of the effect of those medications and is included as a lower bound of the likely magnitude of the effect.

INTERPRETATION Before discussing the significance of the above projections, some cautions are needed. First, the projections may actually be underestimates, as they do not include quits from medications other than nicotine patch, nicotine gum, and bupropion. On the other hand, the numbers may be overestimates, as they assume smokers do not use more than one medication at a time and do not use more than one medication per year. As stated above, we do not have any actual data on these two issues. Third, the calculations assume that all medication use is for cessation. A recent survey found that 94 percent of OTC gum use is, in fact, for cessation (Pillitteri *et al.*, 1998). Fourth, these estimates assume that utilization will continue at the same rate. Often, medications have an initial period of popularity followed by a decline in use. OTC gum and patch have been available for a sufficient period to indicate that sales are now stable. Bupropion has been available for less than a year; thus, whether its sales will decline (or alternately, they might still increase) is difficult to know.

The term "quits *associated with* medication" has been used to avoid the often implicit assumption that the effects of medication are entirely due to traditional pharmacological effects.

Of course, some of these effects are due to placebo effects and other non-pharmacological effects, including telephone-based counseling offered to smokers trying to quit. The one randomized study of such counseling showed that it improved quit rates on its own by a factor of 1.7 (Shiffman *et al.*, 1997a & b). However, probably less than 5 percent of medication users take advantage of such a program (Smith Kline Beecham, personal communication). Thus the contribution of telephone counseling to medication-associated quits is probably small. Another non-pharmacological effect is that medication availability may prompt quit attempts. OTC availability has made it easier to access medications among smokers who do not have to see a physician for such medication. Finally, the pharmaceutical companies have engaged in a large amount of direct-to-consumer advertising, the majority of which includes a stop-smoking message and encourages cessation, and the impact of this advertising on cessation activity has not yet been examined (Shiffman *et al.*, 1997a & b).

Neither did the analyses address whether any medication-associated quits are from "stealing" quitters who would have quit via behavior therapy. There are no data on whether this is the case; however, even if it were, the effect would be very small given the miniscule utilization of behavior therapy (<2 percent of all quits; Smith Kline Beecham, 1995).

With these caveats in mind, Table 5-4 presents a number of summary estimates for the effects of medication. With 44 million smokers and 17 million making quit attempts each year, and with 11.5 percent of those quit attempts lasting at least 3 months, approximately 2 million successful quits (for at least a 3-month period) would occur. Drug-use data would suggest that 6.3 million uses of patch and gum would occur (some individuals would use medications in more than one cessation attempt per year), and 3.7 million uses of bupropion would occur. Of the total population of daily smokers, 21-24 percent of those who make a quit attempt are estimated to use patch and gum, and an additional 14 percent are estimated to use bupropion. If 10-percent success rates are estimated for use of either medication, then approximately 1 million successful quits would be associated with medication. If the attributable fraction for medication use is between 0.15 and 0.5, then the number of excess quits produced by medication would be 150,000 to 500,000, or 7.5 to 25 percent of all successful quits.

CONCLUSION The major conclusions of these analyses are that medications are widely utilized for smoking cessation and make a substantial contribution to cessation success in the smoking population. Up to 1 million successful quits/year may be accompanied by medication use, and there may be an additional 150,000 to 500,000 successful quitters associated with medication use in the United States each year.

The development of truly effective medications, the decreased professional time necessary with OTC medications, the large increase in availability with OTC access, and the direct-to-consumer advertising for both Rx and OTC drugs by the pharmaceutical companies have led to a situation in which medications make an important contribution to smoking cessation in the United States.

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Effect of Cost on Cessation

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BACKGROUND ON THE ROLE OF PRICE/TAXATION

One of the best known principles of economics is that of the downward sloping demand curve. As the price of a commodity increases, the demand for that commodity will decrease. This law of economics can be extremely valuable in population-based tobacco control strategies. We can increase tobacco prices through tax policy, thus promoting reduced consumption.

The pricing of tobacco products is recognized as a key strategy in the "comprehensive plans" that health organizations have developed to guide tobacco control. The major health and medical organizations in the United States identify tax strategy as critical to achieving reductions in tobacco use, and the World Health Organization (WHO), in its publication *Guidelines for Controlling and Monitoring the Tobacco Epidemic* (WHO, 1998), lists tobacco taxes as a key strategy. It is important to ensure that the accessibility of tobacco products reflects the gravity of harm produced by these products. One important way of reducing this accessibility is to reduce the affordability of tobacco products by increasing the taxes imposed on them.

There is a substantial body of evidence, from the United States and elsewhere, demonstrating that a cigarette price increase will lead to a fall in overall cigarette consumption, though that fall will be less than proportionate to the increase in price. Much of the evidence on the role of price was summarized in the 1992 report of the Surgeon General, *Smoking and Health in the Americas* (U.S.DHHS, 1992), a 1993 summary report of a National Cancer Institute Expert Panel (NCI, 1993), and in the report of the Institute of Medicine (IOM), *Growing Up Tobacco Free* (IOM, 1994). In general, these analyses of the literature estimate that a 10 percent increase in the price of cigarettes will, all other things being equal, result in roughly a 4 percent decline in overall consumption (Chaloupka and Warner, 1999).

Price is also one of the few things tobacco companies acknowledge as affecting tobacco consumption. Filings with the Securities and Exchange Commission (SEC), and similar bodies in other countries, and reports to current or potential shareholders often mention the impact of price on sales. For example, the current 10-K filing with the SEC by Philip Morris Companies Inc. states (p. 4):

> "In the opinion of PM Inc. and Philip Morris International, past increases in excise and similar taxes have had an adverse impact on sales of cigarettes. Any future increases, the extent of which cannot be predicted, could result in volume declines for the cigarette industry, including PM Inc. and Philip Morris International…" (Philip Morris, Inc.)

Recent research has reiterated the importance of price. A review of this evidence was carried out by Dr. Frank Chaloupka as a policy analysis paper for the Health Science Analysis Project (Chaloupka, 1998), which looked at the potential impact on health of the price components of the various tobacco-related bills which had recently been introduced in Congress. His review of the research leads to the conclusion, "…that substantial sustained cigarette tax increases are potentially the most effective means of achieving long-run reductions in smoking in all segments of the population."

The impact of price is sufficiently strong that it can be demonstrated simply by juxtaposing data on price and consumption. As shown in Figures 6-1 through 6-3, there is a pronounced tendency for per-capita consumption to move in an inverse relationship to real prices.

OVERVIEW OF RECENT STUDIES

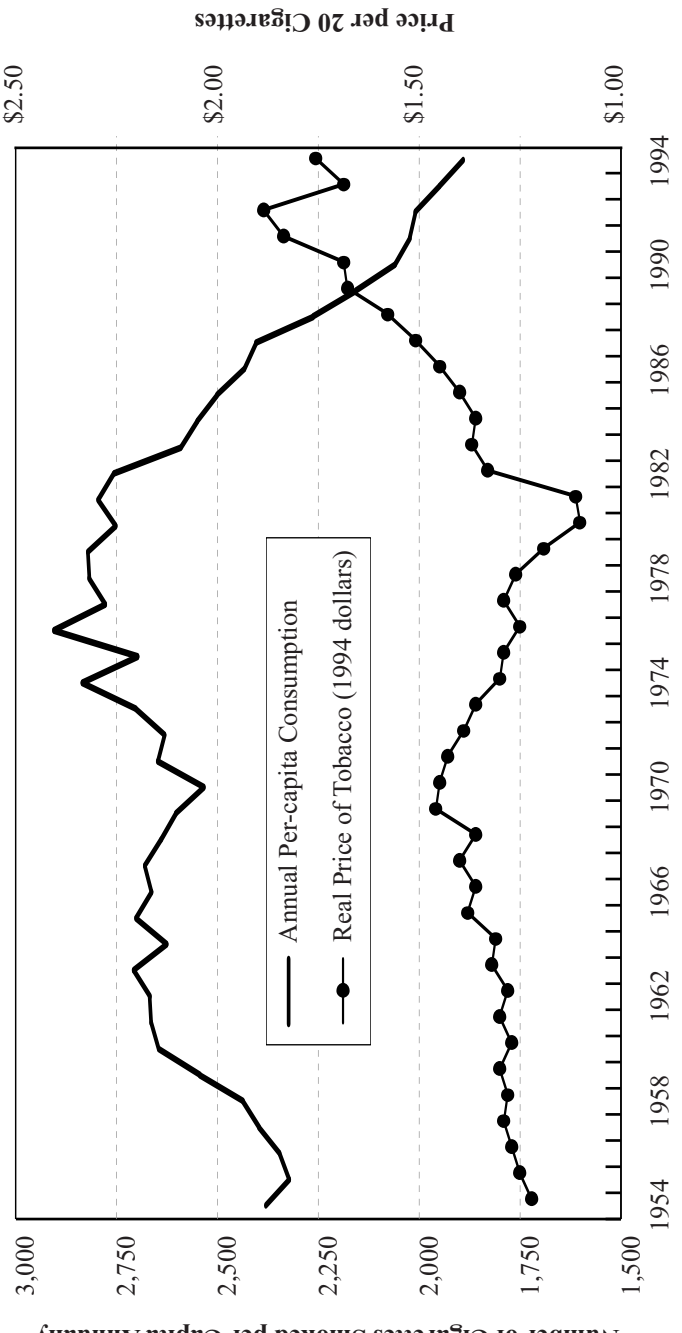
Although cigarette smoking is an addiction, even addictive behaviors have been shown to have downward sloping demand curves. This is an established effect quite independent of tobacco price studies. For example, it has been shown in animal experiments that there is an inverse relationship between the amount of work required and the consumption of an addictive substance (Bickel and DeGrandpre, 1996).

The idea that decisions about the use of addictive products can be made on the basis of a rational decision-making process is encompassed within the "rational addiction" model (Becker and Murphy, 1988), which is now widely accepted among economists (Chaloupka, 1991; Keeler *et al.*, 1993; Becker *et al.*, 1994; Sung *et al.*, 1994). Within this model, present consumption is influenced by past consumption and by the perception of the various costs of anticipated future consumption. Because of the role of past consumption in influencing current consumption, measures that reduce cigarette use in the present will have an additional effect on longer term use. In addition, increases in the perceived future costs of smoking will lead to reductions in current smoking.

There is significant evidence that young people are particularly price sensitive, and that this price-sensitivity will be reflected primarily in whether they smoke at all (Grossman and Chaloupka, 1997). By reducing the overall level of tobacco use within a population cohort, we create a strong tendency toward reduced consumption over the longer term. This, in part, explains the estimates that the long-term price elasticity is about double the short-term effect (Chaloupka, 1991; Becker *et al.*, 1994). This effect suggests that a 10 percent price increase could be expected to reduce overall cigarette use by about 4 percent in the short term, but by about 8 percent in the long term.

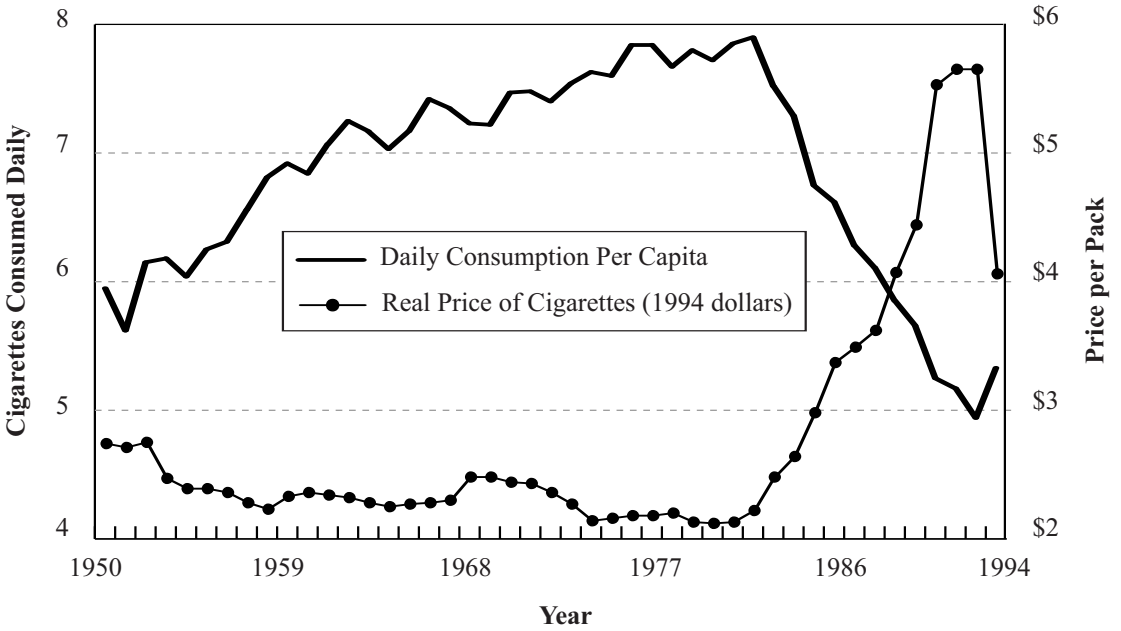
In terms of estimating overall population-based cessation, it is important to note that estimates of price responsiveness among smokers measure aggregate cigarette consumption. This is a combination of the effects of those who quit (or do not start) and those who reduce their consumption. A 4 percent decline in consumption does not mean a 4 percent decline in smoking prevalence. A recent analysis (Evans and Farrelly, 1996) estimated that approximately half of the impact of price on adult smoking is on the decision to smoke in the first place.

Figure 6-1
Annual per Capita Consumption of Cigarettes and Real Price of Tobacco (per 20 Cigarettes): United States, 1954–1994



Sources: The Tax Burden on Tobacco, published by The Tobacco Institute, Washington, DC, vol. 33, 1998
U.S. Bureau of Labor Statistics, CPI (all items)

Figure 6-2
Daily Consumption of Cigarettes (per Capita) and Real Price of Tobacco (per 20 Cigarettes): Canada, 1950–1994



Notes: Data include the highest credible estimate of contraband tobacco.
Cigarettes include fine-cut tobacco equivalents (1 g)

Sources: Canadian Tobacco Consumption, 1990–1994, Prepared by The Non-Smokers' Rights Association, 1994
Statistics Canada, catalogues, 32-022 Monthly, 91-022, vol. 7, no. 3, 91-512 and 91-213
Linquist Avey MacDonald Baskerville, Inc. "Contraband Estimate 1992—An Update" September 27, 1993

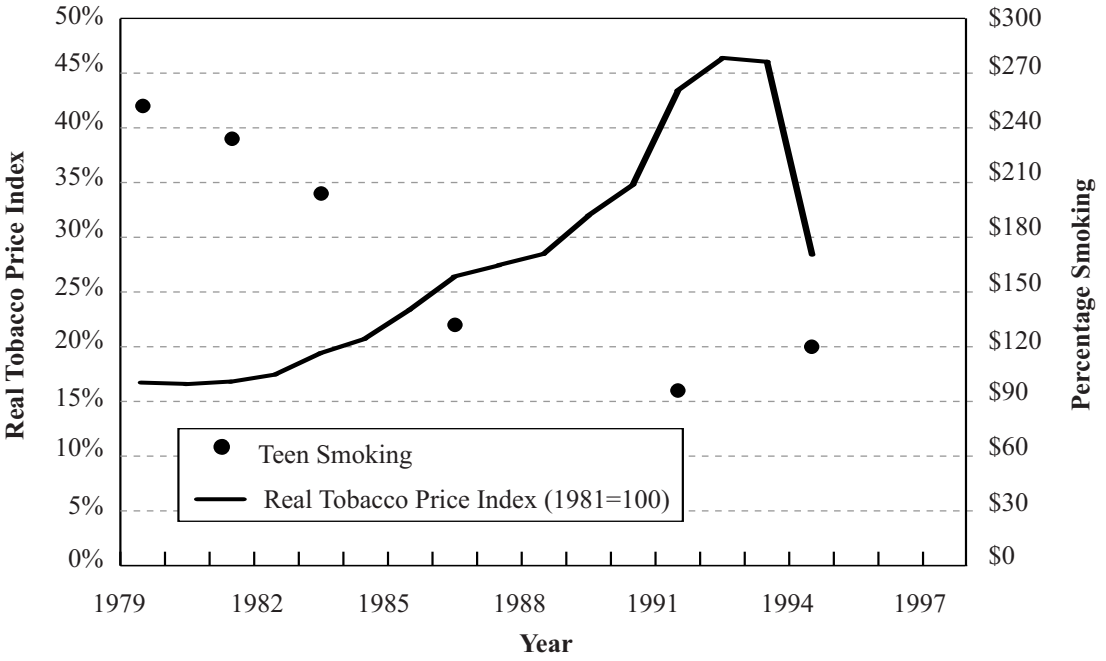
THE CANADIAN EXPERIENCE

From 1982 to 1991, there were rapid increases in the cost of cigarettes in Canada, caused primarily by a series of large tax increases. The real price of a pack of 20 cigarettes went from about $2.10 to about $5.40 (Sweanor *et al.*, 1994). Smuggling of tobacco products—supplied overwhelmingly by Canadian cigarettes shipped to the United States—led to a significant contraband market, which began to erode prices in 1992 and 1993. In early 1994 there were large tobacco tax reductions, bringing the average price of a pack of 20 back to about $3.20.

There is no doubt that the rapid escalation of tobacco prices in Canada was accompanied by significant declines in consumption. In terms of total per-capita consumption, the decline among adults from 1982 to 1992 was approximately 40 percent, and among 15- to 19-year-olds, the decline was roughly 60 percent (Sweanor *et al.*, 1994; Sweanor and Martial, 1994).

This decline in Canadian per-capita consumption was significantly more rapid than that experienced in the United States. Figures compiled by the Canadian Tobacco Manufacturers' Council (CTMC, 1993) show that per capita cigarette consumption among those over the age of 15 declined by 42.4 percent in Canada from 1982 to 1992, compared to a decline of 25.7 percent in the United States.

Figure 6-3
Real Cigarette Prices and Daily Cigarette Smoking among Canadians: Age 15 to 19



Sources: Statistics Canada, Labor Force Survey, 1991
Canadians and Smoking: An Update, Health and Welfare Canada, 1991
Survey on Smoking in Canada, Cycle 3, 1994

The Canadian experience also showed that the declines in per capita consumption were accompanied by significant declines in prevalence. The federal health department (Health Canada, 1991) does periodic polling of smoking rates, and these rates show a decline in smoking prevalence from 39.5 percent in 1981 to 31 percent in 1991. Gallup, who does an annual survey, found a decline from 45 percent in 1981 to 33 percent in 1991. By far the most comprehensive surveys of smoking behaviors, however, are conducted by tobacco companies themselves. Data from Imperial Tobacco, a BAT affiliate that controls two-thirds of the Canadian market, show a decline in smoking prevalence from 39.4 percent in 1981 to 30.6 percent in 1991 (Imperial Tobacco, 1989; Imasco, 1993). In all cases, the percentage decline in the prevalence of smoking increased significantly during the time of rapidly increasing prices (Stephens, 1994).

