

# Chapter 3

## The Epidemiology of Tobacco Use Among Young People in the United States and Worldwide

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### **Introduction** 131

Data Sources 131

Key Epidemiologic Measures 133

Data Analysis 134

### **Key Epidemiologic Findings** 134

Age When Cigarette Smoking Begins 134

Current Prevalence of Cigarette Smoking 135

    Current Prevalence Among Adolescents 136

    Current Prevalence Among Young Adults 137

Trends in Cigarette Smoking Over Time 138

    Trends in Cigarette Smoking Among Adolescents 138

    Trends in Cigarette Smoking Among Young Adults 141

Current Prevalence of Smokeless Tobacco Use and Cigar Smoking 142

Trends in Smokeless Tobacco Use and Cigar Smoking Over Time 144

    Trends in Smokeless Tobacco Use Among Adolescents and Young Adults 144

    Trends in Cigar Smoking Among Adolescents and Young Adults 149

Disparities in Cigarette Smoking And Other Tobacco Use 149

Concurrent Use of Multiple Tobacco Products 154

Tobacco Use Among Young People Worldwide 156

### **Other Epidemiologic Findings** 157

Cigarette Smoking and Weight Loss 157

Tobacco Use and Academic Achievement 161

Tobacco Brand Preferences Among Young People 161

### **Evidence Summary** 164

### **Conclusions** 165

### **References** 166



## Introduction

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The purpose of this chapter is to document key patterns and trends in tobacco use among young people in the United States and worldwide, updating and expanding information presented in the 1994 report of the Surgeon General on preventing tobacco use among young people (U.S. Department of Health and Human Services [USDHHS] 1994). Effectively describing these key patterns and trends in tobacco use among young people is critical to the success of efforts designed to reduce the burden of tobacco-related morbidity and mortality. In addition to providing current information on tobacco use and influences on that behavior, this chapter includes information on new lines of research (e.g., transitions in tobacco use and trajectories of smoking behavior). This chapter can help readers assess the need for interventions designed to reduce tobacco use among young people, suggest appropriate target groups for interventions, and clarify when and where interventions should be implemented.

## Data Sources

A variety of surveillance, research, and evaluation data collection systems related to youth and young adult tobacco use exist at national and subnational levels. Such data collections typically assess tobacco use behaviors and may also collect information on knowledge and attitudes, exposures to protobacco and antitobacco influences, effects of tobacco use, and other health risk behaviors (e.g., alcohol use), among other factors. Although each system or study serves a particular purpose, no individual survey is able to serve all purposes by comprehensively covering every relevant issue and reaching all relevant populations. Specific surveillance systems were selected to serve as primary data sources for this chapter by the salience of their content, the timeliness of their data, the completeness with which they cover the populations they are intended to represent, and the strength of their methodology.

The data presented include cross-sectional data from four national surveillance systems—the National Survey on Drug Use and Health (NSDUH), Monitoring the Future (MTF), the Youth Risk Behavior Surveillance System (YRBSS), and the National Youth Tobacco Survey (NYTS)—and one international surveillance system, the Global Youth Tobacco Survey (GYTS). Each of these surveys is population based and uses anonymous or confidential self-reported surveys, a methodology that provides valid youth tobacco use data (Brener et al. 2003). Table 3.1 provides basic information about these data sources, and

they are discussed in detail in Appendix 3.2. Briefly, NYTS and the National Youth Risk Behavior Survey (YRBS), one component of the YRBSS, are based on probability samples of public and private school students with questionnaires administered anonymously in schools; NYTS includes students in grades 6–12 and YRBS includes students in grades 9–12 (CDC 2004, 2010a). MTF collects data from youth as well as college students and adults. The youth participants are from a probability sample of public and private students enrolled in 8th, 10th, or 12th grade within the 48 contiguous states; questionnaires are administered anonymously or confidentially at the schools. GYTS uses probability sampling of students enrolled in the grades typical for 13-, 14-, and 15-year-olds for a given country and usually includes both private and public schools. Again, questionnaires are administered anonymously in the school setting. NSDUH uses household-based sampling to represent the entire civilian noninstitutionalized population of the United States age 12 years and older. Questionnaires are completed confidentially in the home with computer-assisted interviewing (CAI), so that only the respondent is aware of the questions being asked.

These surveys provide comparable, but not identical, measures of tobacco use among youth. Because each survey provides some unique information, monitoring the results of all is necessary to fully understand behaviors and trends. GYTS is the only standardized source for comparable, population-based data on youth tobacco use internationally. Among the U.S. surveys, NSDUH and the YRBS are both used to track national progress toward the U.S. Healthy People goals for youth tobacco use (USDHHS 2011). Throughout this chapter, data from the national Youth Risk Behavior Survey (YRBS), one component of the YRBSS, are reported, unless otherwise indicated (e.g., in one case, state-level YRBS data are used).

Unless otherwise indicated, all YRBS data are from the 2009 survey. All NSDUH data are from the 2010 survey, MTF data from the 2009 survey, and NYTS data from the 2009 survey. GYTS data are from surveys conducted between 1999 and 2007. NSDUH is used to track initiation of tobacco use in adolescents as young as 12 years of age and provides comparable data for youth (12–17 years of age), young adults (18–25 years of age), and older adults (≥26 years of age). YRBS is used to track the prevalence of current use of tobacco and quit attempts among high school students. NYTS uses a sampling procedure identical to that of YRBS, but the surveys have important distinctions. NYTS includes middle school students and YRBS does not. Further, while YRBS monitors several categories

**Table 3.1 Sources of national data on tobacco use among young people; United States and worldwide**

	National Survey on Drug Use and Health (NSDUH)	Monitoring the Future (MTF)	Youth Risk Behavior Survey (YRBS)	National Health Interview Survey (NHIS)	Global Youth Tobacco Survey (GYTS)	National Youth Tobacco Survey (NYTS)	National Longitudinal Study of Adolescent Health (Add Health)
Sponsoring agency or organization	Substance Abuse and Mental Health Services Administration	National Institute on Drug Abuse; administered by the University of Michigan's Institute for Social Research	Centers for Disease Control and Prevention	National Center for Health Statistics	World Health Organization Tobacco Free Initiative	Centers for Disease Control and Prevention	<i>Enice Kennedy Shriver</i> National Institute of Child Health and Human Development
Type of survey	Cross-sectional	Cross-sectional and longitudinal	Cross-sectional	Cross-sectional	Cross-sectional	Cross-sectional	Cross-sectional and longitudinal
Years	1971–2010 <sup>a</sup>	1975–2009	1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009	1965–2009 (various)	Varied by country: 1997–2009	1999, 2000, 2002, 2004, 2006, and 2009	Wave I: 1994–95 Wave II: 1996 Wave III: 2001–02 Wave IV: 2007–08
Mode of survey administration	Audio, computer-assisted self-interview	School-based, self-administered questionnaire	School-based, self-administered questionnaire	Audio, computer-assisted self-interview (since 1997)	School-based, self-administered questionnaire	School-based, self-administered questionnaire	School-based questionnaire; household, computer-administered interview
Response rate	2010: 88.8% for household screening; 74.7% for interviewing	2009: 88% of 8th graders, 89% of 10th graders, and 82% of 12th graders completed questionnaires; 54% of original schools responded; 98% response rate with replacements	2009: 81% for schools; 88% for students; 71% overall	2009: 82.2% household response rate; 65.4% adult survey response rate	Varied by country (see Appendix 3.1)	2009: 92.3% for schools; 91.9% for students; 84.8% overall	Wave I: 78.9% Wave II: 88.2% Wave III: 77.4%
Ages/grades	≥12 years	8th and 10th grades (since 1991) and 12th grade (since 1975); college students; young adults	9th–12th grades	All ages	Students aged 13–15 years	6th–12th grades	Wave I: 7th–12th grades Wave II: 8th–12th grades Wave III: 18–26 years of age
Sample size	2010: 68,487	2009: 46,097	2009: 16,410	2009: 33,856 households, for 34,640 families and 88,446 persons	Varied by country (see Appendix 3.1)	2009: 22,679	Wave I: 90,118 school based; 20,745 in home Wave II: 14,738 Wave III: 15,197

Table 3.1 Continued

	National Survey on Drug Use and Health (NSDUH)	Monitoring the Future (MTF)	Youth Risk Behavior Survey (YRBS)	National Health Interview Survey (NHIS)	Global Youth Tobacco Survey (GYTS)	National Youth Tobacco Survey (NYTS)	National Longitudinal Study of Adolescent Health (Add Health)
Type of tobacco use examined	Cigarettes, smokeless tobacco (chewing tobacco, snuff), cigars and pipe tobacco, blunts	Cigarettes and smokeless tobacco	Cigarettes, smokeless tobacco, cigars	Cigarettes	Cigarettes and smokeless tobacco	Cigarettes, smokeless tobacco, cigars, pipes, bidis, and kreteks	Cigarettes and smokeless tobacco

<sup>a</sup>The NSDUH survey has been administered annually since 1990. Previously, it was conducted every 2–3 years. Data in recent years are trendable only for 2002–2008, but for some variables there are discontinuities within that period.

of risk behaviors and has a limited focus on tobacco use, NYTS is dedicated to monitoring tobacco behaviors and is the most comprehensive source of nationally representative tobacco data among students. For example, NYTS includes information about exposure to protobacco and antitobacco influences, preferred brands, attitudes, and susceptibility to using tobacco, items that are not found in YRBS.

MTF has a unique strength in tracking trends because it was among the first of these surveys to be fielded in 1975. NSDUH began in 1971 but had a methodology change in 2002 that makes direct comparison to previous years’ findings inadvisable (Substance Abuse and Mental Health Services Administration [SAMHSA] 2011b). Alone among these surveys, NSDUH covers the entire youth population, not just those enrolled in school; this is an important difference because tobacco use prevalence is higher among school dropouts than among enrolled youth (Kopstein 2001). Further, NSDUH is a lengthier survey that includes detailed questions about substance use, mental health issues, family socioeconomic status (SES), and other factors relevant to tobacco use.

### Key Epidemiologic Measures

This chapter covers a variety of epidemiologic measures pertinent to the study of tobacco use among young people. Topics include age when cigarette smoking begins, current prevalence of cigarette smoking, trends in cigarette smoking over time, disparities in cigarette smoking and other tobacco use, current prevalence of smokeless tobacco use and cigar smoking, trends in smokeless tobacco use and cigar smoking over time, concurrent use of multiple tobacco products, and tobacco use among young people worldwide. This chapter also includes epidemiologic measures that support major conclusions of other chapters of this report: cigarette smoking and weight loss, related to Chapter 2, “The Health Consequences of Tobacco Use Among Young People”; tobacco use and academic achievement, related to Chapter 4, “Social, Environmental, Cognitive, and Genetic Influences on the Use of Tobacco Among Youth”; and tobacco brand preferences among young people, related to Chapter 5, “The Tobacco Industry’s Influence on the Use of Tobacco Among Youth.”

For each measure reviewed in this chapter, data from the survey or surveys best suited to address the issue are presented in the text and accompanying tables and figures. However, as noted above, more than one source is available to shed light on many of these issues, and examining data from multiple sources provides evidence of the range of effects as well as evidence that findings are valid or otherwise based on the consistency of those

sources. Therefore, Appendix 3.1 provides a comprehensive, detailed review of the data and the measures provided from the four primary surveys as well as comparable findings gleaned from the National Longitudinal Study of Adolescent Health and the National Health Interview Survey (NHIS) of adults.

Appendix 3.1 also provides supplemental analyses on subtopics related to the major topics presented here, including intensity of cigarette smoking, transitions and trajectories in smoking, implications for smoking during adolescence for young adults, nicotine addiction in adolescence and young adulthood, attempts to quit smoking, trends in knowledge and attitudes about smoking, cigarette smoking and depression, patterns of cigar use, and patterns of use of emerging tobacco products.

## Key Epidemiologic Findings

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In this section, epidemiologic analyses that support the major conclusions of this chapter are considered. These analyses are selected from a more comprehensive set that is presented in Appendix 3.1. These findings reinforce and extend, as appropriate, conclusions that were first presented in the 1994 Surgeon General's report on preventing tobacco use among young people.

### Age When Cigarette Smoking Begins

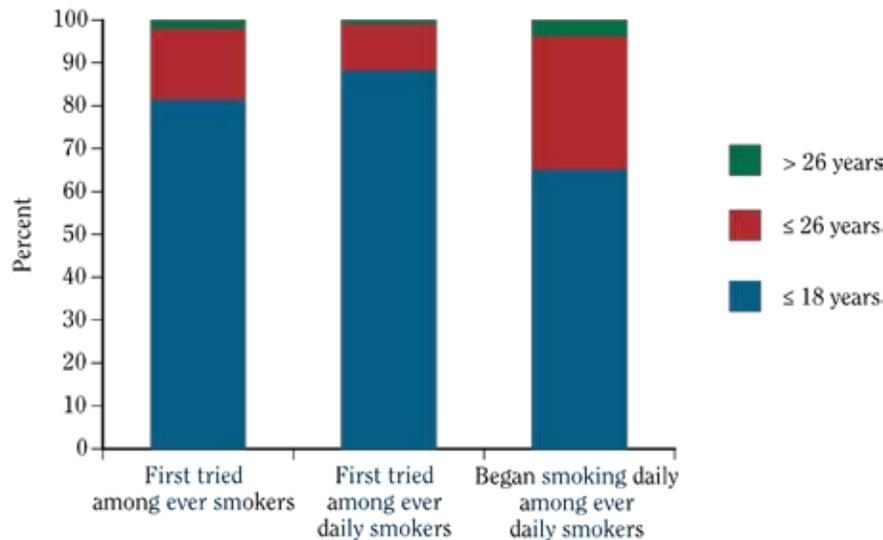
One of the most important—and widely cited—findings from the 1994 Surgeon General's report on smoking and health was that virtually all cigarette smoking begins before adulthood. Figure 3.1 and Table 3.2 illustrates and updates this finding, using the most recent data from NSDUH (2010) in an analysis parallel to that conducted for the 1994 Surgeon General's report. In this survey, adult smokers 30–39 years of age were asked about their first experience with cigarette smoking. Among adults who had ever tried a cigarette, 81.5% reported trying their first cigarette by the time they were 18 years of age, while an additional 16.5% did so by 26 years of age. Among adults who had ever smoked cigarettes daily, 88.2% reported trying their first cigarette by the time they were 18 years of age, while an additional 10.8% did so by 26 years of age. About two-thirds (65.1%) of adults who had ever smoked daily began smoking daily by 18 years of age, and almost one-third of these adults (31.1%) began

## Data Analysis

Using these data sources and relevant measures, population-weighted estimates with 95% confidence intervals were calculated using statistical software to account for the multistage probability sampling designs of the surveys. For some analyses, but not all, statistical tests were conducted to investigate differences in prevalence estimates by demographic factors of interest (e.g., age/grade, gender, race/ethnicity) and, when possible, in trends over time. Significance ( $p < 0.05$ ) was determined by the use of two-sided  $t$ -tests, throughout.

smoking daily between 18 and 26 years of age. Therefore, virtually *no* initiation of cigarette smoking (<1–2%) and few transitions to daily smoking (<4%) actually occur in adulthood after 26 years of age. Moreover, it is important to note that the initiation of cigarette smoking can often occur quite early in adolescence, before 18 years of age. In this analysis of the 2010 NSDUH data, for example, more than one-third (36.7%) of adults who had ever smoked cigarettes reported trying their first cigarette by 14 years of age, which is the age when one typically enters high school in the U.S. (Table 3.2). This is one of the most critical epidemiologic findings of this report, underscoring again that adolescence and young adulthood represent a time of heightened vulnerability to tobacco use and the initiation of cigarette smoking. Additional analyses that investigate distinct developmental trajectories and transitions in cigarette smoking across adolescence through young adulthood are presented in Appendix 3.1 (e.g., see Figure 3.1.4 and Tables 3.1.16–3.1.20). It is important to note that these NSDUH estimates from adults represent smoking initiation that occurred during the late 1990s, at about the time of the Master Settlement Agreement, when the prevalence of youth tobacco use was beginning to decline (see “Trends in Cigarette Smoking Over Time” later in this chapter). To investigate more contemporary trends in tobacco use initiation, we turned to adolescent and young adult data from NSDUH in recent years (2006–2010). Initiation rates for cigarette smoking have been stable over the last 5 years. Comparing 2006 to 2010, the rate of initiation of cigarette smoking (number of persons who smoked cigarettes for the first time in the last 12

**Figure 3.1** Percentage of recalled age at which adult smokers first tried a cigarette and began smoking daily, among 30- to 39-year-old adult smokers, by smoking status; National Survey on Drug Use and Health (NSDUH) 2010; United States



Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: Based on responses to the following questions: “Have you ever smoked part or all of a cigarette?” “How old were you the first time you smoked part or all of a cigarette?” “Has there ever been a period in your life when you smoked cigarettes every day for at least 30 days?” “How old were you when you first started smoking cigarettes every day?” For further information, refer to Appendix 3.1, Table 3.1.12.

months divided by the number of persons who had never smoked in the last year) among adolescents (12–17 year of age) and young adults (18–25 years of age) did not change overall and for all subgroups (i.e., by gender and race/ethnicity) ( $p > 0.05$ ) (Appendix 3.1, Table 3.1.30).

## Current Prevalence of Cigarette Smoking

According to the 2009 NYTS, about 1 in 4 (23.2%) high school seniors is a current cigarette smoker (i.e., had smoked a cigarette in the last 30 days; see Appendix 3.3 for more detail on this definition). This figure is comparable to the prevalence of current cigarette smoking among adults ( $\geq 26$  years of age), according to the 2010 NSDUH survey (22.8%) (SAMHSA 2011b). Young adults (18–25 years old) have the highest prevalence of current cigarette smoking of all age groups, at 34.2% (SAMHSA 2011b) (see Figure 3.1). By multiplying the current smoking prevalence in middle school (from the NYTS 2009) and the current smoking prevalence in high school (from the NYTS

2009) with the number of students enrolled in middle and high school, respectively (US Census Bureau 2009), this report finds that about 3.0 million (95% confidence interval [CI], 2,782,555–3,295,540) high school students and about 624,000 (95% CI, 515,957–731,939) middle school students are current cigarette smokers. Note, then, that the total number of current smokers is somewhat higher given out-of-school youth. By way of comparison, among young adults aged 18–25 years, about 11.7 million (95% CI, 11,352,000–11,980,000) are current cigarette smokers and about 14.7 million (95% CI, 14,343,000–15,005,000) have smoked a cigarette within the past year (SAMHSA 2011a). To achieve the national Healthy People objectives outlined for 2020, further reductions in cigarette smoking are necessary and will likely require renewed intervention efforts (see “Trends in Cigarette Smoking Over Time” later in this chapter). According to the 2009 YRBS, 19.5% of students in grades 9–12 currently smoke cigarettes. The target prevalence estimate referenced in *Healthy People 2020* for current smoking among adolescents (in grades 9–12) is 16% and among adults ( $\geq 18$  years old) is 12% (USDHHS 2011). *Healthy People 2020* also references 2% reductions in smoking initiation (USDHHS 2011).

