

CHAPTER 1

HISTORICAL PERSPECTIVE, OVERVIEW, AND CONCLUSIONS

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Historical Perspective

Each of the last five Surgeons General of the U.S. Public Health Service (PHS) has identified cigarette smoking as one of this Nation's most significant sources of death and disease. Today, more than one of every six American deaths is the result of cigarette smoking. Smoking is responsible for an estimated 30 percent of all cancer deaths, including 87 percent of lung cancer, the leading cause of cancer mortality; 21 percent of deaths from coronary heart disease; 18 percent of stroke deaths; and 82 percent of deaths from chronic obstructive pulmonary disease. Other forms of tobacco use, including pipe and cigar smoking and use of smokeless tobacco, are also associated with significantly elevated risks of disease and death (US DHEW 1979a; US DHHS 1986b).

Although the health hazards of tobacco use have been suspected for almost 400 years, the first reported clinical impressions of a relationship between tobacco and disease date from the 18th century, when tobacco use was associated with lip cancer (US DHEW 1979a) and nasal cancer (US DHHS 1986b). However, true scientific understanding of the health effects of tobacco has been achieved only in the present century. Broders (1920) published an article in the *Journal of the American Medical Association* linking tobacco use to lip cancer, and 8 years later, Lombard and Doering (1928) published an article in the *New England Journal of Medicine* noting that heavy smoking was more common among cancer patients than among control groups. Later, Pearl (1938) observed in the journal *Science* that heavy smokers had a shorter life expectancy than nonsmokers.

During the 1930s, the Nation's increasing rate of lung cancer and other diseases prompted the initiation of epidemiologic and laboratory studies of the relationship between tobacco use and disease. In the late 1940s and early 1950s, a number of retrospective epidemiologic studies, published by Wynder and Graham (1950) and by other investigators, provided scientific evidence strongly linking smoking to lung cancer. This association was soon thereafter supported by the emerging early findings of major prospective (cohort) mortality studies, including the work of Doll and Hill (1954, 1956) in Great Britain and Hammond and Horn (1958a, 1958b) in the United States. The strength and consistency of these results, combined with evidence from laboratory and autopsy studies, led a national scientific study group to conclude in 1957 that the relationship between smoking and lung cancer was causal (Study Group on Smoking and Health 1957).

On July 12 of that year, U.S. Surgeon General Leroy Burney issued a statement declaring that "The Public Health Service feels the weight of the evidence is increasingly pointing in one direction; that excessive smoking is one of the causative factors in lung cancer" (US PHS 1964). Two years later, in 1959, Surgeon General Burney said that "The weight of evidence at present implicates smoking as the principal factor in the increased incidence of lung cancer" (Burney 1959).

Increases in chronic diseases in other parts of the world led health authorities in other countries to examine the relationship between tobacco and disease, particularly in Europe and Scandinavia. In 1957, the British Medical Research Council reported that a major part of the increase in lung cancer was attributable to smoking (British Medical Research Council 1957). Later, the Royal College of Physicians (1962) issued a

landmark document on smoking and health that concluded that “Cigarette smoking is the most likely cause of the recent world-wide increase in deaths from lung cancer . . . is an important predisposing cause of the development of chronic bronchitis . . . probably increases the risk of dying from coronary heart disease...has an adverse effect on healing of [gastric and duodenal] ulcers . . . [and] may be a contributing factor in cancer of the mouth, pharynx, oesophagus, and bladder.”

On June 1, 1961, the presidents of the American Cancer Society, the American Public Health Association, the American Heart Association, and the National Tuberculosis Association (now the American Lung Association) urged President John F. Kennedy to establish a commission to study the health consequences of smoking. Representatives of these organizations met with Surgeon General Luther L. Terry in January 1962 to reiterate their call for action. In April, the Surgeon General presented a detailed proposal for an advisory group to reevaluate the position adopted by the Public Health Service in 1959. In calling for the advisory group, Dr. Terry cited new research on the adverse health effects of tobacco, a request from the Federal Trade Commission for guidance on policy regarding the labeling and advertising of tobacco products, and the findings in the new report of the Royal College of Physicians.

On July 27, 1962, following consultations between the White House and the Public Health Service, the Surgeon General held a meeting to define the work of an expert advisory group and to identify candidates for the committee. Meeting with the Surgeon General were representatives of the American Cancer Society, the American College of Chest Physicians, the American Heart Association, the American Medical Association, the Tobacco Institute, the Food and Drug Administration, the National Tuberculosis Association, the Federal Trade Commission, and the President’s Office of Science and Technology. The group agreed on a list of more than 150 scientists and physicians. Each of the organizations had the right to veto any of the names on the list for any reason. Persons who had taken a public position on smoking and health were not considered for inclusion on the advisory committee.

Dr. Terry selected 10 individuals from the list to serve on the Surgeon General’s Advisory Committee on Smoking and Health: Stanhope Bayne-Jones, M.D., LL.D., former Dean, Yale School of Medicine; Walter J. Burdette, M.D., Ph.D., University of Utah; William G. Cochrane, M.A., Harvard University; Emmanuel Farber, M.D., Ph.D., University of Pittsburgh; Louis F. Fieser, Ph.D., Harvard University; Jacob Furth, M.D., Columbia University; John B. Hickam, M.D., Indiana University; Charles LeMaistre, M.D., University of Texas; Leonard M. Schuman, M.D., University of Minnesota; and Maurice H. Seevers, M.D., Ph.D., University of Michigan.

The Advisory Committee held nine meetings from November 1962 through December 1963, during which they reviewed all the available data from animal laboratory experiments, clinical and autopsy studies, and retrospective and prospective epidemiologic studies. The Committee had access to over 7,000 publications pertaining to smoking and health, including more than 3,000 articles reporting research findings published after 1950. In evaluating evidence linking smoking to disease, the Committee restricted judgments of a causal relationship to those associations for which the evidence was (1) consistent, (2) strong, (3) specific, (4) supportive of appropriate temporal relationships, and (5) coherent (US PHS 1964).

The final Report of the Advisory Committee was released on January 11, 1964 (US PHS 1964). It concluded that “Cigarette smoking is causally related to lung cancer in men; the magnitude of the effect of cigarette smoking far outweighs all other factors. The data for women, though less extensive, point in the same direction The risk of developing lung cancer increases with duration of smoking and the number of cigarettes smoked per day, and is diminished by discontinuing smoking.”