The decline in smoking prevalence among 15- to 19-year-olds in Canada was more pronounced, as shown in federal government surveys (Health Canada, 1991). In 1981, 43.5 percent of 15- to 19-year-olds were smoking cigarettes and 39.5 percent were smoking daily. By 1991, only 22 percent were smoking at all and only 16 percent were smoking daily.

With the reduction in tobacco prices—a process that began with smuggling and was greatly enhanced by the tax reductions—the trend lines in tobacco consumption reversed. The best example of this is, again, data from the tobacco industry. RJR's Canadian subsidiary does monthly polling of smoking trends in Canada, and a year ago this information became available for the years 1988 to 1996 (RJR-Macdonald, 1997). The relationship of consumption rates with price changes is very strong. Among all adults it shows a decline in smoking prevalence from 31.0 percent in 1988 to 26.7 percent in 1991. There was a further small decline in 1992, coinciding with the growth of smuggling, but a slight increase (to 26.9 percent) in 1993 as smuggling peaked. The price cuts of 1994 correspond to an increase in smoking prevalence to 27.9 percent that year, followed by an increase to 28.4 percent in 1995 and a slight decrease (to 28.2 percent) in 1996.

The price effects indicated by the RJR data are even more pronounced among 19- to 24-year-olds. The data show a decline in prevalence from 33.4 percent in 1988 to 28.4 percent in 1992 and 28.3 percent in 1993. With the tax cuts, prevalence went to 29.6 percent in 1994 and was 32.3 percent in 1996.

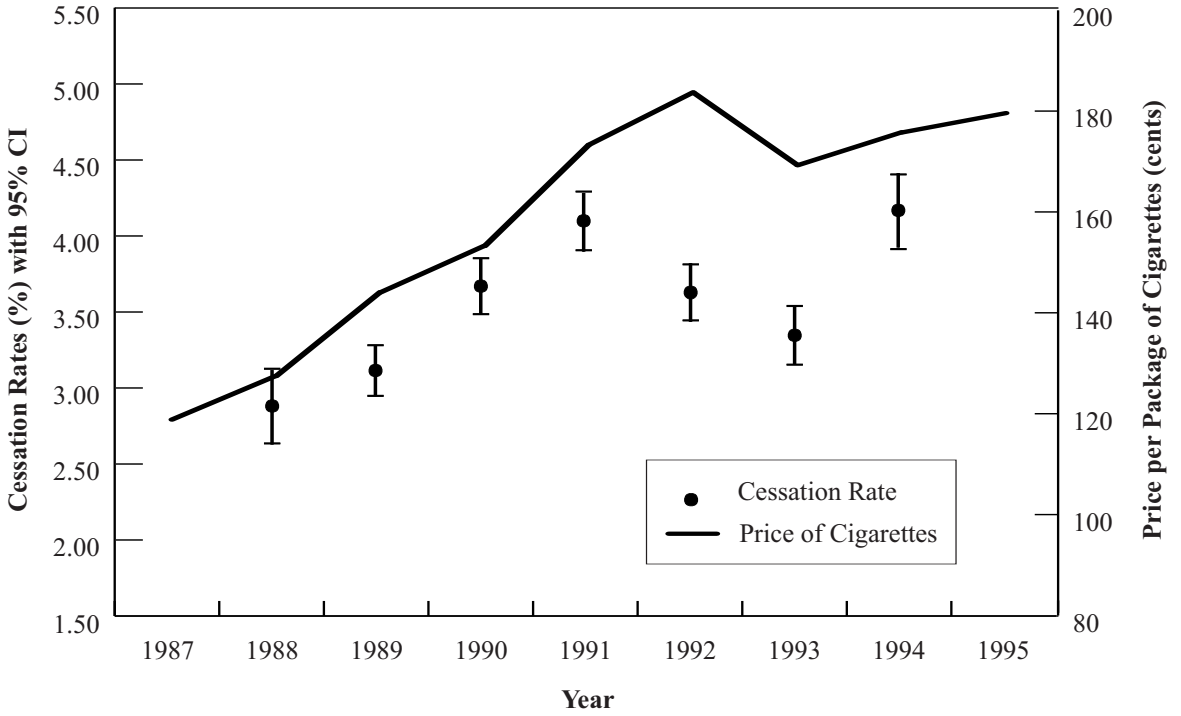
EFFECTS OF COST ON MEASURES OF CESSATION

Much of the work examining the role of cigarette cost as a tobacco control intervention has centered around using cigarette consumption as the measure of smoking behavior that is changing in relation to changes in cost. However, consumption can change because smokers quit long term, because smokers reduce the number of cigarettes that they smoke per day, because large numbers of smokers quit for brief periods and then relapse, or because fewer adolescents begin to smoke. Obviously the public health benefits of these different causes of reductions in consumption are vastly different, but few studies have been able to examine the effect of changes in cost of cigarettes on cessation due to the difficulties in obtaining population-based cessation data around the time of a price increase and the difficulty in finding an appropriate comparison group. We have utilized the 1992/93 and 1995/96 Current Population Surveys (CPS) which provide state-specific smoking prevalence and cessation data to examine the effect of cost on cessation in the United States.

LONG-TERM SUCCESSFUL CESSATION

The CPS asks all former smokers when they quit smoking, allowing identification of the calendar year in which they quit. These data allow estimation of annual successful cessation rates. The number of current smokers for each of the years prior to the survey is estimated by adding those who are current smokers at the time of the survey and those who have quit between the year in question and the survey year. This number forms the denominator of the cessation rate for each calendar year. The number of these current smokers who report having quit during that year forms the numerator. By restricting the analyses to those who have been quit for at least 1 year at the time of the survey, only those who are successfully quit for 1 year or more are included in the numerator; and the estimates become an annual estimate of long-term (1 year or more) successful cessation for each of the calendar years. Use of 5- and 10-year digit preferences in the response to the question on how long ago the former

Figure 6-4
Long-Term Cessation Rates* versus Price of Cigarettes: United States



** The at-risk population for each calendar year includes those CPS subjects who reported smoking during that year and who responded to the CPS no less than 2 calendar years and no more than 4 calendar years from the year for which the rate was calculated. Long-term quits are those that are at least 1 year long.*

smoker quit limits the utility of calendar year quit rate estimates to those within 4 years of the survey. But by combining the 1992/93 and 1995/96 CPS it is possible to get calendar-year, long-term successful cessation rates for the period of 1988-1995.

Figure 6-4 presents these calendar-year, long-term successful cessation rates in conjunction with the average sales-weighted cost (Tobacco Institute, 1998) of a pack of cigarettes for the same years. There is a remarkable concordance between the cost and cessation data, particularly for the fall in cost and fall in cessation that occurred between 1992 and 1993 as part of a price competition triggered by the discounting of the prices of Marlboro and other premium cigarettes. This pattern suggests that at a macro level there is a concordance between cost of cigarettes and cessation rates.

MEASURES OF CESSATION

There is a marked disparity in the cost of cigarettes among different U.S. states. This disparity is produced by differences in the state excise taxes on cigarettes and by differences in the market share of different brands of cigarettes, particularly of generic brands that sell at a steep discount to full-price premium brands such as Marlboro. Differences across states in cost of cigarettes can be compared to differences in state-specific

cessation measures (cessation attempt, being a former smoker, being a former smoker for 3+ months (see Chapter 2)) for those who were daily smokers 1 year prior to the CPS. These measures provide state-specific estimates of the rates of cessation attempts and cessation success that can be compared to the differences across states in the absolute cost of cigarettes.

Cost measures were calculated separately for each month of the CPS (September, January, and May). The cost measures were the average of the annual costs for the 12 months prior to the survey month, with the change in cost estimate for the 3+ month cessation analysis excluding the costs for the 3 months prior to the survey—*i.e.*, it was an average of 9 months rather than 12. An appendix to this chapter contains a more detailed description of the methods used in these analyses.

An analysis of repeated measures for these data were performed and are included in the appendix. There are statistically significant effects identified for the association between absolute costs of cigarettes and increases in cessation attempts, being a former smoker of any duration, and 3+ month cessation success. The effect of the prior year's absolute cost on becoming an occasional smoker was not statistically significant. Table 6-1 quantifies the magnitude of this effect of cost on cessation by expressing the change expected in the cessation measures based on various percentage differences in the cost of cigarettes. The differences are somewhat dependent on the starting point chosen for calculation of the differences in cost and the baseline rate of cessation in the state, but these estimates provide a general measure of the magnitude of the effect found in the analysis. For example, if the difference in the price per pack of cigarettes between states is from $2.00 to $2.30 (a 15 percent difference), the analyses would predict that there would be a difference in cessation attempts from 30 percent to 32.1 percent (a 7.1 percent increase) and a difference in 3+ month cessation rates of from 5 percent to 5.4 percent (a 10.6 percent increase). These absolute differences may appear small, but they are similar to or larger than the price elasticities calculated for the acute effects of cost changes on consumption, and they would accumulate over time to have a much larger effect on prevalence as described above. These analyses are cross-sectional in nature, and it is likely that many of the same environmental factors that allow a high excise tax within a state will have an effect on cessation independent of their effect on the cost of cigarettes. The association of these other factors with the cost measure will overestimate the independent effect of cost on cessation in these analyses. However, these data provide further support for an effect of cigarette cost on smoking cessation as one mechanism for the reduction in cigarette consumption measures demonstrated following increases in excise taxes.

CAVEATS Many factors must be kept in mind when analyzing the potential impact of price policies on population-based cessation. To begin with, economists talk about "real" (*i.e.*, inflation-adjusted) prices. Price increases must be sustained, or the impact will be eroded by inflation.

Table 6-1

Predicted Difference in Cessation Measures for Various Differences in the Cost of Cigarettes

(Estimated from the Relationship across States between the Percentage Difference in Cost and Percentage Difference in Cessation Measures, Controlling for the Random Effects of Time and State, CPS 92/93 & 95/96 Combined)

Percentage Difference in Cost (%)	Difference in Cessation Measures Expressed as a Percentage		
	Cessation Attempts* (%)	Former Smokers	
		Any Length (%)	3+ Months (%)
5	2.4	2.6	3.6
10	4.8	5.2	7.1
15	7.1	7.7	10.6
20	9.4	10.1	14.0
25	11.6	12.5	17.4
-5	-2.5	-2.7	-3.6
-10	-5.0	-5.4	-7.3

**Attempts: Includes those who have made a quit attempt or have become former smokers, excludes occasional smokers.*

For example: A state charges $2.00 for a pack of cigarettes, 30% of its residents made a quit attempt and 5% became former smokers. If the price per pack is raised to $2.30 (a 15% increase in cost), the analysis would predict the reported cessation measures to increase to 32.1% and 5.4%, respectively.

Price data may not accurately reflect what is actually paid for the product. For instance, "average prices" in the United States often use the price of Marlboros as the standard or use a market-weighted average price. Such methodologies fail to take into account market segmentation on pricing issues. Looking at average prices ignores the role of cheaper cigarettes as a way of retaining price-sensitive smokers.

To examine the effect of price on price-sensitive smokers we need to know what prices these people are actually paying. This means knowing about not only cheaper cigarette brands, but also about the role of discount coupons and the provision of merchandise (such as Marlboro gear) that effectively lowers the price paid for the product.

Most pricing analyses, like most other research on tobacco consumption, are based on examining one variable while holding other variables "constant." This, of course, does not work well in practice, as many other factors change over the same time periods that a change in price occurs. Studies of price need to consider the following:

- Disposable income. There is an income elasticity as well as a price elasticity. Looking only at prices will miss the overall impact of affordability. This is particularly significant when looking at relatively small price increases during times of significant disposable income changes. These income changes may be particularly significant among adolescents and young adults and may dwarf the effects of measured price changes.
- Promotional activities. The activities of tobacco companies can increase the perceived value of tobacco products in the eyes of purchasers as a way of combating the effects of higher prices. Tobacco companies are quite capable of fighting back against an increase in excise tax by increasing promotional activities in

order to retain existing users and attract new users. This can happen through promotions such as Marlboro gear, Joe Camel, and tobacco-product movie placement.

- Population differences. Populations change over time. Looking at the effects of price on smoking rates over time in, say, Vancouver or California without taking into account changing demographics may simply miss key associations. It may be that there is a broad-based change in consumption due to price, but this change needs to be distinguished from consumption changes due to other factors such as high numbers of non-smoking immigrants.

SUMMARY Cost is clearly one of the major public policy tools that can influence smoking behavior. Increases in the cost of cigarettes have been shown to reduce cigarette consumption across a wide range of political jurisdictions and time periods. It is estimated that a 10 percent increase in the cost of cigarettes can be expected to reduce cigarette consumption by 4 percent, for a price elasticity of 0.4. Adolescents appear to be more sensitive to the effect of increasing cigarette costs. Data comparing long-term cessation rates in the United States with changes in the sales-weighted average cost of cigarettes show a fall in cessation when the cost of cigarettes was reduced between 1992 and 1993 as part of a cigarette price competition. Comparison of differences in costs across states with differences in cessation rates shows a statistically significant association of the absolute cost of cigarettes with both cessation attempts and 3+ month successful cessation. Taken as a whole, these data support an effect of cost on both cigarette consumption and smoking cessation.

Appendix

CPS CESSATION MODELS WITH COST: SUMMARY OF METHODS USED IN REPEATED MEASURES ANALYSIS

Population

The analysis includes cessation measures based on respondents of the Current Population Surveys for 1992/93 and 1995/96, who are 25 years of age or older. To be included in the analyses, these respondents must have a valid current smoking status (daily, occasional, or former) and must have been daily smokers 1 year ago. In other words, respondents who did not answer whether they had smoked at least 100 cigarettes (Question 32), whether they currently smoke (Question 35), and whether they smoked daily 12 months ago (Question 61) are excluded from the analysis. Additionally, respondents are excluded from the analysis if they are:

- current daily and occasional smokers with unknown quit attempts (Questions 44 and 45),
- current occasional and former smokers who have not been daily smokers for at least 6 months (Questions 39 and 55), or
- current former smokers with unknown lengths of quit time (Question 59).

Additionally, the cessation measures were calculated for all states (plus D.C.) for each survey month (Sept 92, Jan 93, May 93, Sept 95, Jan 96, and May 96), yielding six repeated measures for each state.

Below is a summary of the number of respondents used for the cessation measures for the CPS for various years.

Population	Sept 92	Jan 93	May 93	Sept 95	Jan 96	May 96
Respondents to Current Population Survey	105,937	105,148	104,920	98,082	87,336	87,811
Daily Smokers 12 months ago	15,194	15,367	14,255	13,314	11,564	11,516
Daily Smokers 12 months ago, age 25+	13,676	13,830	12,815	12,081	10,473	10,363

Outcomes The five different cessation outcomes modeled using the CPS algorithm were as follows:

Change	Daily smokers 1 year ago who have either tried to quit (current daily smokers with quit attempts in the past year), have become occasional smokers, or have quit altogether (current former smokers).
Attempts	Daily smokers 1 year ago, excluding current occasional smokers, who have tried to quit or who have quit. Current occasional smokers have been excluded from the analysis of this outcome since their attempts to quit are not monitored on the CPS.
Occasional	Daily smokers 1 year ago who have become occasional smokers.
Former	Daily smokers 1 year ago who have quit smoking, regardless of the length of this current quit effort.
Former, greater than 3 months	Daily smokers 1 year ago who quit smoking at least 3 months prior to the survey.

Covariates The following fixed effects are used to model the cessation outcomes:

Time-weighted Price for Prior Year's Absolute Cost	The price of cigarettes for all states (plus D.C.) was obtained from *The Tax Burden on Tobacco* (Tobacco Institute, 1998). Each price is the weighted average price per package for the calendar year. To calculate an appropriate cost measure of time for the cessation measures Change, Attempt, and Any Former, we weighted the price for each calendar year by the number of months in each year that spans the 12-month period prior to the survey month. To calculate an appropriate cost measure of time for the cessation measure Formers with at Least 3 Months Quit Time, we weighted the price for each calendar year by the number of months in each year that spans the 9-month period 3 months prior to the survey month.

The following random effects are used to model the cessation outcomes:

Month/Year — A continuous variable that takes into account the length of time between the survey months. This variable is needed to account for the unequal time intervals in our repeated measures analysis.

Month/Year	Code
September '92	1
January '93	2
May '93	3
September '95	10
January '96	11
May '96	12

State — A categorical variable that assigns a number to each state (plus D.C.).

Variables *State* and *Month/Year* were used as random effects to address the issue that observations from the same state are correlated as are observations from the same year.*

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Self-Help Materials

Susan J. Curry, Jacqueline M. Major

INTRODUCTION Population-based approaches to smoking cessation can be viewed on the continuum of clinical to public health interventions (Curry, 1993). At one end, a clinical approach provides intensive, efficacious interventions to smokers who seek help, whereas a public health approach provides lower intensity interventions to a broader spectrum of the population (Abrams *et al.*, 1991; Lichtenstein and Glasgow, 1992). Generally, population-based approaches fall in at the public health end of this continuum. At the population level, we often talk about wanting to maximize the impact of an intervention. Impact can be defined as the product of an intervention's reach (*i.e.*, the proportion of smokers who are exposed to the intervention) and its effectiveness (*i.e.*, the cessation rate associated with the intervention). Because of their potential for wide-scale dissemination, self-help materials for smoking cessation are an important component of population-based approaches to smoking cessation.

We define self-help materials as comprehensive behavioral programs for smoking cessation that do not require attendance at treatment sessions (in person or via telephone). Such programs can take the form of written materials, computerized programs, or audio-visual programs. Self-help materials can be delivered alone or as part of a set of intervention components that comprise "minimal interventions." Examples of minimal intervention packages include self-help materials along with proactive telephone counseling, with pharmacotherapy, or with face-to-face treatment sessions.

There are several intuitively appealing features of self-help materials. As noted above, the materials can package components of intensive interventions for broad reach into the population. Such materials are relatively low cost to disseminate in a variety of settings. Self-help materials can be tailored or customized for different target groups, and users of self-help materials can tailor the program recommendations to their own specific needs. Self-help materials can be kept and reused for multiple quit attempts. Finally, the majority of smokers prefer less intensive self-help approaches (Fiore *et al.*, 1990).

This brief report examines the current state of knowledge regarding the rates of use for self-help materials among the general smoking population and the impact of self-help materials on smoking cessation attempts and on the achievement rates of smoking cessation success.

UTILIZATION OF SELF-HELP MATERIALS

Key national surveys of tobacco use and cessation—including the 1986 Adult Use of Tobacco Survey and the past and current Behavioral Risk Factor Surveys—do not assess the use of self-help materials. Nor did the Fiore *et al.* (1990) analysis of assisted and unassisted methods of cessation include a specific reference to self-help materials. The 1986 version of the Cancer Control Supplement to the National Health Interview Survey *did* ask current smokers whether they had ever tried to stop smoking by following instructions in a book or pamphlet, but these data have not been published (Office on Smoking and Health, personal communication, 1998).