**Table 3.2 Cumulative percentages of recalled age at which a respondent first used a cigarette and began smoking daily, by smoking status among 30- to 39-year-olds; National Survey on Drug Use and Health (NSDUH) 2010;<sup>a</sup> United States**

Recalled age (years)	All persons		Persons who had ever tried a cigarette	Persons who had ever smoked daily	
	First tried a cigarette % (95% CI)	Began smoking daily % (95% CI)	First tried a cigarette % (95% CI)	First tried a cigarette % (95% CI)	Began smoking daily % (95% CI)
≤10	4.1 (3.54–4.77)	0.4 (0.24–0.61)	5.9 (5.12–6.90)	6.7 (5.60–8.09)	1.0 (0.65–1.64)
≤11	5.8 (5.16–6.58)	0.7 (0.48–1.01)	8.4 (7.47–9.51)	9.6 (8.25–11.14)	1.9 (1.29–2.70)
≤12	12.1 (11.13–13.19)	1.8 (1.40–2.23)	17.5 (16.14–19.02)	20.9 (18.85–23.14)	4.7 (3.75–5.93)
≤13	18.5 (17.36–19.78)	3.5 (2.95–4.07)	26.8 (25.18–28.53)	32.4 (30.15–34.71)	9.3 (7.93–10.82)
≤14	25.4 (24.02–26.78)	6.0 (5.30–6.72)	36.7 (34.89–38.56)	43.6 (41.17–46.09)	16.0 (14.31–17.81)
≤15	34.4 (32.94–35.93)	10.5 (9.57–11.52)	49.8 (47.87–51.72)	58.5 (56.03–61.00)	28.1 (25.89–30.46)
≤16	43.9 (42.31–45.42)	15.3 (14.22–16.39)	63.5 (61.59–65.27)	72.9 (70.55–75.07)	40.9 (38.53–43.26)
≤17	49.4 (47.76–50.95)	19.2 (18.08–20.40)	71.4 (69.64–73.10)	80.3 (78.21–82.27)	51.4 (49.09–53.74)
≤18	56.3 (54.75–57.90)	24.3 (23.03–25.66)	81.5 (79.91–82.98)	88.2 (86.45–89.81)	65.1 (62.67–67.41)
≤19	59.3 (57.72–60.86)	27.4 (26.06–28.88)	85.8 (84.37–87.10)	91.8 (90.30–93.11)	73.5 (71.14–75.65)
≤20	61.9 (60.38–63.41)	30.0 (28.55–31.44)	89.6 (88.33–90.68)	93.2 (91.75–94.38)	80.2 (78.11–82.16)
≤21	64.2 (62.67–65.72)	32.0 (30.53–33.50)	92.9 (91.81–93.86)	95.9 (94.78–96.77)	85.6 (83.82–87.27)
≤22	65.2 (63.72–66.75)	33.1 (31.63–34.61)	94.4 (93.40–95.25)	96.6 (95.61–97.43)	88.6 (86.92–90.08)
≤23	65.9 (64.39–67.39)	33.9 (32.40–35.40)	95.3 (94.45–96.11)	97.3 (96.34–98.00)	90.7 (89.13–92.02)
≤24	66.5 (65.03–68.02)	34.6 (33.09–36.12)	96.3 (95.42–96.97)	97.9 (97.02–98.50)	92.6 (91.14–93.78)
≤25	67.6 (66.11–69.04)	35.7 (34.22–37.27)	97.8 (97.14–98.30)	98.8 (98.23–99.23)	95.6 (94.56–96.49)
≤26	67.8 (66.28–69.20)	35.9 (34.43–37.47)	98.0 (97.39–98.53)	99.0 (98.39–99.36)	96.2 (95.18–96.96)
≤27	67.9 (66.44–69.36)	36.1 (34.62–37.68)	98.3 (97.64–98.73)	99.1 (98.46–99.42)	96.7 (95.74–97.44)
≤28	68.1 (66.61–69.52)	36.5 (34.98–38.04)	98.5 (97.90–98.94)	99.3 (98.75–99.60)	97.7 (96.90–98.27)
≤29	68.2 (66.69–69.59)	36.7 (35.14–38.20)	98.6 (98.01–99.03)	99.3 (98.81–99.64)	98.1 (97.39–98.63)
≤30	68.7 (67.28–70.14)	37.0 (35.50–38.56)	99.4 (98.98–99.69)	99.8 (99.44–99.93)	99.1 (98.50–99.43)
31–39	69.1 (67.68–70.53)	37.4 (35.85–38.91)	100.0	100.0	100.0
Never smoked	100.0	100.0	NA	NA	NA
Mean age (years)	15.9	17.9	15.9	15.1	17.9

Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: CI = confidence interval; NA = not applicable.

<sup>a</sup>Based on responses to the following questions: “Have you ever smoked part or all of a cigarette?” “How old were you the first time you smoked part or all of a cigarette?” “Has there ever been a period in your life when you smoked cigarettes every day for at least 30 days?” “How old were you when you first started smoking cigarettes every day?”

### Current Prevalence Among Adolescents

The prevalence of current cigarette smoking among high school and middle school students is provided in Table 3.3a and Appendix 3.1, Table 3.1.2. In the NYTS–high school survey, the prevalence of current cigarette smoking was higher for males than for females overall

(19.6% vs. 14.8%,  $p < 0.05$ ), but no significant differences by gender were observed for YRBS (19.8% vs. 19.1%,  $p > 0.05$ ) or NYTS–middle school (5.6% vs. 4.7%,  $p > 0.05$ ). For NYTS–high school, White and Hispanic students had the highest prevalence of current cigarette smoking (19.2%), followed by Other youth (16.4%) and Blacks

**Table 3.3a Percentage of high school students and middle school students who currently smoke cigarettes, by gender and race/ethnicity; National Youth Risk Behavior Survey (YRBS) 2009, and National Youth Tobacco Survey (NYTS) 2009; United States**

Characteristic	YRBS 9th–12th grades <sup>a</sup>		NYTS 9th–12 grades <sup>a</sup>		NYTS 6th–8th grades <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	19.5 (17.9–21.2)		17.2 (15.0–19.4)		5.2 (4.2–6.1)	
<b>Gender</b>						
Male	19.8 (17.8–21.9)	a	19.6 (16.6–22.5)	a	5.6 (4.3–6.9)	a
Female	19.1 (17.2–21.0)	a	14.8 (12.8–16.7)	b	4.7 (3.9–5.5)	a
<b>Race/ethnicity</b>						
White	22.5 (20.0–25.2)	a	19.2 (16.4–21.9)	a	4.3 (3.1–5.5)	a
Male	22.3 (18.9–26.0)		21.2 (18.0–24.5)		4.5 (3.0–5.9)	
Female	22.8 (20.3–25.5)		17.1 (14.5–19.8)		4.1 (2.7–5.6)	
Black or African American	9.5 (8.2–11.1)	b	7.5 (4.6–10.3)	b	5.1 (3.6–6.6)	a,b
Male	10.7 (8.4–13.5)		8.6 (3.6–13.6)		5.8 (3.6–8.0)	
Female	8.4 (6.5–10.9)		6.3 (3.0–9.6)		4.4 (2.7–6.1)	
Hispanic or Latino	18.0 (16.0–20.2)	c	19.2 (16.5–21.9)	a	6.7 (5.2–8.2)	b
Male	19.4 (16.7–22.5)		22.6 (19.9–25.4)		7.0 (5.3–8.7)	
Female	16.7 (14.4–19.2)		15.7 (12.0–19.4)		6.4 (4.5–8.3)	
Other <sup>c</sup>	16.5 (13.1–20.5)	c	16.4 (13.2–19.5)	a	7.2 (2.5–12.0)	a,b
Male	15.9 (12.4–20.2)		21.7 (16.6–26.8)		8.7 (0.2–17.2)	
Female	16.7 (12.5–21.9)		11.2 (6.7–15.8)		5.7 (3.0–8.5)	

Source: 2009 YRBS: Centers for Disease Control and Prevention (CDC 2011d); 2009 NYTS: CDC (unpublished data).

Note: CI = confidence interval; SN = statistical note.

<sup>a</sup>Estimates are based on responses to the question, “During the past 30 days, on how many days did you smoke cigarettes?” Respondents who reported that they had smoked on at least 1 or 2 days were classified as current smokers.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system (e.g., YRBS). These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another ( $p > 0.05$ ). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another ( $p < 0.05$ ).

<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

(7.5%;  $p < 0.05$  for all comparisons with Blacks). Note that students in the Other category include other racial/ethnic subgroups besides White, Black, and Hispanic (such as American Indian/Alaska Native and Asian). For YRBS, White students had the highest prevalence of current smoking (22.5%), compared to Hispanic (18.0%), Other (16.5%), and Black (9.5%) students ( $p < 0.05$  for all comparisons with White students). Differences between Hispanic and Other students were not significant for YRBS ( $p > 0.05$ ). For NYTS—middle school, Hispanic students had a higher prevalence of cigarette smoking than did White students (6.7% vs. 4.3%,  $p < 0.05$ ).

### Current Prevalence Among Young Adults

The prevalence of current cigarette smoking among young adults (18–25 years old) is provided in Table 3.3b. In the 2010 NSDUH, the prevalence of current cigarette smoking was higher for young adult males than for females (38.1% vs. 30.3%). White youth had the highest prevalence (39.1%), followed by Hispanic (27.4%) and Black (23.3%) youth (SAMHSA 2011b). Of all age groups in the United States, young adults have the highest prevalence of current cigarette smoking (Figure 3.2), and this prevalence is especially high among young adults who are not college educated (Green et al. 2007). It should be noted that the tobacco industry targets young adults (18–

**Table 3.3b Percentage of young adults (18–25 years old) who currently smoke cigarettes, by gender and race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2010; United States**

Characteristic	NSDUH 18–25 years of age <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	34.2 (35.3–35.2)	
<b>Gender</b>		
Male	38.1 (36.8–39.4)	a
Female	30.3 (29.2–31.4)	b
<b>Race/ethnicity</b>		
White	39.1 (38.0–40.3)	a
Male	41.9 (40.3–43.5)	
Female	36.3 (34.9–37.8)	
Black or African American	26.3 (24.2–28.5)	b
Male	31.7 (28.5–35.0)	
Female	21.4 (19.0–24.1)	
Hispanic or Latino	27.4 (25.5–29.5)	b
Male	33.1 (30.2–36.1)	
Female	20.7 (18.1–23.6)	
Other <sup>c</sup>	27.2 (23.7–31.0)	b
Male	32.5 (27.8–37.5)	
Female	22.0 (18.0–26.5)	

Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: CI = confidence interval; SN = statistical note.

<sup>a</sup>Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system (e.g., NSDUH). These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another ( $p > 0.05$ ). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another ( $p < 0.05$ ).

<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

25 years of age) through its advertising and promotional campaigns (Katz and Lavack 2002; Ling and Glantz 2002; Biener and Albers 2004). Therefore, cigarette smoking (and other tobacco use) among young adults should continue to be monitored closely. Data from NSDUH will be

helpful in this regard, as this national surveillance system has a wide repertoire of tobacco use measures that can be compared across age groups, for adolescents (12–17 years old), young adults (18–25 years old), and adults ( $\geq 26$  years old). Young adulthood may be a critical time in life for deciding whether cigarette smoking will become an established, lifelong behavior or will be rejected for a healthier lifestyle. Studies suggest that the number of individuals aged 18 and 19 years in the early stages of smoking initiation may be more than double that of established smokers aged 18 years (Ling and Glantz 2002; Biener and Albers 2004; Green et al. 2007). As illustrated in Figure 3.1 and Table 3.2, transitioning to daily smoking will not occur until young adulthood for about one-third of young smokers.

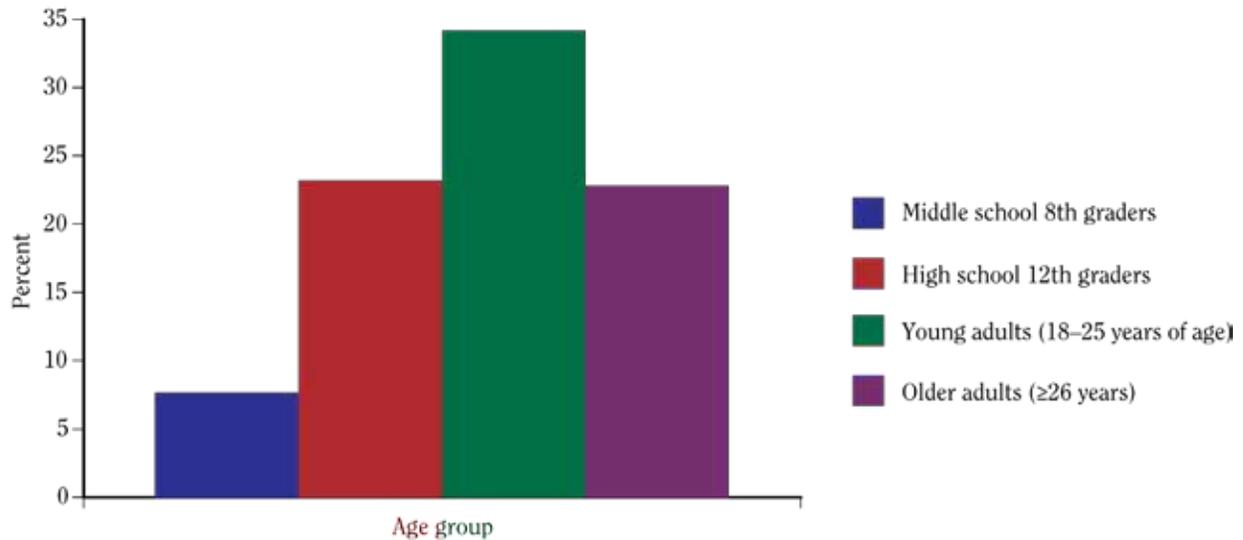
## Trends in Cigarette Smoking Over Time

Trend data for cigarette smoking and other tobacco use among young people are available from four primary surveillance systems: YRBSS, NYTS, MTF, and NSDUH. Trends in the prevalence of current cigarette smoking and other tobacco use based on YRBS data are illustrated upfront in this chapter, (e.g., Figures 3.3a, 3.3b, 3.6a, 3.8a and 3.8b) and in Appendix 3.1 (e.g., Figures 3.1.6 onward). Trend data from MTF are also provided in Figure 3.6b and in Appendix 3.1 (e.g., Figures 3.1.5 onward). MTF data include prevalence estimates for ever and current cigarette smoking, as well as trends in knowledge and attitudes about cigarette smoking over time. Finally, trend data from NSDUH are also available here (Figures 3.5a and 3.5b) as well as in Appendix 3.1 (e.g., Figure 3.1.13 onward). This includes trends in the prevalence of current cigarette smoking among adolescents and young adults, as well as information on the initiation of tobacco use over time, among adolescents and young adults alike. To supplement these analyses, recent published manuscripts on trends in cigarette smoking over time are cited where appropriate (e.g. Nelson et al. 2008; CDC 2010a,d).

### Trends in Cigarette Smoking Among Adolescents

Figures 3.3a and 3.3b illustrate trends in the prevalence of current cigarette smoking for students in 9th–12th grades since 1991, using YRBS. After a dramatic increase in the prevalence of current smoking in this population through the mid-1990s, the prevalence of current smoking dropped sharply. This inflection point (i.e., the point in time when the prevalence of cigarette smoking stopped increasing and began to decrease) coincided with

**Figure 3.2** Percentage of middle school 8th graders, high school seniors, young adults (18–25 years of age), and adults (≥26 years of age) who currently smoke cigarettes; National Youth Tobacco Survey (NYTS)<sup>a</sup> 2009 and National Survey on Drug Use and Health (NSDUH)<sup>b</sup> 2010; United States



*Source:* Middle school and high school data, 2009 NYTS: Centers for Disease Control and Prevention (unpublished data). Young adult and older adult data, 2010 NSDUH: Substance Abuse and Mental Health Services Administration (published data). (For young adults, see SAMHSA 2011a, Table 2.24B.) (For adults ≥26 years, see SAMHSA 2011a, Table 2.25B.)

<sup>a</sup>Based on responses to the question, “During the past 30 days, on how many days did you smoke cigarettes?” Respondents who reported that they had smoked on at least 1 or 2 days were classified as current smokers.

<sup>b</sup>Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers. For further information, refer to Appendix 3.1, Table 3.1.2.

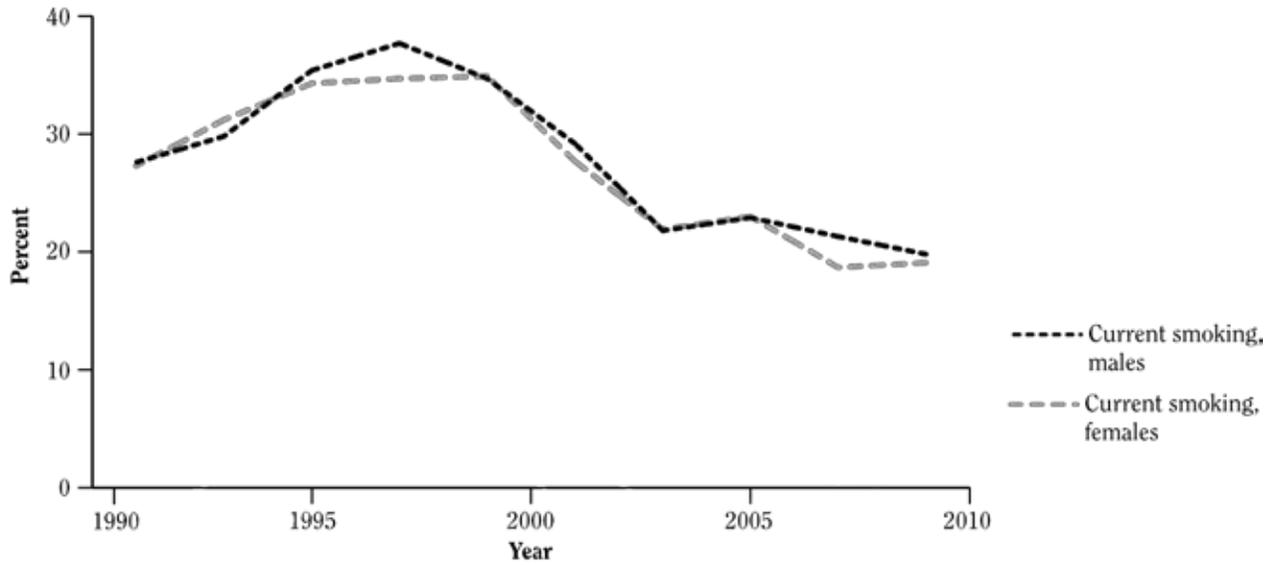
the Master Settlement Agreement in 1998 when new initiatives to reduce youth tobacco use became widespread. Over time, however, this decline has decelerated, and for some subgroups, may have stopped altogether. YRBS data suggest the rates of decline in the prevalence of current smoking, ever smoking, and frequent smoking began to slow in 2003 (CDC 2010a). CDC estimates that if the decline in the prevalence of current smoking had continued from 2003 to 2009 at the same rate as had been seen from 1999 to 2003, 3 million fewer youth and young adults would have been current cigarette smokers by 2009 (Figure 3.4) (CDC unpublished data). Unfortunately, subgroup analyses suggest that the 1999–2003 rate of decline in the prevalence of current cigarette smoking only continued past 2003 for Black female students (CDC 2010a). For some subgroups of youth—White female students, Black male students, and younger students (9th–10th-grade students)—the decline in prevalence of current cigarette smoking began to slow in 2003 (CDC 2010a). The decline in current cigarette smoking stalled completely in 2003 for White males, Hispanic males, Hispanic females, and

older students (11th–12th-grade students) (CDC 2010a). Data from MTF are consistent with the trends found using YRBS. According to MTF, the deceleration in ever smoking among students seems to have started in 2003, as well (Appendix 3.1, Figure 3.1.5), while the deceleration in current smoking among students may have started a year earlier or later, depending on the subgroup(s) involved (e.g., in 2002 for 12th-grade males and in 2004 for 8th-grade males and females; see Figure 3.1.8 in Appendix 3.1).