The Report also concluded that pipe smoking is causally related to lip cancer, that cigarette smoking is causally related to laryngeal cancer in men, and that “Cigarette smoking is the most important of the causes of chronic bronchitis.” The Advisory Committee identified significant associations between smoking and cancer of the esophagus, cancer of the urinary bladder, coronary artery disease, emphysema, peptic ulcer disease, and low-birthweight babies, but it did not consider the available data to be sufficient to label these associations causal.

The Committee found that male cigarette smokers had a 70-percent excess mortality rate over men who had never smoked and that female smokers also had an elevated mortality rate, although less than that of males. The Advisory Committee concluded that “Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action.”

“Remedial action” was initiated immediately after publication of the Advisory Committee’s Report, when the Federal Trade Commission (FTC) proposed that cigarette packs and advertisements bear warning labels and that strict limitations be placed on the content of cigarette advertising. With passage of the Federal Cigarette Labeling and Advertising Act of 1965 (Public Law 89-92; amended in April 1970 by Public Law 91-222), Congress preempted the FTC’s recommendation: beginning in 1966, a congressionally mandated health warning appeared on all cigarette packs but not on advertisements.

The Act also required the Secretary of Health, Education, and Welfare to submit annual reports to Congress on the health consequences of smoking, together with legislative recommendations, beginning no later than mid-1967. New reports of the Surgeon General on smoking and health were issued in each calendar year beginning in 1967, except for 1970, 1976, 1977, and 1987. (In 1976, a volume of selected chapters from the 1971–75 Reports was published. The report issued in 1978 was a joint Report for the years 1977 and 1978.) Thus, the present volume, commemorating the 25th anniversary of the 1964 Report, is the 20th Report in the series. In addition, in 1986, PHS issued a report on the health consequences of using smokeless tobacco (US DHHS 1986b). Table 1 identifies the previous reports and highlights their coverage.

The reports published since the 1964 Report have confirmed the scientific judgment of the Advisory Committee and have extended its findings. The evidence available today has reinforced the Advisory Committee’s judgments of causality; converted most of its “significant associations” into causal relationships, adhering to the strict criteria described in the first Report; confirmed causal associations for relationships not contemplated in the 1964 Report (e.g., the health hazards of involuntary smoking (US DHHS 1986a)); and identified additional disease associations.

Accompanying the growth and dissemination of scientific knowledge has been increased public understanding of the hazards of smoking, reflected in decreases in smok-

TABLE 1.—Surgeon General’s Reports on smoking and health, 1964–88

Year	Subject/Highlights
1964	First official report of the Federal Government on smoking and health. Concluded that “Cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action.” Concluded that cigarette smoking is a cause of lung cancer in men and a suspected cause of lung cancer in women. Identified many other causal relationships and smoking–disease associations (US PHS 1964).
1967	Confirmed and strengthened conclusions of 1964 Report. Stated that “The case for cigarette smoking as the principal cause of lung cancer is overwhelming.” Found that evidence “strongly suggests that cigarette smoking can cause death from coronary heart disease.” 1964 Report had described this relationship as an “association.” Also concluded that “Cigarette smoking is the most important of the causes of chronic non-neoplastic bronchiopulmonary diseases in the United States.” Identified measures of morbidity associated with smoking (US PHS 1968a).
1968	Updated information presented in 1967 Report. Estimated smoking-related loss of life expectancy among young men as 8 years for “heavy” smokers (over 2 packs per day) and 4 years for “light” smokers (less than 1/2 pack per day) (US PHS 1968b).
1969	Also supplemented 1967 Report. Confirmed association between maternal smoking and infant low birthweight. Identified evidence of increased incidence of prematurity, spontaneous abortion, stillbirth, and neonatal death (US PHS 1969).
1971	Reviewed entire field of smoking and health, with emphasis on most recent literature. Discussed new data indicating associations between smoking and peripheral vascular disease, atherosclerosis of the aorta and coronary arteries, increased incidence and severity of respiratory infections, and increased mortality from cerebrovascular disease and nonsyphilitic aortic aneurysm. Concluded that smoking is associated with cancers of the oral cavity and esophagus. Found that “Maternal smoking during pregnancy exerts a retarding influence on fetal growth” (US DHEW 1971).
1972	Examined evidence on immunological effects of tobacco and tobacco smoke, harmful constituents of tobacco smoke, and “public exposure to air pollution from tobacco smoke.” Found tobacco and tobacco smoke antigenic in humans and animals; tobacco may impair protective mechanisms of immune system; nonsmokers’ exposure to tobacco smoke may exacerbate allergic symptoms; carbon monoxide in smoke-filled rooms may harm health of persons with chronic lung or heart disease; tobacco smoke contains hundreds of compounds, several of which have been shown to act as carcinogens, tumor initiators, and tumor promoters. Identified carbon monoxide, nicotine, and tar as smoke constituents most likely to produce health hazards of smoking (US DHEW 1972).
1973	Presented evidence on health effects of smoking pipes, cigars, and “little cigars.” Found mortality rates of pipe and cigar smokers higher than those of nonsmokers but lower than those of cigarette smokers. Found that cigarette smoking impairs exercise performance in healthy young men. Presented additional evidence on smoking as risk factor in peripheral vascular disease and problems of pregnancy (US DHEW 1973).