Data on use of self-help materials alone and in combination with other interventions (*e.g.*, counseling, nicotine replacement, etc.) are available from the 1996 California Tobacco Survey for adults. Among adults age 25 and older who were daily smokers 12 months prior to the survey and who had made a quit attempt in the past 12 months, 2.5 ± 0.7 percent reported using self-help materials alone and 9.3 ± 1.3 percent reported using them alone or in combination with some other cessation method (Table 7-1). These rates of use are higher than for counseling, but lower than the rates for nicotine gum or patch, particularly gum or patch used either alone or in combination with other methods. There appear to be some differences in rates of use by age, with a lower proportion of younger smokers (ages 18-24, data not shown) reporting the use of self-help methods, either alone or in combination. Female smokers were slightly more likely than males to use self-help approaches in combination with other methods, and Asian/Pacific Islander smokers were slightly less likely to use self-help approaches. Otherwise, there were few differences by age or race/ethnicity. There was a modest increase in the use of self-help approaches among higher educated and higher income groups (with the exception of those earning $75,000 or more). Figure 7-1 shows abstinence rates at the time of the survey for adult smokers who reported using either no cessation method or using counseling, patch, gum, or self-help alone or in combination with another method. Self-help, patch, and gum, when used in combination with other methods, had significantly higher rates of being quit at the time of the survey, but the differences in being quit for 3 or more months were not statistically significant, possibly due to the small number of observations.

Table 7-2 presents the current smoking or cessation status at the time of the survey for those who were daily smokers 1 year prior to the survey and who made a cessation attempt. Cessation and smoking status are presented by the method used. Although the confidence intervals on these observations are too broad to draw statistically significant interpretations, the fraction of those who made a quit attempt and who are still quit at the time of the survey among those reporting that they used self-help methods alone is only slightly higher than that for those who reported using no method at all. The use of gum alone, self-help in combination with counseling or patch or gum, and patch or gum in combination with self-help or counseling were all associated with a higher rate of being still quit at the time of the survey. There is a suggestion that self-help used in combination with patch, gum, or counseling may be more effective than self-help methods

Table 7-1

Aids Used by Those Who Made a Cessation Attempt in the Last Year*—California Tobacco Survey, 1996

	Single Aid Only										Combination of Aids**									
	None		Counseling		Self-Help Materials		Nicotine Patch		Nicotine Gum		Counseling		Self-Help Materials		Nic Patch or Gum		Unknown		Pop Size	Samp Size
	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	%	± CI	(N)	(n)
Total	72.3	2.0	1.7	0.7	2.5	0.7	4.6	0.8	3.3	0.8	7.1	1.1	9.3	1.3	21.0	1.8	0.7	0.3	1,266,663	2,680
Gender																				
Male	75.2	2.7	1.3	0.8	2.4	1.0	4.7	1.1	2.7	1.0	5.6	1.4	8.0	1.7	19.2	2.3	0.6	0.5	707,535	1,377
Female	68.5	3.4	2.2	1.1	2.7	1.1	4.4	1.2	3.9	1.4	8.9	1.6	11.0	1.9	23.4	2.9	0.7	0.5	559,127	1,303
Age (Years)																				
25–44	74.6	2.1	1.9	0.9	2.9	0.9	3.9	0.8	2.7	0.9	6.0	1.2	9.0	1.7	18.2	2.0	0.9	0.5	797,986	1,661
45–64	69.3	4.2	1.7	1.4	2.0	1.0	5.7	1.8	3.6	1.5	9.2	2.6	10.0	2.6	24.1	3.5	0.3	0.4	365,166	803
65+	64.3	7.7	0.4	0.8	1.3	1.8	6.3	2.8	6.6	5.1	7.7	3.8	9.1	4.8	32.5	7.5	.	.	103,509	216
Race/Ethnicity																				
NH White	68.4	2.2	1.2	0.6	2.6	0.7	6.1	1.1	3.5	1.1	6.8	1.1	9.7	1.4	25.1	2.1	0.7	0.4	806,518	1,930
Hispanic	80.6	4.6	2.7	2.1	2.0	1.6	2.0	1.6	2.5	1.8	6.5	3.0	7.6	2.9	13.2	4.0	0.4	0.7	224,058	332
Afric-Am	79.5	6.2	1.8	2.9	3.6	2.6	.	.	2.4	2.2	9.5	4.9	10.7	4.1	11.4	4.9	2.1	2.3	111,550	185
Asian/PI	77.9	7.7	2.6	4.1	2.2	2.4	5.7	4.1	2.9	2.9	8.0	6.4	5.9	3.9	15.5	6.1	.	.	70,309	135
Nativ Am	72.5	13.7	2.9	4.2	1.3	2.5	1.8	2.1	4.6	8.3	7.4	4.7	12.0	6.5	20.7	11.1	.	.	54,227	98
Other	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0
Education (Years)																				
<12	77.2	5.6	3.8	2.5	1.5	1.2	2.1	1.4	3.3	2.0	8.3	3.1	7.2	3.0	15.8	4.8	1.0	0.8	299,599	312
12	72.0	3.1	1.1	0.6	2.7	1.0	6.1	1.5	2.1	1.0	6.0	1.9	9.2	2.2	22.3	2.9	0.5	0.5	364,834	903
13–15	71.9	3.7	1.0	0.7	2.6	1.2	5.2	1.6	2.8	1.0	6.7	1.8	9.8	2.1	20.4	3.2	1.1	0.9	359,691	887
16+	67.1	4.8	1.0	0.8	3.4	1.5	4.6	1.6	5.5	2.4	7.7	2.5	11.3	2.7	26.5	4.2	.	.	242,537	578
Household Income (Dollars)																				
≤10K	78.2	5.3	3.0	2.7	1.9	1.5	1.8	1.9	3.2	2.5	8.3	4.0	6.9	3.3	14.8	4.7	1.2	1.3	156,924	264
10-20K	76.3	4.9	2.5	2.1	1.9	1.3	3.7	1.8	2.6	1.8	6.8	3.2	6.4	2.7	18.2	4.5	0.7	1.0	187,040	354
20-30K	78.5	4.4	0.6	0.7	3.1	1.7	3.6	1.8	1.8	1.1	4.5	2.0	9.7	2.9	14.9	4.3	0.8	1.1	190,339	398
30-50K	69.7	4.4	1.5	1.4	2.5	1.3	6.0	2.2	2.9	1.5	7.6	2.6	10.4	2.9	23.8	4.1	0.6	0.7	271,517	605
50-75K	66.9	5.7	1.6	1.5	3.6	2.0	5.4	2.1	3.3	1.7	8.6	3.1	13.5	4.1	23.9	5.0	0.7	0.9	200,708	452
>75K	64.9	5.6	2.3	2.4	1.2	1.2	6.6	2.5	5.4	3.6	7.7	3.2	6.9	2.8	29.9	5.5	0.4	0.7	148,285	377
Unknown	71.9	6.4	0.4	0.7	3.4	2.3	4.4	2.9	4.8	3.9	5.2	2.5	9.7	4.0	21.5	5.7	0.4	0.7	111,848	230

**Those 25+ years of age who have made a quit attempt in the past year and were daily smokers 1 year ago.*

***Combination includes use of the method alone or with any other method.*

Figure 7-1
Current Cessation Status at Time of Survey by Method Used among Those Who Were Daily Smokers 1 Year prior to the Survey and Who Made a Quit Attempt, Ages 25+, 1996 CTS

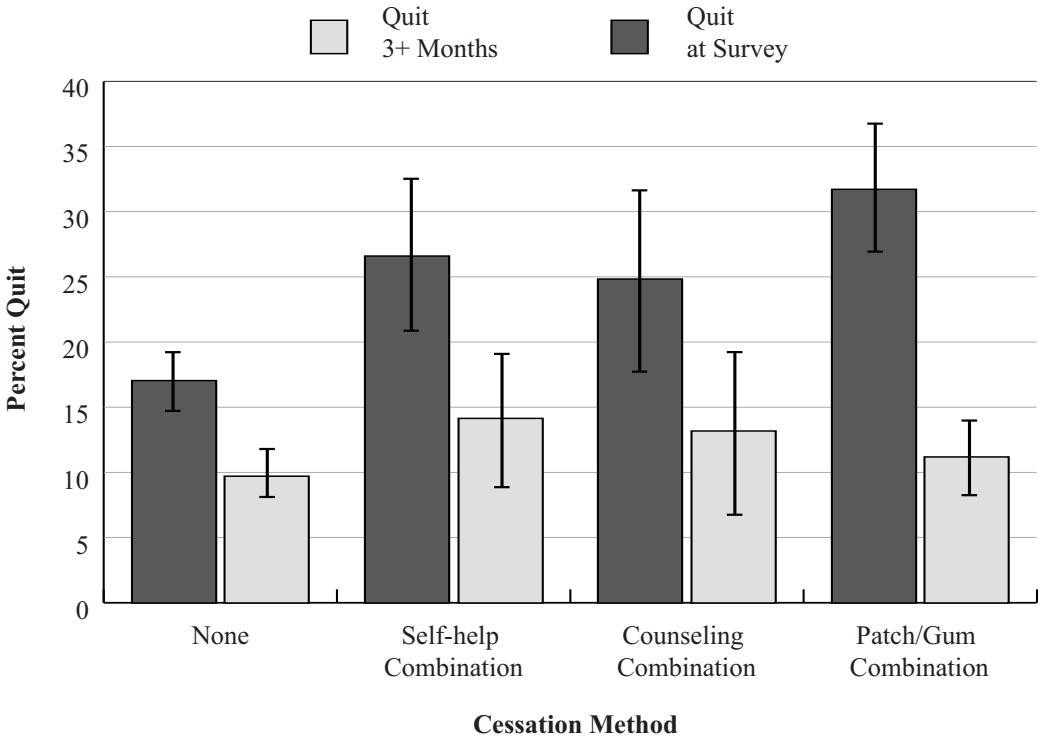

Table 7-2
Current Smoking and Cessation Status by Method of Cessation Used*

	Current Smoker w/Quit Attempt				Former Smoker of Any Quit Length		Pop Size (N)	Samp Size (n)
	Daily		Occasional					
	%	CI	%	CI	%	CI		
Total	71.79	2.09	7.56	1.21	20.65	1.90	1,266,663	2,680
Single Aid Only								
None	74.59	2.30	8.35	1.60	17.06	2.20	915,186	1,886
Counseling Only	.	.	3.79	5.39	.	.	21,538	38
Self-Help Only	73.04	9.63	6.48	5.66	20.48	8.88	32,124	74
Patch Only	67.11	8.17	6.49	4.06	26.40	8.04	58,422	142
Gum Only	57.49	14.99	8.00	6.32	34.52	14.16	41,251	92
Aids in Combination								
Counseling**	71.81	7.11	3.32	2.55	24.87	7.16	89,356	189
Self-Help**	69.06	6.22	4.34	3.07	26.60	6.08	117,871	260
Patch/Gum**	62.62	4.87	5.68	1.76	31.71	4.51	266,595	612
Unknown	.	.	.	.	.	.	8,549	16

**Those 25+ years of age who have made a quit attempt in the past year and were daily smokers 1 year ago.*
***Combination includes use of the method alone or with any other method.*
Source: California Tobacco Survey, 1996

used alone. In contrast, there is no trend suggesting that the addition of self-help or counseling methods improves the percentage of gum users who are quit at the time of the survey. These data suggest that, if self-help materials are used, they should be used as one component of a multi-component cessation intervention.

Unpublished data from a study conducted at the Group Health Cooperative (Curry *et al.*, 1995) provide some population-based data on uti lization of self-help materials. In this study, a total of 1,137 smokers were identified from a population-based survey of over 5,900 adults (response rate 74 percent). Smokers were asked the following question, "Have you ever tried self-help quit smoking books, pamphlets or guides?" Overall, 3 percent indicated that they were currently using one, 28 percent said they had used them in the past, and 69 percent said that they had never tried a self-help guide. Rates of use differed by gender, with women reporting sig nificantly more current (4 percent versus 2 percent) and past (32 percent versus 24 percent) use than men.

Population-based estimates of the proportion of smokers who say they have used self-help materials do not provide insight into what the smokers actually do with the books or guides when they have them. Because self-help materials can be easily disseminated, it may be of particular interest to examine rates of use and the impact of materials in smokers who voluntari ly request materials compared to those who receive the materials through population-based outreach efforts. A recent publication from our research program (McBride *et al.*, 1998) examined the use of self-help materials and smoking cessation among proactively recruited and volunteer intervention participants. The study used data from two separate randomized trials that used the same self-help manual as one of the treatment arms (Curry *et al.*, 1991 & 1995). As expected, volunteer smokers were significantly more like ly to read the self-help materials and to complete any activities than were nonvolunteer smokers (84 percent versus 33 percent read materials, respec tively; 49 percent versus 13 percent completed activities, respectively). Baseline variables that predicted use of the self-help materials (with use defined as reading at least half of the materials and completing any recom mended activities) for the volunteer smokers were whether participants reported any prior quit attempts and a strong desire to quit smoking. Desire to quit smoking also predicted use among nonvolunteers, as did higher education level.

McBride and colleagues also tested for associations between using the self-help materials and outcomes at a 12-month follow-up. These prospec tive analyses examined whether reported use of the self-help manual at 3 months predicted quit attempts or abstinence when assessed at 12 months. In both the volunteer and nonvolunteer samples, self-reported use of the self-help manual at 3 months was associated with a higher likelihood of reporting 24-hour quit attempts at the 12-month follow-up. Use of the materials did not predict 12-month prevalent abstinence in either sample.

IMPACT OF SELF-HELP MATERIALS ON SMOKING CESSATION

The Cochrane Tobacco Addiction Review Group is completing a meta-analysis of self-help interventions for smoking cessation (Lancaster and Stead, 1999). They examined a total of 39 randomized clinical trials with a minimum of 6 months of follow-up. The studies were selected if they had at least one arm that included a self-help intervention without repeated face-to-face thera pist contact. The target outcome is long-term abstinence, defined as either 6-month sustained abstinence or two consecutive point-prevalent absti nence reports.

Five hypotheses guided the review:

- Self-help interventions are better than no treatment.
- Self-help interventions are equivalent to more intensive behav ioral interventions and to pharmacotherapy.
- Different forms of self-help materials (written, audio, video) have equivalent effects.
- Adjuncts such as computer-generated feedback, telephone hot-lines, and pharmacotherapy increase effectiveness.
- Approaches tailored to the individual are more effective than nontailored materials.

Self-help interventions are defined as "any manual or program to be used by individuals to assist a quit attempt not aided by health profession als, counselors, or group support." The review group also distinguished tai lored from personalized materials, with tailored materials defined as those "…prepared for and targeted at particular groups of smokers (*e.g.*, over 60, stage of readiness to change)" and personalized materials defined as those "…adapted for characteristics of individual smokers based on questionnaire responses."

Data were not available to address all of the review hypotheses. Tables 7-3 and 7-4 summarize the odds ratios and confidence intervals for several comparisons related to the self-help versus no self-help hypotheses and to the impact of enhancements to self-help. Among the key conclusions from the Cochrane analysis are:

- There is little evidence that self-help materials, used on their own, were an effective means of aiding smoking cessation.
- Tailoring materials to the perceived needs of broadly defined groups did not have an effect.
- Personalizing materials to the individual appeared to have an effect. However, there is insufficient evidence regarding the spe cific elements of personalization that may be important.
- Increasing the intensity of self-help interventions via telephone counseling increases quit rates.

Table 7-3
Preliminary Results from Cochrane Tobacco Addiction Review Group Meta-Analysis of Self-Help versus No Self-Help

Comparison	Peto OR [95% CI]
Neither group face-to-face (*n* = 9)	1.05 [0.87-1.26]
Both groups face-to-face (*n* = 4)	1.21 [0.97-1.52]
Both groups face-to-face with advice (*n* = 10)	0.95 [0.78-1.18]
Self-help vs. no self-help overall (*n* = 23)	1.06 [0.94-1.20]

Table 7-4
Preliminary Results from Cochrane Tobacco Addiction Review Group Meta-Analysis of Enhancements to Self-Help

Comparison	Peto OR [95% CI]
Additional written materials (*n* = 4)	1.02 [0.85-1.22]
Additional video (*n* = 2)	0.70 [0.38-1.31]
Tailored versus standard (*n* = 2)	1.14 [0.71-1.83]
Personalized versus standard (*n* = 6)	1.55 [1.16-2.07]
Additional phone follow-up (*n* = 6)	1.81 [0.67-1.31]
Self-help + NRT versus NRT only (*n* = 2)	0.84 [0.67-1.31]

GENERAL CONCLUSIONS Despite their intuitive appeal and positive results in individual studies, meta-analytic results strongly indicate that self-help materials for smoking cessation have not demonstrated significant advan tages over no-treatment control groups. In contrast to the discouraging results from comparing self-help to no self-help interventions, there are promising effects for minimal intervention programs that include personal ization of printed intervention messages and for providing self-help materi als along with supportive telephone counseling. Thus, although self-help materials may not significantly increase quit rates when used alone, they are so commonly a core component of minimal interventions that have been demonstrated to be effective that they may be a necessary component of these programs and may be useful for effectively delivering the personal ized and/or telephone counseling components of minimal interventions. To date, however, there are no randomized trials evaluating the impact of self-help adjuncts such as personalized feedback or telephone counseling with and without comprehensive self-help materials.

Self-help materials have been evaluated with both volunteer and proac tively recruited (*i.e.*, nonvolunteer) samples of smokers. As more nonvolun teer, population-based studies are completed, the evidence suggests that simply distributing self-help materials to the general population of smokers is unlikely to significantly increase rates of cessation. It is noteworthy that, in many of these studies, the intervention group achieved the target quit rate (*i.e.*, the proportional outcome used to determine sample size and sta tistical power). The null results were due to equally impressive quit rates in the no-treatment control groups. One interpretation of this pattern is that the assessment components of these population-based studies have as large an intervention effect as the minimal intervention protocols being evaluat ed.

Despite the lack of empirical support for the effect of self-help materi als, it would be premature to recommend against their further dissemina tion. The meta-analyses summarized in this report do not address impor tant questions such as whether health care providers are more likely to advise their patients to quit smoking if they have written self-help materials to distribute or whether worksites are more likely to adopt and enforce non-smoking policies if they can make self-help materials available to their employees who smoke. Ultimately, we need to examine and appreciate the potential value of self-help materials in the broader context of the social and organizational components of population-based strategies for smoking cessation.

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Telephone Quitlines for Smoking Cessation

Shu-Hong Zhu

Telephone counseling programs have attracted increasing interest in recent years as an alternative system for delivering smoking cessation services. The convenience of telephone counseling encourages program participation, which has been a significant barrier for formal treatment programs (Fiore *et al.*, 1991; Lichtenstein and Hollis, 1992). Telephone quitlines can also be centralized; for example, one toll-free number can provide most cessation services to smokers in even a large state. This makes it easier and more cost-efficient to promote the services in a large public health campaign.

Telephone counseling can be reactive or proactive. In reactive counseling, the smoker initiates all calls and talks with the counselor about specific issues of current concern. In proactive counseling, the counselor calls the smoker and provides counseling in a systematic manner, with scheduled sessions similar to traditional cessation clinics. Of course, a telephone quitline can be both reactive and proactive, taking calls from smokers who need immediate service and following up with those who need more intensive treatment.

We will outline the strengths of telephone quitlines, review the extent of their usage, and evaluate the empirical evidence for their efficacy. We will also discuss potential uses of the telephone quitline as support for physicians' advice to quit smoking and as an adjuvant for nicotine replacement therapy (NRT).