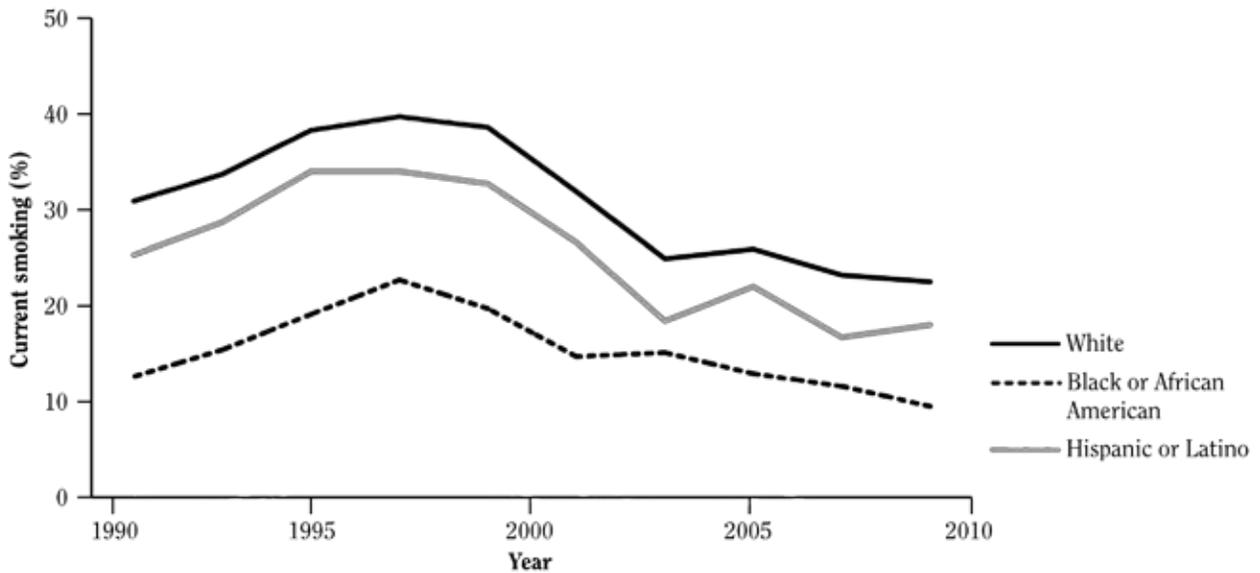
Detailed NSDUH data on trends in smoking prevalence among adolescents are not provided in this report, but are found elsewhere (SAMHSA 2009a,b; 2011b), with comparable surveillance data over time available from 2002. In contrast to YRBS and MTF, NSDUH, which includes both in-school and out-of-school youth, shows a consistent decline in the prevalence of cigarette smoking among adolescents overall (12–17 years old) from 2002 to 2008 (SAMHSA 2009b) and through 2010 (SAMHSA 2011b). However, when subgroup analyses were conducted, the decline in the prevalence of current cigarette

**Figure 3.3 Trends in the prevalence of current cigarette smoking over time among high school students, by gender and race/ethnicity; National Youth Risk Behavior Survey (YRBS) 1991–2009; United States**

**A. Gender**



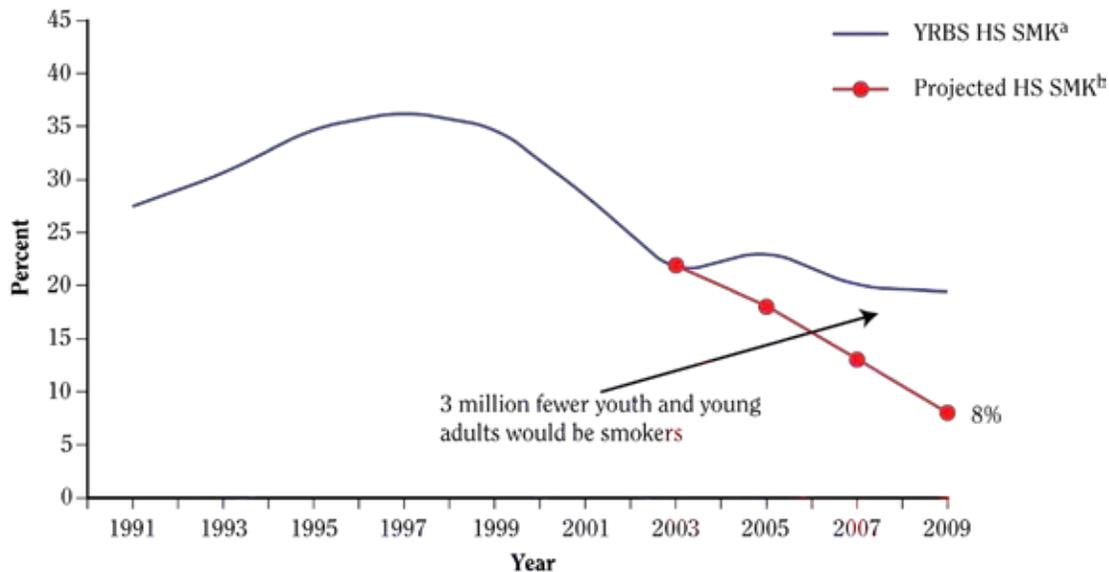
**B. Race/ethnicity**



Source: 1991–2009 YRBS: Centers for Disease Control and Prevention (2011d).

Note: Based on responses to the question, “During the past 30 days, on how many days did you smoke cigarettes?” Respondents who reported that they had smoked on at least 1 or 2 days were classified as current smokers. Also see Appendix 3.1, Figures 3.1.7 and 3.1.9D.

**Figure 3.4** Current high school cigarette smoking and projected rates if decline had continued; National Youth Risk Behavior Survey (YRBS); United States, 1991–2009



Source: 1991–2009 YRBS: Centers for Disease Control and Prevention, Division of Adolescent and School Health, Office on Smoking and Health (unpublished data).

Note: **HS SMK** = high school smokers. Based on responses to the question, “During the past 30 days, on how many days did you smoke cigarettes?” Respondents who reported that they had smoked on at least 1 or 2 days were classified as current smokers.

<sup>a</sup>High school students who smoked on 1 or more of the 30 days preceding the survey.

<sup>b</sup>Projected high school students who smoked on 1 or more days of the past 30 days if 1997–2003 decline had been maintained.

smoking between 2007 and 2008 appears to have been limited to White males and females only (SAMHSA 2009b), and between 2009 and 2010, the decline in the prevalence of current cigarette smoking was limited to White males only (SAMHSA 2001b). For all other subgroups, no significant differences in the prevalence of current cigarette smoking were observed between 2007 and 2008 (SAMHSA 2009b) or 2009 and 2010 (SAMSHA 2011b). This suggests the decline might have finally stalled for these subgroups at these time points, from NSDUH’s perspective. However, the rate of initiation of cigarette smoking among adolescents (12–17 years old) declined overall from 2006–2010 (Appendix 3.1, Table 3.1.30) ( $p < .05$ ), decreasing for females and Whites ( $p < .05$ ) and unchanged for other groups.

These recent trends in the prevalence of current cigarette smoking among adolescents are difficult to fully reconcile, especially given subgroup differences both within and between surveillance systems. Nevertheless, it seems clear that progress in decreasing youth cigarette smoking has greatly slowed for some subgroups and halted altogether for others. Analyses of NYTS data through 2009

show that susceptibility to cigarette smoking (defined as the absence of a firm commitment not to smoke cigarettes or, conversely, a willingness to experiment with cigarette smoking) has remained unchanged since it was first measured in the 1999–2000 school year (Mowery et al. 2004; CDC 2010c).

### Trends in Cigarette Smoking Among Young Adults

Trends in cigarette smoking among young adults from 1973 through 2005 have been reviewed elsewhere (Nelson et al. 2008) through an analysis of NHIS data. In this review, changes in the prevalence of current cigarette smoking among young adults (18–24 years old in this analysis) lagged a few years behind the changes for adolescents, providing evidence for a cohort effect (Lantz 2003; Nelson et al. 2008). After the increase in the prevalence of current smoking among adolescents in the mid-1990s, young adult smoking peaked at about the year 2000, a few years after the inflection point for adolescents, (i.e., the point when the prevalence of current cigarette smoking

stopped increasing and began to decrease). Throughout this period, from the 1990s into the first part of the new millennium, the rise and fall of young adult smoking was never as steep as it was among adolescents (Nelson et al. 2008). In recent years, NSDUH data suggest that the decline in young adult prevalence may have stalled, too for certain subgroups. The initiation rate for cigarette smoking among young adults overall (18–25 years old) remained stable between 2006 and 2010, according to NSDUH ( $p > 0.05$ ). Still, for Whites, there was a significant decrease from 2006–2010 ( $p < 0.05$ ). This is illustrated in Figures 3.5a and 3.5b (see also Appendix 3.1, Table 3.1.31). Trends in the prevalence of current smoking for young adults (18–25 years old) from 2002 through 2010 are presented in Appendix 3.1, in Figures 3.1.13 to 3.1.15. As can be seen from these figures, cigarette smoking appears to have stalled from 2007 forward in young adult males and females (Figure 3.1.13) and in White, Black, and Hispanic subgroups of young adults (Figure 3.1.14) overall. When examined by SES status, however (Figure 3.1.15), this flat line may be masking an important difference: for young adults at or below the poverty line, the prevalence of current cigarette smoking actually began to increase in 2007, as it continued to decrease for those above the poverty line, albeit at a slower rate. No changes in current smoking for any of these subgroups occurred between 2009 and 2010, as reflected by either education level or employment status (trends by poverty level have not been publicly reported) (SAMHSA 2011b). The take-home message for young adults, then, is equally as worrisome as that for adolescents. As noted before (Figure 3.2), it must be emphasized that young adults have the highest prevalence of cigarette smoking of all age groups and may be uniquely situated, as they transition into older adulthood, to benefit from interventions, especially help with cessation, although research to date suggests few young adults avail themselves of these resources (see Chapter 6, “Efforts to Prevent and Reduce Tobacco Use Among Young People”). Continued surveillance of smoking and interventions to reduce smoking should be cognizant of critical differences in the prevalence of cigarette smoking among young adults by education level and SES status (Lantz 2003; Green et al. 2007).

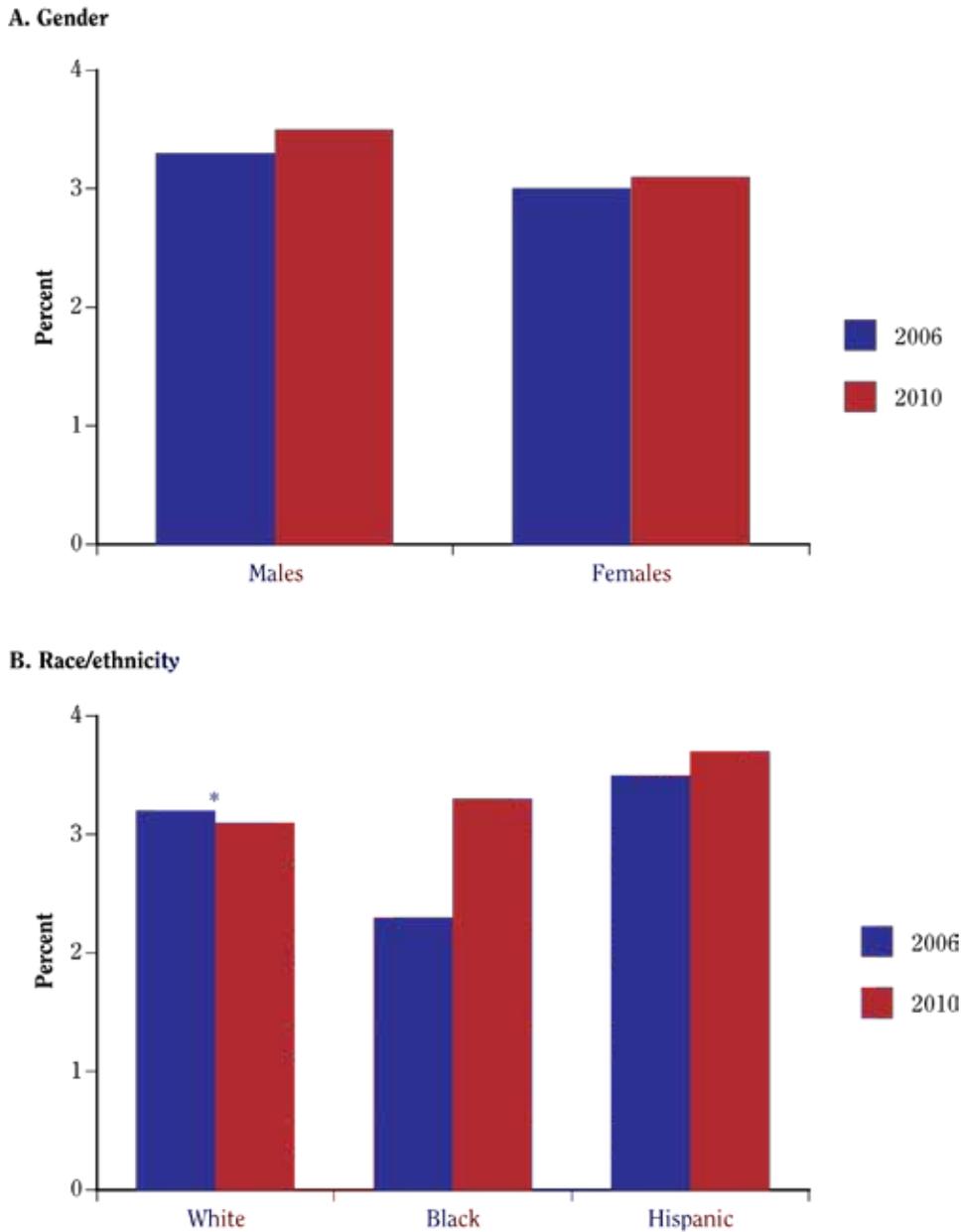
## Current Prevalence of Smokeless Tobacco Use and Cigar Smoking

According to the 2009 NYTS, about 1 in 10 high school males (11.6%) are current smokeless tobacco users

(i.e., had used smokeless tobacco in the last 30 days [Table 3.4a; see Appendix 3.3 for more detail on this definition]), compared to about 1 in 100 high school females (1.8%), overall. The prevalence of smokeless tobacco use is highest among White high school students, compared to any other racial/ethnic group ( $p < 0.05$ ), according to NYTS–high school. The prevalence of cigar smoking is somewhat higher than that of smokeless tobacco use, overall. Again, according to the 2009 NYTS–high school, 15.0% of high school males and 6.7% of high school females ( $p < 0.05$ , comparing males to females) currently smoke cigars (i.e., had smoked a cigar in the last 30 days; [Table 3.5a; see Appendix 3.3 for more detail on this definition]). The prevalence of current cigar smoking is highest among White (12.0%) and Hispanic (11.8%) high school students ( $p > 0.05$ , comparing Whites to Hispanics), followed by students of Other race/ethnicities (8.0%) and Blacks (7.3%) ( $p > 0.05$ , comparing Others to Blacks), according to NYTS–high school (see Table 3.5a). By multiplying the current tobacco use prevalence (which includes cigarettes, smokeless tobacco, and cigars) in middle school (from the NYTS 2009) and the current tobacco use prevalence in high school (from the NYTS 2009) with the number of students enrolled in middle and high school, respectively (US Census Bureau 2009), this report finds that approximately 4.3 million (95% CI, 3,699,710–4,399,235) high school students and about 985,000 (95% CI, 863,928–1,103,908) middle school students currently use a tobacco product (includes cigarettes, smokeless tobacco, and cigars). Similarly, NSDUH found that, among young adults aged 18–25 years in 2010, 13.9 million (95% CI, 13,582,000–14,228,000) used a tobacco product within the past month and 17.4 million (95% CI, 17,088,000–17,758,000) used a tobacco product within (includes cigarettes, smokeless tobacco, cigars) the past year.

The prevalence of current smokeless tobacco use among young adults (18–25 years old) is provided in Table 3.4b. In the 2010 NSDUH, the prevalence of current smokeless tobacco use was higher for young adult males than for females (12.0% vs. 0.7%;  $p < 0.05$ ). White (9.5%) youth had the highest prevalence, followed by Hispanic (2.2%) and Black (0.6%) youth ( $p < 0.05$  for all comparisons with Whites) (SAMHSA 2011b). The prevalence of current cigar smoking among young adults (18–25 years old) is provided in Table 3.5b. In the 2010 NSDUH, the prevalence of current cigar smoking was higher for young adult males than for females (16.6% vs. 5.6%;  $p < 0.05$ ). White (12.5%) and Black (11.5%) youth had the highest prevalence, followed by Hispanic (8.4%) youth ( $p < 0.05$  for all comparisons with Hispanics) (SAMHSA 2011b).

**Figure 3.5 Trends in the initiation of cigarette smoking over time among young adults (18- to 25-year-olds), by gender and by race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2006 and 2010; United States**



Source: 2006 and 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: For further information, refer to Appendix 3.1, Table 3.1.31. These data reflect initiation of cigarette smoking among all persons, not just those at-risk-for-initiation (i.e., those who did not use cigarettes in their lifetime or used cigarettes for the first time in the past year). Moreover, they reflect any initiation (i.e., smoked a cigarette for the first time). Difference between 2010 estimate and 2006 estimate is significant at the 0.05 level.

\*Difference between 2010 estimate and 2006 estimate is significant at the 0.05 level.

**Table 3.4a Percentage of high school students and middle school students who currently use smokeless tobacco, by gender and race/ethnicity and age/grade; Youth Risk Behavior Survey (YRBS) 2009, and National Youth Tobacco Survey (NYTS) 2009; United States**

Characteristic	YRBS 9th–12th grades <sup>a</sup>		NYTS 9th–12th grades <sup>a</sup>		NYTS 6th–8th grades <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	8.9 (7.3–10.8)		6.7 (4.5–8.9)		2.6 (2.0–3.2)	
<b>Gender</b>						
Male	15.0 (12.1–18.5)	a	11.6 (7.7–15.4)	a	3.7 (2.6–4.8)	a
Female	2.2 (1.8–2.7)	b	1.8 (1.2–2.3)	b	1.4 (1.0–1.9)	b
<b>Race/ethnicity</b>						
White	11.9 (9.5–14.6)	a	8.7 (6.1–11.2)	a	2.5 (1.8–3.3)	a
Male	20.1 (15.8–25.4)		15.6 (11.2–20.0)		3.7 (2.5–4.8)	
Female	2.3 (1.7–3.2)		1.7 (0.8–2.6)		1.3 (0.7–2.0)	
Black or African American	3.3 (2.3–4.6)	b	1.7 (0.1–3.2)	b	1.5 (0.8–2.2)	b
Male	5.2 (3.7–7.4)		2.1 (0.4–3.7)		1.9 (1.1–2.8)	
Female	1.3 (0.8–2.3)		1.3 (0.3–4.8)		1.1 (0.1–2.1)	
Hispanic or Latino	5.1 (4.1–6.3)	c	4.8 (3.2–6.5)	c	2.5 (1.8–3.2)	a
Male	7.5 (5.7–9.8)		6.8 (4.2–9.5)		3.4 (2.3–4.6)	
Female	2.6 (1.9–3.5)		2.8 (1.4–4.3)		1.6 (0.7–2.5)	
Other <sup>c</sup>	5.7 (3.4–9.3)	b,c	5.3 (2.2–8.4)	c	5.1 (0.5–9.8)	a,b
Male	10.1 (6.3–15.7)		9.5 (4.0–15.0)		7.9 (2.6–21.8)	
Female	1.3 (0.5–3.6)		1.1 (0.0–2.2)		2.2 (0.4–3.9)	

Source: 2009 YRBS: Centers for Disease Control and Prevention, Division of Adolescent and School Health (CDC 2011d); 2009 NYTS: Centers for Disease Control and Prevention (unpublished data).

Note: CI = confidence interval; SN = statistical note.

<sup>a</sup>Based on responses to the question, "During the past 30 days, on how many days did you use chewing tobacco, snuff, or dip?"

Respondents who chose 1 or 2 days or more were classified as current smokeless tobacco users.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system. These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another ( $p > 0.05$ ). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another ( $p < 0.05$ ).

<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

## Trends in Smokeless Tobacco Use and Cigar Smoking Over Time

### Trends in Smokeless Tobacco Use Among Adolescents and Young Adults

Trends in the prevalence of current smokeless tobacco use among adolescents are presented in Figures 3.6a and 3.6b, using data from YRBS (Figure 3.6a, 9th–12th-grade students) and MTF (Figure 3.6b, 12th-grade students only). As these data demonstrate, smokeless tobacco use occurs predominantly among White male students, as compared to other subgroups of students. Notably, for

this particular subgroup, according to YRBS, following a sharp decline in use since the late 1990s, the prevalence of current smokeless tobacco use began to rise sharply again in 2003 and has continued to rise since. According to MTF, smokeless tobacco stalled for 12th-grade White male students from 2003 to 2007, after which it began to increase sharply again. For 8th- and 10th-grade White males, this recent increase was less sharp (Appendix 3.1, Figures 3.1.34a and 3.1.34b) but an increase nonetheless, following a similar stall from 2003 through 2008 (for 8th-grade students) and 2009 (for 10th-grade students). Since 2003, smokeless tobacco use among young adult (18–25 years old) White males has increased steadily according

**Table 3.5a** Percentage of high school students and middle school students who currently smoke cigars, by gender and race/ethnicity and age/grade; Youth Risk Behavior Survey (YRBS) 2009, and National Youth Tobacco Survey (NYTS) 2009; United States

Characteristic	YRBS 9th–12th grades <sup>a</sup>		NYTS 9th–12 grades <sup>a</sup>		NYTS 6th–8th grades <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	14.0 (12.8–15.4)		10.9 (8.9–12.9)		3.9 (3.4–4.5)	
<b>Gender</b>						
Male	18.6 (17.0–20.5)	a	15.0 (12.1–18.0)	a	4.6 (3.8–5.5)	a
Female	8.8 (7.7–10.1)	b	6.7 (5.4–8.1)	b	3.2 (2.5–3.9)	b
<b>Race/ethnicity</b>						
White	14.9 (13.3–16.7)	a	12.0 (9.8–14.2)	a	2.9 (2.2–3.6)	a
Male	21.0 (18.7–23.4)		17.2 (14.1–20.3)		3.8 (2.6–4.9)	
Female	8.0 (6.8–9.3)		6.7 (5.0–8.3)		2.0 (1.2–2.8)	
Black or African American	12.8 (10.9–15.0)	a,b	7.3 (3.6–10.9)	b	4.5 (3.2–5.8)	b
Male	13.9 (11.6–16.5)		7.7 (2.6–12.8)		5.2 (3.4–7.0)	
Female	11.5 (8.8–14.8)		6.9 (3.4–10.3)		3.7 (1.8–5.7)	
Hispanic or Latino	12.7 (10.9–14.7)	a,b	11.8 (9.6–14.0)	a	6.2 (5.0–7.3)	c
Male	15.8 (13.1–19.1)		16.1 (13.4–18.7)		6.6 (5.2–8.0)	
Female	9.5 (7.6–11.9)		7.5 (5.5–9.4)		5.7 (3.6–7.8)	
Other <sup>c</sup>	11.1 (8.4–14.5)	b	8.0 (4.8–11.1)	b	4.6 (2.5–6.7)	a,b,c
Male	14.4 (10.9–18.9)		10.7 (6.2–15.2)		5.4 (2.0–8.9)	
Female	7.5 (4.8–11.7)		5.3 (2.1–8.4)		3.7 (1.6–5.9)	

Source: 2009 YRBS: Centers for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data); 2009 NYTS: Centers for Disease Control and Prevention (unpublished data).