TABLE 1.—Continued

Year	Subject/Highlights
1974	Tenth Anniversary Report. Reviewed and strengthened evidence on major hazards of smoking. Reviewed evidence on association between smoking and atherosclerotic brain infarction and on synergistic effect of smoking and asbestos exposure in causing lung cancer (US DHEW 1974).
1975	Updated information on health effects of involuntary (passive) smoking. Noted evidence linking parental smoking to bronchitis and pneumonia in children during the first year of life (US DHEW 1975).
1976 ^a	Compiled selected chapters from 1971–75 Reports (US DHEW 1976).
1977–78	Combined 2-year Report focused on smoking-related health problems unique to women. Cited studies showing that use of oral contraceptives potentiates harmful effects of smoking on the cardiovascular system (US DHEW 1978).
1979	Fifteenth Anniversary Report. Presented most comprehensive review of health effects of smoking ever published, and first Surgeon General's Report to carefully examine behavioral, pharmacologic, and social factors influencing smoking. Also first Report to consider role of adult and youth education in promoting nonsmoking. First Report to review health consequences of smokeless tobacco. Many new sections, including one identifying smoking as "one of the primary causes of drug interactions in humans" (US DHEW 1979a).
1980	Devoted to health consequences of smoking for women. Reviewed evidence that strengthened previous findings and permitted new ones. Noted projections that lung cancer would surpass breast cancer as leading cause of cancer mortality in women. Identified trend toward increased smoking by adolescent females (US DHHS 1980a).
1981	Examined health consequences of "the changing cigarette," i.e., lower tar and nicotine cigarettes. Concluded that lower yield cigarettes reduced risk of lung cancer but found no conclusive evidence that they reduced risk of cardiovascular disease, chronic obstructive pulmonary disease, and fetal damage. Noted possible risks from additives and their products of combustion. Discussed compensatory smoking behaviors that might reduce potential risk reductions of lower yield cigarettes. Emphasized that there is no safe cigarette and that any risk reduction associated with lower yield cigarettes would be small compared with benefits of quitting smoking (US DHHS 1981).
1982	Reviewed and extended understanding of the health consequences of smoking as a cause or contributory factor of numerous cancers. Included first Surgeon General's Report consideration of emerging epidemiologic evidence of increased lung cancer risk in nonsmoking wives of smoking husbands. Did not find evidence at that time sufficient to conclude that relationship was causal, but labeled it "a possible serious public health problem." Discussed potential for low-cost smoking cessation interventions (US DHHS 1982).
1983	Examined health consequences of smoking for cardiovascular disease. Concluded that cigarette smoking is one of three major independent causes of coronary heart disease (CHD) and, given its prevalence, "should be considered the most important of the known modifiable risk factors for CHD." Discussed relationships between smoking and other forms of cardiovascular disease (US DHHS 1983).

TABLE 1.—Continued

Year	Subject/Highlights
1984	Reviewed evidence on smoking and chronic obstructive lung disease (COLD). Concluded that smoking is the major cause of COLD, accounting for 80 to 90 percent of COLD deaths in the United States. Noted that COLD morbidity has greater social impact than COLD mortality because of extended disability periods of COLD victims (US DHHS 1984).
1985	Examined relationship between smoking and hazardous substances in the workplace. Found that for the majority of smokers, smoking is a greater cause of death and disability than their workplace environment. Risk of lung cancer from asbestos exposure characterized as multiplicative with smoking exposure. Observed special importance of smoking prevention among blue-collar workers because of their greater exposure to workplace hazards and their higher prevalence of smoking (US DHHS 1985).
1986	Focused on involuntary smoking, concluding that “Involuntary smoking is a cause of disease, including lung cancer, in healthy nonsmokers.” Also found that, compared with children of nonsmokers, children of smokers have higher incidence of respiratory infections and symptoms and reduced rates of increase in lung function. Presented detailed examination of growth in restrictions on smoking in public places and workplaces. Concluded that simple separation of smokers and nonsmokers within same airspace reduces but does not eliminate exposure to environmental tobacco smoke (US DHHS 1986a).
1986 ^b	Special Report of advisory committee appointed by the Surgeon General to study the health consequences of smokeless tobacco. Concluded that use of smokeless tobacco can cause cancer in humans and can lead to nicotine addiction (US DHHS 1986b).
1988	Established nicotine as a highly addictive substance, comparable in its physiological and psychological properties to other addictive substances of abuse (US DHHS 1988).

^aExcluded from count of series volumes in text because no new evidence was reviewed.

^bExcluded from count of series volumes in text because it was a Special Report, not in the series of reports on smoking and health.

ing prevalence and, in recent years, the intensification of public and private measures to discourage smoking. A quarter century after publication of the first Report, smoking remains the leading cause of preventable premature death in our society, but per capita cigarette consumption is declining annually, and analyses of consumption and disease trends augur eventual decreases in smoking’s toll.

Given these changes, the remaining toll of tobacco-related disease, and the Surgeon General’s objective of a smoke-free society by the year 2000 (Koop 1984), Surgeon General C. Everett Koop devotes this 25th anniversary edition of the Surgeon General’s Report to an assessment of progress against smoking in the quarter century since the first Report was published.

Highlights of Conclusions and Findings

Major Conclusions

As the present Report documents, knowledge of the health consequences of smoking has expanded dramatically since 1964, and programs and policies to combat the hazards of smoking have proliferated. The essential chapter-specific conclusions relating to these and other topics of this Report are presented at the end of each chapter and are reproduced in the final Section of this introductory Chapter. The major conclusions of the entire Report, immediately following, address fundamental developments over the past quarter century in smoking prevalence and in mortality caused by smoking. The first two conclusions highlight important gains in preventing smoking and smoking-related disease in the United States. The last three conclusions emphasize sources of continuing concern and remaining challenges.

- 1. The prevalence of smoking among adults decreased from 40 percent in 1965 to 29 percent in 1987. Nearly half of all living adults who ever smoked have quit.**
- 2. Between 1964 and 1985, approximately three-quarters of a million smoking-related deaths were avoided or postponed as a result of decisions to quit smoking or not to start. Each of these avoided or postponed deaths represented an average gain in life expectancy of two decades.**
- 3. The prevalence of smoking remains higher among blacks, blue-collar workers, and less educated persons than in the overall population. The decline in smoking has been substantially slower among women than among men.**
- 4. Smoking begins primarily during childhood and adolescence. The age of initiation has fallen over time, particularly among females. Smoking among high school seniors leveled off from 1980 through 1987 after previous years of decline.**
- 5. Smoking is responsible for more than one of every six deaths in the United States. Smoking remains the single most important preventable cause of death in our society.**

Key New Findings

While this Report is designed to provide a retrospective view of smoking and health over the past 25 years, several findings never previously documented in a report of the Surgeon General emerged during the process of reviewing and analyzing the voluminous materials consulted for the study. Discussed in detail throughout the Report, key new findings include the following:

- Cigarette smoking is a major cause of cerebrovascular disease (stroke), the third leading cause of death in the United States.
- By 1986, lung cancer caught up with breast cancer as the leading cause of cancer death in women. Women smokers' relative risk of lung cancer has increased by a factor of more than four since the early 1960s and is now comparable to the relative risk identified for men in that earlier period. Gender differences in smoking behavior are disappearing; consistent with this, gender differences in the relative risks of and mortality from smoking-related diseases are narrowing.
- Cigarette smoking is associated with cancer of the uterine cervix.
- To date, 43 chemicals in tobacco smoke have been determined to be carcinogenic.
- In 1985, approximately 390,000 deaths were attributable to cigarette smoking. This figure is greater than other recent estimates of smoking-attributable mortality, reflecting the use of higher relative risks of smoking-related diseases for women and, especially in the case of lung cancer, for men. These higher relative risks were derived from the largest and most recent prospective study of smoking and disease, conducted by the American Cancer Society.
- Disparities in smoking prevalence, quitting, and initiation between groups with the highest and lowest levels of educational attainment are substantial and have been increasing. Educational attainment appears to be the best single sociodemographic predictor of smoking.
- There is growing recognition that prevention and cessation interventions need to target specific populations with a high smoking prevalence or at high risk of smoking-related disease. These populations include minority groups, pregnant women, military personnel, high school dropouts, blue-collar workers, unemployed persons, and heavy smokers.
- One-quarter of high school seniors who have ever smoked had their first cigarette by sixth grade, one-half by eighth grade. Associated with knowledge of this fact is a growing consensus that smoking prevention education needs to begin in elementary school.
- Whereas past smoking control efforts targeting children and adolescents focused exclusively on prevention of smoking, the smoking control community has identified the need to develop cessation programs for children and adolescents addicted to nicotine.
- As of mid-1988, more than 320 local communities had adopted laws or regulations restricting smoking in public places. This compares with a total of about 90 as of the end of 1985, a more than threefold increase in 3 years. The number of new State laws restricting smoking in public places in 1987 exceeded the number passed in any preceding year.

- A growing body of evidence on the role of economic incentives in influencing health behavior has contributed to increased interest in and use of such incentives to discourage use of tobacco products. These include excise taxation of tobacco products, workplace financial incentives, and insurance premium differentials for smokers and nonsmokers.
- In marked contrast to the trends in virtually all other areas of smoking control policy, the number of legal restrictions on children's access to tobacco products has decreased over the past quarter century. Studies indicate that vendor compliance with minimum-age-of-purchase laws is the exception rather than the rule.
- The marketing of a variety of alternative nicotine delivery systems has heightened concern within the public health community about the future of nicotine addiction. The most prominent development in this regard was the 1988 test marketing by a major cigarette producer of a nicotine delivery device having the external appearance of a cigarette and being promoted as "the cleaner smoke."
- While over 50 million Americans continue to smoke, more than 90 million would be smoking in the absence of the changes in the smoking-and-health environment that have occurred since 1964.
- Quitting and noninitiation of smoking between 1964 and 1985, encouraged by changes in that environment, have been or will be associated with the postponement or avoidance of almost 3 million smoking-related deaths. That figure reflects the three-quarters of a million deaths noted in conclusion 2 above, and an additional 2.1 million deaths estimated to be postponed or avoided between 1986 and the year 2000.

Overview

Coverage of the Report

As the major conclusions and new findings suggest, progress against smoking is necessarily measured in several dimensions. Ultimately, the most important measure is the burden of mortality, morbidity, and disability associated with smoking. Secondly, changes in the prevalence of smoking and its distribution among sociodemographic groups foretell the future course of smoking-related disease. Behavioral changes in turn reflect a myriad of social and psychological influences that have evolved over the past 25 years. These include public knowledge of smoking hazards and attitudes toward the behavior; availability and effectiveness of smoking prevention and cessation programs; and adoption of smoking-related social policies, often reflections of public attitudes and opinions. At the heart of all these phenomena is the substantial and expanding body of scientific knowledge about the health consequences of smoking.

The 1989 Report examines changes in each of these dimensions over the past quarter century. The Report includes a Foreword by the Assistant Secretary for Health and the Director of the Centers for Disease Control, a Preface by the Surgeon General of the U.S. Public Health Service, and the following chapters:

Chapter 1. Historical Perspective, Overview, and Conclusions

Chapter 2. Advances in Knowledge of the Health Consequences of Smoking

Chapter 3. Changes in Smoking-Attributable Mortality

Chapter 4. Trends in Public Beliefs, Attitudes, and Opinions About Smoking

Chapter 5. Changes in Smoking Behavior and Knowledge About Determinants

Chapter 6. Smoking Prevention, Cessation, and Advocacy Activities

Chapter 7. Smoking Control Policies

Chapter 8. Changes in the Smoking-and-Health Environment: Behavioral and Health Consequences

A key to abbreviations used throughout the Report is found at the end of the volume.

Analysis of changes in scientific–medical understanding follows the core tradition of the Surgeon General’s Report series. Chapter 2 summarizes current knowledge of the health consequences of smoking and examines how it has advanced, both qualitatively and quantitatively, beyond that reflected in the original Surgeon General’s Report. The Chapter also summarizes knowledge of the physicochemical nature of tobacco smoke.

Chapter 3 examines the ultimate population impact of smoking-disease relationships in its review of changes in smoking-attributable mortality. The patterns of mortality have changed in predictable ways, reflecting variations in the rates and sociodemographic distribution of smoking prevalence (the subject of much of Chapter 5). In particular, smoking-attributable mortality in women has increased dramatically, the predictable consequence of the rapid growth in smoking by women in the middle decades of the century. Shifts in sociodemographic patterns of smoking, with greater prevalence now found among blue-collar workers and some minorities than among the white-collar population, presage a continuing disproportionate burden of illness for the Nation’s poor and minority populations.

One element of the decision of whether or not to smoke is personal understanding of the dangers involved. Chapter 4 reviews changes in public knowledge since 1964. The most basic findings from scientific research on the health consequences of smoking have been conveyed to and accepted by the American public, at least at a generalized level. Nevertheless, survey research reveals important gaps in public understanding of the hazards of smoking. Smokers report less understanding of the basic consequences of smoking than do nonsmokers; furthermore, smokers often do not internalize, or personalize, the hazards they acknowledge as applying to smokers in general. In addition, knowledge of smoking-and-health facts beyond the most basic information is not possessed by significant numbers of Americans. Thus, a substantial educational task remains.