THE STRENGTHS OF TELEPHONE QUITLINES

Compared to traditional cessation clinics or classes, a telephone quitline has several advantages. It reduces barriers tied to the logistics of attending cessation classes, including having to wait for classes to form, time away from home to attend class, and the effort and expense of arranging for transportation and childcare. A quitline enables smokers to get help without leaving home and allows them to receive counseling at a time convenient for them, thus making the service more accessible. This is particularly helpful for those whose mobility is limited or who live in rural or remote areas. One study shows that, when offered the choice between group sessions and a telephone quitline, 70 percent of smokers chose the telephone quitline (McAfee *et al.*, 1998).

The telephone format appeals to those who are reluctant to get help face-to-face, especially in group settings. More importantly, it allows the counselor to proactively follow up on the smokers, thus addressing the problem of high attrition rates (Lichtenstein and Hollis, 1992). A proactive calling procedure can significantly reduce dropouts. One study shows that a

change from reactive counseling to proactive counseling reduced the attrition rate from 65 to 25 percent, which in turn was accompanied by a significant increase in quit rate (Zhu *et al.*, 1998a).

A principal strength of telephone quitlines, in the context of a population-based smoking cessation, is that they can utilize one centralized operation site to provide multiple services. The centralized service makes it easy for the quitline to be promoted in a coordinated public health campaign. It is more cost efficient and probably more effective to promote a single telephone number than to promote multiple programs, especially in cases where the promotion of cessation programs is fused with a comprehensive anti-smoking media campaign. For example, media spots can be tagged with the toll-free number of a quitline statewide.

THE USE OF TELEPHONE QUITLINES

Telephone quitlines can have many uses and can take many forms, such as:

- an information resource to distribute cessation materials (Anderson *et al.*, 1992; Cummings *et al.*, 1993);
- a recorded telephone message (Dubren, 1977; Burke, 1993; Ossip-Klein *et al.*, 1991 & 1997; Schneider *et al.*, 1995);
- a relapse prevention mechanism to support those who have finished a cessation program (Colleti and Supnick, 1980; Danaher, 1977; Lando *et al.*, 1996);
- a supplement to printed interventions (Prochaska *et al.*, 1993);
- an adjuvant treatment for nicotine replacement therapy (Lando *et al.*, 1997; Shiffman *et al.*, 1997; Zhu *et al.*, 1998b);
- a component of a preventive medicine program wherein telephone calls are combined with face-to-face interaction with clinical staff (DeBusk *et al.*, 1994; Ockene *et al.*, 1994; Taylor *et al.*, 1990); or
- the primary intervention in which the counselor provides individualized telephone counseling to those who are ready to quit smoking (Orleans *et al.*, 1991; Zhu *et al.*, 1996a & b).

One quitline can have several functions, of course, as has been demonstrated in several projects (Wakefield and Miller, 1997; Zhu *et al.*, 1998a).

In the last 5 years there has been a proliferation of telephone quitline services, most of them with a population orientation. Some are statewide (Altamore, 1998; Zhu, 1996a & b), some are regional (McCabe and Crone, 1997; Platt *et al.*, 1997), and some are national quitlines (Peters, 1995; Wakefield and Miller, 1997; Zeeman, 1997). The following describes three large projects, each with a different emphasis, but all of them using mass media to motivate smokers to call.

National Quitline in Australia

As part of the National Quit Campaign in Australia, which targeted smokers aged 18-40 years, a quitline number was attached to television ads, radio spots, and other promotional materials across the nation. One phone number was advertised; but when smokers called, they reached different regional call centers. To ensure that most of the smokers' calls were answered, some of the regional centers employed a telemarketing service to answer the first call. The main service of the quitline was to provide a self-help quit pack. However, those who requested further service were transferred to counselors (Wakefield and Miller, 1997).

In the first year of operation, the Quitline received 144,000 calls, representing 4 percent of all Australian smokers of age 18 or older. Approximately one-fifth of the callers were within the 18- to 40- year target age group. This large volume of smokers' request for cessation service in a limited campaign period challenges the belief that most smokers simply will not seek help (Chapman, 1985). Similar success of a coordinated promotion of telephone quitlines has been reported in England, where over 500,000 calls reached the quitline in 1 year (McCabe and Crone, 1997), and in Scotland, where approximately 8 percent of all smokers called the quitline in 1 year (Platt *et al.*, 1997).

A population-based approach to smoking cessation emphasizes that interventions work best when they are combined instead of standing alone (Fishbein, 1998). A quitline, when coupled with an aggressive media campaign, may impact more than just those people who call (Ossip-Klein *et al.*, 1991). The Quitline in Australia, for example, is one component of a comprehensive, nationwide campaign designed to encourage people to quit smoking (Wakefield and Miller, 1997). The presence of the Quitline makes the campaign complete. A single quitline number was shown repeatedly in different media spots, sending a clear message to smokers that if they want to quit, help is only a phone call away.

Quit 4 Life Program for Teen Smokers

The Quit 4 Life Program was a national campaign in Canada that targeted smokers aged 15–19 years. The campaign encouraged teen smokers to quit smoking by calling an 800-number, through which they received a self-help quit kit in the form of a paper or compact disc (CD). The program was promoted through mass media and was in operation for about 3 years. Between 1993 and 1995, nearly 98,000 teenage smokers called, representing almost 20 percent of all smokers targeted for this campaign (Peters, 1995). This result is very encouraging, given that teenage smokers are known not to attend cessation programs (U.S.DHHS, 1994). No counseling was provided through this project, but a year-long evaluation shows that 92 percent of those who received the quit kit used it, at least to some extent. A pre-post comparison based on self-report shows that 77 percent reduced the number of cigarettes smoked and 20 percent achieved a significant period of abstinence as measured by "quitting for 3 months" or "not smoking at both points of evaluation at 6 and 12 months" (Peters, 1995).

California Smokers' Helpline

The California Smokers' Helpline is a statewide cessation service that began in 1992 and is still in operation. No age group has been specifically targeted, although the media spots to which the Helpline's numbers were tagged have been mostly for adults. A major effort was made to reach smokers of minority ethnic backgrounds. The Helpline is currently also testing a counseling protocol for teen smokers.

The Helpline takes a stepped-care approach by providing three levels of cessation service according to smokers' readiness to change and their preference for intensity of treatment:

1) Motivational materials for smokers who are contemplating quitting but not yet ready to take action;
2) Self-help quit kits for those who are ready to quit but prefer to do it themselves with the materials; and
3) Comprehensive proactive counseling for those who are quitting soon and want the counseling.

In addition, the Helpline provides smokers with a list of local cessation programs. It also serves as the primary source of adjuvant behavioral support for smokers who receive free nicotine replacement treatment (NRT) paid for by Medi-Cal (California's version of Medicaid). All Helpline services are provided in six languages—English, Spanish, Mandarin, Cantonese, Vietnamese, and Korean (Zhu, 1996).

The California Smokers' Helpline places emphasis on integrating its activities into the comprehensive tobacco control program in California, rather than on getting a large number of smokers to call the program (although over 80,000 smokers have called the Helpline). The anti-smoking media campaign in California is multi-tracked and has evolved over time. Media spots for cessation have a relatively small share of the overall campaign budget. Although mass media has been the chief mode of promotion for the California Smokers' Helpline, a major effort is also made to encourage local tobacco education groups to promote the Helpline. In 6 years of operation, the media campaigns generated about half of all the Helpline's calls. The rest came from other sources, including referrals from various local tobacco control programs, health care providers, and simple word of mouth. More recently, with counseling now available for teens, an effort is being made to promote the Helpline among school systems statewide.

EFFICACY OF TELEPHONE QUITLINES

Telephone counseling has been tested in a variety of settings, with diverse populations including hospital patients (DeBusk *et al.*, 1994; Ockene *et al.*, 1994), HMO insurees (Orleans *et al.*, 1991; Curry *et al.*, 1995), and smokers in the community at large (Ossip-Klein *et al.*, 1991; Zhu *et al.*, 1996a & b).

Reactive Quitlines

There is an inherent difficulty in evaluating the efficacy of a reactive telephone quitline because it requires a control group that is not aware of the existence of the quitline. Ossip-Klein and her colleagues (1991) conducted a large trial on the effect of a reactive telephone quitline. Ten rural counties were randomized into two conditions; one group received

self-help materials only, and the other group received the same materials plus an offer to access a telephone hotline. A total of 1,813 smokers were recruited into the study and assigned to these two groups—approximately 4 percent of the total number of smokers in these counties. The quitline condition included a recorded message and a session with a counselor. At the end of 12 months, the quitline condition produced higher biochemically confirmed quit rates (quit rates for 90+ days are 12.1 percent and 7.6 percent for the two conditions, respectively) than the self-help condition.

Most subjects in the quitline condition did not actually call: 36 percent did call, but only 9 percent spoke with the counselors; the rest of the callers listened to the recorded messages. The difference in success between the groups cannot be completely attributed to the increased quit rate among the 9 percent who spoke with the counselors, suggesting that simply knowing a quitline is available and/or calling to listen to recorded messages might be beneficial. One possible explanation is that knowing they could call for help if needed may have caused smokers in the quitline condition to be more confident about quitting, leading to a greater attempt rate, which in turn translated into a greater long-term quit rate. This is conjecture, and no data were available in the study with regard to changes in self-efficacy. However, the attempt rate was greater for the quitline condition.

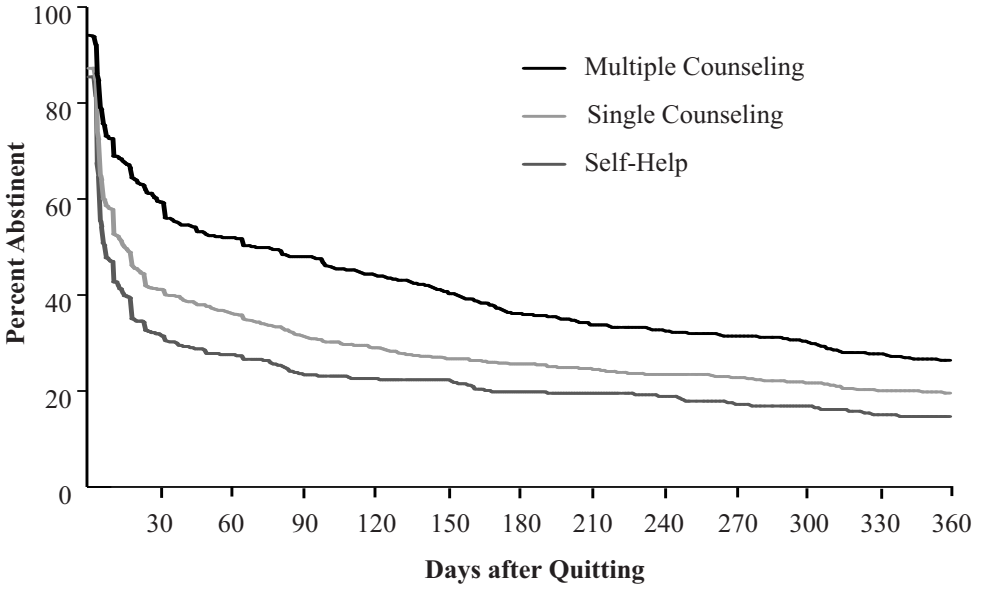
Proactive Quitlines A number of randomized trials for proactive telephone counseling have been conducted and have produced varying results. The studies differed in several major aspects, including the number of counseling sessions (ranging from one to nine sessions), the schedule of these sessions (weekly, monthly, or by relapse probability), and the supervision and quality control provided for the counseling. Two features seem to be associated with lack of effect for counseling: one is if the smokers are not voluntary participants; the other is if the telephone counseling is used only as a secondary follow-up treatment for subjects who have already gone through an intensive cessation treatment. These two types of studies tend to find no significant effect for telephone counseling.

A meta-analysis that combined 13 randomized trials (including all non-significant-effect studies) shows proactive counseling to have an effect that is statistically significant but modest in size. The combined odds ratios are 1.34 for short-term effect (95% CI = 1.19-1.51) and 1.20 for long-term effect (95% CI = 1.06-1.37) (Lichtenstein *et al.*, 1996).

Three studies that used proactive telephone counseling as the primary intervention method found larger effects. One study recruited hospitalized patients with myocardial infarctions (Taylor *et al.*, 1990). At the 12-month follow-up, the helpline condition produced a 61 percent cessation rate compared to 32 percent in the control group. Another study recruited HMO insurees and found a 21.5 percent cessation rate in the counseling group compared to 13.7 percent in the control group at the 18-month follow-up (Orleans *et al.*, 1991).

One study of proactive telephone counseling was conducted in the general population (Zhu *et al.*, 1996a). Smokers were recruited from the general community. Two levels of counseling were tested, single session and multi-

Figure 8-1
Relapse Curves for Self-Help (SH), Single Counseling (SC), and Multiple Counseling (MC)



Source: Zhu et al., 1996a

ple session, against a self-help group in a randomized design. Evaluation of the effect of a single session is valuable for real-world applications because smokers often use the quitline once and then drop out of the process. Thus, it is important to examine whether single session counseling can be effective, as budgetary concerns may prevent the quitline staff from continuing to call those who drop out of the process. This study also made a major effort to document the whole counseling process, both the single and multiple sessions, for the purpose of quality control as well as for future replication (Zhu *et al.*, 1996b).

Both single and multiple counseling were effective, and there was a dose-response relationship between the intensity of treatment and the long-term effect (see Figure 8-1; the 12-month success rates are 14.7 percent, 19.8 percent, and 26.7 percent for self-help, single counseling, and multiple counseling, respectively). A recent evaluation of the California Smokers' Helpline, which used the multiple counseling protocol, replicated the earlier result (26.9 percent in Zhu *et al.*, 1998a).

AN AREA FOR SYNERGY: TELEPHONE QUITLINE AS A SUPPORT FOR PHYSICIAN ADVICE AND ADJUVANT TREATMENT FOR NRT

A potential area for synergy among various approaches to smoking cessation is to use telephone counseling as support for physician advice, as an adjuvant treatment for NRT, or both. Physician advice to quit smoking is a potentially important population-based approach to smoking cessation because most smokers see their physicians at least once a year (Hollis, 1998; Ockene, 1987; and see Chapter 4). The Agency for Healthcare Research and Quality (AHRQ) guidelines recommend that physicians ask about their patients' smoking status at every visit, advise every smoker to quit, and prescribe NRT for every quit attempt in the absence of major medical contraindications. The guidelines further suggest that physicians should help their patients formulate a quit plan, provide supplementary materials, and schedule a follow-up session to be conducted either in person or via telephone (Fiore *et al.*, 2000).

In practice, however, physicians may prescribe NRT but not provide any follow-up counseling for various reasons. They may feel unprepared to provide behavioral counseling (Cummings *et al.*, 1987; Lindsay *et al.*, 1994). Or they may think that advising their patients to quit and prescribing NRT are sufficient. Even if they wish to counsel their patients on how to quit smoking, time constraints generally limit their ability to do so (Humire and Ward, 1998; Thorndyke *et al.*, 1998). Providing follow-up counseling takes even more time. These barriers may be part of the reason for differences between long-term successful cessation demonstrated in multiple research-based physician intervention trials and the absence of an effect of physician advice to quit on long-term cessation success found in the 1996 California Tobacco Survey (See Chapter 4). What physicians can easily do, however, is refer their patients out for cessation counseling.

Telephone counseling is a good referral choice for physicians to use for their patients, for two reasons mentioned at the beginning of this paper. One is that smokers are more likely to use a telephone quitline than to attend face-to-face group sessions (McAfee *et al.*, 1998). The second reason is that once smokers enroll in a quitline, the telephone counselor can proactively call them for the follow-up sessions to prevent early dropout (Zhu, 1996). As the impact of an intervention over a population is a product of how many people enroll and what percentage of them finish the program, the telephone quitline is expected to have a greater overall effect on the population in question than face-to-face group sessions.

When physicians realize that smokers are following up with their referral to cessation programs, their referral behavior will be reinforced. One way to help physicians know the outcome of their referrals is to send a progress report of the smoking patients back to their providers (with smokers' permission). This can be accomplished quite easily if the quitline is set up within a group health setting. This is indeed the case with the Group Health Cooperative (GHC) at Puget Sound, which has developed a systematic approach to using telephone counseling as a support for physician advice and as an adjuvant treatment for NRT (Curry *et al.*, 1998; McAfee *et al.*, 1998). The quitline services have been an important behavioral treat-

ment component in the overall smoking cessation program of GHC, as a majority of smokers used the telephone quitline when they wanted to obtain free NRT. The overall cessation program is credited with contributing to the accelerated decline of smoking prevalence within GHC (McAfee *et al.*, 1998).

In fact, a telephone quitline does not have to be within the health care system to be useful for that purpose. A study with the California Smokers' Helpline shows that telephone counseling can serve as physician support and adjuvant treatment to NRT, even though the Helpline is not officially affiliated with any of the physicians who refer their patients to the program. Over 6 years of operation, the Helpline has received calls from over 14,000 smokers who reported that their health care providers referred them to the program. More than 4,000 smokers also obtained NRT free of charge for their enrollment in the Helpline. They got free NRT because their health plans accepted the Helpline enrollment as a sufficient condition. Some NRT users dropped out of the process after they obtained the NRT, while others stayed with the program for more follow-up sessions. Those who received follow-up sessions are significantly more likely to stay abstinent in the long term (Zhu *et al.*, 1998b). These data suggest that telephone counseling is a useful adjuvant support for both physician advice and NRT.

CONCLUSIONS Telephone quitlines are highly accessible forms of cessation service. They can also be effective aids for smoking cessation. A centralized telephone quitline is easier to integrate with other population-based approaches to smoking cessation, such as mass media campaigns. The convenience and the proactivity associated with the telephone format makes the quitline a good adjuvant treatment for physician advice and nicotine replacement treatment.

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Mass Media in Support of Smoking Cessation

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INTRODUCTION Much of what we have learned about the effect of media can be drawn directly from reports on California and Massachusetts cessation trends; the COMMIT experience; Current Population Survey trends; and specific studies on the combined effects of media on pricing, environmental bans, community programs, clinical and self-help interventions. Our objectives are: 1) to summarize key findings in this research regarding media effectiveness, and 2) to discuss the implications of these findings for media practice in support of smoking cessation.

The mass media provide an important means for reaching and influencing smokers on a population-wide basis. Properly designed and implemented, media campaigns can be cost-effective and efficient in disseminating knowledge and information, realigning attitudes and social norms, and advocating for policy changes (Reid, 1996; Burns, 1994; Goldman and Glantz, 1998; Wallack and Dorfman, 1996). These roles tend to support each other and can have broad ("ripple out") as well as more selective ("targeted") social and behavioral consequences, depending on the methods and strategies used (mass or segmented; population- or subgroup-focused).

