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# THE EPIDEMIOLOGY OF TOBACCO USE, DEPENDENCE, AND CESSATION IN THE UNITED STATES

Stevens S. Smith, PhD, and Michael C. Fiore, MD, MPH

Tobacco use, primarily in the form of cigarettes, is the leading preventable cause of death in the United States, accounting for almost 20% of all deaths.<sup>17,60</sup> Recent estimates of smoking-attributable mortality (SAM) from 1990 to 1994 indicate that cigarette smoking caused nearly 431,000 deaths per year.<sup>17</sup> The economic burden of tobacco-related health care is enormous; for example, total medical expenditures in the United States attributable to smoking amounted to \$72.7 billion in 1993, nearly 12% of all medical costs.<sup>42</sup> In 1996, the US Food and Drug Administration (FDA) determined that nicotine in tobacco is addictive and that most cigarette smokers and users of smokeless tobacco continue to use tobacco in order to satisfy their addiction to nicotine.<sup>40</sup> In addition, the American Psychiatric Association has included nicotine dependence in its Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) in recognition of the addictiveness of nicotine.<sup>2</sup> Tobacco use and dependence, therefore, represent a significant public health issue in both the United States and globally.<sup>5,49</sup>

This article reviews the epidemiology of tobacco use, nicotine dependence, and smoking cessation in the United States, drawing on the latest epidemiologic data and augmenting prior epidemiologic reviews.<sup>27,28,30,33</sup> Tobacco use includes consumption of cigarettes, cigars, snuff, chewing

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tobacco, and loose tobacco for pipe-smoking or hand-rolled cigarettes. The majority of epidemiologic studies have examined cigarette smoking, but more recent studies have examined the use of cigars and smokeless tobacco (snuff and chewing tobacco). Nicotine dependence reflects compulsive use of nicotine-containing tobacco, physiologic tolerance (i.e., needing to use increased amounts of nicotine to achieve the desired effect), nicotine withdrawal upon discontinuation of tobacco use (e.g., symptoms such as craving for nicotine, irritability, anger, anxiety, depression, increased appetite), and continued use despite significant problems related to tobacco use (e.g., health problems).<sup>2</sup> The distinction between tobacco use and dependence may be significant given recent studies indicating that never-daily smokers make up a significant minority of smokers, especially among certain ethnic minorities, where prevalence rates of probable nondependent users (never-daily) smokers are as high as 16.8%.<sup>37</sup> Nicotine-dependent tobacco users also appear to be at increased risk for psychiatric conditions such as major depression and alcoholism. This article, therefore, also reviews epidemiologic data on comorbidity of tobacco use (primarily cigarette smoking) and various psychiatric disorders. Finally, epidemiologic aspects of smoking initiation and tobacco cessation are reviewed.

## **TOBACCO PRODUCTION AND CONSUMPTION IN THE UNITED STATES**

Tobacco production and per capita consumption data for tobacco products in various forms (cigars, cigarettes, snuff, chewing tobacco, and loose tobacco for pipe-smoking or self-made cigarettes) are reported by the US Department of Agriculture. In 1900, total tobacco consumption averaged 7.4 lbs per capita in persons 15 years of age or older.<sup>43</sup> Tobacco consumption nearly doubled during the first half of the 20th century and peaked in 1952, when per capita consumption averaged 12.9 lbs per person. Total tobacco consumption has steadily declined since 1960 to a low of 4.55 lbs consumed per capita in 1997.<sup>58</sup>

In 1900, most tobacco was consumed as chewing tobacco (48%), cigars (27%), or loose tobacco for pipe-smoking or hand-rolling (19%), whereas commercial cigarettes accounted for only about 2% of tobacco consumption in the United States.<sup>43</sup> By 1952, cigarette smoking accounted for 81% of all tobacco consumption, with approximately 4000 cigarettes consumed per capita. Thus, increasing levels of consumption of manufactured cigarettes during the first half of the 20th century largely accounted for the increasing per capita total tobacco consumption. This disproportionate preference by tobacco users for commercial cigarettes has continued to increase to the present time, accounting for approximately 90% of tobacco consumption in 1997 in the United States.<sup>43</sup>

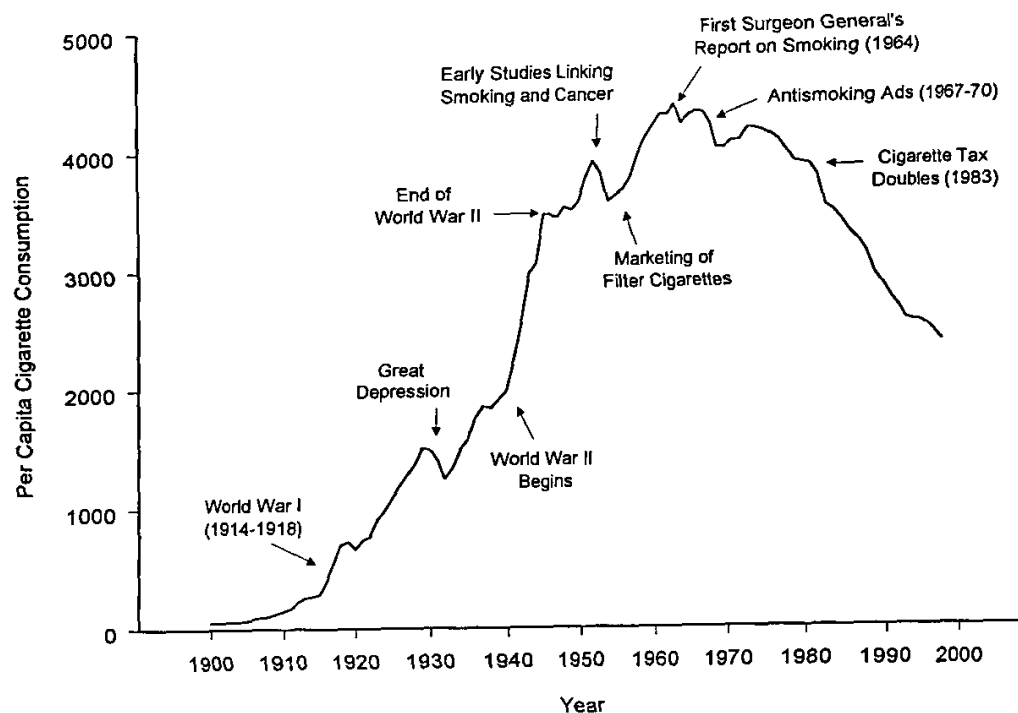
The shift to cigarettes from other forms of tobacco during the first half of the 20 century reflects several factors, including the development of efficient cigarette manufacturing machinery, the introduction and mass

marketing of Camel cigarettes in 1913, and free distribution of cigarettes during the World Wars.<sup>10</sup> More important, though, was the development of new tobacco blends and curing processes for cigarette tobacco.<sup>33</sup> The tobacco used in cigars, snuff, chewing tobacco, and pipe tobacco (e.g., Burley and dark tobaccos) delivers nicotine in an alkaline state, which is absorbed more readily in the mouth and nasal mucosa than in the lungs. In contrast, commercial cigarettes contain flue-cured tobacco, which delivers nicotine in an acidic state that is more readily absorbed in the lungs than in the oral mucosa.<sup>53</sup> Inhaled cigarette smoke provides very rapid delivery of nicotine to the brain (relative to the slower absorption of nicotine by way of the oral mucosa) because of arterial delivery by way of the lungs. In addition, arterial concentrations of nicotine from cigarette smoke are up to three times higher than concentrations in venous delivery (e.g., from oral forms of tobacco).<sup>35</sup> These characteristics of inhaled cigarette smoke (rapid delivery of high doses of nicotine to the brain) make cigarettes highly addictive, with up to 50% of individuals who try smoking cigarettes becoming addicted to nicotine.<sup>61</sup> The combination of the high addictive potential of inhaled cigarette smoke along with other factors (e.g., aggressive advertising) helps to explain the dramatic shift by tobacco users to cigarettes over other forms of tobacco after commercial cigarettes became widely available.

In 1900, per capita cigarette consumption for adults in the United States totaled 54 cigarettes. As shown in Figure 1, per capita consumption increased yearly through the early 1950s (with the exception of a temporary downturn during the Great Depression in the 1930s). By 1952, per capita consumption totaled 3886 cigarettes per person. Studies linking smoking and cancer published in the early 1950s resulted in a temporary decrease in cigarette consumption in 1953 and 1954, but consumption started rising again with the marketing of filter cigarettes, and reached an all-time high in 1963 of 4345 cigarettes per capita. Per capita consumption began decreasing again after the release in 1964 of the first Surgeon General's report on smoking and health<sup>59</sup> followed by a brief rise in the early 1970s after free TV broadcasts of antismoking ads ended. Consumption started decreasing again in 1974 (4141 per capita) and has continued to decline each year, with the 1997 level at 2423 cigarettes per capita.<sup>56,57,58</sup>

Figure 2 shows per capita consumption levels (in lbs) of noncigarette tobacco products over the past 10 years. Decreasing consumption trends are evident for chewing tobacco and loose tobacco (for pipes and hand-rolled cigarettes), whereas consumption appears to be increasing for cigars and snuff.<sup>58</sup> The increase in cigar consumption is largely accounted for by increases in the smoking of large cigars and cigarillos rather than small cigars, but consumption of all three types of cigars has increased since 1993.