Although significant gaps remain, it is also clear that the public has a much better appreciation of the hazards of smoking than it did 25 years ago. Associated with the growing acceptance of smoking as a health hazard for the smoker, and more recently as a hazard for nonsmokers, is a growing public desire to restrict smoking in public places

to protect the rights of nonsmokers to breathe clean air. Opinions about smoking and the appropriate role of smoking control are also considered in Chapter 4.

The relationship between knowledge and opinion change, on the one hand, and subsequent behavior change, on the other, is quite complex. Nevertheless, substantial smoking behavior change has occurred since issuance of the first Surgeon General's Report and has often followed shifts in beliefs and opinions about smoking. The many dimensions of such behavior change are explored in Chapter 5. Part I of the Chapter examines empirical evidence on behavior change across a number of smoking behaviors and across the major sociodemographic groups. Several previous reports of the Surgeon General have included consideration of these trends (US DHEW 1979a; US DHHS 1980a, 1983, 1985, 1988). Part II of Chapter 5 reviews the evolution of understanding of smoking behaviors and their determinants. The 1979 Surgeon General's Report devoted several chapters to the psychological and social determinants of smoking (US DHEW 1979a). Most recently, the phenomenon of nicotine addiction was reviewed thoroughly by the Surgeon General (US DHHS 1988).

Changes in public attitudes toward smoking and in the prevalence of smoking are reflected in the rapid expansion in the 1980s of State and local laws and workplace policies restricting smoking. The Nation's growing nonsmoking ethos is also reflected in more attention to both voluntary and regulatory measures intended to prevent the initiation of tobacco use or to assist smokers to quit. The number of smoking-cessation techniques and programs has expanded. Smoking policy discussions today concern such diverse activities as excise taxation, restriction of advertising and promotion of tobacco products, limitation of children's access to tobacco products, and regulation of the newly emerging nicotine-based products collectively referred to as "alternative nicotine delivery systems."

Chapters 6 and 7 examine developments over the past quarter century in voluntary programmatic efforts and public policies directed at smoking control, respectively. Chapter 6 describes separately programs directed at smoking prevention and cessation, and highlights the work of the major voluntary health associations. The Chapter reviews such diverse efforts as comprehensive school health education curricula and antismoking public service announcements on the broadcast media. Chapter 6 concludes with a brief overview of advocacy and lobbying activities related to smoking and health. Advocacy activities are purely voluntary in nature, yet most have been directed at promoting smoking control policies, particularly in recent years. As such, a discussion of advocacy serves as a logical transition between the focus of Chapter 6 on voluntary efforts to combat smoking and concentration in Chapter 7 on policy measures.

Coverage of developments in smoking control policies in Chapter 7 has few precedents in prior reports of the Surgeon General, despite the first Report's call for "appropriate remedial action" a quarter of a century ago (US PHS 1964). The major exception was the substantial attention accorded workplace and Government smoking restriction policies in the 1986 Report (US DHHS 1986a). Otherwise, the report series' principal references to policy have come in the form of legislative recommendations to the Congress. Yet, as noted above, policies intended to diminish smoking and its disease burden have become increasingly common in both the public and

private sectors. Thus, as part of the history of smoking and health, and as a determinant of progress against smoking, smoking-related policy is examined in detail in this 25th anniversary Report. Coverage of policy in Chapter 7 includes documentation of trends in specific policies, analogous to the coverage afforded smoking restrictions in the 1986 Report. Policies are grouped into three categories: policies pertaining to information and education (Part I), economic incentives (Part II), and direct restrictions (Part III). Where possible, discussion includes examination of scientific understanding of specific policy effects. Such understanding derives from a growing and increasingly sophisticated body of empirical social science research.

Collectively, the program and policy efforts discussed in Chapters 6 and 7, combined with changing public knowledge and social norms, have encouraged tens of millions of Americans not to smoke. As examined in Chapter 8, this behavioral change can be credited with the avoidance of many hundreds of thousands of premature deaths and the associated saving of millions of life-years. Chapter 8 reviews these and other findings on the behavioral and health consequences of changes in the Nation's smoking-and-health environment.

Conclusions pertaining to the findings of each of the Report's chapters are reviewed in the final Section of this introductory Chapter.

By all accounts, the 1964 Report of the Surgeon General's Advisory Committee is a landmark document in the history of public health and a seminal contribution to the Nation's efforts to understand and combat tobacco-related morbidity and mortality. The present Report chronicles progress against smoking in the intervening 25 years, demonstrating an extraordinary array of advances in knowledge, changes in norms and behavior, and effects on the health of the American people. By any reasonable measure, the burden of smoking remains enormous; but the legacy of the 1964 Report is a society that has made impressive strides toward ridding itself of this most preventable source of disease, disability, and death.

1990 Health Objectives for the Nation

In 1979, PHS released the first Surgeon General's Report on Health Promotion and Disease Prevention (US DHEW 1979b). The Report identified 15 priority areas, including smoking, in which significant health gains could be expected in the 1980s, with appropriate actions. Subsequently, working with health experts from both the private and public sectors, the PHS established 226 specific health objectives for the Nation (US DHHS 1980b). Seventeen of these pertain directly to cigarette smoking (Table 2). Many others relate to smoking as well, because they address the prevention of heart disease, cancer, burn injuries, and other smoking-related disease problems. In 1986, the PHS published a midcourse assessment of progress toward achieving the 226 objectives (US DHHS 1986c). One of the goals of the present Report is to offer additional insight in this assessment as it relates to the 17 smoking objectives. This is discussed in the relevant chapters.

PHS is currently developing national health goals for the year 2000, again working with organizations and individuals in the private and public sectors. The reduction of

TABLE 2.—1990 health objectives for the nation pertaining to smoking

Reduced risk factors	1. By 1990, the proportion of adults who smoke should be reduced to below 25 percent. 2. By 1990, the proportion of women who smoke during pregnancy should be no greater than one-half the proportion of women overall who smoke.	3. By 1990, the proportion of children and youth aged 12 to 18 years who smoke should be reduced to below 6 percent. 4. By 1990, the sales-weighted average tar yield of cigarettes should be reduced to below 10 mg. The other components of cigarette smoke known to cause disease should also be reduced proportionately.
Increased public/professional awareness	5. By 1990, the share of the adult population aware that smoking is one of the major risk factors for heart disease should be increased to at least 85 percent. 6. By 1990, at least 90 percent of the adult population should be aware that smoking is a major cause of lung cancer, as well as multiple other cancers including laryngeal, esophageal, bladder, and other types. 7. By 1990, at least 85 percent of the adult population should be aware of the special risk of developing and worsening chronic obstructive pulmonary disease, including bronchitis and emphysema, among smokers.	8. By 1990, at least 85 percent of women should be aware of the special health risks for women who smoke, including the effect on outcomes of pregnancy and the excess risk of cardiovascular disease with oral contraceptive use. 9. By 1990, at least 65 percent of 12-year-olds should be able to identify smoking cigarettes with increased risk of serious disease of the heart and lungs.