For all their potential, however, media campaigns have caveats. Consumers today are more media-literate and more diverse in their media consumption patterns than in past generations. This means that there is no single most effective way to appeal to smokers using the media. The increased number of television channels, in particular, has led to more fractured and less predictable general audiences. Although this proliferation potentially enables better audience segmentation and targeting, it also entails greater complexity and possibly greater costs in reaching a large group. At the same time, messages within a given media campaign must be sensitive to and differentially targeted to differing segments of smokers if penetration of these special populations and widespread effects are to occur (Goldman and Glantz, 1998). Such segments include members of distinct linguistic, geographic, and cultural communities, as well as high-risk lifestyle groups and heavily addicted smokers.

Evidence suggests that media campaigns are most effective at eliciting smoking cessation when they are part of a comprehensive program of interventions. It has been recognized that "Changes in media have been associated with major changes in smoking behavior, but only when the rest of the social structure actively changed the environment for the smoker. These changes act synergistically with media messages, and cessation or behavior change occurs" (Burns, 1994). Even with these caveats, mass media cam-

paigns can be effective in challenging people's everyday understanding of smoking and at stimulating positive attitudinal and behavioral changes with respect to smoking cessation (Reid, 1996; Flay *et al.*, 1993; Sussman *et al.*, 1994; Wallack and Dorfman, 1996).

Media interventions supporting smoking cessation can be undertaken at three levels: to elicit very specific behavioral changes; to affect the determinants of such behavioral changes; and to advocate for policy changes that, in turn, can affect more complex behavioral changes. In each case, interventions can have predisposing, enabling, and/or reinforcing effects (Green and Kreuter, 1991) with respect to these targeted changes within the context of particular campaign strategies (mass or targeted) and outcome objectives (information, education, motivation, and advocacy). This paper focuses on evaluating media efficacy on the first two of these levels—eliciting smoking cessation behavior and influencing attitudes and opinions. The third level, media advocacy, is briefly discussed at the end as an extension of the process of influencing attitudes and opinions. Two major bodies of evidence are reviewed; the California and Massachusetts campaigns are reviewed as examples of the best campaign practices, and the Stanford Five-City Project and COMMIT study are reviewed as the best examples of controlled community trials that used media.

CALIFORNIA AND MASSACHUSETTS ANTISMOKING ADVERTISING CAMPAIGNS

These well-documented campaigns were undertaken in California in 1990 (Bal *et al.*, 1990) and in Massachusetts in 1994 (Koh, 1996; Begay, 1997) with the dual objectives of discouraging smoking initiation and encouraging smoking cessation. Each campaign was accompanied by a tax increase on the sale of cigarettes—in 1989 and 1993, respectively—amounting to $0.25 per pack (although, when the tax went into effect in Massachusetts, the tobacco companies reduced point-of-sale prices to 1992 pretax levels).

Goldman and Glantz (1998) have recently analyzed the cost-effectiveness of the two media-led tobacco control campaigns and synthesized findings from the 186 focus groups (involving over 1,500 children and adults) that were conducted by advertising agencies to develop the message strategies for California and Massachusetts and also for a campaign in Michigan. During 1989-1996, per capita cigarette consumption in California fell 1.93 packs per year faster than in the rest of the United States, and during 1993-1996, Massachusetts consumption fell 1.28 packs per year faster. These declines were the result of the combined effects of the tobacco control campaigns in the two states and the increase in the cigarette costs resulting from the tax increase. However, Massachusetts conducted a more media-intensive campaign. The average yearly per-capita cost for the media campaign in California was $0.50 (1996 U.S. dollars) and the per-capita cost for the Massachusetts campaign was $2.42 (Goldman and Glantz, 1998).

Based on the focus group results, the most influential advertising messages were those that aggressively addressed tobacco industry duplicity and manipulation and the health consequences of secondhand smoke. Focus group results suggest that these were effective for both adults and youths,

although for different reasons. Adults tended to re-express their guilt at being unable to quit smoking as anger towards the tobacco industry's drive to profit from a deadly product, whereas youths perceived tobacco industry manipulation as being exactly the kind of social control they were rebelling against. Secondhand smoke made adults feel responsible for contaminating the air of children. For youths, it tended to awaken a "sense of injustice for the little guy." The secondhand smoke theme was effective for both groups because it portrayed the child as a "helpless victim" as well as "[making] people aware of the effects of their smoking on others" (Goldman and Glantz, 1998, p. 775).

Recent analyses (Biener, 1998) of findings from adult cohort surveys in the Massachusetts advertising campaign suggest that the perceived emotional intensity of antismoking advertisements correlates positively with the advertisements' perceived effectiveness. A representative sample of adults (n = 1,566) was interviewed by telephone before the nine Massachusetts advertisements were aired on television in 1994 and then again 3 years later. In the follow-up survey, cohort recall of the nine advertisements was measured (all were 30-second spots), and each advertisement was then rated on a 10-point effectiveness scale. Correlates of perceived effectiveness were analyzed based on the effectiveness measure, viewer characteristics (from the baseline and follow-up survey), and advertisement characteristics (established independently by a panel of 15 judges). The findings indicate that humorous advertisements are not seen as effective and that spots portraying illness resulting from smoking are likely to be perceived as emotionally intense. Viewer responses were stratified by smoking status (current smoker, quitter, or nonsmoker) for particular advertisements. For example, nonsmokers rated the *Janet Sackman* spot (Tobacco industry is targeting kids) as most effective, whereas quitters and smokers rated the *Picture on Pack* (Quit to stay alive for your kids) as most effective. Nevertheless, all three groups rated the *Circle the date* (Pick a date to quit) and *Ask the doc* (Your doctor can help you) as the two least effective advertisements in the campaign. Smokers on average were found to be more attentive than nonsmokers to anti-tobacco messages. Smokers who were anticipating quitting tended to rate advertisements more highly than those not ready to quit. Smokers who had attempted but failed to quit rated helpful advertisements more highly.

It is likely that the tax increase had an effect on campaign results in California, but not in Massachusetts. Hu *et al.* (1995) conducted an econometric analysis of the relative effects of the California tax increase and the media campaign on per capita cigarette sales and found that the tax increase yielded a higher negative demand elasticity (-0.30) than did the media campaign (-0.05). Goldman and Glantz (1998), however, note that the Hu *et al.* study probably underestimated the demand elasticity of the media campaign, because their model did not account for the additional promotional activities undertaken by the tobacco industry to counter the effects of the media campaign (p. 773). The tobacco industry reduced the price of cigarettes at approximately the same time that the increase in tax occurred in Massachusetts, and therefore the cost effect of the increase in tax was blunted.

Popham *et al.* (1993) surveyed adults who had quit smoking during the first wave of the California campaign (1990-1991) and found that 6.7 percent of smokers, without being cued, identified campaign advertising as a factor in their decision to quit smoking. When directly queried about the campaign, 34.3 percent identified the campaign as having influenced their decision. This translates into 33,000 and 173,000 former adult smokers in California whose decision to quit was influenced to a perceptible degree by the antismoking advertising campaign.

Tables 9-1 and 9-2 present measures of change in smoking behavior for the 1990 and 1996 California Tobacco Surveys (CTS) in relation to self-reported recall of media in the last week (1990) and last month (1996) for television, radio, newspaper, magazine, and billboard spots. The change in smoking behavior measures presented are for those who were current daily smokers 1 year prior to the survey and who were age 25 years or older at the time of the survey. In general, those who reported recall of media spots were more likely to have made a quit attempt in the last 12 months than those who did not. These analyses do not establish whether the quit attempt was a result of the exposure to the media or whether the recall is because of an interest in quitting. Cessation is a process that occurs over time and is measured over the prior 12 months in these analyses. Recall of the media is measured over the last month or week, and it is unlikely that the difference in cessation activity occurred during that period. However, it is also likely that recall of the media is a measure that is generalized over a longer period of time than that specified in the survey question, raising the possibility of a direct effect.

Figure 9-1 presents cessation attempts for the 1990 and 1996 CTS by the number of media channels that the smokers recalled. There is a statistically significant increase in cessation with increasing number of channels recalled for both survey years.

The Massachusetts and California campaigns in many respects represent the "state of the art" in media methodologies, and their results thus far have been quite positive. Several important qualifications need to be made, however, about the findings discussed above. Both campaigns are multidimensional and encompass a number of activities and components in addition to media advertising and taxation. California in particular has integrated a variety of additional services and programs into its campaign, including a statewide proactive telephone helpline, targeted interventions for ethnic and linguistic minorities, and various school- and community-based initiatives. It would be a mistake, therefore, to credit the declines in consumption solely to media advertising. The relative rate comparisons of tobacco consumption reported by Goldman and Glantz (1998) certainly do not rule out other contributing causes, and they do not account for the broader social context of change. Comparing a target state's consumption rate with the rest of the country is useful as a relative indicator of campaign success, but it does not control for ancillary factors that may be contributing to both the national and local state rates. Such factors may include a long-term decline in smoking rates nationally (the "secular trend") or the status

Table 9-1
Recall of Media in the Last Week* among Current and Former Smokers**

	Current Smokers				Former Smoker			
	Made Quit Attempt		No Quit Attempt		(Any Quit Length)		Population Size	Sample Size
	%	CI	%	CI	%	CI	(N)	(n)
Total	35.36	1.71	54.11	1.64	10.53	1.05	3,414,774	7,249
Television Exposure								
Some	38.27	1.99	52.99	2.05	8.74	1.47	1,491,309	3,294
None	33.30	2.30	54.51	2.13	12.20	1.66	1,788,553	3,670
Unknown	30.46	7.28	61.25	8.95	8.28	3.85	134,912	285
Radio Exposure								
Some	41.62	5.18	49.13	4.67	9.25	2.79	501,934	997
None	34.21	1.68	54.95	1.54	10.84	1.06	2,686,266	5,751
Unknown	35.03	6.45	55.27	7.22	9.71	4.42	226,574	501
Newspaper or Magazine Exposure								
Some	36.99	2.56	51.62	2.48	11.39	2.36	701,727	1,683
None	34.93	1.88	54.83	1.83	10.24	1.11	2,564,939	5,308
Unknown	35.08	12.77	53.45	10.16	11.48	7.41	148,108	258
TV, Radio, Newspaper, or Magazine Exposure								
All	41.40	7.06	49.31	10.45	9.29	7.93	92,430	184
Some	37.80	1.91	52.55	2.03	9.64	1.43	1,925,111	4,290
None	31.73	2.48	56.32	2.65	11.95	1.63	1,229,318	2,456
Unknown	30.54	8.84	58.45	9.94	11.01	6.25	167,915	319

**The questions differ between the 1990 survey and the 1996 survey:*
1990: Did you see anything in the newspapers or magazines in the last week about the pros or cons of smoking?
1996: In the last month, have you seen a billboard with a message against smoking?
***Current or former smokers, 25+ years of age, who were daily smokers 1 year ago.*
Source: 1990 California Tobacco Survey.

of antismoking activities in other state jurisdictions. Without detracting from the success of these two campaigns, it is instructive to compare these very positive findings with the more modest results obtained in community trials that have used experimental control methods to evaluate campaign and intervention performance.

STANFORD FIVE-CITY PROJECT (FCP)

The Stanford Five-City Multi-factor Risk Reduction Project (FCP) was a landmark field trial funded in 1978 to evaluate community-based cardiovascular health education methodologies. The FCP was designed to extend the knowledge and experience gained in the Stanford Three-Community Study and to offer a more rigorous basis of evaluation by using two treatment cities (Monterey and Salinas) and three control cities (Modesto and San Luis Obispo; and Santa Maria for morbidity and mortality data only). Initial funding covered 9 years (6-year intervention with a 3-year follow-up); however, funding was extended to 18 total years in 1987 to allow for 4 additional years of education maintenance (to 1990) and 6 more years of program surveillance (Fortmann *et al.*, 1995). Cardiovascular disease (CVD) risk factors targeted for reduction in the program's multifactorial design included hypertension, elevated plasma cholesterol, smoking, obesity, and sedentary lifestyles (Farquhar *et al.*, 1985 & 1990).

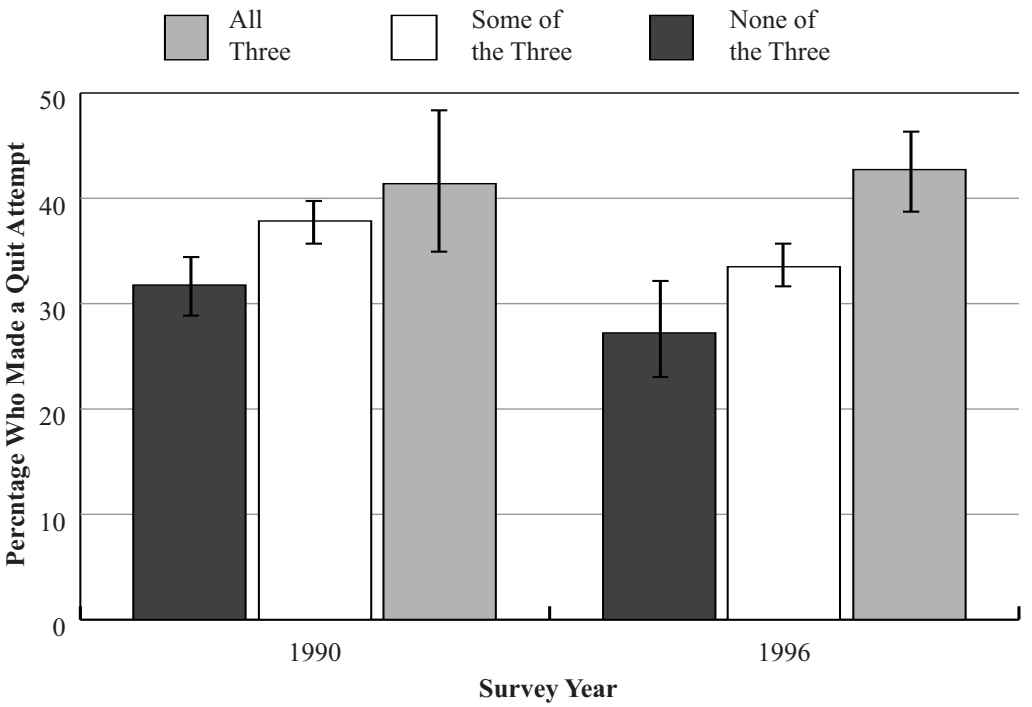
Table 9-2
Recall of Media in the Last Month* among Current and Former Smokers**

	Current Smokers				Former Smoker (Any Quit Length)		Population Size (N)	Sample Size (n)
	Made Quit Attempt		No Quit Attempt					
	%	CI	%	CI	%	CI		
Total	34.80	1.29	54.97	1.42	10.24	1.00	2,888,238	6,203
Television Exposure								
Some	35.84	1.58	54.68	1.64	9.48	0.97	2,265,114	4,891
None	32.15	3.69	54.10	4.09	13.75	3.24	463,099	957
Unknown	27.71	5.89	61.58	6.85	10.71	3.26	160,027	355
Radio Exposure								
Some	38.35	2.46	51.41	2.31	10.24	1.30	1,329,508	2,882
None	32.64	1.94	56.67	2.51	10.70	1.75	1,187,535	2,516
Unknown	29.01	3.73	62.25	4.81	8.75	2.21	371,198	805
Billboard Exposure								
Some	39.83	1.86	50.61	2.20	9.57	1.30	1,278,612	2,698
None	30.69	1.92	58.57	2.01	10.74	1.30	1,580,481	3,434
Unknown	36.99	11.43	.	.	12.05	8.61	29,151	71
TV, Radio, or Billboard Exposure								
All	42.69	3.34	48.07	3.46	9.24	1.56	678,171	1,416
Some	33.49	1.73	56.63	1.84	9.88	1.11	1,875,742	4,085
None	27.19	4.40	57.11	4.94	15.69	4.32	224,240	465
Unknown	24.00	5.73	64.72	6.85	11.28	4.24	110,092	237

**The questions differ between the 1990 survey and the 1996 survey:*
1990: Did you see anything in the newspapers or magazines in the last week about the pros or cons of smoking?
1996: In the last month, have you seen a billboard with a message against smoking?
***Current or former smokers, 25+ years of age, who were daily smokers 1 year ago.*
Source: 1996 California Tobacco Survey.

The smoking cessation component of FCP was comprehensive, integrated, and multifaceted, and used multiple communications channels and message formats to reach a socially diverse audience of smokers (Fortmann *et al.*, 1993). Media elements differed somewhat from year to year but typically encompassed television, radio, and print campaigns. In the third education year (1982-1983) for example, a television-based smoking cessation program was developed and aired, as were nine 30-second and five 10-second television public service announcements (PSAs) and a radio cessation series targeted at younger, blue-collar smokers. Radio and print programs were also developed for Spanish-speaking audiences. Knowledge, attitude, and behavior goals were set for each year, as were program outcomes. For 1982-1983, the goal was to motivate 2,000 smokers to quit. Predisposing, enabling, and reinforcing factors were emphasized to enhance overall smoking cessation objectives. As noted by the authors, "Attempts were made to increase knowledge about the dangers of smoking and the advantages of quitting, to alter attitudes about smoking, to increase smokers' confidence in their ability to quit, and to encourage smoking prevention, cessation, and maintenance. Multiple programs and products were developed to achieve these aims" (Fortmann *et al.*, 1993). In addition to the media com-

Figure 9-1
Percentage of Current Smokers Making a Quit Attempt by Number of Media Modalities in Which Smoking Messages were Recalled



1990: Television, radio, or newspaper/magazine in the last week
1996: Television, radio, or billboard in the last month
Source: 1990, 1996 California Tobacco Surveys

ponent, core program elements included self-help cessation methods (broadcast cessation programs and quit kits in English and Spanish), group programs, contests and events (Smoker's Challenge, Great American Smoke-Out), school-based smoking prevention initiatives, and health professional interventions (education for health practitioners).

An evaluation of smoking rates by Fortmann *et al.*, (1993) after the fifth education year showed significant treatment effects for the FCP's cohort sample and for the baseline population at follow-up, but showed no significant effects for the independent, cross-sectional samples. The decline in cohort smoking rates (factored as a linear slope coefficient) averaged -1.51 percentage points/year in the two treatment cities, nearly double the -0.78 percentage points/year averaged in the two control cities ($p = 0.007$). By contrast, the findings for the independent samples reflected little treatment effect. The decline in smoking prevalence was similar in treatment and control cities, the changes that occurred were not linear, and cessation rates varied within cities between surveys (Op cit., p. 82). Nevertheless, baseline smokers in both the cohort and independent samples (identified in the initial 1978-1979 survey) were more likely to quit smoking in the treatment

cities than in the control cities (bio-confirmed). In the independent sample, 22 percent in the treatment condition quit smoking, compared with 18 percent in the control, and the resulting treatment versus control survival curves were significantly different (log rank $p = 0.04$). The smoking survival analyses for the cohort sample yielded greater differences with quit rates of 40 percent of baseline smokers in the treatment condition, compared with 23 percent in the control condition, and significant survival curve differences (log rank $p = 0.006$). However, the cohort sample sustained a high dropout rate (nearly 50 percent) and when dropouts were re-coded as smokers as a cautionary measure, significance was lost (log rank $p = 0.075$).

Predictors of smoking cessation for men were baseline cigarette consumption (number per day) and treatment status, whereas for women only baseline cigarette consumption was significant. Education level, intention to quit, and alcohol intake were moderately predictive but did not reach statistical significance. More importantly, media exposure and knowledge of cardiovascular disease both had *p* values of less than 0.2 and as a result were not included in the final predictive model.