With the exception of cigars and snuff, decreasing per capita tobacco consumption trends appear to be encouraging, but there is epidemiologic evidence that, in certain sociodemographic groups, tobacco use remains high, is increasing, or does not show a decreasing trend. In addition, other groups appear to be at higher risk for initiation of tobacco use or have



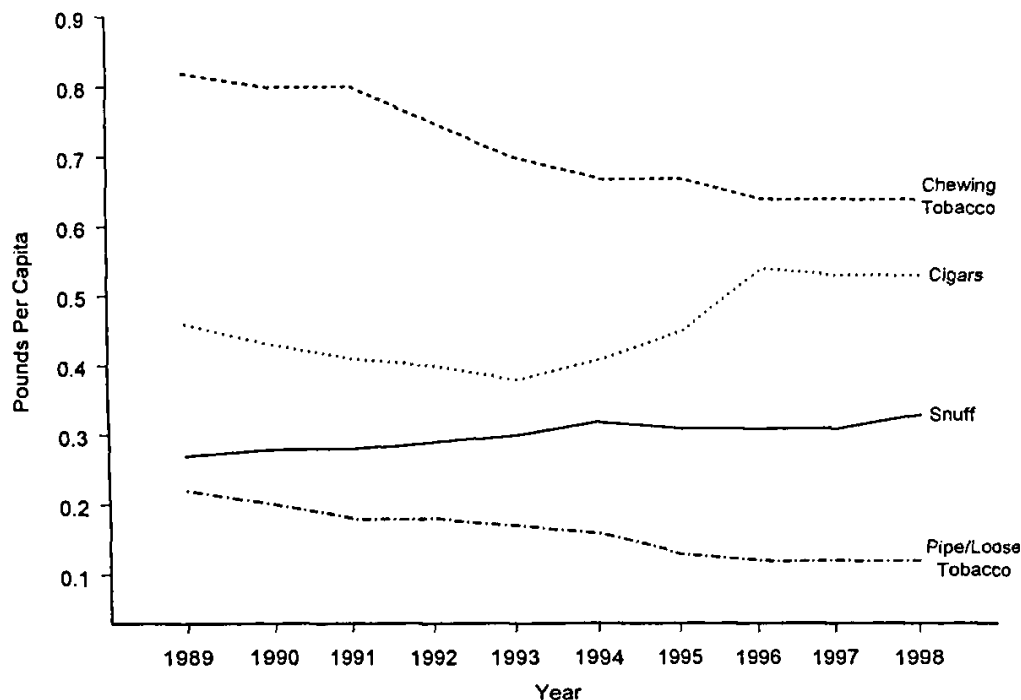
**Figure 1.** Per capita cigarette consumption, 1900–1998, ages 18 years and older, United States. (*From Centers for Disease Control and Prevention, Tobacco Information and Prevention Service, US. Department of Agriculture: Tobacco Situation and Outlook Report (TBS-242). Washington, DC, US Department of Agriculture, Commodity Economics Division, Economic Research Service, 1998.*)

greater difficulty quitting tobacco. Working against public health antismoking and cessation initiatives is the tobacco industry which, in total, spent over 5 billion dollars on cigarette advertising in 1996, with over 67% spent on promotions (e.g., sponsorship of sporting events, free or discounted cigarettes, and branded specialty items such as hats or lighters).<sup>26</sup> In terms of tobacco cessation, the majority of managed care organizations in the United States do not provide coverage, reimbursement, or clinician incentives for more intensive interventions (e.g., pharmacotherapy, group therapy, or individual counseling)<sup>41</sup> that may be more effective with patients high in nicotine dependence.<sup>29</sup>

The remainder of this article reviews epidemiologic and other studies of trends in tobacco initiation, use, dependence, and cessation in various sociodemographic and other groups. Special note will be made of at-risk groups to help clinicians identify and intervene with individuals in these groups.

## EPIDEMIOLOGIC TRENDS IN CURRENT CIGARETTE SMOKING

Large-scale epidemiologic surveys of cigarette smoking in the United States were first conducted in 1955 by the National Cancer Institute (NCI)



**Figure 2.** Per capita noncigarette tobacco consumption (lbs), 1989–1998, ages 18 years and older, United States. (Cigars, chewing tobacco, and pipe and loose tobacco data reflect male consumption only.) (From US Department of Agriculture: Tobacco Situation and Outlook Report (TBS-242). Washington, DC, US Department of Agriculture, Commodity Economics Division, Economic Research Service, 1998.)

as part of the Current Population Survey (CPS).<sup>45</sup> According to the 1955 CPS, approximately 39% of all adults 20 years of age or older in the United States smoked cigarettes, and the prevalence rate for men (53%) was over twice as high as that for women (24%).

More recent epidemiologic data on smoking in the United States are available through a smoking supplement to the National Health Interview Survey (NHIS), an annual epidemiologic health survey that has been conducted since 1957 by the National Center for Health Statistics (NCHS; US Department of Health and Human Services [DHHS], Public Health Service [PHS]). The NHIS collects health data from a national probability sample representing the civilian, noninstitutionalized adult population (18 years of age or older) of the United States. Questions about cigarette smoking were first included in a smoking supplement to the 1965 NHIS, and smoking has been assessed periodically since then with the latest available data collected during 1995.

For purposes of this section, NHIS data are reported for selected years at 5-year intervals (1965, 1970, 1975, 1980, 1985, 1990, and 1995) and are derived from prevalence rates published in *Health, United States, 1998*,<sup>46</sup> a yearly report published by the US Department of Health and Human Services, or other government reports.<sup>19</sup> For the years 1965 through 1990, current smokers were defined as individuals who answered yes to two questions: "Have you smoked at least 100 cigarettes in your entire life?"

(Ever smokers) and "Do you smoke cigarettes now?". For 1995, current smokers were defined as ever smokers who smoked every day or some days at the time of interview. Table 1 presents 1995 NHIS prevalence rates for current smoking in various sociodemographic groups.

Figure 3 presents prevalence rates for current smokers overall and by sex. In 1965, the overall current smoking prevalence rate was 42.4%. By 1995, this figure had decreased to 24.7%, representing 47 million American adults.<sup>19</sup> For men, the prevalence rate decreased from 51.9% to 27.0% during the 30 year period (1965–1995). During that same period, prevalence rates for women dropped from 33.9% to 22.6%. The prevalence rates for

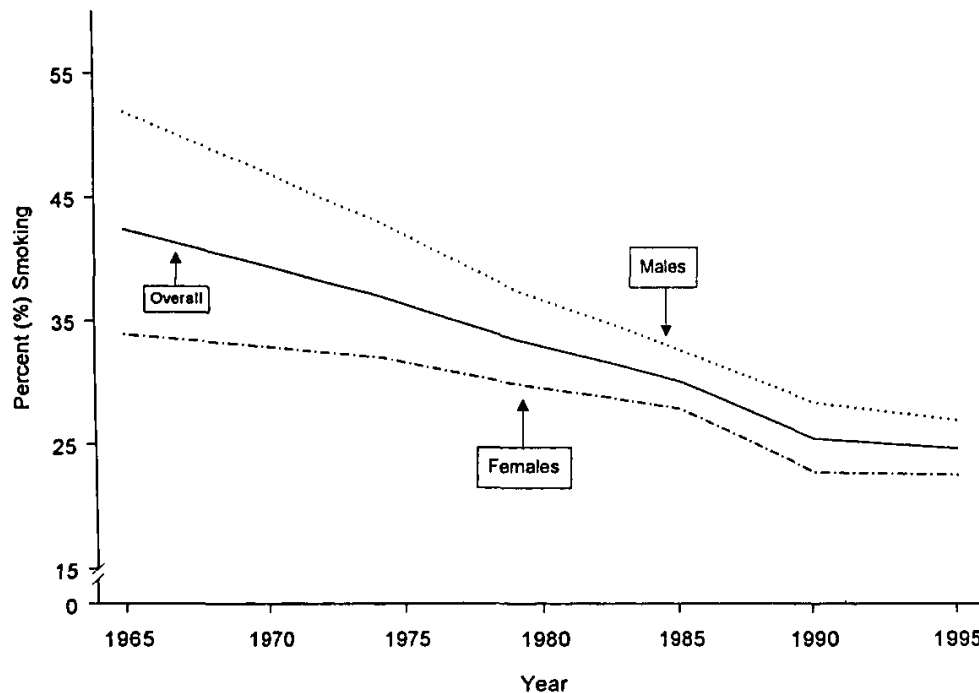
**Table 1. CURRENT SMOKING PREVALENCE IN PERSONS 18 YEARS OF AGE AND OVER, BY SELECTED SOCIODEMOGRAPHIC CHARACTERISTICS, UNITED STATES, NHIS, 1995**