TABLE 2.—Continued

Improved services/protection	10. By 1990, at least 35 percent of all workers should be offered employer/employee-sponsored or -supported smoking cessation programs either at the worksite or in the community.	13. By 1990, laws should exist in all 50 States and all jurisdictions prohibiting smoking in enclosed public places, and establishing separate smoking areas at work and in dining establishments.
	11. By 1985, tar, nicotine, and carbon monoxide yields should be prominently displayed on each cigarette package and promotional material.	14. By 1990, major health and life insurers should be offering differential insurance premiums to smokers and nonsmokers.
	12. By 1985, the present cigarette warning should be strengthened to increase its visibility and impact, and to give the consumer additional needed information on the specific multiple health risks of smoking. Special consideration should be given to rotational warnings and to identification of special vulnerable groups.	
Improved surveillance/evaluation	15. By 1985, insurance companies should have collected, reviewed, and made public their actuarial experience on the differential life experience and hospital utilization by specific cause among smokers and nonsmokers, by sex.	17. By 1990, in addition to biomedical hazard surveillance, continuing examination of the changing tobacco product and the sociological phenomena resulting from those changes should have been accomplished.
	16. By 1990, continuing epidemiologic research should have delineated the unanswered research questions regarding low-yield cigarettes, and preliminary partial answers to these should have been generated by research efforts.	

SOURCE: US DHHS (1980b).

tobacco use is one of 21 priority areas in which objectives are being formulated. PHS intends to publish the objectives in 1990.

Limitations of Coverage

Despite the broad scope of this Report, certain limitations have had to be placed on coverage. Two in particular are worthy of mention here:

(1) The Report focuses primarily, but not exclusively, on cigarette smoking, reflecting its dominance among forms of tobacco use, in terms of both prevalence and disease impact. This focus also reflects the desire to represent the principal interest of the 1964 Advisory Committee in this 25th anniversary Report. Pipe and cigar smoking are much less prevalent than cigarette smoking but also carry significant health risks (US DHEW 1979a). Growing use of smokeless tobacco products (snuff and chewing tobacco), primarily by adolescent males, has focused national attention on the prevalence and health consequences of using these tobacco products (Connolly et al. 1986). This subject was recently reviewed thoroughly by an advisory committee to the Surgeon General (US DHHS 1986b) and in a National Cancer Institute monograph (Boyd and Darbey, in press).

(2) The Report concentrates on smoking in the United States. Both within the United States and around the world, there is growing concern about the spread of smoking, particularly in the world's poorer countries. While per capita cigarette consumption is stable or falling in most developed nations, it is rising in Third World countries. Rates of smoking-related chronic diseases are also increasing rapidly, to the point that tobacco is expected to soon become the leading cause of premature, preventable mortality in the Third World, as it is at present in the developed world (Aoki, Hisamichi, Tominaga 1988).

Concentration of this Report on smoking in the United States is no reflection on the relative importance of the international situation. Rather, it results from the principal objective of reviewing where this Nation has come in its efforts to control smoking-related disease since the 1964 report of the Surgeon General's Advisory Committee. The Public Health Service hopes that this review, like its predecessors, will prove to be of value to scientists, health professionals, and public health officials in countries throughout the world.

Development of the Report

This Report was developed by the Office on Smoking and Health (OSH), Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control, Public Health Service of the U.S. Department of Health and Human Services, as part of the Department's responsibility, under Public Law 91-222, to report new and current information on smoking and health to the U.S. Congress.

The scientific content of this Report was produced through the efforts of more than 130 scientists in the fields of medicine, the biological and social sciences, public health, and policy analysis. Manuscripts for the Report, constituting drafts of chapters or sections of chapters, were prepared by 33 scientists selected for their expertise in the

specific content areas. An editorial team including the Director of OSH, a medical epidemiologist from OSH, and four non-Federal experts edited and consolidated the individual manuscripts into chapters. These draft chapters were subjected to an intensive outside peer review, with each chapter reviewed by 5 to 12 individuals knowledgeable about the chapter's subject matter. Incorporating the reviewers' comments, the editors revised the chapters and assembled a draft of the complete Report. The draft Report was then submitted to 25 distinguished scientists for their review and comment on the entirety of its contents. Simultaneously, the draft Report was submitted to 9 institutes and agencies within the U.S. Public Health Service for their review. Comments from the senior scientific reviewers and the agencies were then used to prepare the final draft of the Report, which was then reviewed by the Offices of the Assistant Secretary for Health and the Secretary, Department of Health and Human Services.

Chapter Conclusions

Chapter 2: Advances in Knowledge of the Health Consequences of Smoking

Part I. Health Consequences

1. The 1964 Surgeon General's Report concluded that cigarette smoking increases overall mortality in men, causes lung and laryngeal cancer in men, and causes chronic bronchitis. The Report also found significant associations between smoking and numerous other diseases.
2. Reports of the Surgeon General since 1964 have concluded that smoking increases mortality and morbidity in both men and women. Disease associations identified as causal since 1964 include coronary heart disease, atherosclerotic peripheral vascular disease, lung and laryngeal cancer in women, oral cancer, esophageal cancer, chronic obstructive pulmonary disease, intrauterine growth retardation, and low-birthweight babies.
3. Cigarette smoking is now considered to be a probable cause of unsuccessful pregnancies, increased infant mortality, and peptic ulcer disease; to be a contributing factor for cancer of the bladder, pancreas, and kidney; and to be associated with cancer of the stomach.
4. Accumulating research has elucidated the interaction effects of cigarette smoking with certain occupational exposures to increase the risk of cancer, with alcohol ingestion to increase the risk of cancer, and with selected medications to produce adverse effects.
5. A decade ago, the 1979 Report of the Surgeon General found smokeless tobacco to be associated with oral cancer. In 1986, the Surgeon General concluded that smokeless tobacco was a cause of this disease.
6. Research in the present decade has established that involuntary smoking is a cause of disease, including lung cancer, in healthy nonsmokers, and that the children of parents who smoke have an increased frequency of respiratory infections and symptoms.