Fortmann *et al.* (1993) also evaluated the effects of socio-demographic characteristics on cessation by cross-tabulating changes in smoking prevalence between the baseline and final cohort surveys with baseline demographic and behavioral characteristics of the sample. These comparisons were post hoc, and Fortmann *et al.* warn that they should be considered exploratory. Because of the small number of comparisons in the data set and the lack of power to detect differences, no statistical tests were reported. Nevertheless, the stratification of changes in smoking rates that resulted is instructive. Treatment effects (measured by net differences in smoking rate changes for treatment and control) were much greater for men (-8.6) than for women (+0.8), and for Anglos (White/non-Hispanic) (-3.8) than for other ethnic groups (approximately half Hispanic) (-2.2), although these subgroups had very dissimilar baseline smoking rates. Treatment cities demonstrated higher smoking rate declines than controls for all age groups and at all education levels, except for the strata with less than a high-school education (+0.8). Lighter smokers (two strata—light ≤15 cigarettes/day; moderate = 16-24 cigarettes/day) were more likely to quit than heavy smokers (≥25 cigarettes/day) in both the treatment and control conditions. But the change in treatment cities was greater than in control cities at all levels, particularly for moderate-level smokers (light: -7.9; moderate: -21.3; heavy: -8.6).

A subsequent analysis of smoking rates conducted by Winkleby *et al.* (1996), several years after the Fortmann *et al.* study, yielded less positive treatment effects. Using cross-sectional data from the final survey in 1989/1990 (conducted 3 years after the main intervention as the last phase of the original 9-year design), Winkleby *et al.* (1996) found that, "smoking rates leveled out or increased slightly in treatment cities, while declines in the control cities continued" (p. 1,777). Comparing figures for the last year of treatment and the final survey (a 3-year period), the net difference in percentage of smokers in the treatment cities versus the control cities was

+5.8 for men (a change of +3.0 percent in treatment and -2.8 percent in control) and +3.8 for women (a change of -0.2 percent in treatment and -4.0 percent in control). No significant treatment effects were found. Winkleby *et al.* (1996) attribute the erosion of treatment effects partly to the secular trends in smoking and partly to antismoking activities in one of the control cities, San Luis Obispo, whose smoking trends approximated those in the treatment cities. The number of smokers in the combined control-city data reported by Winkleby *et al.* (1996) fell from 34.3 percent and 30.3 percent of population at baseline for men and women, respectively, to 21.6 percent and 15.2 percent in the final survey, 10 years later.

COMMUNITY INTERVENTION TRIAL FOR SMOKING CESSATION (COMMIT)

COMMIT was funded by the National Cancer Institute (NCI) in 1986 to test the effectiveness of a comprehensive, multiyear, community-based smoking control intervention using randomized control conditions (COMMIT Research Group, 1996). Results from COMMIT are reported elsewhere in this monograph, therefore, only brief mention will be made here of the design and findings of the study as they pertain to mass media and smoking cessation. The COMMIT trial was organized in 11 pairs of communities that were each matched for size, geographic location (state or province), and demographic characteristics. Intervention and comparison communities were randomly assigned from each pair, so treatment/control comparisons would be between like communities. The intervention strategy was standardized across communities and was a comprehensive community activation approach. Fifty-eight activities were mandated, with only limited opportunity for tailoring. Four primary intervention channels were targeted: public education through the media and community events, health care provider interventions, work-site interventions, and cessation resources development and distribution. The public education component required communities to undertake five core activities (COMMIT Research Group, 1995a; Wallack and Sciandra, 1991):

- Provide media advocacy training for community board members
- Implement an initial “kick-off” event
- Publicize smoking control plans
- Design and implement “magnet events” (such as local Quit & Win contests and local extensions of the Great American Smokeout)
- Publicize activities in other areas (such as self-help materials)

COMMIT's main target population was heavy cigarette smokers (>25 cigarettes/day) aged 25 to 64 years; however, the trial's design was cross-sectional and followed a community-based, mass intervention strategy, not a segmented strategy. The primary hypothesis of COMMIT was that, "implementation of a defined intervention protocol [would] result in at least 10 percent higher quit rates among heavy cigarette smokers in the intervention communities than the quit rate observed in the comparison communities (*i.e.*, 25 percent versus 15 percent)" (COMMIT Research Group, 1996; p. 1,621). One of the optional activities permitted under the research protocol was mass media based cessation campaigns. Intermediate trial goals were compatible with media intervention effects and included:

- Increasing the priority of smoking cessation as a public health issue;
- Increasing the community's capacity to modify the smoking behavior of its residents;
- Enhancing the influence of existing political and economic factors that discourage smoking in the community; and
- Increasing societal norms and values that support nonsmoking.

The COMMIT intervention was carried out over 4 years from January 1989 to December 1992. Baseline surveying was done from January to May 1988, followed by annual surveys during the intervention, and a final prevalence survey from August 1993 to January 1994 (COMMIT Research Group, 1995a).

The COMMIT trial achieved significant smoking cessation effects among light-to-moderate smokers in the cohort sample, but not with heavy smokers and not with the independent cross-sectional samples. Average cessation rates (self-reported) for light-to-moderate smokers in the cohort sample were 0.306 for the intervention communities and 0.275 for the comparison communities ($p = 0.004$). By contrast, the rates for heavy smokers were 0.180 for intervention and 0.187 for comparison, a nonsignificant difference ($p = 0.68$). The average quit ratio (an analogous measure to the cohort quit rate, see COMMIT Research Group, 1995b, pp. 194-195) for the independent sample was 0.198 for intervention and 0.185 for comparison, a nonsignificant difference ($p = 0.09$) (COMMIT Research Group, 1995b, p. 196).

Average smoking prevalence rates for the target 25- to 64-year-old age group (independent sample) declined in the intervention communities from 27.6 percent at baseline to 24.1 percent in the final survey (a change of -3.5 percent) and from 28.6 percent to 25.4 percent in the comparison communities (a change of -3.2 percent), a nonsignificant difference ($p = 0.36$). Heavy smoking prevalence fell from 10.2 percent at baseline to 7.3 percent at final for intervention (change of -2.9) and from 11.0 percent to 8.2 percent for comparison (change of -2.9), also a nonsignificant difference ($p = 0.51$).

The COMMIT Research Group evaluated the intervention effects of the mandated smoking control activities by measuring smokers' and recent ex-

smokers' "perception of receipt" of these activities, and by comparing these findings across the intervention and comparison conditions. Only two of the mandated intervention activities achieved significance in the receipt indices, and they were significant for both the cohort and independent samples. These were events and contests (cohort: $p = 0.001$; independent: $p = 0.01$) and programs and materials (cohort: $p = 0.007$; independent: $p = 0.05$). By contrast, media/public relations activities were the least differentiated between the intervention and comparison communities (cohort: $p = 0.29$; independent: $p = 0.68$).

The COMMIT Research Group used pair-wise rank correlations of quit rate differences and receipt-index differences as a way to evaluate the success of the intervention for changing behavior. The correlation findings demonstrate a significant intervention effect for light-to-moderate smokers in the cohort group (rank order correlation = 0.75, $p = 0.01$), but not for the heavy smokers (rank order correlation = 0.13, $p = 0.71$). As noted by the COMMIT Research Group (1995a):

> "This suggests that in the light-to-moderate smoker cohort, where the COMMIT intervention did produce a behavioral change, the magnitude of this intervention effect was related to the magnitude of the difference in awareness of (or participation in) smoking control activities."

In the independent sample, pair-wise intervention/comparison differences in the summary receipt index (a standardized composite score of all eight evaluated smoking control activities of which media/public relations was one) were found to correlate significantly with differences in the quit ratio (rank order correlation 0.67, $p = 0.02$), but not with differences in changes of smoking prevalence (rank order correlation 0.02, $p = 0.96$). Interaction tests between quitting and socio-demographic variables yielded one statistically significant finding that demonstrated an inverse relationship to education level and showed that most of the benefits in the light-to-moderate smoker cohort were seen in the lesser educated subgroup (COMMIT Research Group, 1995a, p. 187).

DISCUSSION The evidence reviewed here supports the observations that a comprehensive program of tobacco control interventions supported by media campaigns can be effective. Although additional factors were undoubtedly at play in the California and Massachusetts experiences, the combined demand elasticities resulting from increased taxes and an effective media-led tobacco control intervention in California (versus Massachusetts where the tobacco industry lowered point of sale prices) help to account at least in part for the higher reported rate of success in smoking cessation in that state. Findings from the Stanford FCP and COMMIT are less conclusive, although they support the efficacy of integrated interventions. Both trials achieved significant treatment effects, using multifaceted, multilevel interventions that combined media campaigns with community-based programs designed to target smoking cessation. Even though the net gains were appreciable, the effects in both trials were mainly restricted to light-to-moderate smokers in the cohort groups and did not extend to the

independent sample or the population of the more addicted heavy smokers. The media awareness findings in the FCP were not significant ($p = 0.2$), and the COMMIT receipt indices for media/public relations activities were the least differentiated between the intervention and comparison communities (cohort: $p = 0.29$; independent: $p = 0.68$).

A number of researchers have attributed the selective success of the Stanford FCP and COMMIT to declining secular trends in smoking and to the increased diffusion of health information about smoking, championed in part by the popular press (Fortmann *et al.*, 1993; Winkleby, 1994; Winkleby *et al.*, 1996; Green, 1997a; COMMIT Research Group, 1995b; Susser, 1995). The COMMIT Research Group (1995b) speculated that the low receipt indices they found for public education and media coverage may reflect the inability of this type of intervention "to affect smoking behavior much beyond national secular trends" (p. 199). In particular, they noted that the increased coverage of tobacco issues in the media observed during the COMMIT trial may have diminished audience receptivity to the trial's own publicity, resulting in "little additional effect of the COMMIT efforts" (*Op cit.*).

The widespread public adoption of healthier lifestyles (including quitting smoking) has followed the classical S-shaped curve of innovation-diffusion theory over the last three decades (Green, 1991; Green, 1997b; Green and Richard, 1993; Rogers, 1983). Declines in smoking rates began in the United States and Canada in the 1960s, soon after the release of the first Surgeon General's report (1964), and the declines have continued to present (Burns, 1994; Cunningham, 1996). The diffusion curve that has resulted helps to explain a number of the apparent inconsistencies and "failures" in the FCP and COMMIT. For example, the diminished success of these trials when compared with earlier trials such as North Karelia, Finland and the Stanford Three-Community Study, can be explained in part by where they have occurred on the diffusion curve. The earliest community trials--North Karelia and the Stanford Three-Community Study--led the diffusion curve and were therefore more successful at producing treatment effects that were ahead of the secular rate of change. Subsequent programs, however, were undertaken after the secular rate of change was already in full swing and had engaged the steeper component of the curve. In such circumstances, when motivation to quit smoking and knowledge about how to quit is widespread, it becomes increasingly difficult to outperform the secular rate of change in a randomized treatment/control context.

The momentum of the secular trend in smoking today is likely partly a result of the power of the media to communicate to a mass public. It also dramatizes the difficulties faced by health promotion initiatives that want to "be heard" over the "noise" of extant health information in the media system. The secular declines in smoking are largely attributable to the success of prior health education initiatives, however, and this attests to the long-term value of education interventions, whether or not they outperform the secular trend.

A second conclusion to draw from these studies, therefore, is that the environmental context of smoking and smoking information is in a state of change that appears to be following classic diffusion patterns. This helps to explain the rather modest media results of FCP and COMMIT, as just noted, and also highlights an emerging need for campaigns to take better account of the media environments in which they operate. The successes in Massachusetts and California indicate that media planners should exploit formative research methods to ensure that campaign messages reinforce (and where necessary, lead or correct) social beliefs portrayed in the popular media context, so as to build on secular trends. Media advocacy strategies as well as social marketing campaigns and community-based interventions can all follow this course of action.

There are also implications for campaign measurement and evaluation. In a period of increased social diffusion of health messages, one can expect to find more respondent confusion over the authorship of particular health messages and more "legitimate" false recognition of campaign messages in control populations, because of the apparent similarity of secular and campaign messages (Brown *et al.*, 1990).

Diffusion theory predicts that at this point on the diffusion curve, motivational appeals are more likely to achieve success with smokers who are contemplating quitting than are cognitively oriented, informational appeals (although these two strategies are not necessarily incommensurate, as we discuss below). This prediction is founded on the premise that a motivational intervention will positively affect the determinants of behavior for a majority of adopters. The usefulness of the diffusion approach and the ability of the media to affect the determinants of smoking behavior are both supported by the results from the reviewed studies. The finding of Popham *et al.* (1993) that 34.3 percent of surveyed California smokers identified campaign advertising as a factor in their decision to quit smoking when prompted, and 6.7 percent spontaneously cited media as a factor, suggests that the campaign was a significant motivating factor for over a third of the smokers in the population. The campaign advertisements were broadly positioned to promote negative attitudes about smoking, and as such they targeted attitudinal determinants of smoking, although help-line numbers and the names of local health organizations were provided. Popham *et al.*'s findings fit well with Biener's (1998) results from Massachusetts—that emotionally tense advertisements were perceived as most effective. As with the California campaign, the strength of the advertising messages in Massachusetts seems to have been in providing the emotional (motivational) grounds for quitting, not in relaying particular techniques and methods. Smokers who had failed at an initial quit attempt, on the other hand, rated helpful advertisements more highly. Smokers generally were found to be more attentive than nonsmokers to anti-tobacco messages. Smokers who were anticipating quitting tended to rate the campaign advertisements more highly than those who were not ready to quit.

Emotive strategies need not necessarily be separate from informational and educational strategies. In some cases, the effectiveness of information penetration, adoption, and use could be enhanced if it were carried on a

message platform that had emotive and motivational appeal. Media messages can serve as a motivational "cue to action" for some smokers, in addition to influencing the context in which the action itself is undertaken. The obvious methodological question that results in this context is whether media campaigns actually enhance smoking cessation rates, or whether the people who quit smoking during a campaign are already motivated to quit and would have quit anyway (Flay *et al.*, 1993). Other types of media campaign evaluations often find that after an initial increase in the uptake of a recommended behavior, a dip in the rate of uptake appears in the following time interval. The number of people not changing in the second time interval is often approximately equal to the number who changed earlier (Green and Lewis, 1986). For example, this is the relationship seen in the 3-year follow-up study of the Stanford FCP noted above. Winkleby *et al.* (1996) found that "smoking rates leveled out or increased slightly in treatment cities, while declines in the control cities continued" (p. 1,777). This "borrowing from the future" response of populations to mass media appeals for behavior change makes the media appear to be successful in part by getting people to do a little earlier what they would have done later anyway.

To suggest that people might be "cued" by mass media to take action, therefore, draws into question both the manner and level of such "cueing." A study of smoking behavior changes resulting from motivated versus habitual ("de facto") exposure to a television program (Flay *et al.*, 1993) found that the strongest predictor for attempting to quit smoking was prior motivation to quit. At the same time, however, they also found that people did not actively seek out quit information when given the chance. Rather, their routine viewing patterns were a better predictor of their exposure to televised quit information. Most importantly, however, "de facto" exposure to the televised quit program (*i.e.*, as a result of their regular viewing habits) resulted in increased 24-hour quitting behavior even after controlling for a number of key motivational and demographic factors among the participants. This led Flay *et al.* to speculate that "readiness to change" can perhaps be more passive than previously theorized and that people can be serendipitously cued to action even though they would not have pursued it on their own.

This is a useful way to understand the results seen in the studies reviewed for this paper. That is, media interventions can be used to help build the supportive conditions ("determinants") for smoking cessation, and to cue specific behavioral changes in individuals who are receptive to these cues and ready to change. Flay *et al.*(1993) conclude that, "particular audiences can be successfully targeted and some change brought about merely by determining which group views a particular television channel most often and knowing that the televised content meets high substantive standards" (p. 331). Other work by Sussman *et al.* (1994) suggests that these same conditions can be extended to other media. In particular, they found that newspapers had a more pronounced effect, in part because they reached the desired demographic group (older smokers) and they had a longer shelf life. One difficulty with television programs is that they have

no follow-up potential once viewed unless people have taped them. Newspaper supplements, by contrast, are long lasting and can be read or browsed at people's leisure, as they will.

In an era of increasing media outlets and modes of communication, the selection of appropriate communication channels for reaching general and target audiences will tend to become more critical. It may be possible to improve campaign efficiency, however, by following a multimodal, multichannel approach and by using messages that are designed to appeal broadly to several target groups. In the Massachusetts and California campaigns, messages that aggressively focused on tobacco industry duplicity and manipulation and on the health consequences of secondhand smoke were successful with both adults and youths (although for different reasons). This kind of "message efficiency" (of multiple address) can only be achieved through formative research on the targeted populations, as was done (using focus groups) in Massachusetts and California. A second kind of "message efficiency" (of multifunctionality) is also desirable. As noted in the introduction, media messages supporting smoking cessation can be undertaken at three levels: to elicit very specific behavioral changes; to affect the determinants of such behavioral changes; and to advocate for policy changes that, in turn, can affect more complex behavioral changes. Multifunctional messages target change at several of these levels, for example, by using emotive appeals that are designed to alter people's attitudes towards smoking and at the same time cue smoking cessation behavior. Practically speaking, most campaign messages function at several levels, and even functionally distinct campaign strategies can have cross-functional effects. For example, anti-smoking advertising can serve as a stimulus to policy change, and media advocacy programs can result in smoking cessation (as seen in COMMIT).

Events, such as the Great American Smoke-Out and Quit & Win contests, have value in communications plans because they are inherently multi-address and multifunctional. They are also multimodal and attract the interest of a broad segment of the population, although actual participation rates tend to be low. Bains *et al.* (1995) found that contests generally recruit only 1 to 2 percent of the target population. Shipley *et al.* (1995) found that participation rates for stop-smoking contests varied from 0.27 percent to 3.11 percent in the COMMIT trial. Nevertheless, the media attention curried on events typically encompasses both print and broadcast media and is potentially far-reaching. Events and contests were the mandated activity with the most significant receipt indices in COMMIT (cohort: $p = 0.001$; independent: $p = 0.01$), more significant than programs and materials (cohort: $p = 0.007$; independent: $p = 0.05$). This suggests that the events themselves played an important role in distinguishing the COMMIT program in the intervention condition.

As a final observation, maintenance of an antismoking message in the mass media is in itself an important role for media campaigns. For the most part, the media context ("mediascape") continues to be populated with positive images of healthy young people smoking, provided through tobacco

advertising, sponsorship and movie placements. This context is unlikely to change appreciably in the near future. Sparks (1997a,b & c) has shown that the rate of tobacco marketing innovation has stayed ahead of the development of tobacco control legislation internationally, such that the tobacco manufacturers continue to be able to promote their brands effectively, even in countries where tobacco advertising is prohibited. A key point, therefore, is that without clear, targeted antismoking messages in the media, the media context is essentially tobacco-positive for most smokers and starters.

The final and overriding message from research, therefore, is that media support for smoking cessation should be undertaken in such a way as to support long-term goals of correcting social norms as well as short- and medium-term goals of eliciting smoking reduction and quitting in those who are predisposed to do so.