Characteristic	Percent Who Were Current Cigarette Smokers*		
	Overall (%)	Females (%)	Males (%)
Race/Ethnicity			
African American, Non-Hispanic	25.8	23.5	28.8
American Indian/Alaska Native	36.2	35.4	37.3
Asian American/Pacific Islander	16.6	4.3	29.4
Hispanic	18.3	14.9	21.7
White, Non-Hispanic	25.6	24.1	27.1
Education (y)†			
≤8	22.6	17.8	28.4
9–11	37.5	33.7	41.9
12	29.5	26.2	33.7
13–15	23.6	22.5	25.0
≥16	14.0	13.7	14.3
Age Group (y)			
18–24	24.8	21.8	27.8
25–44	28.6	26.8	30.5
45–64	25.5	24.0	27.1
≥65	13.0	11.5	14.3
Poverty Status			
At or above	23.8	21.8	25.9
Below	32.5	29.3	36.9
Unknown	23.5	21.0	26.9
TOTAL	24.7	22.6	27.0
SAMPLE SIZE	17,213	9,790	7,423

\*Persons who reported having smoked 100 cigarettes or more, and who reported now smoking every day or some days.

†Persons aged 25 years of age or older

From Centers for Disease Control and Prevention: State-specific prevalence among adults of current cigarette smoking and smokeless tobacco use and per capita tax-paid sales of cigarettes—United States, 1997. MMWR 47:922, 1998



**Figure 3.** Smoking prevalence rates, overall and by sex. National Health Interview Surveys, United States, 1965–1995, adults 18 years of age and older. (From National Center for Health Statistics: Health, United States, 1998 With Socioeconomic Status and Health Chartbook. DHHS Publication (PHS) 98–1232.)

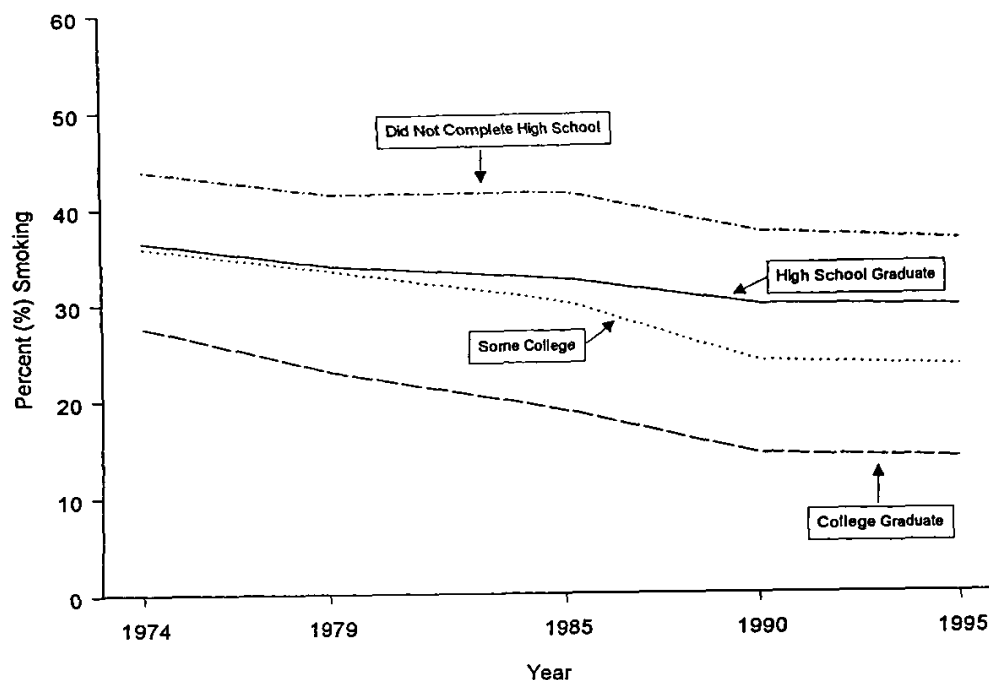
men, therefore, decreased at a faster rate than for women. In 1995, 24.5 million men and 22.5 million women were current smokers. Among all current smokers in 1995, 81.2% were daily smokers.<sup>19</sup>

### Adult Cigarette Smoking and Educational Status

Since 1966, prevalence rates of current smoking in adults have been available for four educational levels: individuals with less than a high school education, individuals who graduated high school, individuals who have some college education, and individuals with a college degree or higher. Data from the 1966 NHIS showed that the rates in the four groups were 41.7% for high school dropouts, 44.7% for high school graduates, 44.8% for those with some college, and 35.3% for college graduates.<sup>13</sup> Figure 4 shows more recent NHIS estimates of current smoking rates by educational level for selected years (1974, 1979, 1985, 1990, and 1995).<sup>46</sup> Among sociodemographic predictors of differences in rates of current smoking, educational attainment has replaced sex as the most predictive characteristic.

From 1974 to 1995, high school dropouts had the highest rates of current smoking and college graduates had the lowest (Fig. 4). Through 1980, high school graduates and individuals with some college had similar prevalence rates (e.g., 33.7% and 33.2%, respectively, in the 1979 NHIS).





**Figure 4.** Smoking Prevalence Rates (age-adjusted), by educational level. National Health Interview Surveys, United States, 1974–1995, adults 25 years of age and older. (From National Center for Health Statistics: Health, United States, 1998 With Socioeconomic Status and Health Chartbook. DHHS Publication (PHS) 98–1232.)

As shown in Figure 4, by 1985 current smoking rates in individuals with some college decreased faster than rates for individuals with just a high school degree; this trend has continued through the most recent NHIS (1995).<sup>19</sup>

Results from the 1995 NHIS provide additional information about individuals with less than a high school degree. As shown in Table 1, individuals with 8 years or less of education had a significantly lower rate of current smoking (22.6% compared with a rate of 37.5% for individuals with 9 to 11 years of education). Table 1 also shows that men with 9 to 11 years of education had an alarmingly high rate of current smoking (41.9%) in 1995. Other groups with high smoking prevalence rates (relative to the overall population rate) include women with 9 to 11 years of education and men with 12 years of education.

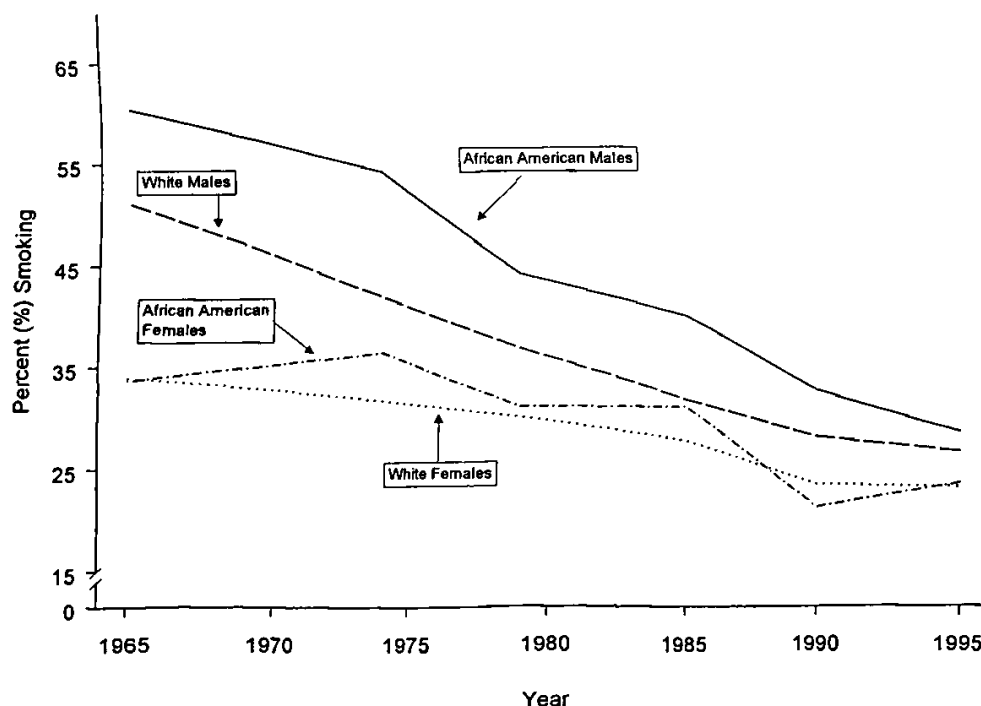
There are over 12 million college students age 18 years or older in the United States.<sup>44</sup> The 1995 National College Health Risk Behavior Survey interviewed a nationally representative sample ( $n = 4838$ ) of undergraduate college students 18 years of age and older and found that 30% of men and 28.2% of women currently used cigarettes.<sup>18</sup> The Harvard School of Public Health College Alcohol Study, surveyed cigarette smoking prevalence in 15,103 college students in 1993 and 14,251 students in 1997 and found that current cigarette use increased from 22.3% to 28.5% from 1993 to 1997.<sup>63</sup> Assuming an overall prevalence rate of 28%, more than 3,000,000 college students were smoking cigarettes in 1997. In addition, 28% of cur-

rent college smokers in 1997 started smoking regularly while in college. These studies raise concern about cigarette use in college students and highlight the importance of prevention and intervention efforts in this population.