Note: CI = confidence interval; SN = statistical note.

<sup>a</sup>Based on responses to the question, “During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?” Respondents who reported that they had smoked cigars, cigarillos, or little cigars on 1 or 2 days or more were classified as current cigar smokers.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system (e.g., YRBS). These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another ( $p > 0.05$ ). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another ( $p < 0.05$ ).

<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

to NSDUH (see Appendix 3.1, Figures 3.1.30 and 3.1.31), with a sharp rise between 2008 and 2009. However from 2009 to 2010, the prevalence of current smokeless tobacco use did not change for this subgroup (SAMSHA 2011b).

According to YRBS and MTF, the decline in the prevalence of tobacco use began to slow or stall for adolescents, across separate measures of tobacco use (i.e., current cigarette smoking [see above] and smokeless tobacco use), in 2003. This is curious, worth noting, and may be useful to explore in future analyses that are beyond the scope of this chapter at present. The last published review of trends in smokeless tobacco use among adolescents and young adults was optimistic in tone, as trends up through

2003 were being described (Nelson et al. 2006). The review warned about the possible adverse effects of substantial reductions that had occurred in many states’ antitobacco programs at that point in time (Schroeder 2004), and it may be that these adverse effects were, indeed, realized after 2003. Some subgroups have remained unaffected by these changes over time: the very low prevalence of smokeless tobacco use has remained unchanged among high school females and young adult females overall for the last decade (Figure 3.6a and Appendix 3.1, Figure 3.1.30). For other subgroups, such as Hispanic and Black 12th-grade males, trends in the prevalence of smokeless tobacco use over time have been more erratic, with

**Table 3.4b Percentage of young adults (18–25 years old) who currently use smokeless tobacco, by gender and race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2010; United States**

Characteristic	NSDUH 18–25 years of age <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	6.4 (6.0–6.9)	
<b>Gender</b>		
Male	12.0 (11.1–12.8)	a
Female	0.7 (0.5–1.0)	b
<b>Race/ethnicity</b>		
White	9.5 (8.8–10.2)	a
Male	17.8 (16.6–19.1)	
Female	1.0 (0.7–1.5)	
Black or African American	0.6 (0.4–1.0)	b
Male	1.2 (0.8–2.0)	
Female	0.1 (0.0–0.6)	
Hispanic or Latino	2.2 (1.6–3.0)	c
Male	3.8 (2.8–5.2)	
Female	0.3 (0.1–0.7)	
Other <sup>c</sup>	3.6 (2.6–5.0)	d
Male	6.8 (4.9–9.4)	
Female	0.4 (0.2–1.0)	

Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: CI = confidence interval; SN = statistical note.

<sup>a</sup>Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system (e.g., NSDUH). These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another (p >0.05). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another (p <0.05).

<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

**Table 3.5b Percentage of young adults (18–25 years old) who currently smoke cigars, by gender and race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2010; United States**

Characteristic	NSDUH 18–25 years of age <sup>a</sup>	
	% (95% CI)	SN <sup>b</sup>
<b>Overall</b>	11.2 (10.6–11.8)	
<b>Gender</b>		
Male	16.6 (15.7–17.6)	a
Female	5.6 (5.0–6.2)	b
<b>Race/ethnicity</b>		
White	12.5 (11.8–13.3)	a
Male	19.5 (18.3–20.8)	
Female	5.5 (4.8–6.2)	
Black or African American	11.5 (10.1–13.1)	a
Male	14.6 (12.3–17.3)	
Female	8.7 (7.1–10.5)	
Hispanic or Latino	8.4 (7.3–9.7)	b
Male	11.9 (10.1–14.0)	
Female	4.2 (3.2–5.6)	
Other <sup>c</sup>	6.6 (5.3–8.3)	b
Male	10.0 (7.5–13.2)	
Female	3.3 (2.1–5.2)	

Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: CI = confidence interval; SN = statistical note.

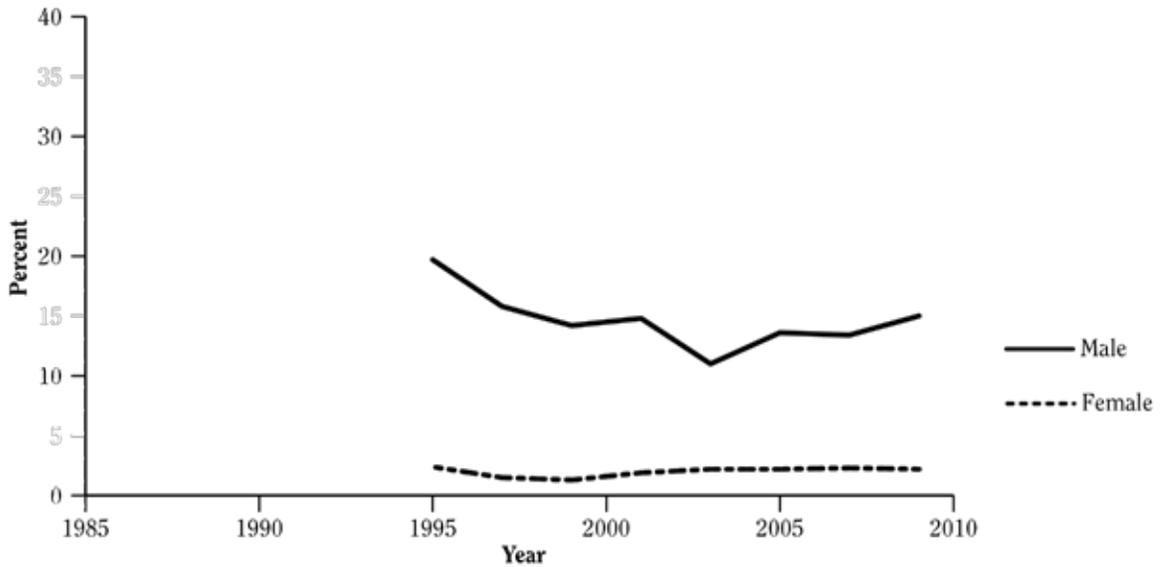
<sup>a</sup>Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers.

<sup>b</sup>This column represents the results of statistical tests that were run separately within each surveillance system (e.g., NSDUH). These tests were performed to examine differences in estimates within specific demographic subgroups (e.g., gender). Estimates with the same letter (e.g., a and a) are not statistically significantly different from one another (p >0.05). Estimates with different letters (e.g., a and b) are, in contrast, statistically significantly different from one another (p <0.05).

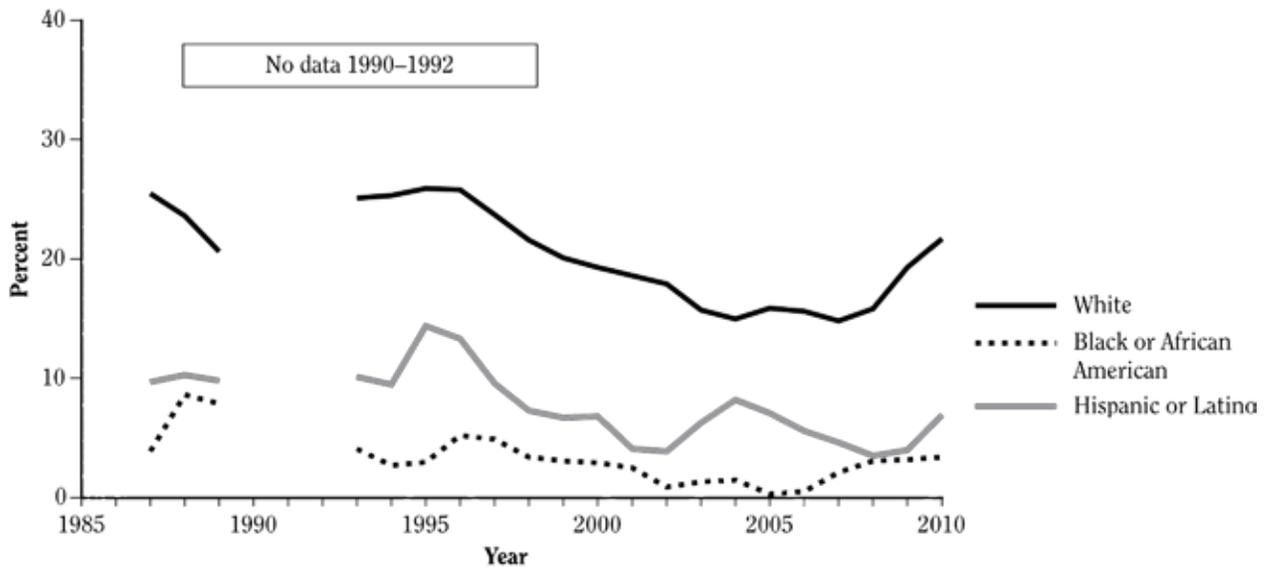
<sup>c</sup>Includes Asians, American Indians or Alaska Natives, Native Hawaiians or Other Pacific Islanders, and persons of two or more races.

**Figure 3.6 Trends in the prevalence of current smokeless tobacco use over time among high school students (National Youth Risk Behavior Survey [YRBS]) and high school seniors (Monitoring the Future [MTF]), by gender and by race/ethnicity; YRBS 1995–2009 and MTF 1987 (or 1993)–2010; United States**

**A. Males and females, 9th–12th grades, YRBS<sup>a</sup>**



**B. Males only, 12th grade, MTF<sup>b</sup>**

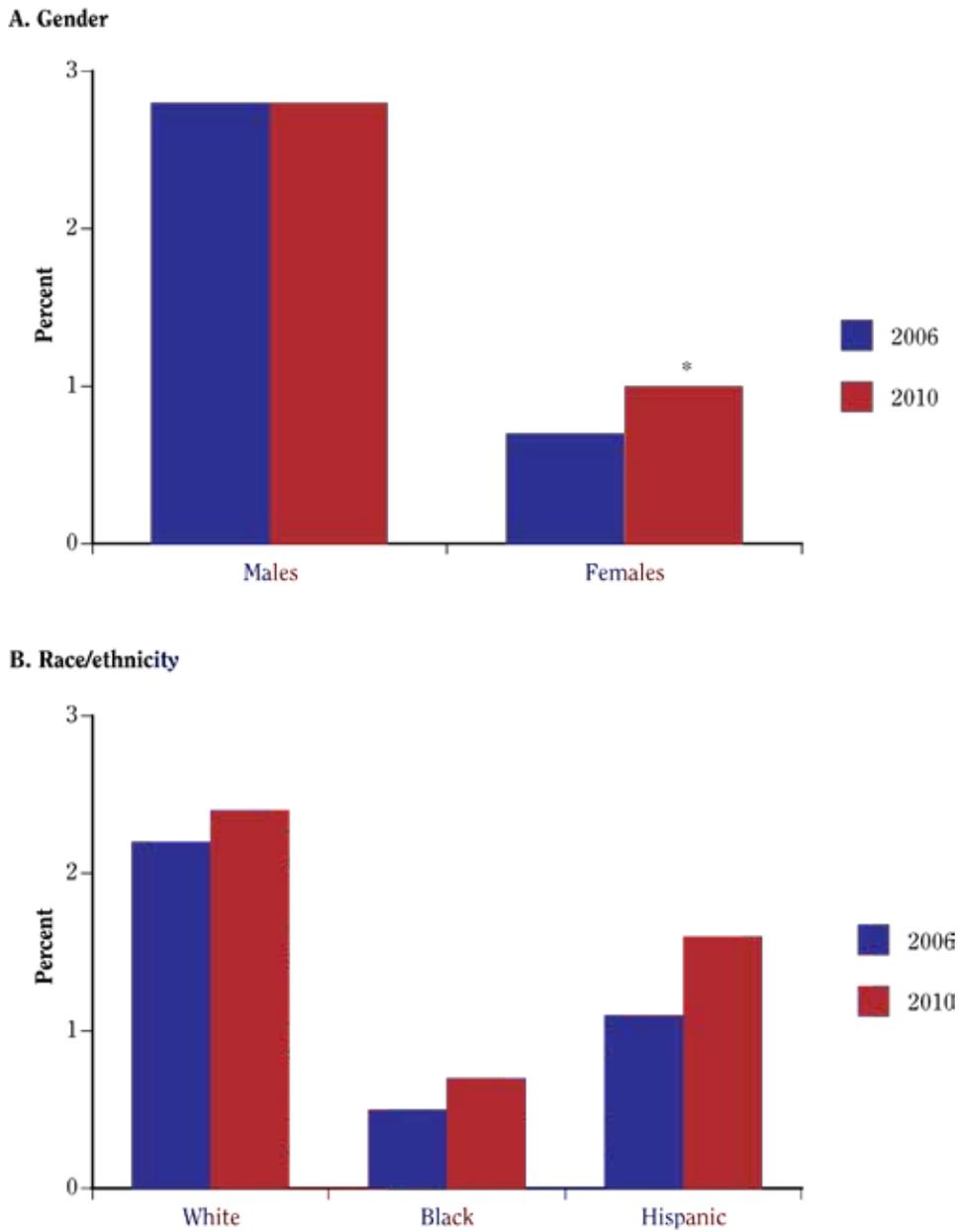


Source: 1995–2009 YRBS: Center for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data); 1987 (or 1993)–2010 MTF: University of Michigan, Institute for Social Research (unpublished data).

<sup>a</sup>Based on responses to the question, “During the past 30 days, on how many days did you use chewing tobacco, snuff, or dip, such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen?” Respondents who reported that they had used chewing tobacco, snuff, or dip on 1 or 2 days or more were classified as current smokeless tobacco users.

<sup>b</sup>Based on responses to the question, “Have you ever taken or used smokeless tobacco (snuff, plug, dipping tobacco, chewing tobacco)?” Respondents who chose “regularly now” were classified as current users of smokeless tobacco. Also see Appendix 3.1, Figures 3.1.33C and 3.1.34.

**Figure 3.7 Trends in the initiation of smokeless tobacco use over time among young adults (18- to 25-year-olds), by gender and by race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2006 and 2010; United States**



Source: 2006 and 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: For further information, refer to Appendix 3.1, Table 3.1.58. These data reflect initiation of smokeless tobacco among all persons, not just those at-risk-for-initiation (i.e., those who did not use smokeless in their lifetime or used smokeless for the first time in the past year). Moreover, they reflect any initiation (i.e., used smokeless for the first time).

\*Difference between 2010 estimate and 2006 estimate is significant at the 0.05 level.

some evidence of an increase in the last few years. Among young adult males, the prevalence of smokeless tobacco use among Hispanics and Blacks has remained small and static, like that for females, over time (see Appendix 3.1, Figure 3.1.31). Unlike cigarette smoking, these trends do not appear to differ by SES status (Appendix 3.1, Figure 3.1.32).

Close monitoring of smokeless tobacco use among all subgroups of young people is warranted in the future, especially as the tobacco industry continues to diversify its portfolio of product offerings (see Chapter 5 in this report). According to NSDUH, from 2006 to 2010, the initiation of smokeless tobacco use did not increase significantly among adolescents (12–17 years old) or among young adults (18–25 year olds), overall ( $p > 0.05$ ). However, for young adults, there was a significant increase in initiation for females during this period ( $p < 0.05$ ). The young adult data are presented in Figures 3.7a and 3.7b (and Appendix 3.1, Table 3.1.58).

### Trends in Cigar Smoking Among Adolescents and Young Adults

YRBS began collecting data on cigar smoking in 1997. Their measure includes the use of cigars, cigarillos, and little cigars. Trends in the prevalence of current cigar smoking among these students are presented in Figures 3.8a and 3.8b. Like the trends shown for current cigarette smoking, current cigar smoking declined in the late 1990s for high school males overall, then stalled from 2005 forward. For high school females overall, the prevalence of current cigar smoking has been low (although greater than that for smokeless tobacco use) and (like that for smokeless tobacco use) has decreased slowly over the last decade. From 2007 to 2009, although the prevalence of current cigar use among females overall has not increased ( $p > 0.05$ ), the prevalence of current cigar smoking by Black females almost doubled (6.7% to 11.5%,  $p < 0.05$ ) (CDC 2011d). MTF did not collect data on cigar smoking during this period, so the trend results from this surveillance system cannot be compared to YRBS. NYTS data did not show any changes in cigar smoking among any subgroup of middle or high school students, from 2006 to 2009 (6.8–6.5%,  $p > 0.05$ ) (CDC 2010d), nor did NSDUH for adolescents (12–17 years old), from 2006 to 2010 (3.0–2.1%,  $p > 0.05$ ) (SAMHSA 2011b).

NSDUH data show that the initiation of cigar smoking among adolescents (12–17 years old) decreased significantly, from 2006 to 2010, overall ( $p < 0.05$ ), for males ( $p < 0.05$ ), for females ( $p < 0.05$ ), and for Whites ( $p < 0.05$ ) (see Appendix 3.1, Table 3.1.61). For young adults (18–25 years old) over this same period, initiation of cigar smoking increased among Hispanics ( $p < 0.05$ ) (Figure 3.9;

Appendix 3.1, Table 3.1.60). For all other subgroups, initiation of cigar smoking remained unchanged over this period ( $p < 0.05$ ). Trends in the prevalence of cigar smoking from 2002 to 2010 for young adults is displayed in Figures 3.1.37–3.1.39 in Appendix 3.1, using additional data from NSDUH. These trends suggest that current cigar smoking has remained relatively unchanged over this period for males and females, for all racial/ethnic subgroups, and for young adults above and below the poverty line. From 2009 to 2010, current cigar smoking decreased among all racial/ethnic subgroups of young adults (18–25 years old), except American Indians/Alaskan Natives overall (although this increase was not significant). The decline from 2009 to 2010 was also significant for young adult males overall ( $p < 0.05$ ) (SAMHSA 2011b).

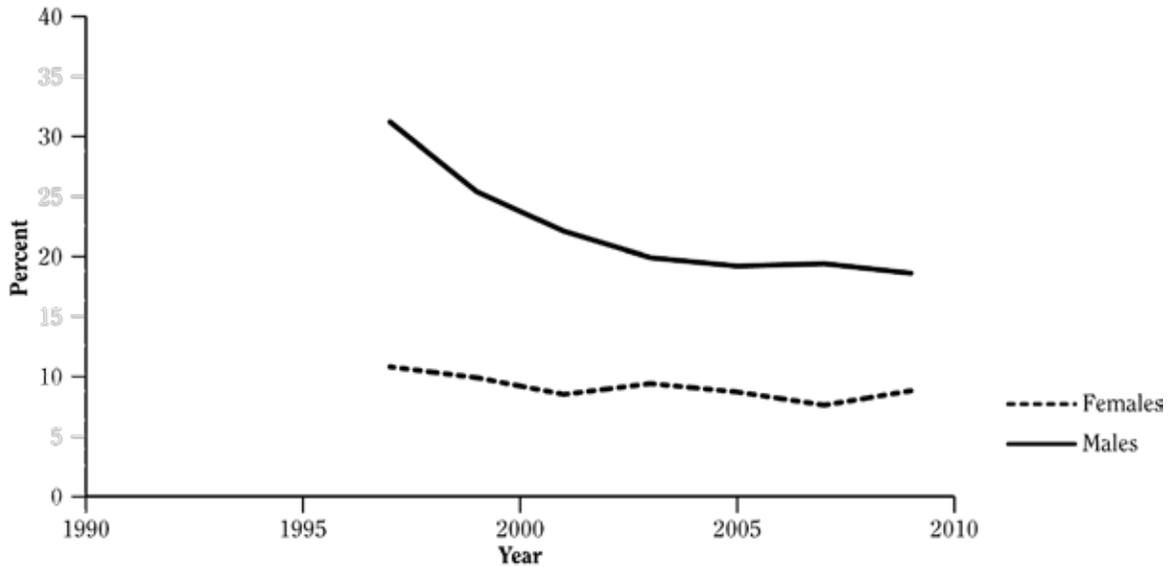
## Disparities in Cigarette Smoking And Other Tobacco Use

Disparities in health outcomes and health behaviors, unfortunately, are not uncommon in the United States (CDC 2011b), and tobacco use among young people is no exception. Here, disparities in tobacco use are considered by race/ethnicity and SES among adolescents and young adults. Limited, if any, surveillance data exists for other demographic subgroups known to have higher rates of tobacco use (e.g., the lesbian, gay, bisexual, and transgender community; Lee et al. 2009), so are not explored. Geographic disparities are described in Appendix 3.1 (e.g., Figures 3.1.1–3.1.2).