7. In 1964, tobacco use was considered habituating. A substantial body of evidence accumulated since then, and summarized in the 1988 Surgeon General's Report, has established that cigarettes and other forms of tobacco are addicting. Given the prevalence of smoking, tobacco use is the Nation's most widespread form of drug dependency.
8. Studies dating from the 1950s have consistently documented the benefits of smoking cessation for smokers in all age groups.
9. Recent evidence, including that presented in this 1989 Report of the Surgeon General, documents that cigarette smoking is a cause of cerebrovascular disease (stroke) and is associated with cancer of the uterine cervix.

Part II. The Physicochemical Nature of Tobacco

1. The estimated number of compounds in tobacco smoke exceeds 4,000, including many that are pharmacologically active, toxic, mutagenic, and carcinogenic.
2. Forty-three carcinogens have been identified in tobacco smoke.
3. Carcinogenic tobacco-specific nitrosamines are found in high concentrations in smokeless tobacco.

Chapter 3: Changes in Smoking-Attributable Mortality

1. Lung cancer death rates increased two- to fourfold among older male smokers over the two decades between the American Cancer Society's two Cancer Prevention Studies (CPS-I, 1959–65, and CPS-II, 1982–86). Lung cancer death rates for younger male smokers fell about 30 to 40 percent during this period.
2. Lung cancer death rates increased four- to sevenfold among female smokers aged 45 years or older in CPS-II compared with CPS-I, while lung cancer death rates among younger women declined 35 to 55 percent.
3. The two-decade interval witnessed a two- to threefold increase in death rates from chronic obstructive pulmonary disease (COPD) in female smokers aged 55 years or older.
4. There was no change in the age-adjusted death rates for lung cancer and COPD between CPS-I and CPS-II among men and women who never smoked regularly.
5. Overall death rates from coronary heart disease (CHD) declined substantially between CPS-I and CPS-II. The decline in CHD mortality among nonsmokers, however, was notably greater than among current cigarette smokers.
6. In CPS-II, the relative risks of death from cerebrovascular lesions were 3.7 and 4.8 for men and women smokers under age 65. Increased risks of stroke were also observed among older smokers and former smokers. Along with the recently reported results of other studies, these findings strongly support a causal role for cigarette smoking in thromboembolic and hemorrhagic stroke.
7. In 1985, smoking accounted for 87 percent of lung cancer deaths, 82 percent of COPD deaths, 21 percent of CHD deaths, and 18 percent of stroke deaths. Among men and women less than 65 years of age, smoking accounted for more than 40 percent of CHD deaths.

8. The large increase in smoking-attributable mortality among American women between 1965 and 1985 was a direct consequence of their adoption of lifelong cigarette smoking, especially from their teenage years onward.
9. In 1985, 99 percent of smoking-attributable deaths occurred among people who started smoking before the 1964 Surgeon General's Report. For this group, the annual smoking-attributable fatality rate is about 7,000 deaths per 1 million persons at risk.
10. For 10 causes of death, a total of 337,000 deaths were attributable to smoking in 1985. These represented 22 percent of all deaths among men and 11 percent among women. If other cardiovascular, neoplastic, and respiratory causes of death were included—as well as deaths among newborns and infants resulting from maternal smoking, deaths from cigarette-caused residential fires, and lung cancer deaths among nonsmokers due to environmental tobacco smoke—the total smoking-attributable mortality was about 390,000 in 1985.

Chapter 4: Trends in Public Beliefs, Attitudes, and Opinions About Smoking

1. In the 1950s, 40 to 50 percent of adults believed that cigarette smoking is a cause of lung cancer. By 1986, this proportion had increased to 92 percent (including 85 percent of current smokers).
2. Between 1964 and 1986, the proportion of adults who believed that cigarette smoking increases the risk of heart disease rose from 40 to 78 percent. A similar increase occurred among smokers, from 32 to 71 percent.
3. The proportion of adults who believed that cigarette smoking increases the risk of emphysema and chronic bronchitis rose from 50 percent in 1964 to 81 percent (chronic bronchitis) and 89 percent (emphysema) in 1986. These proportions increased among current smokers from 42 percent in 1964 to 73 percent (chronic bronchitis) and 85 percent (emphysema) in 1986.
4. Despite these impressive gains in public knowledge, substantial numbers of smokers are still unaware of or do not accept important health risks of smoking. For example, the proportions of smokers in 1986 who did not believe that smoking increases the risk of developing lung cancer, heart disease, chronic bronchitis, and emphysema were 15 percent, 29 percent, 27 percent, and 15 percent, respectively. These percentages correspond to between 8 and 15 million adult smokers in the United States.
5. In 1985, substantial percentages of women of childbearing age did not believe that smoking during pregnancy increases the risk of stillbirth (32 percent), miscarriage (25 percent), premature birth (24 percent), and having a low-birthweight baby (15 percent). Of women in this age group, 28 percent did not believe that women taking birth control pills have a higher risk of stroke if they smoke.
6. Some smokers today do not recognize their own personal risk from smoking or they minimize it. In 1986, only 18 percent of smokers were "very concerned" about the effects of smoking on their health, and 24 percent were not at all concerned.

7. In 1986, about half of current smokers and 40 percent of never smokers incorrectly believed that a person would have to smoke 10 or more cigarettes per day before it would affect his or her health.
8. A national survey conducted in 1983 by Louis Harris and Associates found that the public underestimates the health risks of smoking compared with many other health risks.
9. Many smokers underestimate the population impact of smoking. In 1987, 28 percent of smokers (and 16 percent of the general population) disagreed with the statement, "Most deaths from lung cancer are caused by cigarette smoking."
10. The proportion of high school seniors who believe that smoking a pack or more of cigarettes per day causes great risk of harm increased from 51 percent in 1975 to 66 percent in 1986.
11. In 1986, about three-quarters of adults believed that using chewing tobacco or snuff is harmful to health.
12. The social acceptability of smoking in public is declining, as measured by the proportion of adults who find it annoying to be near a person smoking cigarettes. This proportion increased from 46 percent in 1964 to 69 percent in 1986.
13. A majority of the public favors policies restricting smoking in public places and worksites, prohibiting the sale of cigarettes to minors, and increasing the cigarette tax to fund the medicare program. Recent surveys indicate that about half the public supports a ban on cigarette advertising.