### Adult Cigarette Smoking and Racial and Ethnic Minority Groups

Racial and ethnic differences in current cigarette smoking have been observed since the early 1960s. Figure 5 shows current smoking rates for African-Americans and whites by sex for the period of 1965 to 1995.<sup>46</sup> Smoking rates for African-American and white men were substantially higher than rates for women from both races up through the mid-1970s. From 1965 to 1995, smoking prevalence rates decreased for men and women of both races, with faster rates of decline for men. The most recent NHIS estimates (1995) of current smoking in various racial and ethnic groups are presented in Table 1.

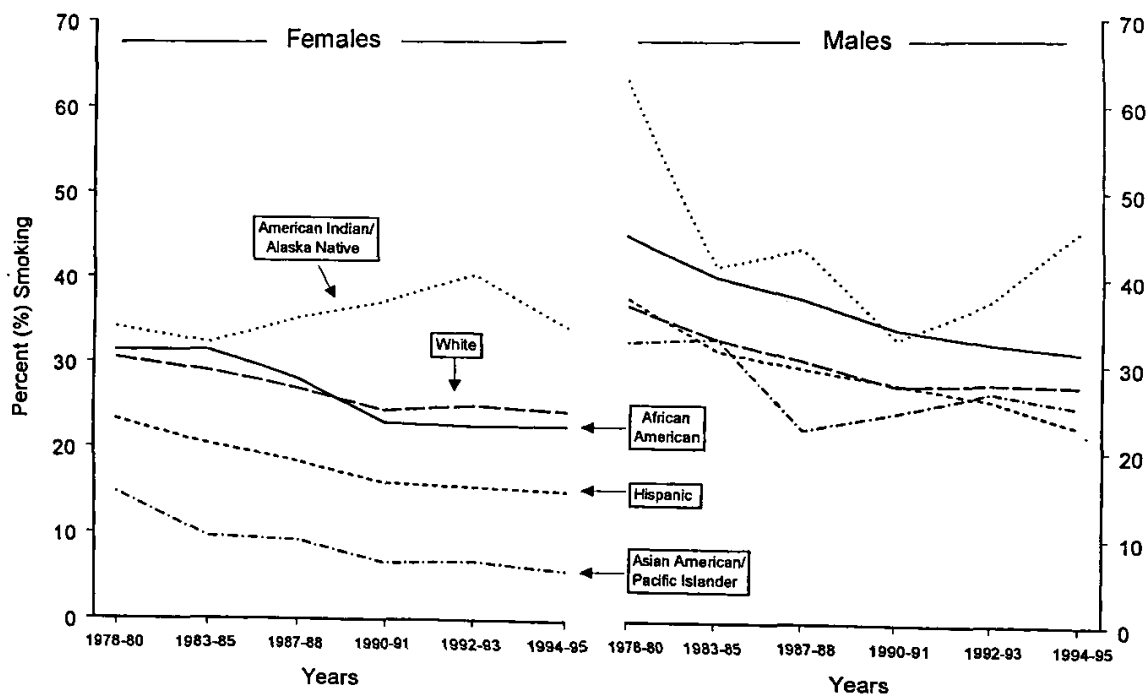
Until 1978, limited detailed epidemiologic data were available for racial and ethnic minorities, other than whites and African-Americans. In 1998, the US DHHS published a new Surgeon General's report, *Tobacco Use Among U.S. Racial/Ethnic Minority Groups*,<sup>62</sup> that provided data on to-



**Figure 5.** Smoking Prevalence Rates, African-Americans and whites by sex. National Health Interview Surveys, United States, 1965–1995, adults 18 years of age and older. (From National Center for Health Statistics: Health, United States, 1998 With Socioeconomic Status and Health Chartbook. DHHS Publication (PHS) 98–1232.)

bacco use for four minority groups: African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics; data for non-Hispanic white Americans were also provided for comparison purposes. Results from this recent Surgeon General's report provide the basis for most of the information in this section.

Figure 6 shows trends in current smoking for the four racial and ethnic groups and whites by sex for persons age 18 years of age or older. To increase the precision of estimates, data from the NHIS were combined into six periods for the years 1978 to 1980, 1983 to 1985, 1987 to 1988, 1990 to 1991, 1992 to 1993, and 1994 to 1995.<sup>62</sup> From 1978 to 1995, overall current smoking prevalence declined in the four minority groups, with the exception of the American Indian and Alaska Native group, in which rates did not change for men from 1983 to 1995 or for women from 1978 to 1995. In all racial and ethnic groups, with the exception of the American Indian and Alaska Natives group, men had significantly higher rates of smoking than women. As shown in Table 1, the highest overall rates of current smoking among the four minority groups occurred in American Indians and Alaska Natives (36.2%) and African-Americans (25.8%); the lowest overall rates occurred in Asian and Pacific Islanders (16.6%) and Hispanics (18.3%).



**Figure 6.** Smoking Prevalence Rates, by racial/ethnic minority group and sex. National Health Interview Surveys, United States, 1978–1995, aggregate data, Adults 18 years of age and older. (From US Department of Health and Human Services: Tobacco Use Among US Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General. Atlanta, US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1998.US Government Printing Office, Stock No. 017-001-00527-4.)

## Cigarette Smoking Among Teenagers and Children

In 1994, the US DHHS issued a Surgeon General's Report, *Preventing Tobacco Use Among Young People*,<sup>61</sup> that reviewed various aspects of tobacco use in adolescents, including epidemiologic trends and patterns of use. In regard to trends and patterns of cigarette smoking among adolescents up through 1994, the Surgeon General's report concluded that tobacco use generally started by age 16, with almost all first use occurring before high school graduation, that smoking prevalence declined during the 1970s and 1980s with slower declines in the 1980s, that boys and girls are equally likely to smoke (although in the 1980s, girls were more likely to smoke than boys), that cigarette smoking appeared to be declining among African-American adolescents, and that many adolescents are addicted to cigarettes and experience withdrawal symptoms similar to those reported by adults. This section reviews the latest available epidemiologic data on adolescent smoking since the publication of the Surgeon General's Report.

Several sources of epidemiologic data on current adolescent smoking were reviewed in the 1994 Surgeon General's report, including data from the 1991 Youth Risk Behavior Survey (YRBS) sponsored by the CDC.<sup>61</sup> The 1991 YRBS surveyed 12,272 high school students and showed an overall prevalence rate of current smoking (any smoking in the past 30 days) of 27.5%, with approximately equal rates for boys and girls. The highest rates of current smoking were observed in white and Hispanic adolescents and among 11th and 12th graders. Overall prevalence of frequent cigarette use (cigarettes smoked on 20 or more days during the past 30 days) was 12.7% with similar sex, race and ethnicity, and grade level patterns that were seen with the current use measure.

Since 1991, the YRBS has been re-administered in 1993, 1995, and 1997 and, thus, can provide the most up-to-date prevalence rates for current and frequent cigarette smoking among high school students.<sup>15,16,21</sup> Table 2 presents prevalence rates from the 1993, 1995, and 1997 administrations of the YRBS. In general, both current and frequent cigarette use have been increasing with each successive YRBS since 1993, with increases seen even in African-American students. A closer inspection of Table 2 shows that there were increases in use among boys of all races from 1993 to 1997, whereas rates of use in girls increased from 1993 to 1995 and changed little from 1995 to 1997. As found in the 1994 Surgeon General's report,<sup>61</sup> white and Hispanic students show the highest rates of current and frequent use. Figure 7 presents rates of frequent smoking by grade level and sex for 1993, 1995, and 1997. Two distinct patterns can be seen in Figure 7. The first pattern is that 11 and 12 grade students of both sexes showed an increase in frequent use from 1993 to 1995 that was followed by a decrease from 1995 to 1997. The second pattern shows alarming increases in frequent use of cigarettes by 9 and 10 grade students from 1993 to 1997 for both boys and girls.