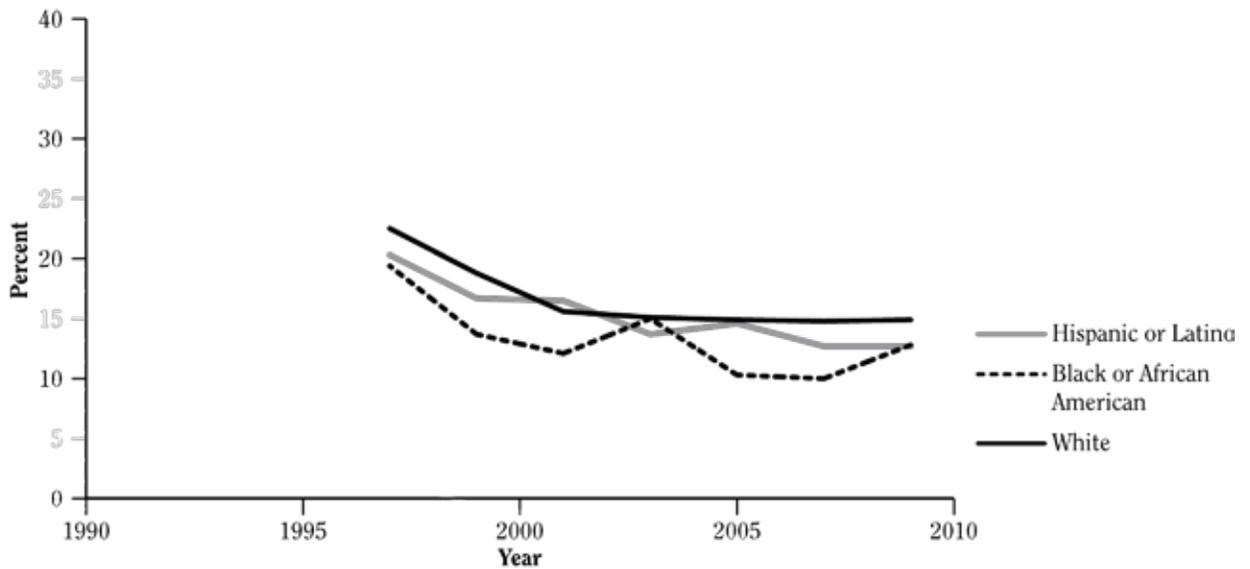
Data from multiple NSDUH surveys (2008–2010) were combined to reliably estimate differences in the prevalence of current cigarette smoking among adolescents (12–17 years of age) and young adults (18–25 years of age), by race/ethnicity and within race/ethnicity, by gender. The results of these analyses are presented in Figures 3.10a and 3.10b (see also Appendix 3.1, Tables 3.1.3 and 3.1.4). For both age groups, American Indian/Alaskan Native males (14.3% adolescents; 50.0% young adults) and females (16.3% adolescents; 46.1% young adults) had the highest prevalence of cigarette smoking, followed by White males (10.0% adolescents; 43.0% young adults) and females (10.7% adolescents; 37.1% young adults). In young adults, the prevalence of cigarette smoking among Hispanic males (35.2%) was on par with that for White females. For both age groups, the prevalence of cigarette smoking was lowest for Black and Asian youth. Trend analyses using national YRBS and MTF data (Appendix 3.1, Figures 3.1.9A–D) show these differentials in current cigarette smoking have been relatively consistent over time, historically speaking, since the mid-1980s, at least

**Figure 3.8 Trends in the prevalence of current cigar smoking over time among high school students, by gender and by race/ethnicity; National Youth Risk Behavior Survey (YRBS) 1997–2009; United States**

**A. Gender**

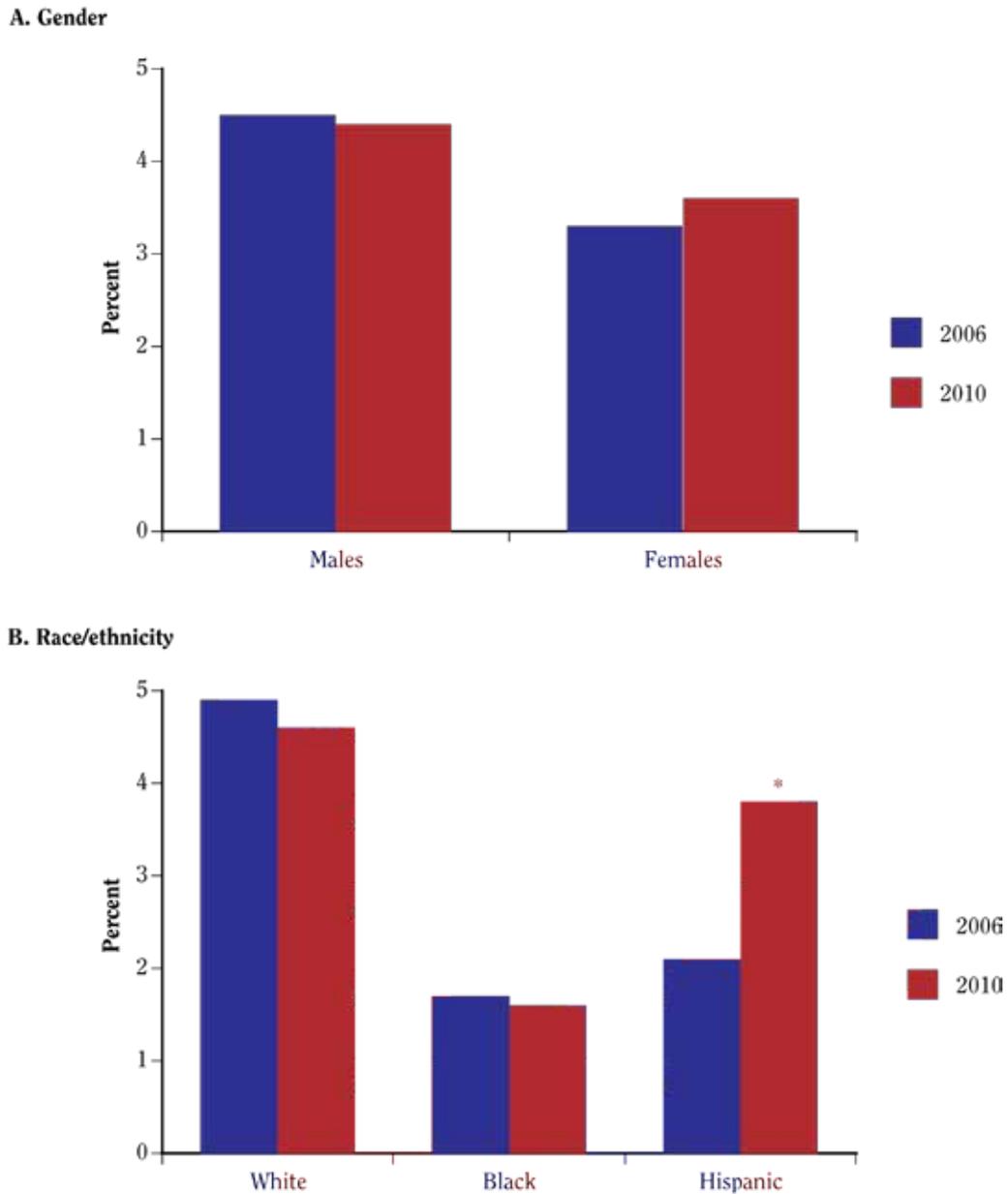


**B. Race/ethnicity**



Source: 1997–2009 YRBS: Centers for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data).  
 Note: Based on responses to the question, “During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?” Respondents who reported that they had smoked cigars, cigarillos, or little cigars on 1 or 2 days or more were classified as current cigar smokers. Also see Appendix 3.1, Figures 3.1.41A and 3.1.41B.

**Figure 3.9 Trends in the initiation of cigar smoking over time among young adults (18- to 25-year-olds), by gender and by race/ethnicity; National Survey on Drug Use and Health (NSDUH) 2006 and 2010; United States**



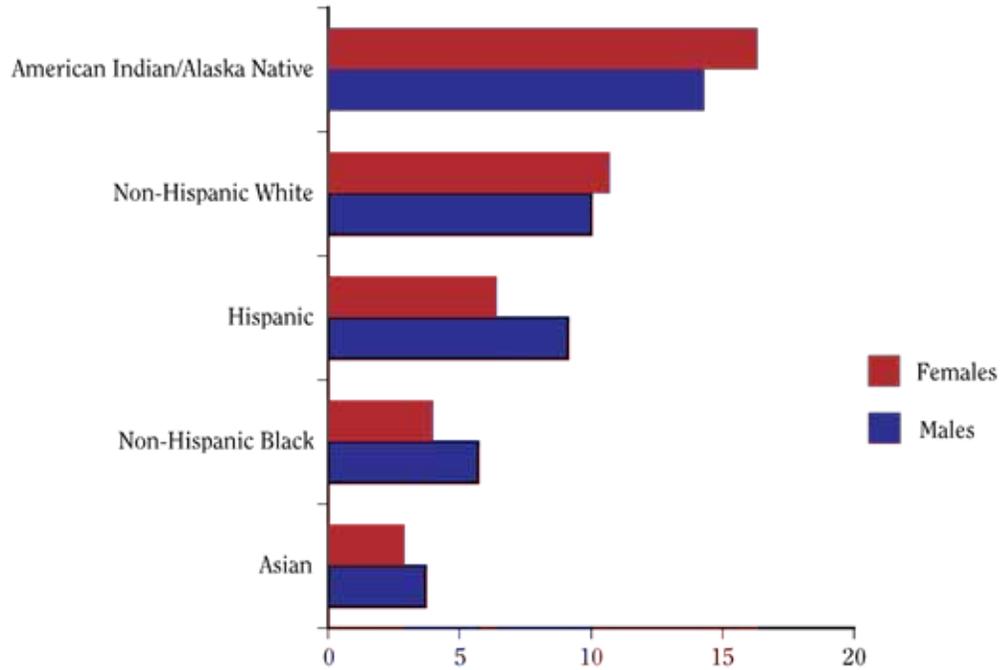
Source: 2006 and 2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: For further information, refer to Appendix 3.1, Table 3.1.60. These data reflect initiation of cigar smoking among all persons, not just those at-risk-for-initiation (i.e., those who did not smoke cigars in their lifetime or smoked cigars for the first time in the past year). Moreover, they reflect any initiation (i.e., smoked cigars for the first time).

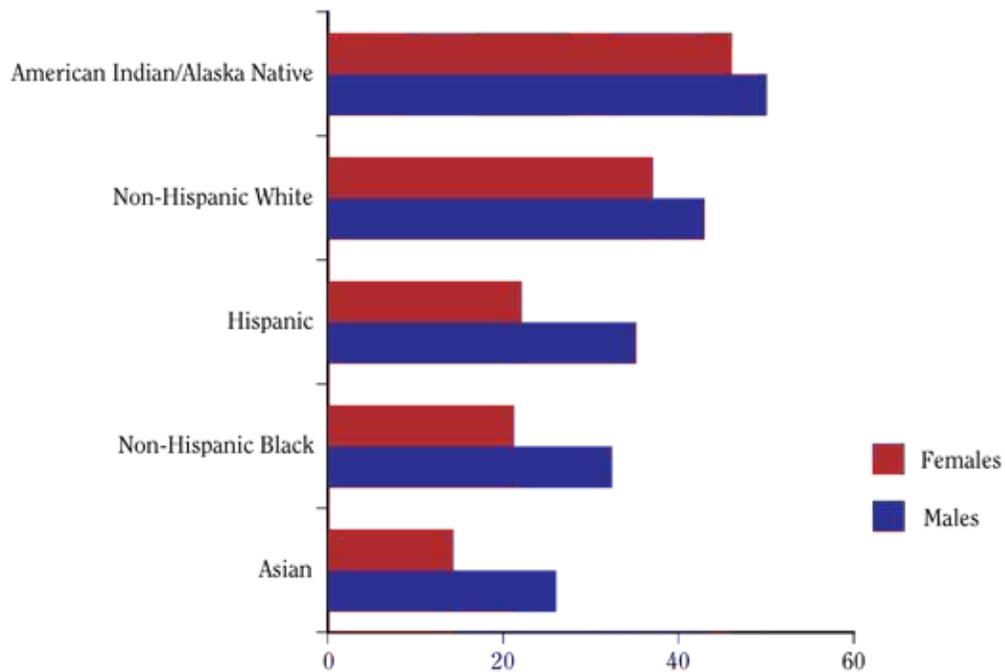
\*Difference between 2010 estimate and 2006 estimate is significant at the 0.05 level.

**Figure 3.10 Percentage of current cigarette smoking among adolescents (12- to 17-year-olds) and young adults (18- to 25-year-olds), by race/ethnicity and by gender; National Survey on Drug Use and Health (NSDUH) 2008–2010; United States**

**A. Adolescents (12- to 17-year-olds)**



**B. Young adults (18- to 25-year-olds)**



Source: 2008–2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers. For further information, refer to Appendix 3.1, Tables 3.1.3 and 3.1.4.

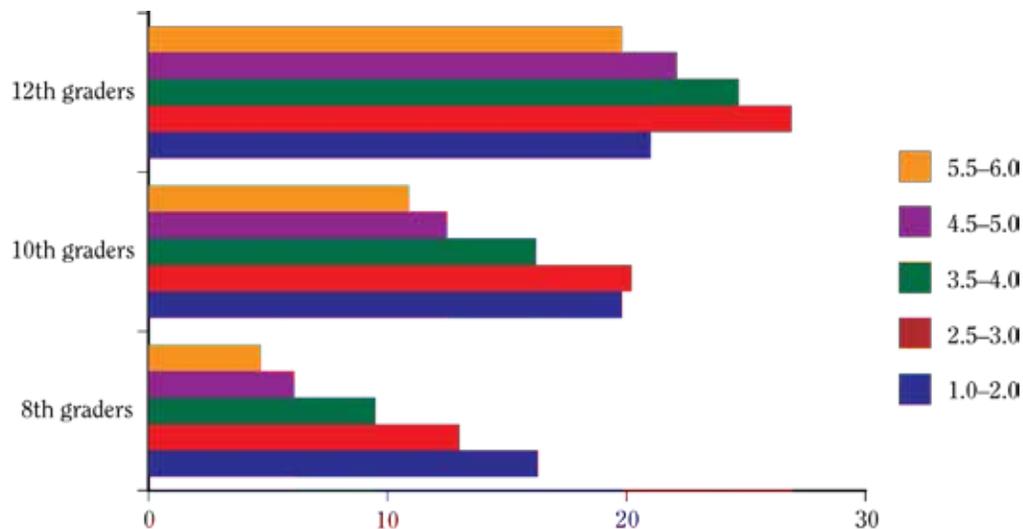
for White, Hispanic, and Black students. Other analyses of NSDUH data (2002–2003 to 2007–2008) showed that American Indian/Alaskan Native youth have experienced especially sharp declines in current cigarette smoking in recent years, which suggests that some progress has been achieved in reducing disparities in cigarette smoking in this racial/ethnic group (Garrett et al. 2011). By adulthood, American Indian/Alaskan Native males and females will still have the highest prevalence of current cigarette smoking of all racial/ethnic subgroups.

Differences in tobacco use by SES can be somewhat challenging to determine, especially among adolescents, as reliable and widely accepted measures of SES are lacking, especially in surveillance data. Here, parental education is considered as a proxy for SES among 8th-, 10th-, and 12th-grade students, using MTF data collapsed across multiple years (2002–2007) (Figure 3.11). Education and employment levels are used as a proxy for SES among young adults using 2010 NSDUH data (Figure 3.12). The socioeconomic gradient in current cigarette smoking is clear and consistent in both analyses: youth of lower SES

have a higher prevalence of current cigarette smoking than youth of a higher SES. The gradient among young adults is especially strong and mirrors other analyses of young adult data that suggest that the prevalence of current cigarette smoking for non-college-educated young adults is twice as high as that for their college-educated counterparts (Green et al. 2007). Although the socioeconomic gradient is strong here for adolescents, too, other analyses of MTF data suggest that differences in current cigarette smoking among adolescents by SES might be moderated by race/ethnicity (Bachman et al. 2010, 2011). In these studies, the effect of lower SES (as defined by parental education levels) on tobacco use is most pronounced among White and younger (e.g., eighth grade students) adolescents. The large proportion of Blacks and Hispanics in the lowest socioeconomic groups may mask SES disparities for these subpopulations that can be readily discerned among Whites.

The disparities noted here for cigarette smoking by SES extend to other tobacco products also (e.g., Bachman et al. 2010, 2011). Profiles for other tobacco

**Figure 3.11 Percentage of current cigarette smoking among 8th, 10th, and 12th graders, by parental education (as a proxy for socioeconomic status) and grade level; Monitoring the Future (MTF) 2002–2007; United States**



Source: 2002–2007 MTF: University of Michigan, Institute for Social Research (unpublished data).

Note: Parental education is measured as an average score of mother's education and father's education. Response categories are (1) completed some grade school or less, (2) some high school, (3) completed high school, (4) some college, (5) completed college, and (6) graduate or professional school after college. Based on responses to the question, "How frequently have you smoked cigarettes during the past 30 days?" Respondents who reported that they had smoked less than 1 cigarette per day or more were classified as current smokers. For further information, refer to Appendix 3.1, Table 3.1.5 (adolescents).

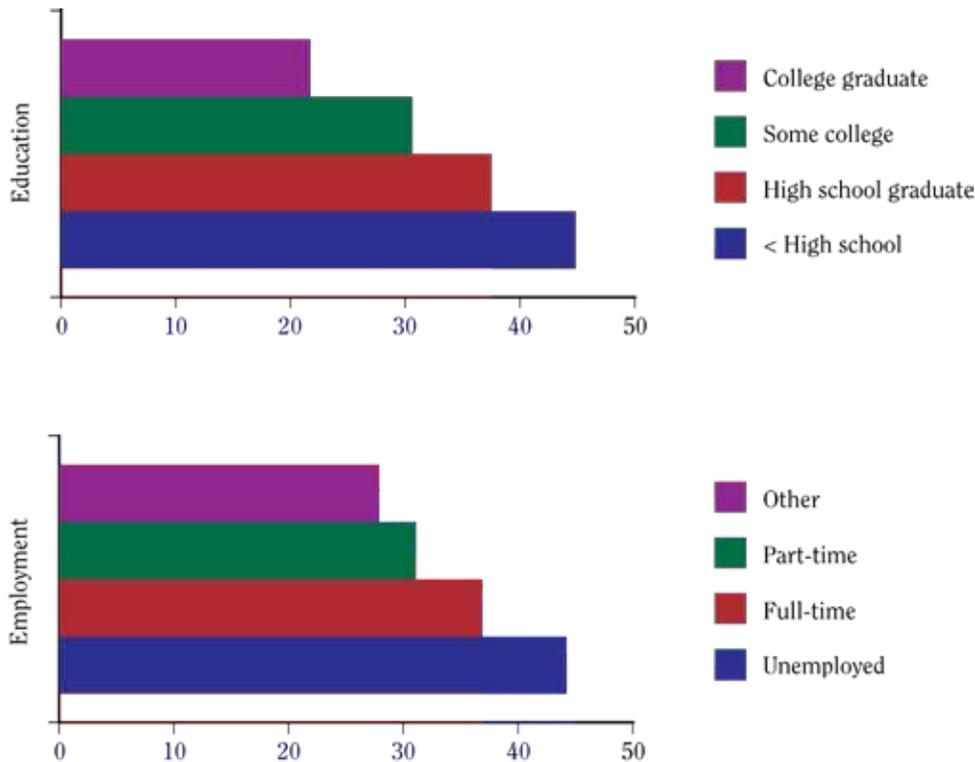
products by race/ethnicity, however, do differ and are discussed in Appendix 3.1. According to YRBS, the current use of smokeless tobacco, for example, is substantially more prevalent among adolescent males than among females ( $p < 0.05$ ; Appendix 3.1, Table 3.1.41), and among Whites when compared to Other youth ( $p < 0.05$ , Appendix 3.1, Table 3.1.41). Current cigar smoking is also significantly more prevalent for males than females ( $p < 0.05$  Appendix 3.1, Table 3.1.49), and among Whites when compared to Blacks, Hispanics and Other youth ( $p < 0.05$  for all comparisons with Whites; Appendix 3.1, Table 3.1.49). From 2007 to 2009, however, the prevalence of cigar use

by Black female high school students almost doubled (6.7–11.5%,  $p < 0.05$ ) (CDC 2011b). However, NSDUH data for Black girls aged 12–17 years show the prevalence of cigar use remaining between 1.6% and 2.5% during 2007–2010.