Chapter 5: Changes in Smoking Behavior and Knowledge About Determinants

Part I. Changes in Smoking Behavior

1. Prevalence of cigarette smoking has declined substantially among men, slightly among women, and hardly at all among those without a high school diploma. From 1965–87, the prevalence of smoking among men 20 years of age and older decreased from 50.2 to 31.7 percent. Among women, the prevalence of smoking decreased from 31.9 to 26.8 percent. Smoking prevalence among whites fell steadily. Among blacks, the prevalence of smoking changed very little between 1965 and 1974; subsequently, prevalence declined at a rate similar to that of whites during the same period. Smoking prevalence has consistently been higher among blue-collar workers than among white-collar workers.
2. Annual per capita (18 years of age and older) sales of manufactured cigarettes decreased from 4,345 cigarettes in 1963 to 3,196 in 1987, a 26-percent reduction. Total cigarette sales increased gradually to 640 billion cigarettes in 1981 and then fell to 574 billion in 1987.
3. In 1965, 29.6 percent of adults who had ever smoked cigarettes had quit. This proportion (quit ratio) increased to 44.8 percent in 1987. The rate of increase in the quit ratio from 1965–85 was similar for men and women. The rate of change in quitting activity in recent years is similar for whites and blacks. From 1965–85, the quit ratio increased more rapidly among college graduates than among adults without a high school diploma.

4. Of all adults who smoked at any time during the year 1985–86, 70 percent had made at least one serious attempt to quit during their lifetime and one-third stopped smoking for at least 1 day during that year.
5. The age of initiation of smoking has declined over time, particularly among females. Among smokers born since 1935, more than four-fifths started smoking before the age of 21.
6. Trends in prevalence of cigarette smoking among those aged 20 to 24 years are an indicator of trends in initiation. By this measure, initiation has declined between 1965 and 1987 from 47.8 to 29.5 percent. Initiation has fallen four times more rapidly among males than among females. The rate of decline has been similar among whites and blacks. Initiation has decreased three times more rapidly among those with 13 or more years of education than among those with less education.
7. The prevalence of daily cigarette smoking among high school seniors decreased from 29 percent in 1976 to 21 percent in 1980, after which prevalence leveled off at 18 to 21 percent. Prevalence among females has consistently exceeded that among males since 1977. Prevalence was lower for students with plans to pursue higher education than for those without such plans. The difference in prevalence by educational plans widened throughout this period; in 1987, smoking rates were 14 percent and 30 percent in these two groups, respectively.
8. The best sociodemographic predictor of smoking patterns appears to be level of educational attainment. Marked differences in smoking prevalence, quitting, and initiation have occurred and have increased over time between more and less educated people.
9. The domestic market share of filtered cigarettes increased from 1 percent in 1952 to 94 percent in 1986. The market share of low-tar cigarettes (15 mg or less) increased from 2 percent in 1967 to 56 percent in 1981, after which this proportion fell slightly and then stabilized at 51 to 53 percent. The market share of longer cigarettes (94 to 121 mm) increased from 9 percent in 1967 to 40 percent in 1986.
10. Between 1964 and 1986, use of smokeless tobacco (snuff and chewing tobacco) declined among men and women 21 years of age and older. However, among males aged 17 to 19, snuff use increased fifteenfold and use of chewing tobacco increased more than fourfold from 1970–86.
11. Differences in prevalence of cigarette smoking and smokeless tobacco use between young males and young females suggest that the prevalence of any tobacco use is similar in these two groups.
12. From 1964 to 1986, the prevalence of pipe and cigar smoking declined by 80 percent among men.

Part II. Changes in Knowledge About the Determinants of Smoking Behavior

1. Smoking was viewed as a habit in 1964 and is now understood to be an addiction influenced by a wide range of interacting factors, including pharmacologic effects of nicotine; conditioning of those effects to numerous activities, emotions, and settings; socioeconomic factors; personal factors such as coping resources; and social influence factors.

2. Since 1964, there has been a gradual evolution of understanding of the progression of smoking behavior through the broad stages of development, regular use, and cessation. Each of these stages is differentially affected by multiple and interacting determinants.
3. Views of determinants of smoking are affected by the predominating theoretical and methodological perspectives. In smoking, the earlier focus on broad, dispositional variables (e.g., extraversion) has given way to an emphasis on situation-specific and interactional variables; a focus on a search for a single cause has given way to a focus on multiple and interacting causes.

Chapter 6: Smoking Prevention, Cessation, and Advocacy Activities

Part I. Smoking Prevention Activities

1. Diverse program approaches to the prevention of smoking among youth grew out of antismoking education efforts in the 1960s. These approaches include media-based programs and resources; smoking prevention as part of multicomponent school health education; psychosocial prevention curricula; and a variety of other resources developed and sponsored by professional and voluntary health organizations, Federal and State agencies, and schools and community groups.
2. Psychosocial curricula addressing youths' motivations for smoking and the skills they need to resist influences to smoke have emerged as the program approach with the most positive outcomes. Evolution in program content has been accompanied by a shift since the 1960s in prevention program focus from youths in high school and college to adolescents in grades 6 through 8.
3. Existing prevention programs vary greatly in the extent to which they have been evaluated and used. Psychosocial prevention curricula have been intensively developed over the last decade and have been the most thoroughly evaluated and best documented; however, they are generally not part of a dissemination system. More widely disseminated smoking prevention materials and programs, such as those using mass media and brochures, have not always been as thoroughly evaluated; however, they have achieved wider use in the field.
4. The model of stages of smoking behavior acquisition underlies current smoking prevention programs and suggests new intervention opportunities, ranging from prevention activities aimed at young children to cessation programs for adolescent smokers.
5. There has been and continues to be a lack of smoking prevention programs that target youth at higher risk for smoking, such as those from lower socioeconomic backgrounds or school dropouts.

Part II. Smoking Education and Cessation Activities

1. During the past 25 years, national voluntary health agencies, especially the American Cancer Society, the American Heart Association, and the American