In terms of smoking initiation, studies cited in the 1994 Surgeon General's Report on smoking found that the mean age of onset for first use of cigarettes is 14.5 years and that almost 89% of daily smokers first try a

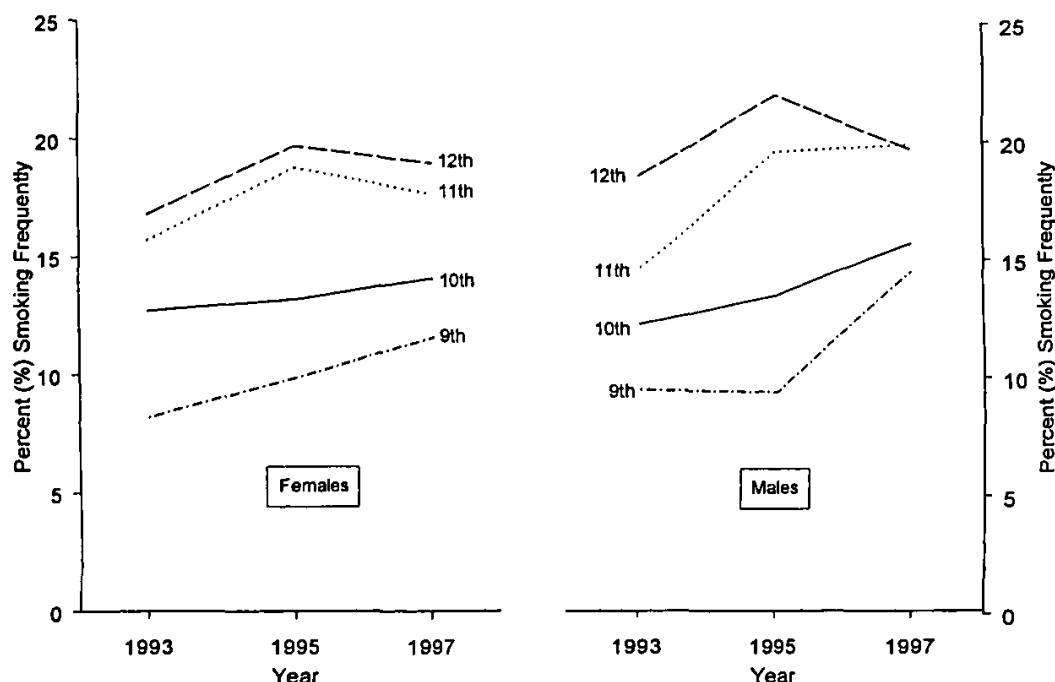
**Table 2. PERCENTAGE OF HIGH SCHOOL STUDENTS WHO USED CIGARETTES BY SEX AND RACE/ETHNICITY, UNITED STATES, YOUTH RISK BEHAVIOR SURVEY, 1993, 1995, 1997**

Category	Current Smoking*			Frequent Smoking†		
	1993	1995	1997	1993	1995	1997
Girls by race/ethnicity						
African American girls	14.4	12.2	17.4	4.3	4.5	4.3
Hispanic girls	27.3	32.9	32.3	6.9	10.0	8.1
White girls	35.3	39.8	39.9	16.1	19.5	20.1
All girls	31.2	34.3	34.7	13.5	16.1	15.7
Boys by race/ethnicity						
African American boys	16.3	27.8	28.2	5.0	8.5	10.1
Hispanic boys	30.2	34.9	35.5	8.5	10.7	13.2
White boys	32.2	37.0	39.6	16.0	18.4	19.8
All boys	29.8	35.4	37.7	14.0	16.3	17.6
Overall	30.5	34.8	36.4	13.8	16.3	16.7

\*Smoked cigarettes on  $\geq 1$  of the 30 days preceding the survey.

†Smoked cigarettes on  $\geq 20$  of the 30 days preceding the survey.

From Centers for Disease Control and Prevention: CDC Surveillance Summaries. MMWR 44 (No. SS-1), 1995; Centers for Disease Control and Prevention: CDC Surveillance Summaries. MMWR 45 (No. SS-4), 1996; Centers for Disease Control and Prevention: Tobacco use among high school students—United States, 1997. MMWR 47:229, 1998



**Figure 7.** Prevalence rates for frequent smoking by high school students, by grade level and sex. Youth Risk Behavior Surveys (1993, 1995, 1997), United States. (Frequent smoking is defined as smoking cigarettes for 20 or more days of the 30 days preceding the survey.) (From Centers for Disease Control and Prevention. CDC Surveillance Summaries, MMWR 1995, 44 (No. SS-1); MMWR 1996, 45 (No. SS-4); MMWR 1998, 47 (No. SS-3).)

cigarette by 18 years of age, with nearly 37% first trying a cigarette before age 14.<sup>61</sup> More recent analyses of data from the National Household Survey on Drug Abuse for 1994 to 1997 provided evidence that smoking initiation and daily use are occurring more frequently in adolescents 12 to 17 years of age.<sup>23</sup> These analyses showed that from 1988 to 1996, the incidence of initiation of first use of cigarettes increased by 30%, and the incidence of first daily use increased by 50% among persons 12 to 17 years of age. The 1997 YRBS also asked questions about smoking initiation<sup>22</sup> and found that, of the 70.2% of high school students who had ever tried cigarettes, 35.8% went on to smoke daily. Among those daily smokers, 72.9% had tried to quit smoking, but only 13.5% were successful. Pierce and Gilpin<sup>50</sup> analyzed NHIS data from 1965 to 1988 and estimated that adolescent boys will smoke for approximately 16 years and adolescent girls will smoke for at least 20 years.

In summary, in contrast to the declining trends observed in the 1970s and the 1980s, the most recent YRBS data show clearly that adolescent smoking is increasing in most sociodemographic groups, especially among younger students, and that initiation is occurring at younger ages.

### **CIGAR SMOKING, SMOKELESS TOBACCO USE, AND PIPE SMOKING**

Although cigarette smoking accounted for approximately 85% to 90% of all tobacco use in recent years, the use of other types of tobacco remains

a public health concern because of the carcinogenic potential of these products, and the fact that nicotine dependence can develop in users of all types of tobacco. With a few exceptions, the use of these other forms of tobacco mostly has been limited to men, but high rates are observed in certain sociodemographic groups also. This section reviews recent epidemiologic trends in the use of cigars, smokeless tobacco, and pipes, and identifies groups at risk for initiating, using, and becoming dependent on these products.

## Cigar Smoking

Increasing numbers of Americans began smoking cigars in 1993; this trend continues presently. In response to this increase, the National Cancer Institute (NCI) coordinated a major scientific review of cigar use in the United States, which culminated in the 1998 publication of an NCI monograph, *Cigars: Health Effects and Trends*.<sup>52</sup> Epidemiologic trends in cigar use were reviewed by Gerlach and colleagues<sup>31</sup> and are summarized here.

In contrast to the extensive epidemiologic data available for cigarette smoking, more limited data are available for national estimates of cigar smoking prevalence. For example, the most recent NHIS data on prevalence of current cigar use by adults (defined as having smoked 50 cigars lifetime plus current use) was reported for 1992 and showed rates of 3.3% for men and 0.02% for women. Other important data on prevalence of cigar use were collected as part of the NCI's Community Intervention Trial for Smoking Cessation (COMMIT) and showed that regular cigar use (defined as use of cigars 3 or 4 times per week) increased from 0.9% in 1989 to 2.1% in 1993.<sup>37</sup> This study also reported higher rates of occasional and regular use for men (10.8% and 4.5%, respectively) versus women (0.9% and 0.4%, respectively) and that cigar use decreased with age and increased linearly based on cigarette smoking status, with never smokers (cigarettes) having the lowest prevalence rates of cigar use and heavy cigarette smokers having the highest.

More recent data on cigar use are from the 1996 California Adult Tobacco Use Survey, which estimated that of 8.4% of California men smoked cigars occasionally and 0.4% smoked cigars daily, whereas 1.1% of women smoked occasionally and less than 0.01% smoked daily.<sup>52</sup> Among men and women, the rate of occasional cigar smoking decreased with age and increased with level of income and years of education. For example, the highest rate of occasional use (14.2%) was observed in men earning \$75,000 per year or more. Prevalence rates for occasional use by men in different racial and ethnic groups were highest in non-Hispanic whites (10.9%), followed by African-Americans (6.2%), Hispanics (5.6%), and Asian and Pacific Islanders (2.9%).<sup>52</sup>

The 1998 NCI monograph on cigars noted substantial rates of cigar use among adolescents, based on a survey by the Robert Wood Johnson Foundation (RWJF) and state surveys in Massachusetts, New York, and

California, all conducted in 1996. For example, the RWJF survey found that 26.7% of adolescents (37% of boys and 16% of girls) between the ages of 14 and 19 smoked at least one cigar during the year prior to the study.<sup>52</sup> In addition, 3% of adolescents in the sample smoked 50 or more cigars in the year prior to the study. The most recent data on adolescent cigar smoking can be found in the 1997 Youth Risk Behavior Survey (YRBS), which included estimates of prevalence rates of cigar use among high school students by various sociodemographic characteristics.<sup>21</sup> These rates are shown in Table 2 and are similar to the results of the RWJF survey. Boys in all racial and ethnic groups had higher rates of use than girls, and white males had the highest rate of use of cigars (32.5%).