### Concurrent Use of Multiple Tobacco Products

This report finds that the concurrent use of two or more tobacco products (i.e., use of two or more tobacco products in the last 30 days) is common among some sub-

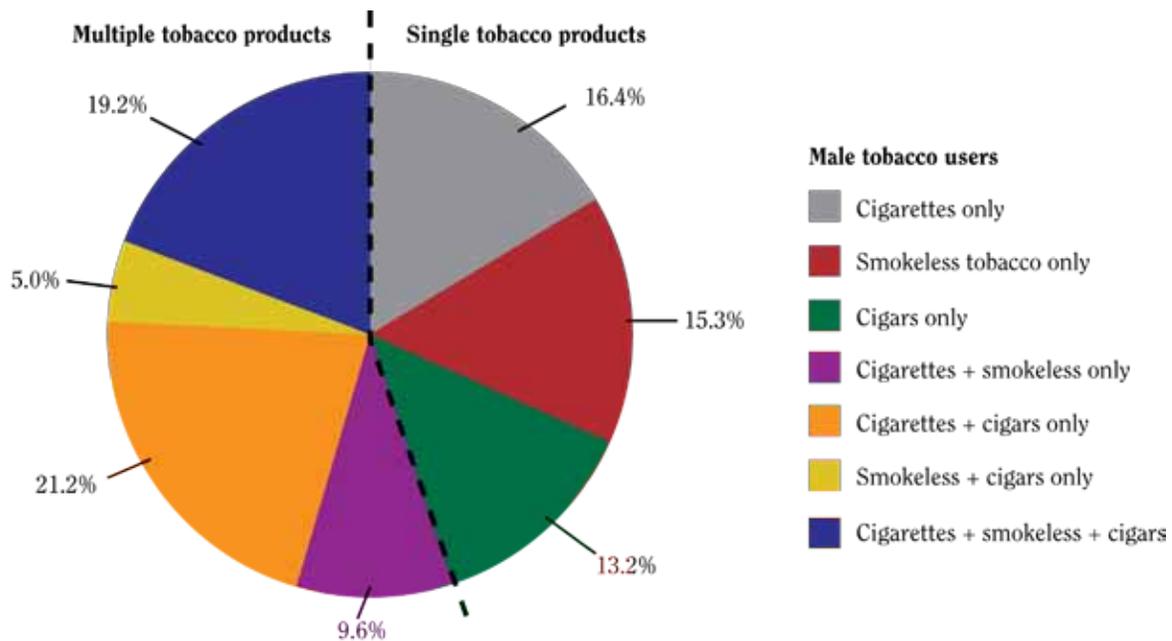
**Figure 3.12 Percentage of current cigarette smoking among young adults (18- to 25-year-olds), by education and employment (as proxies for socioeconomic status); National Survey on Drug Use and Health (NSDUH) 2010; United States**



Source: 2010 NSDUH: Substance Abuse and Mental Health Services Administration (published data).

Note: Based on responses to the question, “During the past 30 days, have you smoked part or all of a cigarette?” Respondents who chose “Yes” were classified as current smokers. For young adults, see SAMHSA 2011a, Table 2.24B. “Other” includes all responses defined as not being in the labor force, including being a student, keeping house or caring for children full time, retired, disabled, or other miscellaneous work statuses. Respondents who reported that they did not have a job and did not want one also were classified as not being in the labor force. Similarly, respondents who reported not having a job and looking for work also were classified as not being in the labor force if they did not report making specific efforts to find work in the past 30 days. Those respondents who reported having no job and who provided no additional information could not have their labor force status determined and were therefore assigned to the “Other” employment category.

**Figure 3.13 Prevalence of current use of multiple tobacco products among high school males who use tobacco; National Youth Risk Behavior Survey (YRBS) 2009; United States**



Source: 2009 YRBS: Centers for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data).

Note: Based on responses to the questions, “During the past 30 days, on how many days did you smoke cigarettes?” and “During the past 30 days, on how many days did you use chewing tobacco, snuff, or dip, such as Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, or Copenhagen?” and “During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?” For further information, refer to Appendix 3.1, Figure 3.1.43.

groups of youth. Based on data from the YRBS, the majority of high school males who currently use tobacco actually use more than one product concurrently (Figure 3.13). Concurrent cigarette and cigar smoking is most prevalent among high school male tobacco users (21.2%), followed closely by the concurrent use of cigarettes, cigars, and smokeless tobacco (19.2%). Less than one-half of all high school male tobacco users reported using a single product (i.e., cigarettes, cigars, or use of smokeless tobacco, alone), in the past 30 days, at 44.9%. The prevalence of the concurrent use of cigarettes, cigars, and/or smokeless tobacco has remained stable among high school male and female student tobacco users since 2001 (Appendix 3.1, Figure 3.1.44). In 2009, more than one-half of all White and Hispanic high school males who used tobacco reported using more than one tobacco product concurrently (Appendix 3.1, Figure 3.1.44). That same year, almost one-half of all Hispanic high school females who used tobacco reported the same, at a rate almost twice as high as their White and Black counterparts (Appendix 3.1, Figure 3.1.44). Thus, the concurrent use of multiple tobacco products

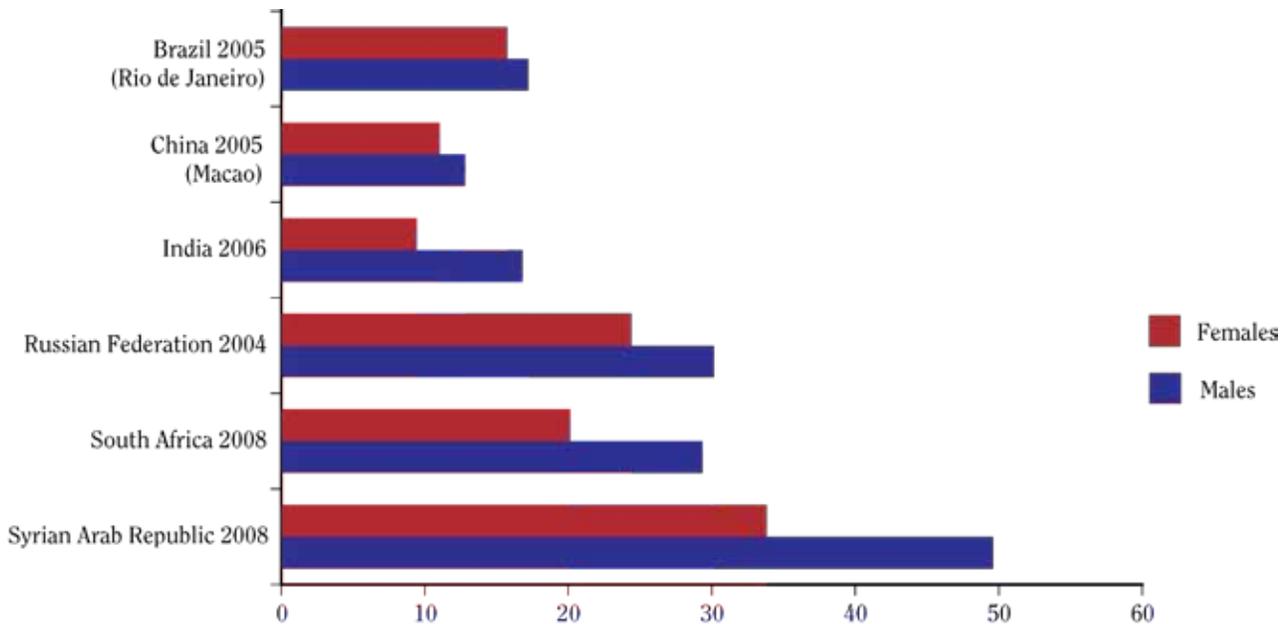
among adolescents is not inconsequential and is cause for concern, especially for White male and Hispanic male and female high school students. It is noteworthy that the tobacco industry has diversified its portfolio in novel ways in recent years and now offers a variety of flavored (e.g., cigars, cigarillos, snus) and emerging (e.g., dissolvables, orbs) tobacco products that appeal to youth (see Chapter 5 of this report). Continued surveillance of the use of these new products is warranted. Measures specific to emerging tobacco products like these are being added to several surveillance system surveys, such as the NYTS, which will make them invaluable to future monitoring efforts. The 2011 NYTS, for example, includes measures of use of water pipes (hookahs), electronic cigarettes, roll-your-own cigarettes, dissolvables, snus, flavored little cigars, and clove cigars, allowing for more detailed examination of the use of these products alone or in combination. The sequence of initiation in regards to the use of multiple tobacco products (e.g., does cigarette smoking precede smokeless tobacco use – or, vice versa?) remains unclear and worthy of additional research in the future.

## Tobacco Use Among Young People Worldwide

Tobacco use among young people is not just a phenomenon limited to the United States, but one that is widespread and growing globally (Shafey et al. 2009). In the 1994 Surgeon General's report on smoking and health, it was not possible to report on tobacco use among young people worldwide in a standard way, given the lack of a global surveillance system. Now that is possible, with the advent of the GYTS in 1999, which is part of the Global Tobacco Surveillance System (GTSS) that is coordinated by CDC. Since its inception, GYTS has been conducted at least once in all six regions of the world as defined by the World Health Organization (WHO), in over 140 countries and 11 territories (Warren et al. 2008). Findings from recent surveys conducted at each of these sites are provided in Appendix 3.1, Tables 3.1.63–3.1.66 and Figures 3.1.45–3.1.48. Here, Figure 3.14 shows differentials in tobacco use by gender for several rapidly developing

countries, worldwide. Rates of tobacco use remain low among girls relative to boys in many developing countries; however, the gender gap between adolescent females and males is narrow in many countries around the globe. In India, for example, the percentage of adult males 15 years and older, who currently smoke tobacco is 24.3%, while this figure is 2.9% for adult females 15 years and older (Ministry of Health & Family Welfare 2010). Thus, the ratio in current smoking between males and females among adults (at 10:1) is much larger than the same ratio in current smoking between males and females for youth (at 2:1). This finding is troubling and does not bode well for the future of the tobacco epidemic worldwide (Warren et al. 2008). Soon we may see similar male/female adult tobacco use rates in countries where women previously smoked at much lower rates. If tobacco use rates do increase among young women, this would accelerate the epidemic of tobacco-related disease worldwide. Although repeated administrations of the GYTS have shown a decline in youth tobacco use in some countries (e.g.,

**Figure 3.14** Percentage of youth 13–15 years of age who currently use any tobacco product, by gender; Global Youth Tobacco Survey (GYTS) (1999–2009); Brazil (Rio de Janeiro), China (Macao), India, Russian Federation, South Africa, and the Syrian Arab Republic



Source: 1999–2009 GYTS: Centers for Disease Control and Prevention 2010b.

Note: Brazil, China, India, Russian Federation, South Africa, and the Syrian Arab Republic are regional examples of (relatively) large, developing countries. Based on responses to the following questions: “During the past 30 days (one month), on how many days did you smoke cigarettes?” “During the past 30 days (one month), have you ever used any form of tobacco products other than cigarettes (e.g., chewing tobaccos, snuff, dip, cigars, cigarillos, little cigars, pipe)?” For further information, refer to Appendix 3.1, Table 3.1.66.

Panama, [CDC 2009a]), in others youth tobacco use has either remained consistent or increased over time, by comparison (e.g., Sri Lanka [CDC 2008]; India, [Sinha et al. 2008]). Continued monitoring of youth tobacco use worldwide is warranted and will help to assess progress in achieving tobacco-related goals. Awareness of tobacco advertising is high among males and females alike in

many countries worldwide, and can be significantly higher among adolescents and young adults (15–24 years old) as compared to adults ( $\geq 25$  years of age) (CDC 2010b). Figures 3.15a and 3.15b show the prevalence of current cigarette smoking by gender, among youth aged 13–15 year of age worldwide (see also Appendix 3.1, Figure 3.1.46).

## Other Epidemiologic Findings

In this section, epidemiologic analyses that support major conclusions presented in other chapters of this report are considered here. These analyses are selected from a more comprehensive set presented in Appendix 3.1. The subheadings below are specific to conclusions in Chapters 2, 4, and 5 of this report.

### Cigarette Smoking and Weight Loss

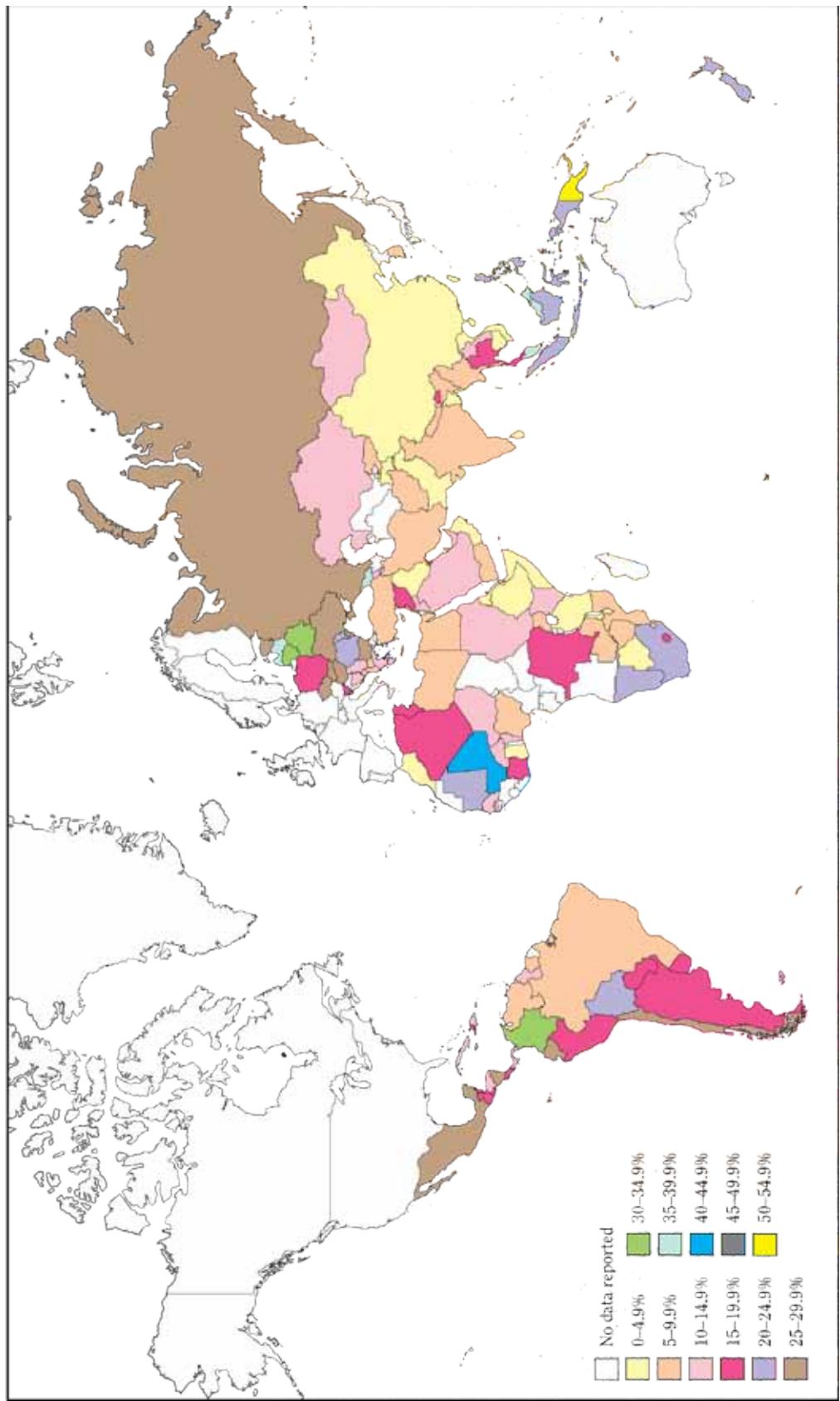
Chapter 2 also provides an extensive review of the literature specific to the relationship between cigarette smoking and weight loss. The chapter concludes that cigarette smoking by adolescents and young adults is not associated with statistically or clinically significant weight loss, although additional research may be necessary to confirm this (see Chapter 2 for additional information). Therefore, to explore this relationship further, additional analyses were conducted in this chapter to examine the relationship between cigarette smoking status and body mass index (BMI) in a nationally representative data set of young people. The analyses focused on high school seniors only and collapsed data from multiple rounds (2003–2009) of the YRBS to ensure that sample sizes were sufficient to detect differences, if any, in BMI by smoking status, by gender and race/ethnicity. Contrary to the belief held by many young people, the findings from these analyses show that cigarette smoking is not associated with a lower BMI. As shown in Figures 3.16a and 3.16b, never smokers had the smallest BMI, when compared to both current and former smokers. This was true for high school senior boys and girls and for high school senior Whites, Blacks, and Hispanics. Never smokers either had a statistically significantly smaller BMI than students in other smoking status categories ( $p < 0.05$ ), or the differences in BMI between never smokers and certain smoking status categories (e.g., among Blacks, former daily smokers) were not statistically significantly different ( $p > 0.05$ )

(Appendix 3.1, Table 3.1.38). The results of these analyses are consistent with other evidence presented in Chapter 2, which shows no relationship with a lower weight or BMI among smokers younger than 35 years of age.

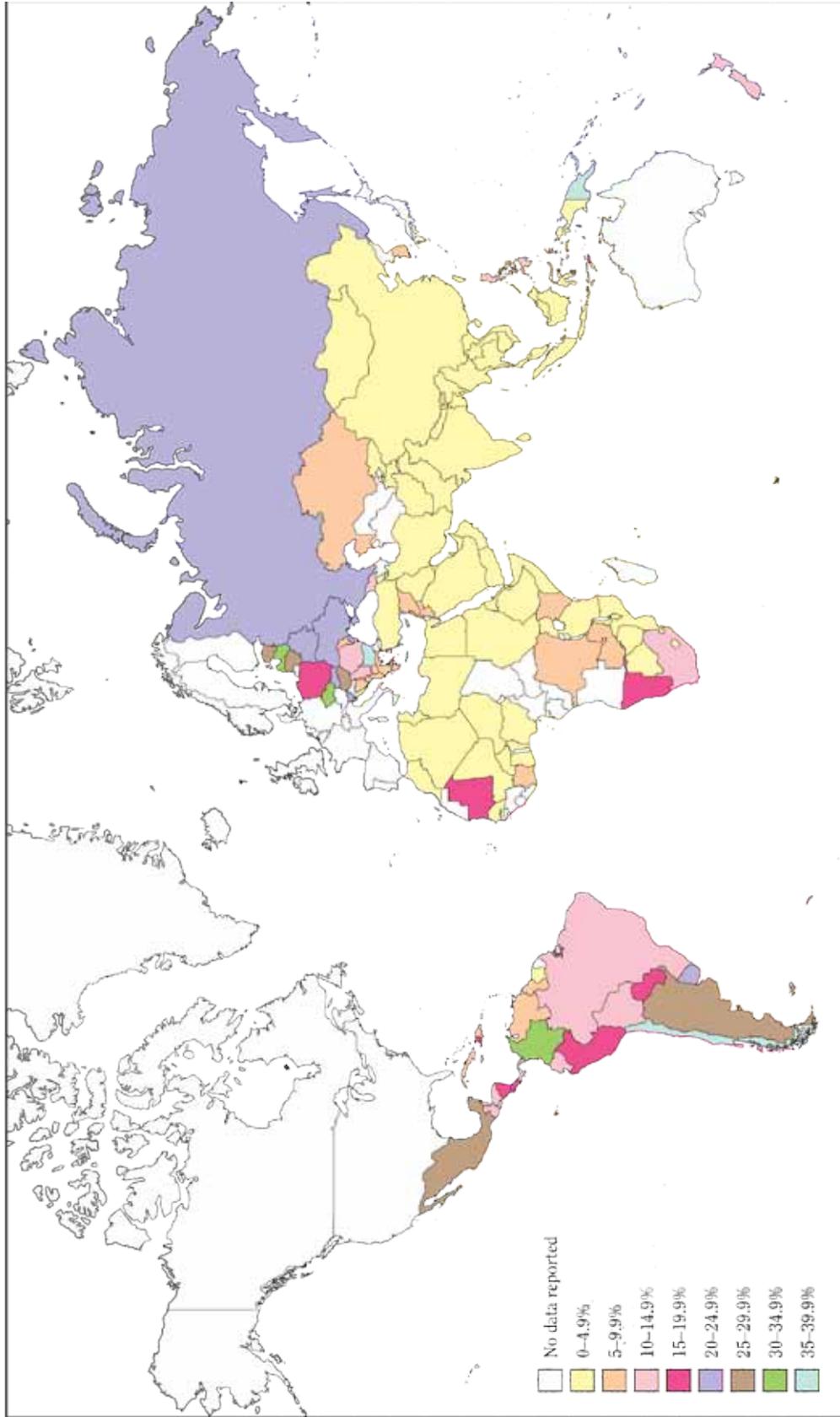
YRBSS is a unique surveillance system. It can assess not only tobacco use among young people but also a wide range of other health risk behaviors and outcomes. In Appendix 3.1, Figures 3.1.27A–S, differences between current cigarette smokers and nonsmokers in these health risk behaviors are considered over time, from 1991 (or whenever the earliest data for a specific behavior were available) to 2009. The review presented in Chapter 2 suggests that the interpretation of evidence linking cigarette smoking to weight loss is complicated by the rising trend in obesity over the last decade. Additional YRBS analyses described here underscore this possibility. According to the YRBS in 1999, for example, the percentage of obese students (defined as  $\geq 95$ th percentile for BMI, by age and gender) was significantly higher among nonsmokers when compared to current smokers (9.3% vs. 6.2%,  $p < 0.05$ ; Appendix 3.1, Figure 3.1.27M). Across time, the situation reversed itself, such that one decade later, in 2009, 16.5% of current smokers were obese, compared to 12.3% of nonsmokers. By comparison, no significant differences between current smokers and nonsmokers in the percentage of overweight students (defined as  $\geq 85$ th but  $< 95$ th percentile for BMI, by age and gender) were observed either in 1999 or 2009 (both comparisons,  $p > 0.05$ ; Appendix 3.1, Figure 3.1.27L). Interestingly, in these additional YRBS analyses, no differences between current smokers and nonsmokers in weight-related behaviors (television viewing, moderate-to-vigorous physical activity, fruit and vegetable intake, milk consumption) were observed over time, from 1999 to 2009 (see Appendix 3.1, Figures 3.1.27N–R), with one exception. Significantly more current cigarette smokers compared to nonsmokers were engaged in one or more unhealthy weight control behaviors (fasting; taking diet pills, powders, or liquids; or