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Community-Wide Interventions for Tobacco Control

K. Michael Cummings

INTRODUCTION There are two unique features of community-wide interventions that distinguish them from other types of tobacco control strategies. First, community interventions attempt to change tobacco use in populations, not just in individuals or select target groups (NCI, 1991). Community-wide interventions for tobacco control operate on the premise that tobacco use is driven by societal attitudes that accept tobacco use and that efforts to reduce tobacco use require changing these attitudes. The second unique feature of community-wide interventions is that they are comprehensive in nature, involving attempts to intervene through multiple social structures in a community (NCI, 1991). This feature of community-wide interventions acknowledges the fact that attitudes about tobacco use are shaped by many different sources, including one's family, workplace, educational and health care institutions, and the media, just to name a few.

ARE THESE ASSUMPTIONS CORRECT? What evidence is available to support the premise that tobacco use is a socially mediated practice that can be altered by changing social customs that support the behavior? First, it is a well accepted tenet of social psychology that humans are subject to a need to conform to the social conventions of the majority (Wrightman, 1977). To the extent that individuals perceive their actions as deviant, there will be pressure to conform to the dominant public opinion.

Second, the history of tobacco use in United States seems to mirror shifts in public attitudes about smoking, reflecting increasing social sanctions on smoking in the early part of the century and then growing disapproval of smoking as a practice dangerous to the smoker and later to others (Warner, 1986).

Third, even the tobacco industry recognizes that besides nicotine delivery, smoking behavior is mediated by social influences, as evidenced by the following explanation offered by a Philip Morris scientist on changing trends in teenage smoking prevalence:

> "There is no question but that peer pressure is important in influencing the young not to begin smoking. A decade or more ago it was a major reason why teenagers began to smoke. Now it is a major reason for their not beginning to smoke?" (Philip Morris, Inc, 1981)

Because the norms of society are in large part prescribed through public sources, such as the media, they are subject to the influences of special interest groups. Viewed in this light, tobacco advertising can be thought of as an effort to create demand for tobacco products by influencing the pub-

lic's perceptions about the benefits of tobacco use. As marketing professor Richard Pollay points out: "...to smokers advertising is a reminder and reinforcer, while to the non-smoker it is a temptation and a teacher" (Pollay, 1995).

While the mass media has been used to increase the demand for tobacco, it has also been used to discourage the use of tobacco, as evidenced during the Fairness Doctrine period when anti-smoking television commercials were aired on a regular basis during prime time and cigarette consumption dropped sharply (U.S.DHHS, 1989). Thus, it appears that despite the addictive qualities of tobacco, tobacco use behavior is strongly influenced by the social conventions, customs, and norms of society and is subject to changes in the social environment.

DO COMMUNITY-WIDE INTERVENTIONS WORK?

The scientific literature clearly demonstrates the limited effect of individually focused, single-channel interventions in terms of influencing tobacco use throughout populations (U.S.DHHS, 1989; Klausner, 1997). Perhaps with the exception of nicotine replacement products, those programs with substantial efficacy, particularly clinic-based cessation programs, have not been widely accepted by smokers. By offering a comprehensive intervention that operates through multiple channels in a community, it is hoped that a synergy will be produced whereby the social norms undercutting tobacco will spread throughout the population at a faster pace than would otherwise be the case. Community-wide tobacco control interventions often have little to do with providing direct services to individual tobacco users, but instead focus attention on employers, health providers, politicians, and community leaders who are in positions to implement policies that help define the social norms about tobacco use in the population at large (NCI, 1991).

What evidence is there that community-wide tobacco control interventions work? In recent years, we have seen a number of well-conducted, large-scale evaluations of community-wide interventions to reduce tobacco use. Although a few of these showed a degree of success, for most, the effects have been small and certainly less than predicted given the effort expended. For example, the Stanford Five-City Project reported a small treatment effect on quitting behavior, but no effect on smoking prevalence (Fortmann *et al.*, 1993). The Minnesota Heart Health Program reported a modest beneficial effect for women in their cross-sectional analysis, but no effect in their cohort sample (Leupker *et al.*, 1994). The Pawtucket Heart Health Program failed to demonstrate a significant intervention effect for smoking in any of their analyses (Carlton *et al.*, 1994). The NCI's Community Intervention Trial for Smoking Cessation (COMMIT) failed to affect quit rates among heavy smokers, but did boost quit rates by about 3 percent among light-to-moderate smokers (COMMIT Research Group, 1995a & b). Although COMMIT did not achieve the kind of success that had been hoped for, the modest increase in quitting observed among light-to-moderate smokers, if achieved nationally, would translate into 1.2 million additional adults stopping smoking (Klausner, 1997). A recent analysis of the cost-effectiveness of the COMMIT shows that the intervention com-

pares favorably with a number of other common preventive practices and many therapeutic interventions as well (Lewit *et al.*, 1998). The finding that COMMIT was relatively cost-effective, given its limited effectiveness, appears to rest largely on the estimate of its incremental social cost—$167 per smoker for the 4 years of the trial ($42 per smoker per year) as compared with the costs of other health and medical interventions.

In evaluating the scientific literature on community interventions for tobacco control, one also has to recognize that not all interventions are equal. The focus and content of community-wide tobacco control interventions has evolved over the years from an approach a decade ago that was primarily designed to provide education and services to individual smokers to one that today actively attempts to bring about formal policy changes (Klausner, 1997). The focus of activity in most community tobacco programs today is on efforts to enact policies that have the potential to influence every smoker and potential smokers, including regulations on where smoking is permitted, taxation of tobacco products, limits on tobacco advertising and promotion, dedicated funding for mass-reaching public information campaigns, and mainstreaming of cessation advice and treatment by health care providers (Klausner, 1997). The success of a comprehensive, policy-focused approach to tobacco control is seen in the recent evaluations of the Massachusetts Tobacco Control program and the NCI's American Stop Smoking Intervention Trial for Cancer Prevention (ASSIST), both of which found significant reductions in cigarette consumption associated with program efforts (Harris *et al.*, 1997; Manley *et al.*, 1997). Indeed, as Glantz has pointed out, the 7 percent reduction in per-capita cigarette consumption attributable to the ASSIST program means that if ASSIST were a cigarette brand, it would exceed the market share for all other brands of cigarettes sold except Marlboro (Glantz, 1997).

WHAT LESSONS HAVE WE LEARNED?

The history of the tobacco control movement provides some useful lessons to ponder as we consider whether community interventions are a good investment (Susser, 1995). First, to bring about large-scale changes in tobacco consumption, the social norms related to tobacco use need to change, and this change takes time. Two decades ago, who would have envisioned a smoke-free workplace as the accepted norm? The campaign to enact smoke-free policies began with a few public health advocates standing alongside those harmed by smoke pollution and gradually grew to include health care institutions, private employers, and government regulators. The usual time frame for evaluations of community tobacco control interventions is years when the time required to bring about social change may be decades. For example, significant reductions in smoking associated with the North Karelia intervention did not become evident for nearly 10 years (Puska *et al.*, 1973 & 1983).

Second, the measured effects of community-wide interventions is likely to be small, but as demonstrated by COMMIT, even a modest percentage effect on smoking behavior can translate into a large public health impact (Carlton *et al.*, 1994; Lewit *et al.*, 1998; Glantz, 1997).

Third, community-wide interventions like COMMIT do not seem to have much impact on changing the smoking habits of heavy smokers. For those who are highly dependent on nicotine, more intensive clinical interventions and/or substitution of less lethal forms of nicotine ingestion may be necessary (Warner *et al.*, 1997).

Fourth, community tobacco control activities change over time, to reflect both the current state of scientific knowledge and shifting public attitudes about tobacco. Three decades ago, the primary focus of community interventions was educating consumers about the hazards of tobacco. Today, the emphasis is on dictating the policies that govern the way that tobacco products are designed, used, and marketed (Klausner, 1997).

Finally, the conventional experimental research paradigm typically used to evaluate medical interventions may not be ideally suited to assessing the impact of community tobacco control efforts that encompass entire populations and change over time (Klausner, 1997; Susser, 1995). In the COMMIT study, over half of the $42.5 million devoted to that project was used for evaluation purposes (Lewit *et al.*, 1998). A simpler, more efficient use of resources would be to design a surveillance system that would encompass the entire population and allow evaluators to compare differences in tobacco use trends over time and between communities.

SUMMARY Although national and statewide initiatives have important roles to play in a comprehensive program to reduce tobacco use, local community intervention is where the action is, and represents the heart of the tobacco control movement. We would all be smart to live by the old adage, "Think global, act local." Local community intervention, tailored to the unique concerns and needs of a community, represents the best hope of speeding up the pace of change in the social norms that govern tobacco use.

It would be a big mistake to abandon community tobacco control efforts on the basis of a few disappointing studies. We have much to learn about how to bring about population-wide changes in tobacco use. Research is now just beginning to help us elucidate the factors that are important (Kaufman, 1997). For example, a recent secondary analysis of data collected as part of the COMMIT study has shown that community variation in tobacco use trends can be accounted for in part by differences in cigarette pricing and marketing practices, policies that influence workplace smoking, and policies that influence the cost and accessibility of stop smoking therapies (Lewit *et al.*, 1997; Cummings *et al.*, 1997a & 1997b; Glasgow *et al.*, 1997). We need to use this knowledge and invest more time and energy into learning how to apply this information to the practice of community tobacco control.

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Interaction of Population-Based Approaches for Tobacco Control

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OVERVIEW This paper looks at program effectiveness results from data collected in 1996 and 1997 during Wave 1 of the Independent Evaluation of California's Tobacco Control, Prevention, and Education Program (IEC, 1998). The issues discussed in this paper are based on certain assumptions about the tobacco-control atmosphere in California. These assumptions are 1) that tobacco control programs and activities do not occur in isolation; 2) that adults and youths throughout California were exposed to more than one tobacco control program or activity; and 3) that the California tobacco control program delivers a consistent anti-tobacco message. Given these assumptions, the issue to be explored is whether exposure to multiple tobacco-control programs and activities will produce stronger anti-tobacco attitudes and beliefs than the effect of exposure to only one program or activity.

BACKGROUND California's Tobacco Control Program was developed in response to voters' actions in passing Proposition 99—the Tobacco Tax and Health Promotion Act of 1988. The Tobacco Control Program (TCP) Model utilizes a comprehensive integrated approach for preventing and reducing tobacco use. Throughout California, various program interventions are implemented through multiple modalities—*i.e.*, community programs, school programs, and a statewide media and public relations campaign.

From 1993 to the present, California's tobacco control efforts have concentrated on three priority areas:

1. Reducing exposure to environmental tobacco smoke (ETS);
2. Reducing youth access to tobacco via commercial and social sources; and
3. Countering pro-tobacco influences in the community.

One of the primary objectives of the comprehensive California program is to promote social norms that tobacco use and exposure to ETS are not acceptable.

* Collection of the data described in this article was supported by a contract from the California Department of Health Services, Tobacco Control Section (Contract #95-222998). The analyses, interpretations, and conclusions are those of the authors, not the California Department of Health Services. The authors thank Todd Rogers, June Flora, and Caroline Schooler for assistance with the research design and interpretation of results.

FRAMEWORK FOR OUR STUDY The conceptual framework for the evaluation is illustrated in Figure 11-1. The schematic presents a simplified view of the presumed relationships among TCP activities, intermediary outcomes, and ultimate outcomes. It shows that TCP activities are conducted independently and interactively through community programs, schools, and the statewide media and public relations campaign. Activities are directed towards tobacco-related social norm changes (*i.e.*, intermediary outcomes such as attitudes, beliefs, behaviors, and policies) within three program priority areas: (1) reducing youth and adult exposure to environmental tobacco smoke (ETS); (2) reducing youth access to tobacco products; and (3) countering pro-tobacco influences. In addition, school-based programs are directed toward changing tobacco-use mediators such as perceptions and refusal skills.

INDEPENDENT EVALUATION METHODS The Independent Evaluation conducted in California was designed to assess the effectiveness of tobacco control activities. The primary purpose of the evaluation was to gather information that would be used to provide feedback to help the California Department of Health Services and the California Department of Education to achieve their objectives.

As of this writing, the Independent Evaluation is beginning year 4 of a 5-year effort; it includes three sequential, cross-sectional waves of data collection. The first wave of data—used as the basis for this paper—was conducted from October 1996 to March 1997 and focused on a 2-year period of tobacco control activities in California—calendar years 1995 and 1996.

SAMPLING SCHEMES The sampling scheme for the Independent Evaluation sought to find a set of 18 counties that were representative of the entire state. Because a major intervention arm of the TCP is the statewide mass media, we pre-selected the five counties comprising the largest media markets in the state. We applied a cluster solution approach to the remaining 53 counties. The analysis was designed to form three clusters (strata) based on county population density (population per square mile) and percentage of rural area. We randomly selected 13 counties from these 3 strata. These 13 counties, plus the 5 media market counties, yielded the sample of 18 counties shown in Figure 11-2. These 18 counties represent 75 percent of the state's population, and data analytic results based on these 18 counties are generalized to the entire state.

The evaluation focused on assessing program implementation, exposure, and outcomes. Measures of program implementation were obtained from organizations that sponsored tobacco-control activities. Measures of program exposure were obtained from random samples of youths and adults in the 18 counties. Outcome measures were focused on intermediary outcomes of the tobacco control program, which included individual- and community-level indicators. Multiple data collection methods were used, including telephone interviews, school-based surveys, written surveys, and coding of archival records.

Figure 11-1
Conceptual Framework for the Independent Evaluation

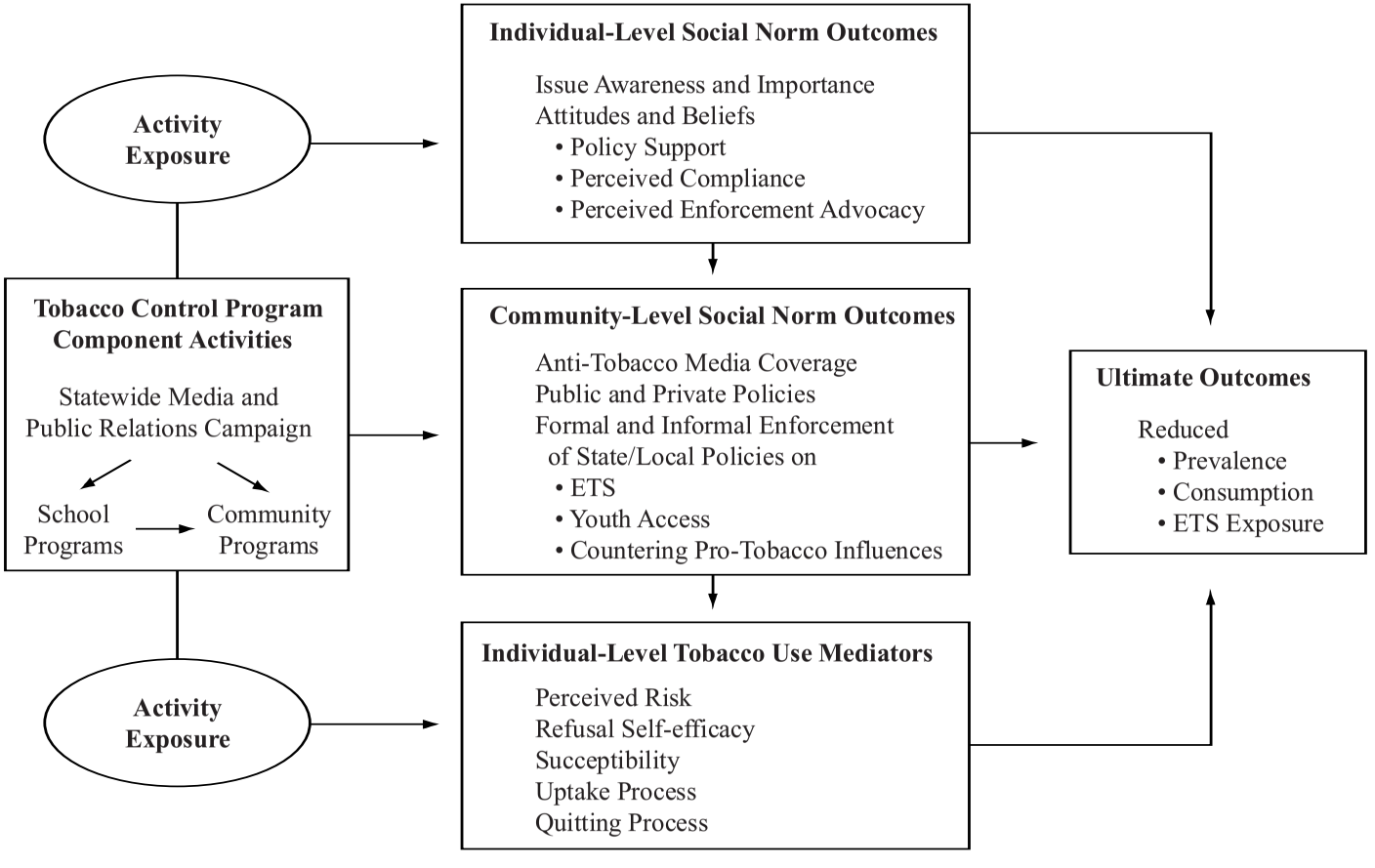


Figure 11-2
Eighteen Focal Counties

Media Markets Medium Density	
Fresno	Monterey
Los Angeles	San Bernardino
Sacremento	Shasta
San Diego	Yuba
San Francisco	
High Density	**Low Density**
Alameda	Lake
Contra Costa	Lassen
Orange	Mono
San Mateo	Plumas
Santa Clara	

A limitation of the Independent Evaluation approach is that linkages between program exposure and outcomes were observed at only one point in time—data from Wave 1. We point out that these baseline data provide a cross-sectional look at program effectiveness. Given our cross-sectional evaluation design, we are able to observe associations between program exposure and outcomes, but we cannot infer causal relationships.

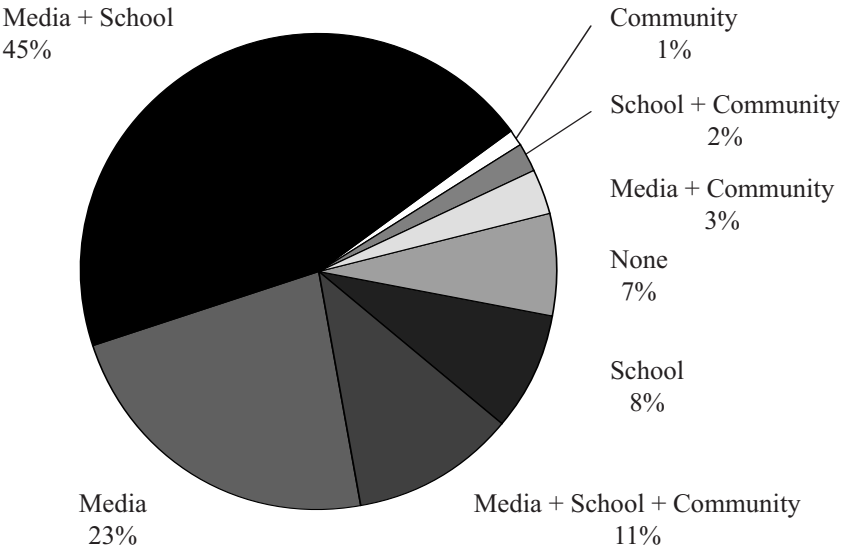
DATA COLLECTION METHODS Multiple data-collection methods were used to examine program activities in counties across the state, and individual- and community-level outcome indicators in the 18 counties. Information on implementation of tobacco control programs and activities was gathered from 12 different sources, including Local Lead Agency (LLA) progress reports; project director surveys and interviews; teacher surveys; school administrator surveys; surveys and interviews with media and public relations campaign contractors; and content analysis of statewide media campaign materials.