### Smokeless Tobacco Use

The use of smokeless tobacco is receiving increased attention by the CDC and other health agencies because of high rates of use by adolescent white boys, Native Americans, Alaska Natives, and older African American women.<sup>55,62</sup> Table 3 presents NHIS data from 1970, 1987, and 1991 for adult current use of chewing tobacco and snuff in African-Americans and whites. Decreasing trends were seen for most groups, except for white men for whom rates of snuff use increased from 1970 to 1991. Rates of chewing tobacco use were also relatively high for white men at all three points. Age trends in the data (not shown in the table) revealed that smokeless tobacco use was highest for white men 18 to 24 years of age and for African-American women 65 years of age or older. Overall, in 1991, an estimated 4.8 million men and 533,000 women were using smokeless tobacco.<sup>11</sup>

The 1998 Surgeon General's Report, *Tobacco Use Among Racial/Ethnic Minorities*, provided smokeless tobacco prevalence data for minorities other than African-Americans.<sup>62</sup> Based on data from the Behavioral Risk Factor Surveillance System (BRFSS), which is a random-digit-dialed telephone survey of the civilian, noninstitutionalized adult (18 years of age or older) population conducted by state health departments surveys from 1988 to 1992, American Indians and Alaska Natives were most likely to use smokeless tobacco, with use varying by state and region. High rates of use were reported for American Indian men in the Northern Plains states (24.6%; Montana, Nebraska, North Dakota, and South Dakota), in the Northern Woodlands (16.8%; Iowa, Michigan, Minnesota, and Wisconsin), in Oklahoma (14.3%), and in Alaska Natives (11.6%).<sup>62</sup> Extremely high rates of smokeless tobacco use have been reported for American Indian women in Southeastern North Carolina (Lumbee), who were 65 years of age or older (51%) and who had less than 12 years of education (42%).<sup>14</sup>

The most recent estimates of overall adult use for women and men of smokeless tobacco are derived from the 1997 BRFSS results, which included data on smokeless tobacco use (defined as ever having used or



**Table 3. TRENDS IN PREVALENCE RATES OF USE BY ADULTS 18 YEARS OF AGE OR OLDER OF CHEWING TOBACCO\*, SNUFFT, AND PIPE§§ BY SEX AND RACE, UNITED STATES, NATIONAL HEALTH INTERVIEW SURVEYS, 1970, 1987, 1991**

	African American (%)			White (%)		
	1970	1987	1991	1970	1987	1991
<b>Chewing tobacco use</b>						
Women	3.1	1.7	1.2	0.2	0.1	0.1
Men	5.9	3.4	1.8	3.8	4.2	3.3
<b>Snuff use</b>						
Women	5.0	2.2	1.5	1.0	0.3	0.2
Men	2.2	1.1	0.5	1.4	3.3	3.7
<b>Pipe smoking</b>						
Women	0.5	0.0	0.0	0.1	0.1	<0.05
Men	10.8	3.4	1.4	13.5	3.4	2.1

\*Current use of chewing tobacco defined in 1970 as "currently used chewing tobacco," and in 1987 and 1991 as "had used chewing tobacco  $\geq 20$  times and currently used chewing tobacco."

†Current use of snuff defined in 1970 as "currently used snuff," and in 1987 and 1991 as "had used snuff  $\geq 20$  times and currently used snuff."

§Current pipe smoking defined in 1970 as "had smoked  $\geq 3$  packages of pipe tobacco and currently smoked a pipe," and in 1987 and 1991 as "had smoked a pipe  $\geq 50$  times and currently smoked a pipe."

From Centers for Disease Control and Prevention: Surveillance for Selected Tobacco-Use Behaviors—United States, 1900–1994. MMWR 43(SS-3), 1994

tried smokeless tobacco plus current use of a smokeless tobacco product) in 17 states.<sup>24</sup> Prevalence rates for men ranged from a low of 2.6% in Arizona and a high of 18.4% in West Virginia; other states with rates of use for men that were less than 9% were Wyoming (14.7%), Kentucky (12.2%), Montana (10.5%), Kansas (10.3%), Alabama (9.9%), and Alaska (9.2%). For women, prevalence rates were 1.7% or less in all states, with the highest rates in Georgia (1.7%), Alaska (1.6%), and Alabama (1.4%).

Table 4 presents trends in smokeless tobacco use among American high school students from the YRBS for the years 1993, 1995, and 1997. Overall rates of use have declined from 1993 to 1997, but rates of current use remain quite high for white men (20.6% in 1997). Also, the rate of use in 1997 for white 9th graders who were boys (16.6%) was almost as high as the rate for 12th graders (18.3%).<sup>20</sup> Thus, early identification of smokeless tobacco use and aggressive cessation intervention is important with adolescent white boys and other at-risk sociodemographic groups noted in this section.

## Pipe Smoking

Very limited national prevalence data are available for pipe smoking. As seen in Table 3, the prevalence of pipe smoking declined dramatically from 1970 to 1991 in men of both races and was very uncommon in women during any year. Nelson and colleagues<sup>47</sup> reviewed NHIS data from 1965 to 1991 and concluded that pipe smoking will likely be quite rare by the year 2000. Pipe smoking, however, remains a significant health risk (e.g., 1095 deaths were attributable to pipe smoking in 1991), and clinicians should make efforts to help pipe smokers quit smoking.<sup>47</sup>

## STATE-SPECIFIC TRENDS IN CIGARETTE SMOKING

The prevalence of state-specific current smoking among adults is monitored by the CDC by way of the BRFSS.<sup>24</sup> Table 5 provides state-specific prevalence rates of current smoking in 1997 among adults in each of the 50 states and the District of Columbia. The median prevalence rate of current smoking was 23.2% overall, 25.5% for men, and 21.3% for women.<sup>24</sup> Table 5 also provides rank orderings of the states and shows that the highest overall rates of current smoking occurred in Kentucky (30.8%), Missouri (28.7%), and Arkansas (28.5), and the lowest rates occurred in Utah (13.7%), California (18.4%), and Hawaii (18.6%). In most states, prevalence rates for men exceeded rates for women, but a reversal of this pattern was found in Connecticut, Nevada, New Mexico, West Virginia, and Wyoming (Table 6). The highest rate for men was found in Kentucky (33.1%), and the highest rate for women was found in Nevada (29.8%).

**Table 4. TRENDS IN PREVALENCE RATES OF SMOKELESS TOBACCO USE\* IN HIGH SCHOOL STUDENTS, BY SEX AND RACE/ETHNICITY, UNITED STATES, YOUTH RISK BEHAVIOR SURVEY, 1993, 1995, 1997**

Year	Female (%)			Male (%)		
	African American	Hispanic	White	African American	Hispanic	White
1993	0.6	1.7	2.3	4.7	8.0	26.0
1995	1.1	3.1	2.5	3.5	5.8	25.1
1997	1.3	1.2	1.6	3.2	8.3	20.6

\*Used chewing tobacco or snuff on 1 or more days of the 30 days preceding the survey.

From Youth Risk Behavior Surveys, 1993, 1995, 1997, reported in CDC Surveillance Summaries MMWR (1995, 44, No. SS-1; 1996, 45, No. SS-4; 1998, 47, SS-3)

**Table 5. PREVALENCE OF CURRENT CIGARETTE SMOKING\* AMONG ADULTS, BY STATE (INCLUDING DISTRICT OF COLUMBIA) AND SEX, UNITED STATES, 1997**