Figure 3.15 Percentage of 13- to 15-year-olds who currently smoke cigarettes, by gender; Global Youth Tobacco Survey 1999–2007; worldwide

A. Boys



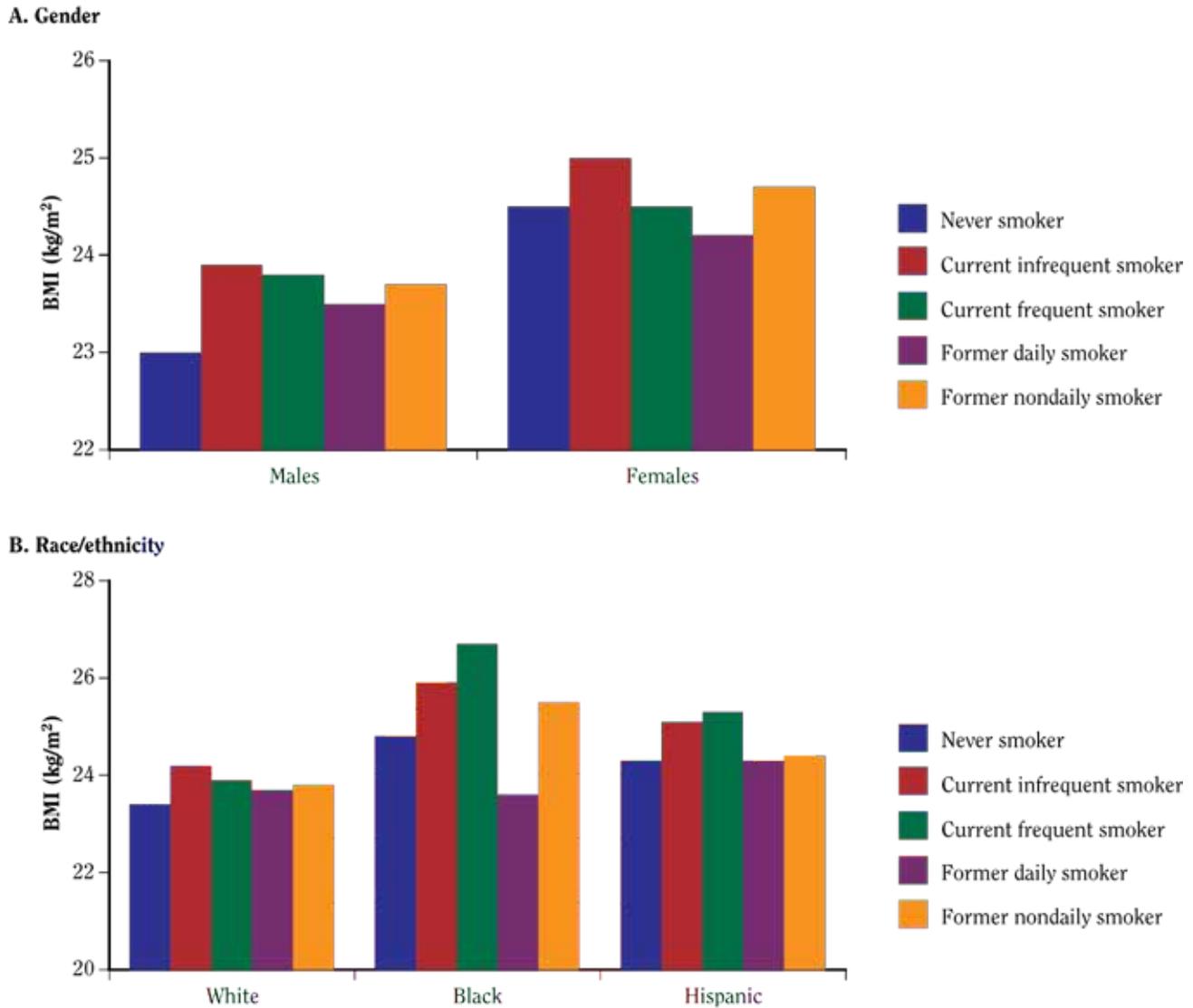
B. Girls



Source: Centers for Disease Control and Prevention 2010c.

Note: Based on responses to the question: "During the past 30 days (one month), on how many days did you smoke cigarettes?" Respondents who reported 1 or 2 days or more were classified as a current smoker.

**Figure 3.16 Body mass index (BMI) by smoking status/frequency among high school seniors, by gender and race/ethnicity; National Youth Risk Behavior Survey (YRBS) 2003–2009; United States**



Source: 2003–2009 YRBS; Centers for Disease Control and Prevention, Division of Adolescent and School Health (unpublished data).  
 Note: Body mass index (kg/m<sup>2</sup>) (BMI) was calculated from self-reported height and weight. Definitions for these categories are as follows: Students who answered “no” to ever smoking were categorized as nonsmokers. Students who answered “yes” to ever smoke and “yes” to currently smoke were categorized as (a) current infrequent smokers for smoking 1–19 days during the base 30 days or (b) current frequent smokers for smoking >19 days during the past 30 days. Students who answered “yes” to ever smoke and “no” to currently smoke were categorized as (a) former daily smokers if they answered “yes” to daily or (b) former nondaily smokers if they answered “no” to daily. For further information, refer to Appendix 3.1, Table 3.1.38.

vomiting/taking laxatives to lose weight or to keep from gaining weight) over time, in both 1999 and 2009 (both comparisons,  $p < 0.05$ ; Appendix 3.1, Figure 3.1.27S). Examination of the constellation of health risk behaviors that young cigarette smokers engage in may be helpful in further elucidating the causal relationship, if any, between cigarette smoking and weight loss among young people and adults.

## Tobacco Use and Academic Achievement

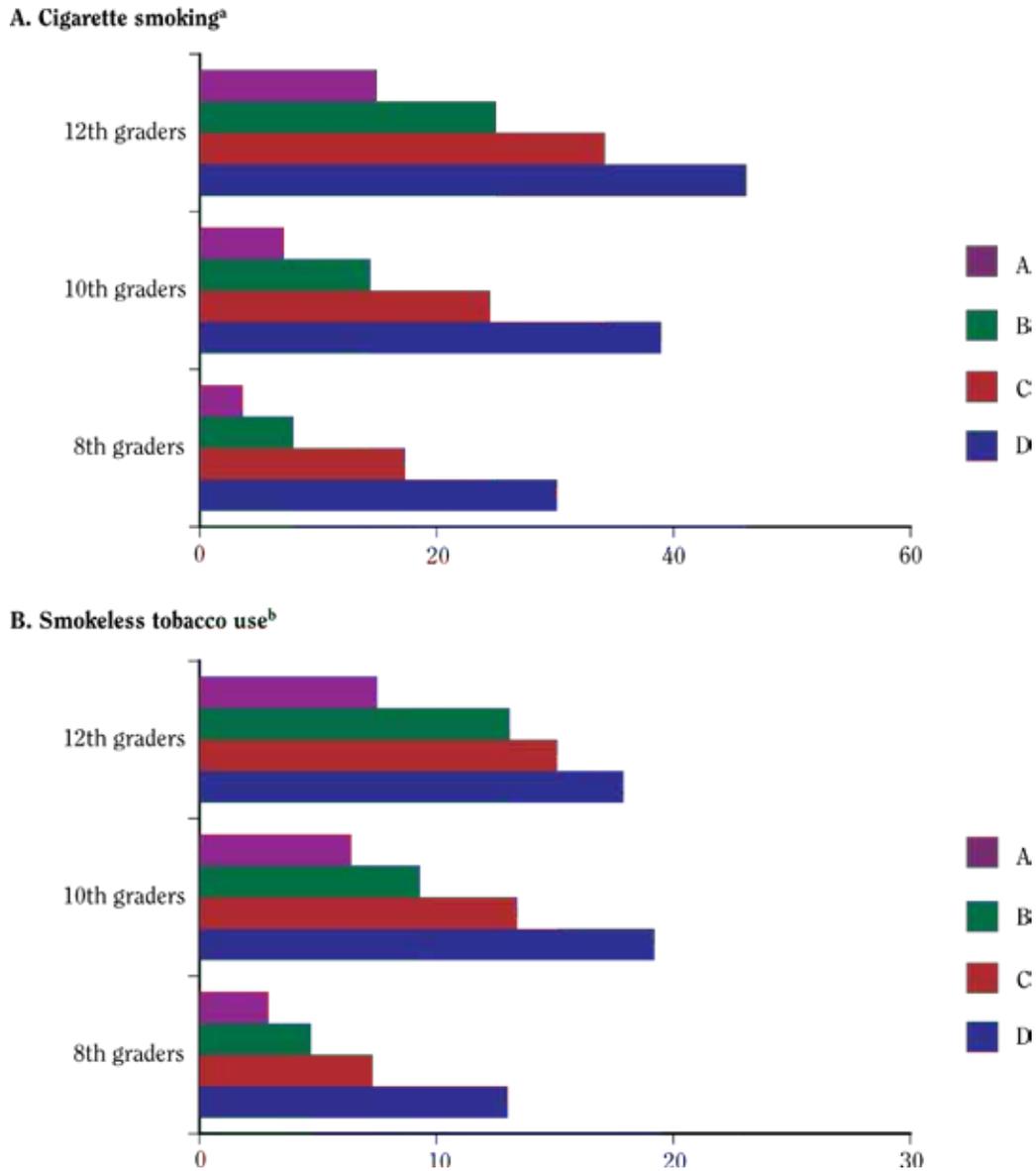
Chapter 4 concludes that the adolescents most likely to begin using tobacco are those who have low academic achievement. Does tobacco use lead to lower grades, or does poor academic achievement predict tobacco use? Studies have lent support for both possibilities (e.g., Young and Rogers 1986; Hu et al. 1998; Bryant et al. 2000a,b; Bergen et al. 2005), suggesting that there is an ongoing reciprocal relationship between these two outcomes. The negative association between academic achievement and tobacco use, however, is undisputed and generalizes across developed and developing country contexts, including studies that have been conducted in Portugal (Azevedo et al. 1999), Canada (Leatherdale et al. 2008), Turkey (Yorulmaz et al. 2002), India (Mohan et al. 2005; Dhavan et al. 2010), China (Li et al. 1999), and the United States (Bryant et al. 2000a). Figures 3.17A and 3.17B show the results of analyses of MTF data collapsed over several years (2002–2007) to provide reliable estimates of the relationship between academic performance and tobacco use. Cigarette smoking and smokeless tobacco use are considered here, across three grade levels (8th, 10th, and 12th grades). For each grade level and for both tobacco products, tobacco use is lowest among students who typically get As in school and highest among students who typically get Ds in school. The dose-response relationship between academic performance and tobacco use is strong, with a monotonic increase in tobacco use, given lower academic performance. As this report considers school-based strategies to prevent tobacco use among young people, in Chapter 6, it is important to note that the implementation of evidence-based strategies does not deter from academic success. A primary goal of modern school health policies and programs is, in fact, to promote academic success (CDC 2011b). Comprehensive literature reviews of coordinated school health programs concluded that these programs can improve academic performance while reducing health risk behaviors, such as tobacco use (Zins et al. 2004; Murray et al. 2007).

## Tobacco Brand Preferences Among Young People

Knowing what brands of cigarettes are preferred by young tobacco users can provide insight into the influence that the marketing practices of the tobacco industry and the design of its products may have on young people and, importantly, aid the development of interventions to prevent smoking (Cummings et al. 2002; Wayne and Connolly 2002; Carpenter et al. 2005; Klein et al. 2008; National Cancer Institute 2008). Additional information on the relationship between the marketing practices of the tobacco industry and tobacco use among young people can be found in Chapter 5 of this report. Here, Figure 3.18 (and in Appendix 3.1, Tables 3.1.10 and 3.1.11) provides evidence of which cigarette brands are preferred by adolescents (12–17 years of age) and young adults (18–25 years of age), using data that have been combined from multiple NSDUH surveys (2008–2010) to provide reliable estimates. The top six brands are displayed for each age group. Among adolescents, all 10 of the most commonly preferred brands of cigarettes (shown in Appendix 3.1, Table 3.1.10) were subbrands of Marlboro (46.2%), Newport (21.8%), or Camel (12.4%), making these 3 the preferred brands of 80.4% of adolescent smokers. Among young adults, 9 out of the 10 most commonly preferred brands (shown in Appendix 3.1, Table 3.1.11) were subbrands of Marlboro (46.1%), Newport (21.8%), or Camel (12.4%), making these 3 the preferred brands of 80.3% of young adult smokers. Marlboro full flavor (19.7%) was the most preferred brand overall among adolescents, while Marlboro Lights (22.7%) was the most preferred brand overall among young adults (Appendix 3.1, Tables 3.1.10 and 3.1.11). Among Blacks, Newport full flavor was preferred most often by adolescents (42.4%) and young adults (61.2%), followed by Newport Lights for adolescents (16.9%) and Newport Mediums for young adults (9.0%). Newport is a well-known brand of mentholated cigarettes. Mentholated cigarettes deserve special note and are discussed further in Appendix 3.1. They are also the subject of a recent report from the U.S. Food and Drug Administration's (FDA) Tobacco Product Scientific Advisory Committee (TPSAC 2011).

In comparing the overall market share that each brand secured in the United States in 2008, it can be seen that the market share data are aligned with the data for brand preference among adolescents and young adults in regard to the top three preferred brands. In 2008, Marlboro accounted for 41.0% of all cigarette sales in the United States, followed by Newport (9.7%), then Camel (6.7%) (Maxwell 2009). Other brands secured less than

**Figure 3.17 Percentage of current cigarette smoking and smokeless tobacco use among 8th, 10th, and 12th graders, by grade level and academic performance; Monitoring the Future (MTF) 2002–2007; United States**



Source: 2002–2007 MTF: University of Michigan, Institute for Social Research (unpublished data).

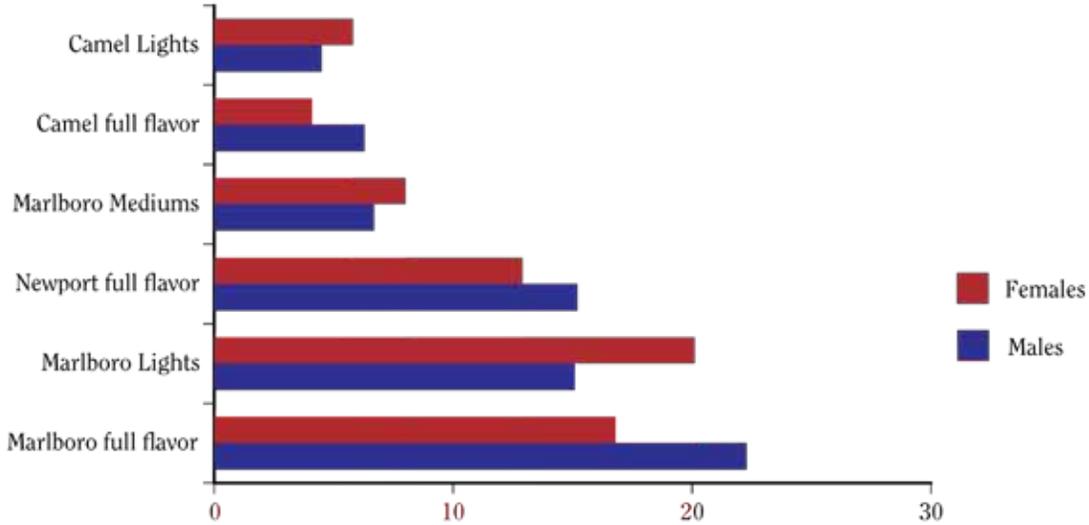
Note: Note that the grades reported here are grades that students report typically getting in school.

<sup>a</sup>Based on responses to the question, “How frequently have you smoked cigarettes during the past 30 days?” Respondents who reported that they had smoked less than 1 cigarette per day or more were classified as current smokers.

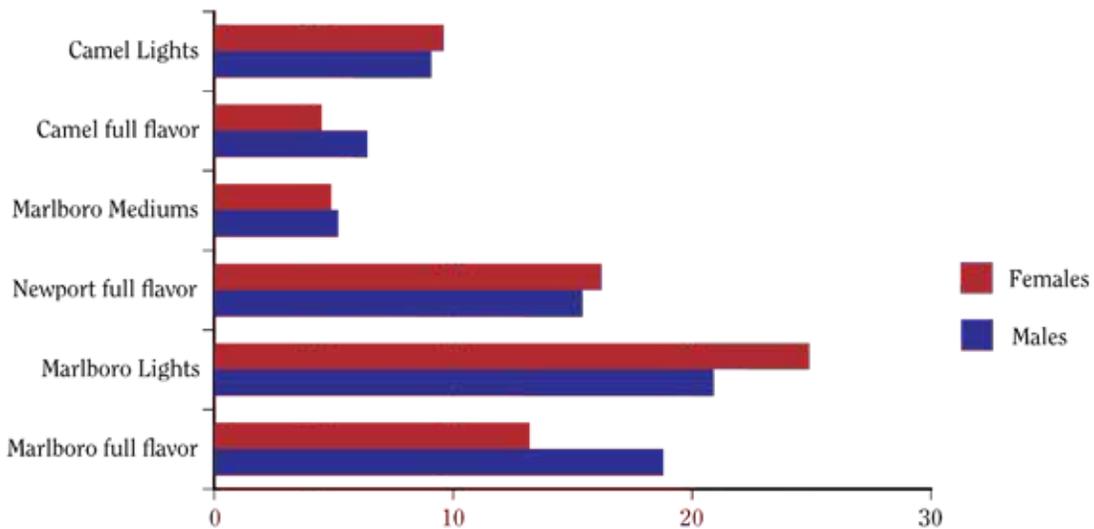
<sup>b</sup>Based on responses to the question, “Have you ever taken or used smokeless tobacco (snuff, plug, dipping tobacco, chewing tobacco)?” Respondents who chose “regularly now” were classified as current users of smokeless tobacco. For further information, refer to Appendix 3.1, Table 3.1.5 (cigarette smoking) and Table 3.1.42 (smokeless tobacco use).

**Figure 3.18 Percentage distribution of cigarette brands that adolescents (12- to 17-year-olds) and young adults (18- to 25-year-olds) who were current smokers preferred; National Survey on Drug Use and Health (NSDUH) 2008–2010; United States**

**A. Adolescents (12- to 17-year-olds)**



**B. Young adults (18- to 25-year-olds)**



Source: 2008–2010 NSDUH: Substance Abuse and Mental Health Services Administration (unpublished data).

Note: Based on responses to the following questions: “During the past 30 days, what brand of cigarette did you smoke most often?” and “During the past 30 days, what type of cigarettes did you smoke most often?” For further information, refer to Appendix 3.1, Tables 3.1.9 and 3.1.10.