Data on program outcomes were obtained from 11 different sources, including adult computer-assisted telephone interviews (n = 6,985); school-based youth surveys with students in 5th, 8th, and 10th grades (n = 3,139 5th-graders, 5,870 8th-graders, and 6,929 10th-graders); telephone surveys of opinion leaders in the focal counties; and data on enactment of local policy.

APPROACH Our hypothesis suggests that if the various tobacco control program modalities deliver consistent messages, they may reinforce and enhance one another. If this occurs, Californians exposed to multiple tobacco control program modalities may show even stronger anti-tobacco attitudes and beliefs than those exposed to only one program.

We first looked at the percentage of the populations of interest exposed to the different program modalities. Then we explored the differences in tobacco-related attitudes and behaviors among those Californians exposed

Figure 11-3
Percentage of Youth Exposed to Different Combinations of TCP Activity



to one type of TCP activity with those exposed to more than one TCP activity. For clarity of the results, we define exposure to a tobacco control activity as 1) for community: recall of at least one local community program; 2) for media: validated recall of at least one tobacco control program media ad; and 3) for schools: recall of at least one in-school lesson or school-wide activity.

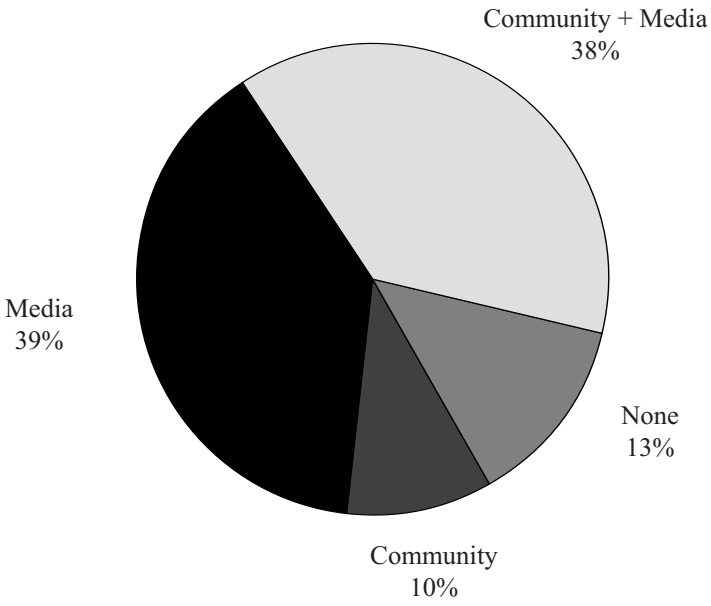
RESULTS Ninety-three percent of California 10th-grade youths were exposed to at least one modality of the California Tobacco Control Program.

Most California youths reported exposure to more than one tobacco control modality. Figure 11-3 shows the percentage of youths that were exposed to different combinations of tobacco control program modalities. Only 7 percent of youths were not exposed to any activity.

Adults Eighty-seven percent of California adults were exposed to at least one tobacco control program activity. Figure 11-4 shows the percentage of adults who were exposed to tobacco control community and media programs. Over one-third (38 percent) were exposed to both community and media programs.

Exposure to each tobacco control program component was associated with tobacco-related knowledge, attitudes, and beliefs, even after accounting for the respondents' exposure to other tobacco control program components. We evaluated the associations between tobacco control program exposure and tobacco-related outcome variables, while controlling for the respondents' level of exposure to other tobacco control program modalities.

Figure 11-4
Percentage of Adults Exposed to Different Combinations of TCS-Funded Programs



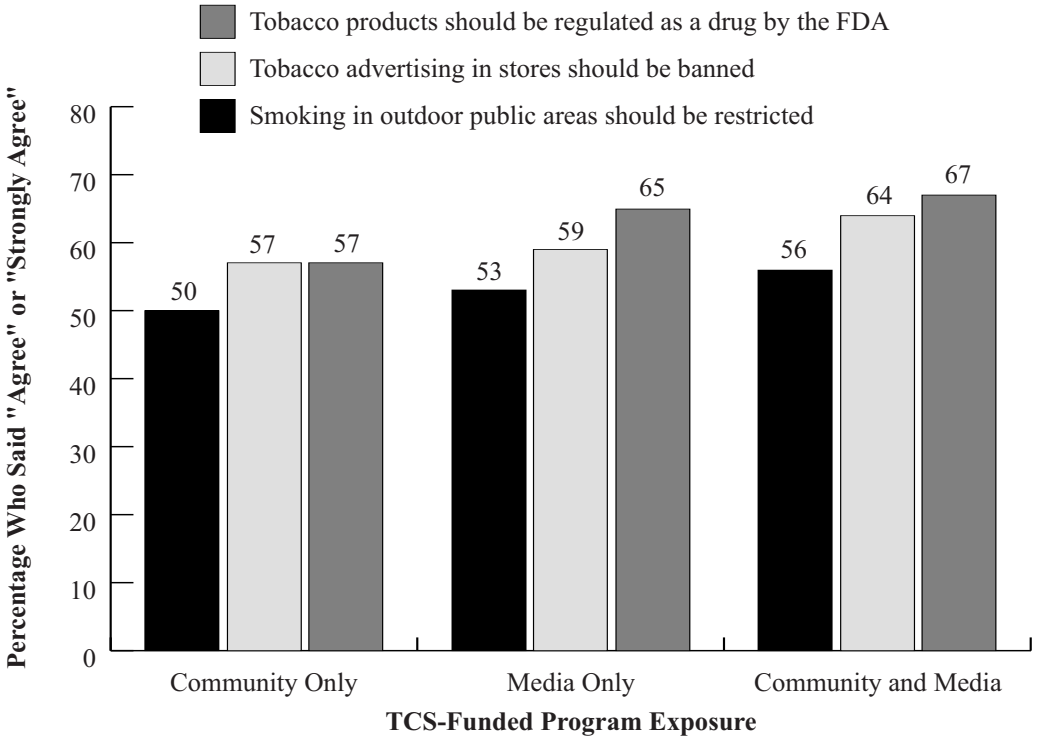
These results evaluate how strongly each tobacco control program component (*i.e.*, community programs, media campaign, and school-based programs) would have been associated with outcomes if everyone had received an equal level of exposure to the other program modalities.

Among adults, exposure to community programs was associated with anti-tobacco attitudes and behaviors. Adults who reported high levels of exposure to TCS community programs were more likely to practice personal enforcement and talk about not smoking. These associations were present regardless of adults' exposure to media programs.

Similarly, among adults, exposure to media programs was associated with anti-tobacco attitudes and behaviors. Adults who reported high levels of exposure to media programs were more likely to dislike environmental tobacco smoke, favor government regulation of tobacco, practice personal enforcement, talk about not smoking, and express greater belief in the importance of tobacco issues. These associations were present regardless of the adults' exposure to TCP community programs.

Adults who were exposed to both media and community programs tended to support anti-tobacco policies more than did adults who were exposed only to media programs or only to community programs (Figure 11-5). Media programs and community programs had important individual associations with support for anti-tobacco policies, but the interaction (or combination of the programs) seems to have been most effective. The data show that each type of program reinforced or increased the relationship between the other type of program and policy attitudes.

Figure 11-5
Percentage of Adults Who Supported Anti-Tobacco Policies, According to TCS-Funded Program Exposure



Significant differences at the $p = 0.05$ level were found when comparing results for community only to community and media; and for media only compared to community and media.

We found similar trends for youth exposure and outcomes as we had observed for adults.

10th Grade Youths Among youths, exposure to school programs was associated with anti-tobacco attitudes and behaviors. Regardless of their level of exposure to other tobacco control program activities, the following findings distinguished 10th-graders with high level school-based tobacco program exposure from their peers who reported lower levels of school program exposure:

- More likely to believe that ETS, youth access to tobacco, and pro-tobacco influences are serious problems
- Higher rates of advocacy actions such as signing petitions, contacting government officials, and attending youth conferences
- More likely to talk to others about tobacco use
- More negative attitudes toward the tobacco industry

- More positive attitudes toward anti-tobacco policy enforcement
- More negative perceived consequences of tobacco use

Among youths, TCP community programs appear to have had a mix of positive and negative associations with anti-tobacco attitudes and behaviors, after exposure to school and media programs was taken into account. Tenth-grade youths with high community program exposure showed the following characteristics relative to those with lower exposure to community programs:

- More likely to believe that ETS, youth access to tobacco, and pro-tobacco influences are serious problems
- Higher rates of advocacy actions such as signing petitions, contacting government officials, and attending youth conferences
- More likely to talk to others about tobacco use

However, somewhat surprisingly, 10th-grade youths with high community program exposure also showed the following *negative* characteristics relative to their peers with lower community program exposure:

- Fewer perceived negative consequences of use
- Lower cigarette refusal self-efficacy
- Higher perceived smoking prevalence among peers
- More exposure to ETS in the home or car

We speculate that youths who smoked were perhaps disproportionately aware of community events and activities, accounting for many of the negative associations and higher rates of smoking among those exposed to community programs.

Exposure to tobacco control program media programs was associated with stronger anti-tobacco attitudes and behaviors among youths. The following results distinguished 10th-grade youths with high media exposure from their peers with low media exposure:

- More negative attitudes toward the tobacco industry
- More perceived negative consequences of tobacco use
- Higher cigarette refusal self-efficacy

Figure 11-6 shows the percentage of 10th-grade youths who participated in advocacy actions, such as signing petitions, contacting government officials, and attending youth conferences. Youths who reported exposure to more than one type of tobacco control program were more likely to have performed these advocacy actions than were youths exposed to only one program or to no programs at all.

In most cases, exposure to multiple programs was better than exposure to a single program. All comparisons of results for these three actions following exposure to a single component as compared with exposure to multiple components were significant at $p = 0.05$, except for the following: *media* versus *media and school*; *community* versus *media and school*; and *school* versus *media and school*.

Figure 11-6
Advocacy Actions among Youths, According to TCP Exposure

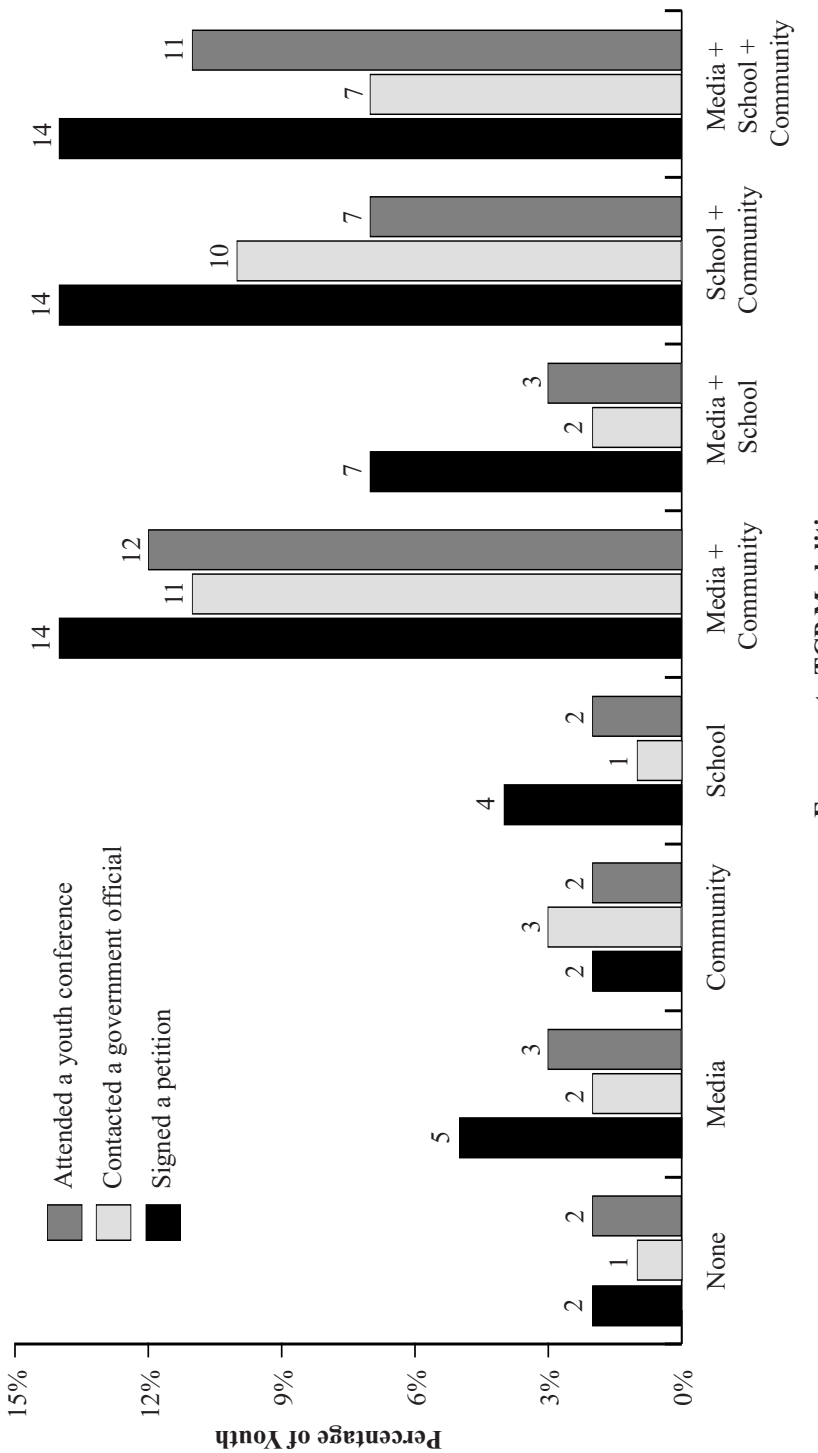


Figure 11-7
Negative Attitudes toward the Tobacco Industry among Youth, According to TCP Exposure

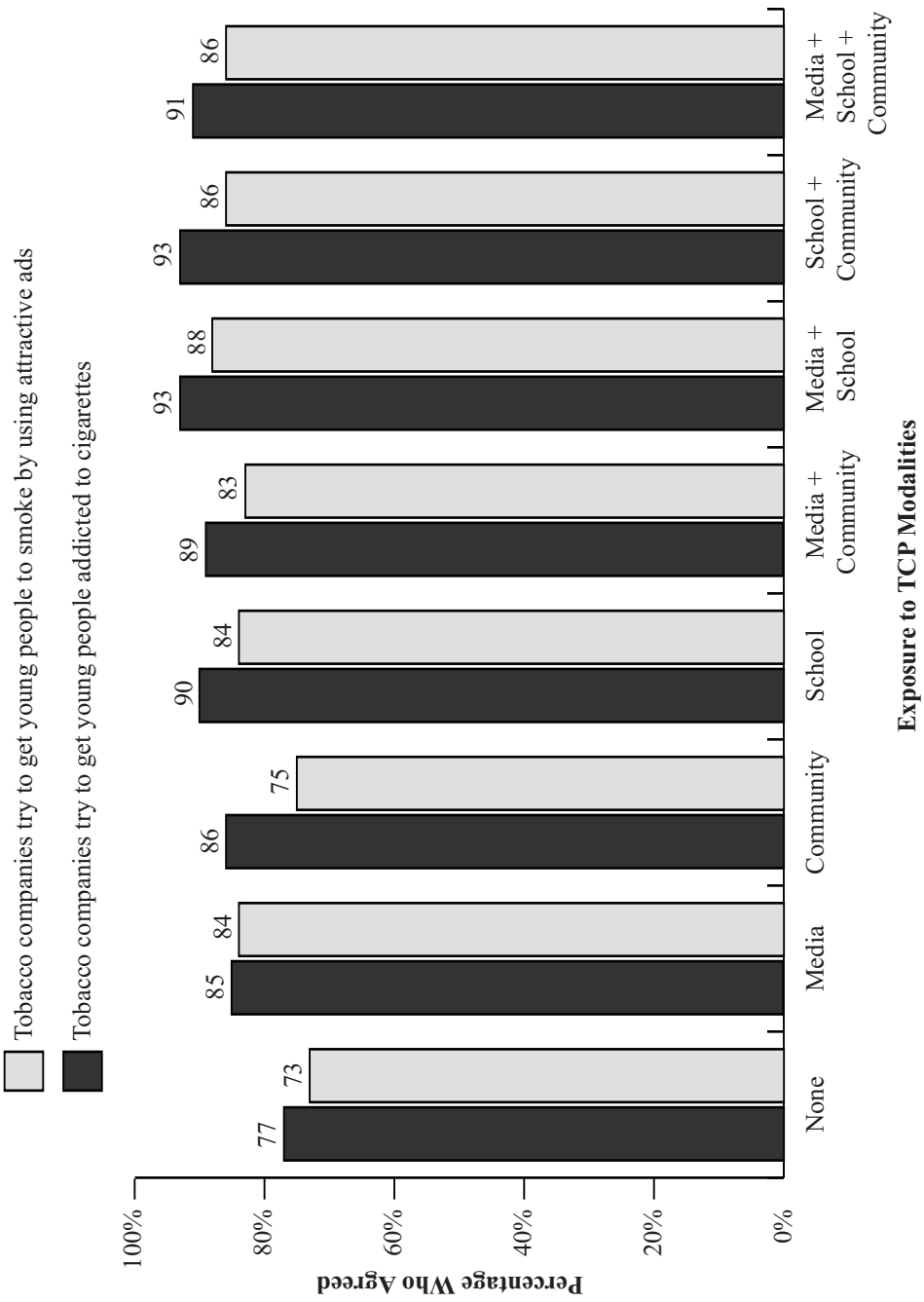


Figure 11-7 shows the percentage of 10th-grade youths that expressed negative attitudes toward the tobacco industry, according to their exposure to TCS program modalities. Youths exposed to more than one program expressed attitudes toward the tobacco industry that were significantly more negative than those of youths exposed to only one program or youths not exposed to any programs.

The trends showed a slight but significant increase in negative attitudes toward the tobacco industry among youths exposed to messages from multiple modalities. Significant differences in youth attitudes were found (at $p = 0.05$) when results were observed for comparisons between *media* versus *media and school*; and *school* versus *media and school*. The nonsignificant results for negative attitudes toward the tobacco industry may be due to a ceiling effect; regardless of program exposure, most students already had very negative attitudes about the tobacco industry.

SUMMARY While exposure to specific tobacco control programs was associated with anti-tobacco attitudes and behaviors, exposure to multiple components appeared to be more beneficial than exposure to only one component. This indicates that presenting information through a variety of modalities is an important strategy for tobacco control.

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