State	Men		Women		Overall	
	%	Rank†	%	Rank†	%	Rank†
Alabama	28.6	10	21.3	26	24.7	15*
Alaska	27.4	15	25.8	6	26.7	7
Arizona	22.1	42‡	20.2	34‡	21.1	42
Arkansas	32.1	2	25.2	7	28.5	3
California	22.4	41	14.5	50	18.4	50
Colorado	24.0	34‡	21.2	27	22.6	33‡
Connecticut	21.4	48‡	22.2	21	21.8	39‡
Delaware	29.3	7‡	24.2	8	26.6	8
District of Columbia	22.7	40	15.5	49	18.8	48
Florida	26.0	21‡	21.4	25	23.6	23
Georgia	25.2	26‡	19.9	37	22.4	35
Hawaii	21.4	48‡	15.8	48	18.6	49
Idaho	21.8	44‡	18.0	45	19.9	47
Illinois	25.0	32‡	21.6	22	23.2	25‡
Indiana	29.2	9	23.7	12‡	26.3	9
Iowa	25.5	26‡	20.9	29	23.1	29‡
Kansas	26.8	17	18.9	43	22.7	31‡
Kentucky	33.1	1	28.7	2	30.8	1
Louisiana	29.3	7‡	20.4	31‡	24.6	15‡
Maine	25.2	26‡	20.4	31‡	22.7	31‡
Maryland	21.8	44‡	19.4	40‡	20.6	44
Massachusetts	21.8	44‡	19.2	42	20.4	46
Michigan	29.6	5	22.8	16	26.1	10
Minnesota	24.1	36	19.8	38	21.8	39
Mississippi	28.3	11	18.6	44	23.2	25‡
Missouri	31.7	3	26.0	4‡	28.7	2
Montana	20.8	50	20.2	34‡	20.5	45
Nebraska	24.4	34	20.2	34‡	22.2	36‡
Nevada	25.7	23	29.8	1	27.7	4
New Hampshire	26.0	21‡	23.7	12‡	24.8	13
New Jersey	23.3	39	19.8	38‡	21.5	41
New Mexico	21.6	47	22.6	18	22.1	38
New York	25.0	32‡	21.5	23‡	23.1	29‡
North Carolina	29.7	4	22.3	20	25.8	11
North Dakota	24.3	35	20.3	33	22.2	36‡
Ohio	26.3	18	24.0	11	25.1	12
Oklahoma	25.2	26‡	24.1	9‡	24.6	15‡
Oregon	22.1	42‡	19.4	40‡	20.7	43
Pennsylvania	26.2	19‡	22.5	19	24.3	18‡
Rhode Island	25.6	24‡	23.0	15	24.2	20
South Carolina	29.5	6	17.8	46	23.4	24
South Dakota	28.1	12	20.8	30	24.3	18‡
Tennessee	27.9	14	26.0	4‡	26.9	6
Texas	28.0	13	17.5	47	22.6	33‡
Utah	16.1	51	11.5	51	13.7	51
Vermont	25.1	30‡	21.5	23‡	23.2	25‡
Virginia	26.2	19‡	23.1	14	24.6	15‡
Washington	25.1	30‡	22.7	17	23.9	22
West Virginia	27.1	16	27.7	3	27.4	5
Wisconsin	25.6	24‡	21.0	28	23.2	25‡
Wyoming	24.0	37‡	24.1	9‡	24.0	21

\*Percentage of persons 18 years of age or older who reported having smoked more than 100 cigarettes during their lifetime, and who currently smoke every day or some days. Estimates are weighted to the age, race, and sex distribution of the state population (crude prevalence).

†Descending rank order from highest prevalence (1) to lowest (51).

‡Tie.

From Centers for Disease Control and Prevention: State-specific prevalence among adults of current cigarette smoking and smokeless tobacco use and per capita tax-paid sales of cigarettes—United States, 1997. MMWR 47:922, 1998.

**Table 6. CHANGE IN PREVALENCE OF CURRENT SMOKING IN ADULTS BY OCCUPATIONAL CLASS AND EMPLOYMENT STATUS FOR FEMALES AND MALES, NATIONAL HEALTH INTERVIEW SURVEYS, 1978-1980 AND 1987-1990, UNITED STATES**

	Women (%)		Men (%)		Overall (%)	
	1978-1980	1987-1990	1978-1980	1987-1990	1978-1980	1987-1990
Occupational classes						
White collar	31.4	24.4	32.0	24.0	31.7	24.2
Blue collar	36.9	34.8	45.3	40.2	43.7	39.2
Farm	20.9	15.1	27.9	24.8	26.7	22.8
Service	35.2	33.6	40.8	36.0	37.2	34.5
Employment status						
Employed	32.3	26.7	38.1	31.0	35.6	29.1
Unemployed	40.3	34.9	51.4	46.6	45.6	40.9
Not in labor force*	25.9	22.1	29.7	24.5	27.0	22.9
All adults	29.7	25.0	36.8	30.1	33.0	27.4

\*Includes retirees, housewives, unpaid charity workers, and persons physically unable to work.

From Nelson DE, Emont SL, Brackbill RM, et al: Cigarette smoking prevalence by occupation in the United States: A comparison between 1978 to 1980 and 1987 to 1990. J Occupation Med 36:516, 1994; with permission.

## TRENDS IN CIGARETTE SMOKING AMONG DIFFERENT OCCUPATIONAL GROUPS

Studies of smoking prevalence in different occupational groups typically report higher rates of smoking in blue collar and service workers and the unemployed.<sup>60</sup> Nelson and colleagues recently examined trends in cigarette smoking among different occupational groups based on aggregated data from National Health Interview Surveys during two periods, 1978 to 1980 and 1987 to 1990.<sup>48</sup> These authors reported finding overall decreases in smoking from 1978 to 1980 and 1987 to 1990 in most occupational groups, but the declines in smoking were greater among white collar workers. In addition, the results showed that blue collar and service workers continued to have the highest rates of smoking, and that unemployed individuals were more likely to smoke than employed individuals. Table 6 shows changes in prevalence of current smoking by occupational class and employment status for women and men during the two time periods.<sup>48</sup> Table 7 provides estimated smoking prevalence from 1987 to 1990 for occupations with estimated employment of less than 250,000 United States workers, in which prevalence rates exceeded 40%.

**Table 7. SMOKING PREVALENCE DURING 1987–1990 FOR OCCUPATIONS WITH ESTIMATED US EMPLOYMENT OVER 250,000 IN WHICH PREVALENCE RATES EXCEEDED 40%. NATIONAL HEALTH INTERVIEW SURVEYS, 1987–1990, UNITED STATES**

Occupation	Current Smoking Prevalence*	Employed (No.)
Machinists	40.1	522,361
Plumbers, pipefitters, steamfitters	40.2	468,604
Laborers, except construction	40.3	1,292,845
Industrial machinery repairers	40.5	419,342
Automobile mechanics	41.6	950,872
Miscellaneous machine operators	42.1	959,239
Welders and cutters	42.7	634,643
Machine operators, not specified	43.0	538,167
Industrial truck and tractor equipment operators	44.1	513,982
Printing machine operators	44.5	387,602
Carpenters	45.5	1,517,285
Heavy truck drivers	45.8	2,027,382
Waiters and waitresses	46.6	1,354,887
Painters, construction, and maintenance	47.1	518,797
Construction laborers	47.1	734,071
Operating engineers	47.6	251,110
Bartenders	52.4	309,547
Roofers	57.8	518,797

\*Persons who had smoked 100 cigarettes or more in their lifetime, and who reported that they smoked regularly or occasionally at the time of the survey.

From Nelson DE, Emont SL, Brackbill RM, et al: Cigarette smoking prevalence by occupation in the United States: A comparison between 1978 to 1980 and 1987 to 1990. *J Occupation Med* 36:516, 1994; with permission.

## TRENDS IN TOBACCO USE AMONG MILITARY PERSONNEL

The US Department of Defense periodically surveys smoking and other tobacco use in military personnel in its *Survey of Health Related Behaviors Among Military Personnel*. Overall rates of current smoking (100 or more cigarettes in lifetime and last smoked a cigarette during the past 30 days) among military personnel have been declining every survey year since 1980 (51%) through 1995 (31.9%).<sup>6</sup> Heavy smoking (one pack of cigarettes per day or more) also has declined from 34.2% in 1980 to 15% in 1995.

Table 8 presents 1995 survey results for selected sociodemographic and other characteristics. Higher rates of cigarette smoking are seen in men, in whites, younger personnel, and personnel with less education. Also, as in prior surveys, an inverse relationship between military rank and current smoking prevalence with higher rates was observed in the 1995 survey,<sup>6</sup> with lower ranking personnel having the highest smoking rates (40.8% in E1–E3 pay grade) and the highest ranking personnel having the lowest smoking rates (7.1% in O4–O10 pay grade). In terms of

**Table 8.** CURRENT CIGARETTE SMOKING BY MILITARY PERSONNEL, *SURVEY OF HEALTH RELATED BEHAVIORS AMONG MILITARY PERSONNEL*, 1995, N = 16,193

Characteristic	Currently Smoking (%)
Sex	
Women	26.3
Men	32.7
Education	
High school or less	41.0
Some college	33.3
College graduate or higher	11.5
Race/ethnicity	
African American, non-Hispanic	23.4
Hispanic	28.1
White	34.4
Other	32.9
Age (y)	
20 or younger	40.8
21–25	35.0
26–34	29.2
35 or older	26.9
Pay grade	
E1–E3	40.8
E4–E6	34.8
E7–E9	32.6
W1–W5	22.4
O1–O3	9.5
O4–O10	7.1
Overall	31.9

From Bray RM, Kroutil LA, Wheelless SC, et al: 1995 Department of Defense survey of health-related behaviors among military personnel. Research Triangle, NC, Research Triangle Institute, 1995

other tobacco use, 13.2% of military personnel used smokeless tobacco and 18.7% smoked cigars or pipes. The highest rates of use were observed for men 18 to 24 years of age (21.9% for smokeless tobacco and 27.3% for cigars/pipes), whereas women had the lowest rates of use (0.7% for smokeless tobacco and 2.1% for cigars/pipes).

## **PREVALENCE OF NICOTINE DEPENDENCE AND INTERMITTENT (LOW RATE) SMOKING**

The fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)<sup>2</sup> published by the American Psychiatric Association includes Nicotine Dependence as a substance-related disorder. Diagnosis of Nicotine Dependence requires a maladaptive pattern of use leading to clinically significant impairment or distress characterized by at least three of the following symptoms or signs: tolerance (need for increased amount of substance to get desired effect or effects are diminished when the same amount of the substance is used); withdrawal; the substance is often taken in larger amounts or over a longer period than was intended; persistent desire or unsuccessful efforts to cut down or control substance use; a great deal of time is spent getting or using the substance or recovering from use of the substance; important social, occupational, or recreational activities are given up or reduced because of use; and continuation of use of the substance despite knowledge of having a persistent or recurrent physical or psychological problem that is probably caused by the substance or worsened by using the substance.<sup>2</sup> Nicotine Dependence was similarly operationalized in the previous DSM edition, DSM-III-R.<sup>1</sup>

A limited number of studies have examined DSM-III-R or DSM-IV Nicotine Dependence in smokers. Breslau and colleagues<sup>7,8</sup> conducted structured psychiatric interviews with 1007 randomly sampled members (21 to 30 years of age) of an HMO and found that only 51.3% of 394 smokers met criteria for Nicotine Dependence (DSM-III-R criteria). In this study, nicotine-dependent smokers smoked an average of 24.8 cigarettes per day, compared with an average of 14.3 for nondependent smokers. In addition, nicotine dependent smokers reported an earlier mean age of onset of first cigarette use and first daily use (14.2 and 16.6 years, respectively), compared with non-dependent smokers (15.3 and 17.8 years, respectively). Other studies have found prevalence rates for DSM-IV Nicotine Dependence between 30% and 90%, depending on the nature of the sample.<sup>4,64</sup>

Breslau and colleagues<sup>8</sup> also reported significant comorbidity between nicotine dependence and other psychiatric disorders. More specifically, nicotine dependent smokers had higher rates of major depression, anxiety disorders, and substance abuse/dependence disorders than smokers not meeting criteria for Nicotine Dependence. For example, major depression was diagnosed at rates of 21.3% (men) and 29.9% (women) in nicotine-dependent smokers compared with rates of 6.8% (men) and 12.2% (women) in nondependent smokers. The comorbidity of depression



and smoking is a widely-replicated finding.<sup>3,34</sup> Recent studies have begun to shed light on the nature of the observed association between smoking and depression. For example, data from the Teenage Attitudes and Practices Survey (TAPS), a nationally representative prospective cohort study of adolescents in the United States between 12 and 18 years of age who were interviewed in 1989 and 1993, showed that depressed adolescents were more likely than nondepressed adolescents to start smoking.<sup>25</sup> Also, results from a recent twin study provided evidence that nicotine dependence and depression may share common genes.<sup>39</sup> Thus, clinicians should be aware that psychopathology, especially depression, may increase the risk of smoking initiation in adolescents and that significant percentages of adult smokers may also suffer from depression and other psychiatric conditions that may complicate efforts at cessation.<sup>3</sup> This link between depression and tobacco dependence may also account in part for the effectiveness of antidepressant medications such as bupropion for smoking cessation.<sup>36</sup>

At the opposite end of the smoking spectrum are intermittent smokers (those who have never smoked daily),<sup>32,37</sup> or "chippers" (regular smokers who smoke no more than 1–5 cigarettes daily).<sup>51</sup> A recent analysis of 1991 NHIS data indicated that, overall, 7.5% of ever smokers had never smoked daily, with prevalence rates as high as 16.8% in Hispanics 15% in American Indian and Alaska Natives, and approximately 12% in African American and Asian American and Pacific Islanders.<sup>37</sup> The typical never-daily smoker smoked, on average, 11.4 days per month and 4 to 5 cigarettes per day, compared with about 20 cigarettes per day for daily smokers. Never-daily smokers numbered 2.7 million adults in the United States in 1991. No amount of tobacco use is safe and, thus, intermittent or never-daily smokers should be encouraged to quit smoking, especially because the risk of progressing to daily smoking or higher rates of cigarette use is unknown. In general, intermittent or low-rate smokers are thought to be less likely to depend on nicotine, yet these occasional smokers persist in smoking for long periods of time.<sup>32</sup>

## TRENDS IN CESSATION OF SMOKING

Trends in the prevalence of smoking cessation among adults are available from NHIS data for various years from 1965 through 1995.<sup>13,19</sup> Table 9 presents NHIS data for current smokers, former smokers, and never smokers for the years 1965, 1974, 1985, and 1995. Two somewhat encouraging trends are evident. First, the percentage of ever smokers who are former smokers has increased from 1965 to 1995. Second, the percentage of the total adult population who never smoked increased from 44% in 1965 to 52% in 1995. Thus, over the last 30 years, more adults avoided becoming current smokers and more ever smokers quit.

Although more people have quit over the last 30 years, 24.7% of the adult population in the United States, representing 47 million individuals, are current smokers. A plateauing of the rate of current smoking in the

**Table 9.** NUMBER AND PERCENTAGE OF ADULT CURRENT SMOKERS, FORMER SMOKERS, AND NEVER SMOKERS, UNITED STATES 1965, 1974, 1985, 1995, NATIONAL HEALTH INTERVIEW SURVEYS

	1965 (%)	1974 (%)	1985 (%)	1995 (%)
Number (in millions):				
Current smokers	50.1	48.9	50.4	47.0
Former smokers	16.0	25.8	40.5	44.3
Never smokers	52.0	57.3	76.6	98.7
Adult population:				
Current smokers	42.4	37.1	30.1	24.7
Former smokers	13.6	19.5	24.2	23.3
Never smokers	44.0	43.4	45.8	52.0
Ever smokers who were former smokers	24.3	34.5	44.5	48.6

*From Centers for Disease Control and Prevention, CDC Surveillance Summaries: Surveillance for selected tobacco-use behaviors—United States, 1900–1994. MMWR 43 (SS-3), 1994; Centers for Disease Control and Prevention: Cigarette smoking among adults—United States, 1995. MMWR 46:1217, 1997*

1990s (see Fig. 3), coupled with increasing rates of smoking initiation among adolescents, have caused alarm among public health scientists and clinicians, especially with regard to the implications for smoking cessation. As Table 9 shows, the percentage of the total adult population who are former smokers did not increase between 1985 (24.2%) and 1995 (23.3%). These trends highlight the need for increased prevention and intervention efforts to reduce the societal burden of smoking into the next century.

Rates of smoking cessation among adolescents are alarmingly low. Data from the 1997 Youth Risk Behavior Survey show that 72.9% of ever-daily adolescent smokers have tried to quit smoking, but only 13.5% were successful.<sup>22</sup> Rates of success were similarly low for girls and boys (14.0% and 13.0%, respectively) and for different racial and ethnic groups (16.9% for African Americans, 14.3% for Hispanic students, and 13.4% for whites). These results are consistent with other studies that have found low rates of long-term success in quitting among adolescents who try to quit smoking; they strongly suggest that adolescents become addicted to nicotine in a manner similar to adults.<sup>61</sup>

## SUMMARY

Smoking is the leading preventable cause of mortality in the United States. Overall, rates of current smoking have decreased during the past 30 years, but recent increases in adolescent smoking initiation have resulted in a plateau in smoking rates in the 1990s. Currently, about 25% of all adults smoke. This represents 47 million adult smokers in the United States, and over 5 million adult smokeless tobacco users.<sup>11,19</sup> Over 3 million adolescents are current smokers<sup>61</sup> and over 750,000 adolescents use smokeless tobacco.<sup>21</sup> Adult groups with higher rates of current cigarette

smoking include high school dropouts, American Indians and Alaska Natives, impoverished individuals, blue collar and service workers, and unemployed individuals. Recent data show a concerning increase in adolescent smoking initiation and current smoking, especially among groups such as 9th and 10th grade high school students. Smokeless tobacco use among adolescent white boys remains alarmingly high. Thus, tobacco use continues to be a major public health concern that demands continuing prevention and intervention efforts at the individual and community levels. Health care professionals can play an important role in identifying and intervening with tobacco users, because 70% of tobacco users see a primary care clinician each year.<sup>12</sup> Various treatments are available to help tobacco users overcome dependence on nicotine, especially with the assistance of clinicians who can provide effective psychosocial and pharmacotherapeutic interventions.<sup>29,54</sup>

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