5% each of the total cigarette market (Maxwell 2009). It is important to note that market share is influenced primarily by the preferences of adults, not adolescents (given that market share represents cigarette sales, and many youth obtain their cigarettes through social, not commercial, sources). Therefore, these figures indicate that the combined share of Marlboro, Newport, and Camel is not as concentrated in adults (57.4%) as it is for adolescents (80.4%) and young adults (80.3%). However, the consistencies in these data suggest that brand preferences that develop early in the life course will extend into adulthood. This finding extends to smokeless tobacco and cigar use as well. Brand preferences for these products are discussed in Appendix 3.1 (for smokeless tobacco use, see Tables 3.1.44–3.1.45 and 3.1.47; for cigar use, Tables 3.1.50–

3.1.52). Like that observed here, brand preference data for smokeless tobacco and cigars among young people are consistent with industry data for market share. Skoal and Grizzly are the most preferred brands of moist snuff (a type of smokeless tobacco that is preferred over chewing tobacco) among young people, while Black & Mild is the most preferred brand of cigars. It should be noted that with the exception of Black & Mild, the top cigar brands preferred by adolescents and young adults alike include various flavorings, such as peach, grape, apple, and chocolate. At present, characterizing flavors are only banned by the FDA for cigarettes, not cigars. Given this loophole, some flavored cigarettes are reemerging as flavored cigars (Associated Press 2009; CSPnet 2010; U.S. House of Representatives Committee on Energy & Commerce 2011).

## Evidence Summary

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Similar to the 1994 Surgeon General's report on smoking and health, this report finds that cigarette smoking virtually always begins in adolescence or young adulthood, as does the transition to daily smoking. In 2010, among adults aged 30–39 years, 81.5% of those who had ever tried a cigarette did so by the age of 18 years and 98.0% did so by the age of 26 years, based on NSDUH data (Table 3.2; Appendix 3.1, Table 3.1.9). Among those who had ever smoked cigarettes daily, the mean age of initiation was even younger; 88.2% first smoked by the age of 18 years and 99.0% first smoked by 26 years of age. Smoking initiation was most likely to occur in a young person's 15th or 16th year, which was also true in 1994 (USDHHS 2011). Adolescent and young adult initiation rates for cigarette smoking have been stable over the past 5 years (Appendix 3.1, Table 3.1.31). This finding is consistent with the idea that tobacco companies are successfully targeting young people in advertising and promotion efforts to attract new smokers (see Chapter 5).

Almost one-fifth of high school students are current cigarette smokers, and the prevalence rises with age; one-fourth of high school seniors are current cigarette smokers at present (Figure 3.3; Table 3.3a and Appendix 3.1, Table 3.1.2). Young adults have the highest smoking prevalence among all age groups (Figure 3.3). Males remain more likely than females to be current smokers in every age group except those aged 65 years and older (CDC 2011c). Similar to findings for adults (CDC 2011c), the prevalence of cigarette smoking among young people is highest for American Indians/Alaska Natives and Whites. The lowest prevalence of cigarette smoking among young

people are among Asian and Blacks; in contrast, prevalence are lowest for Asians and Hispanics among adults (CDC 2011c). Since the late 1990s, smoking prevalence has decreased for both youth and young adults (CDC 2001, 2009b). Around 2003, however, the rate of decrease began to slow, such that any changes in the prevalence of current smoking from one iteration of a survey to the next were often statistically insignificant. These findings have led to concern that progress in decreasing youth smoking may have “stalled,” or halted. Findings as to which youth demographic subgroups show a more or less pronounced stall are inconsistent across surveys. Overall, however, the most recent reports from both YRBS and MTF suggest a stall in particular subgroups. In NYTS, the prevalence of current cigarette smoking did not differ significantly between 2006 and 2009, the two most recent survey iterations (CDC 2010a). Only NSDUH has shown a continuing, statistically significant decline since 2002 in current smoking, although this decline may be limited to White youth since 2007 (SAMHSA 2009b).

Smokeless tobacco is currently used by less than 10% of adolescents overall, but this finding masks significant differences in patterns of use among youth subgroups. The prevalence of current use among females is less than 2% except in a few Western states (See section on current use of smokeless tobacco, Appendix 3.1). Further, White male students are far more likely than males in other racial/ethnic subgroups to use smokeless tobacco, with the prevalence of current use among white male high school students at around 20%, based on YRBS data (Table 3.4a). Recent data from YRBS and MTF

indicate that smokeless tobacco use may have increased among young White males in the latter half of the last decade. The prevalence of current use of cigars (including little cigars and cigarillos) is more than 10% for high school students but is more common among White male youth than among other youth subgroups (Table 3.5a). However, there are a few states in which female cigar use prevalence is around 5% (Appendix 3.1), especially among Black females. The prevalence of cigar use among youth has been largely unchanged over the last few years with some evidence of an increase among Black females since 2007. Smokeless tobacco and cigars are often used by the same youth who smoke cigarettes. Indeed, more than one-half of White and Hispanic male high school students who use any tobacco product use more than one product, and just under one-half of Hispanic female high school students report the same. About 40% use both cigarettes and cigars; one-half of these youth use smokeless tobacco in addition. The prevalence of concurrent use of multiple tobacco products in the last 30 days among high school students has been stable for the past decade.

Globally, the prevalence of tobacco use and the predominant products used among youth vary broadly.

Among the 140 countries and 11 territories, commonwealths, provinces, and regions that implemented the GYTS between 2000 and 2007, cigarettes were the predominant form of tobacco used by 13- to 15-year-old students in the Americas, Europe, and Western Pacific regions (Warren et al. 2008). In the Eastern Mediterranean and South-East Asia regions, other forms of tobacco (such as smokeless tobacco, water pipes, or bidis) were more commonly used (Warren et al. 2008). The prevalence of current cigarette smoking among 13- to 15-year-old students varied by region, from 4.0% in Africa to 9.3% in the Americas; however, even within a region, broad variations in prevalence were noted (Appendix 3.1, Table 3.1.64). Although boys were more likely than girls to be tobacco users and current smokers in the majority of countries, the gender gap was narrow or nonexistent in some places; for example, the gap in current use of any tobacco product was statistically indistinguishable in Brazil (Rio de Janeiro), China (Shanghai), and the Russian Federation (Warren et al. 2008). In Spain and some South American (e.g., Argentina, Brazil, Chile, Uruguay), ever cigarette smoking is more prevalent among girls than among boys.

## Conclusions

1. Among adults who become daily smokers, nearly all first use of cigarettes occurs by 18 years of age (88%), with 99% of first use by 26 years of age.
2. Almost one in four high school seniors is a current (in the past 30 days) cigarette smoker, compared with one in three young adults and one in five adults. About 1 in 10 high school senior males is a current smokeless tobacco user, and about 1 in 5 high school senior males is a current cigar smoker.
3. Among adolescents and young adults, cigarette smoking declined from the late 1990s, particularly after the Master Settlement Agreement in 1998. This decline has slowed in recent years, however.
4. Significant disparities in tobacco use remain among young people nationwide. The prevalence of cigarette smoking is highest among American Indians and Alaska Natives, followed by Whites and Hispanics, and then Asians and Blacks. The prevalence of cigarette smoking is also highest among lower socioeconomic status youth.
5. Use of smokeless tobacco and cigars declined in the late 1990s, but the declines appear to have stalled in the last 5 years. The latest data show the use of smokeless tobacco is increasing among White high school males, and cigar smoking may be increasing among Black high school females.
6. Concurrent use of multiple tobacco products is prevalent among youth. Among those who use tobacco, nearly one-third of high school females and more than one-half of high school males report using more than one tobacco product in the last 30 days.
7. Rates of tobacco use remain low among girls relative to boys in many developing countries, however, the gender gap between adolescent females and males is narrow in many countries around the globe.

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**Data Table for Figure 3.15: Percentage of 13- to 15-year-olds who currently smoke cigarettes, by gender; Global Youth Tobacco Survey 1999–2007; worldwide**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
<b>Africa</b>	6.2 (5.8–6.6)	2.7 (2.4–3.0)
Algeria, 2007 (Constantine)	18.3 (14.1–23.5)	1.5 (0.6–3.6)
Benin, 2003 (Atlantique Littoral)	11.2 (7.4–16.5)	1.8 (0.9–3.6)
Botswana, 2008	18.1 (13.4–23.9)	10.9 (7.8–15.0)
Burkina Faso, 2006 (Ouagadougou)	14.1 (10.4–18.7)	2.4 (1.3–4.3)
Burundi, 2008	5.8 (2.8–11.8)	3.2 (1.6–6.4)
Cameroon, 2008 (Yaoude)	7.6 (5.5–10.5)	2.8 (1.5–5.2)
Cape Verde, 2007	3.7 (2.2–6.1)	3.1 (1.8–5.4)
Central African Republic, 2008 (Bangui)	10.4 (6.7–15.7)	4.3 (2.2–8.3)
Comoros, 2007	13.5 (8.3–21.3)	6.9 (3.7–12.6)
Congo, 2006	15.0 (9.8–22.2)	8.1 (4.3–14.7)
Côte D'Ivoire, 2003 (Abidjan)	19.3 (16.1–23.0)	7.1 (5.1–9.9)
Democratic Republic of the Congo, 2008 (Kinshasa)	11.5 (8.1–16.1)	3.7 (2.8–4.7)
Equatorial Guinea, 2008	9.9 (6.2–15.4)	3.4 (2.0–5.5)
Eritrea, 2006	2.0 (1.5–2.7)	0.6 (0.2–1.4)
Ethiopia, 2003 (Addis Ababa)	2.5 (1.1–5.3)	0.7 (0.2–2.4)
Gambia, 2008 (Banjul)	12.7 (9.6–16.5)	8.6 (5.8–12.6)
Ghana, 2006	2.8 (1.7–4.7)	2.3 (1.4–3.5)
Guinea, 2008	11.6 (7.9–16.7)	1.6 (0.7–3.7)
Guinea-Bissau, 2008 (Bissau)	7.2 (5.5–9.5)	3.0 (1.7–5.1)
Kenya, 2007	11.2 (8.9–14.0)	5.2 (3.5–7.6)
Lesotho, 2008	11.8 (7.0–19.3)	7.5 (4.9–11.2)

**Data Table for Figure 3.15**      **Continued**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
Liberia, 2008 (Monrovia)	2.0 (0.7–5.5)	1.2 (0.3–4.3)
Madagascar, 2008	30.7 (23.0–39.7)	10.2 (5.9–17.0)
Malawi, 2005	3.8 (2.2–6.4)	2.2 (1.3–3.6)
Mali, 2008	17.4 (12.2–24.3)	2.5 (1.4–4.5)
Mauritania, 2006	20.3 (17.5–23.4)	18.3 (13.4–24.5)
Mauritius, 2008	20.3 (13.9–28.6)	7.7 (4.1–14.0)
Mozambique, 2007 (Maputo City)	4.5 (2.6–7.9)	1.2 (0.4–3.5)
Namibia, 2004	21.9 (18.9–25.2)	16.1 (13.3–19.3)
Niger, 2006	11.7 (7.6–17.4)	1.1 (0.3–3.9)
Nigeria, 2008 (Cross River State)	6.8 (2.4–17.7)	1.2 (0.2–6.4)
Rwanda, 2008	3.0 (1.7–5.2)	0.9 (0.2–3.0)
Senegal, 2007	12.1 (7.6–18.9)	2.7 (1.3–5.4)
Seychelles, 2007	23.2 (17.4–30.2)	20.0 (15.0–26.2)
Sierra Leone, 2008 (Western Area)	6.6 (3.8–11.3)	5.0 (3.0–8.0)
South Africa, 2008	17.9 (15.2–21.0)	10.6 (8.0–13.8)
Swaziland, 2005	8.9 (7.8–10.2)	3.2 (2.5–4.2)
Togo, 2007	9.1 (5.1–15.6)	1.7 (1.1–2.6)
Uganda, 2007	6.6 (5.2–8.5)	4.0 (2.7–5.8)
United Republic of Tanzania, 2008 (Arusha)	2.2 (0.9–5.5)	1.1 (0.3–3.6)
Zambia, 2007 (Lusaka)	6.7 (4.0–11.1)	6.8 (4.0–11.3)
Zimbabwe, 2008 (Harare)	4.8 (2.6–9.0)	1.5 (0.5–4.6)
<b>The Americas</b>	10.1 (9.5–10.7)	8.8 (8.3–9.3)
Antigua & Barbuda, 2004	2.7 (1.7–4.3)	4.4 (2.3–8.2)

**Data Table for Figure 3.15**      **Continued**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
Argentina, 2007	21.1 (18.5–23.8)	27.3 (23.4–31.6)
Bahamas, 2004	6.2 (3.8–10.1)	3.7 (2.1–6.6)
Barbados, 2007	14.3 (10.4–19.3)	9.3 (6.4–13.2)
Belize, 2008	11.7 (8.3–16.2)	4.4 (2.6–7.5)
Bolivia, 2003 (La Paz)	20.3 (16.5–24.7)	12.0 (9.3–15.3)
Brazil, 2005 (Rio de Janeiro)	9.1 (6.5–12.5)	12.9 (9.6–17.1)
British Virgin Islands, 2001 <sup>a</sup>	4.1 (1.7–9.2)	2.8 (1.1–6.7)
Chile, 2008 (Santiago)	28.0 (24.3–32.0)	39.9 (36.0–43.9)
Colombia, 2007 (Bogota)	25.4 (21.0–30.3)	26.6 (20.9–33.1)
Costa Rica, 2008	9.4 (7.2–12.0)	9.7 (7.8–12.1)
Cuba, 2004 (Havana)	11.2 (8.3–15.1)	8.8 (6.5–11.9)
Dominica, 2004	11.8 (8.1–16.9)	9.6 (7.0–13.0)
Dominican Republic, 2004	7.3 (5.9–9.0)	5.8 (4.0–8.2)
Ecuador, 2007 (Quito)	23.2 (19.4–27.6)	18.1 (11.1–28.0)
El Salvador, 2003	18.4 (13.4–24.8)	10.9 (6.8–17.1)
Grenada, 2004	10.9 (7.4–15.8)	9.5 (7.4–12.2)
Guatemala, 2008	13.7 (10.9–17.0)	9.1 (7.0–11.6)
Guyana, 2004	11.0 (7.4–16.0)	5.4 (3.1–9.3)
Haiti, 2005 (Port au Prince)	17.2 (12.4–23.5)	17.7 (13.3–23.0)
Honduras, 2003 (Tegucigalpa)	14.4 (10.9–18.8)	14.1 (9.8–19.9)
Jamaica, 2006	20.6 (14.1–29.3)	10.9 (6.5–17.7)
Mexico, 2006 (Mexico City)	26.3 (22.0–31.0)	27.1 (23.7–30.8)
Montserrat, 2000 <sup>a</sup>	3.5	6.3

**Data Table for Figure 3.15**      **Continued**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
Nicaragua, 2003 (Centro Managua)	25.6 (21.4–30.3)	17.4 (12.6–23.6)
Panama, 2008	5.9 (4.0–8.5)	2.8 (1.7–4.6)
Paraguay, 2008	11.3 (9.3–13.6)	5.5 (3.7–8.2)
Peru, 2007 (Lima)	16.7 (12.8–21.6)	15.2 (11.0–20.7)
Puerto Rico, 2004 <sup>b</sup>	5.7 (2.8–11.2)	9.0 (4.9–16.0)
Saint Kitts & Nevis, 2002	7.0 (4.2–11.3)	1.9 (0.9–4.1)
Saint Lucia, 2007	17.0 (12.2–23.1)	9.6 (7.4–12.4)
Saint Vincent & The Grenadines, 2007	14.8 (9.8–21.7)	9.5 (6.6–13.4)
Suriname, 2004	9.3 (6.3–13.5)	4.7 (2.7–8.2)
Trinidad & Tobago, 2007	14.7 (10.9–19.6)	10.3 (6.9–15.1)
U.S. Virgin Islands, 2004 <sup>b</sup>	3.1 (2.0–4.7)	3.5 (2.4–5.2)
Uruguay, 2007	16.4 (13.5–19.8)	22.9 (20.1–26.0)
Venezuela, 1999	6.0 (4.3–8.4)	8.4 (6.6–10.7)
<b>Eastern Mediterranean</b>	8.9 (8.2 – 9.5)	2.5 (2.2 – 2.9)
Afghanistan, 2004 (Kabul)	7.6 (4.5–12.7)	0.0
Bahrain, 2002	17.5 (14.5–20.8)	3.9 (2.2–6.7)
Djibouti, 2003	8.6 (5.3–13.6)	2.6 (1.3–5.4)
Egypt, 2005	5.9 (4.4–7.9)	1.4 (0.9–2.3)
Gaza Strip, 2008 <sup>c</sup>	8.0 (5.9–10.9)	2.8 (1.6–4.9)
Iran, 2007	5.1 (2.8–9.1)	0.9 (0.4–1.9)
Iraq, 2008 (Baghdad)	3.3 (1.9–5.7)	2.7 (1.5–4.8)
Jordan, 2008 <sup>c</sup>	18.9 (12.1–28.2)	5.8 (3.7–9.0)
Kuwait, 2005	17.7 (14.2–21.7)	4.5 (3.0–6.9)

Data Table for Figure 3.15 Continued

WHO region and WHO member state, territory, or special administrative region, and year	Males % (95% confidence interval)	Females % (95% confidence interval)
Lebanon, 2008 <sup>c</sup>	16.6 (11.1–24.0)	5.5 (3.3–9.0)
Libya, 2007	7.7 (4.9–11.9)	0.9 (0.3–2.5)
Morocco, 2006	4.3 (2.9–6.4)	2.1 (1.1–3.9)
Oman, 2007	3.5 (1.8–6.6)	1.2 (0.3–4.1)
Pakistan, 2003 (Islamabad)	2.3 (0.9–5.4)	0.6 (0.2–1.9)
Qatar, 2007	13.4 (9.5–18.7)	2.3 (1.0–5.1)
Saudi Arabia, 2007	10.2 (7.9–13.2)	2.6 (1.3–5.4)
Somalia, 2007 (Somaliland)	4.9 (3.2–7.4)	4.5 (1.6–11.8)
Sudan, 2005	10.2 (6.6–15.5)	2.1 (1.4–3.2)
Syrian Arab Republic, 2008 <sup>c</sup>	19.6 (15.7–24.2)	6.3 (4.1–9.6)
Tunisia, 2007	15.1 (12.3–18.4)	1.6 (0.8–3.1)
United Arab Emirates, 2005	12.1 (10.3–14.1)	3.6 (2.9–4.4)
West Bank, 2008 <sup>c</sup>	32.8 (27.0–39.1)	12.3 (9.1–16.4)
Yemen, 2008	4.2 (2.3–7.5)	1.6 (0.8–3.1)
<b>Europe</b>	11.0 (10.5 – 11.4)	4.2 (4.0 – 4.5)
Albania, 2004	11.9 (9.0–15.5)	5.8 (4.5–7.5)
Armenia, 2004	10.3 (7.7–13.5)	0.9 (0.4–2.2)
Belarus, 2004	31.2 (27.7–35.0)	21.7 (19.0–24.8)
Bosnia and Herzegovina, 2008	14.3 (12.3–16.6)	9.4 (7.3–12.0)
Bulgaria, 2008	24.4 (20.2–29.2)	31.6 (25.9–37.9)
Croatia, 2007	21.7 (17.9–26.0)	25.6 (20.6–31.2)
Cyprus, 2005	12.3 (11.5–13.2)	8.2 (7.5–8.9)
Czech Republic, 2007	29.8 (25.1–35.0)	32.7 (27.6–38.1)

**Data Table for Figure 3.15**      **Continued**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
Estonia, 2007	28.2 (23.5–33.3)	26.2 (21.6–31.4)
Georgia, 2008	15.2 (9.9–22.8)	2.8 (1.0–7.8)
Greece, 2005	11.3 (9.4–13.6)	9.0 (7.2–11.3)
Hungary, 2008	21.5 (16.6–27.4)	23.6 (19.4–28.3)
Kazakhstan, 2004	12.7 (10.5–15.3)	6.6 (5.1–8.5)
Kosovo, 2004 <sup>d</sup>	7.7 (5.6–10.4)	5.4 (4.1–7.2)
Kyrgyzstan, 2008	6.8 (5.0–9.4)	2.2 (1.4–3.6)
Latvia, 2007	36.3 (30.9–42.1)	30.2 (24.1–37.0)
Lithuania, 2005	33.8 (29.4–38.6)	25.9 (21.2–31.2)
Macedonia, former Yugoslav Republic of, 2008	9.7 (7.3–12.9)	9.8 (7.2–13.1)
Moldova, Republic of, 2008	18.5 (15.0–22.6)	5.6 (4.3–7.2)
Montenegro, 2008	5.7 (4.3–7.6)	4.4 (3.1–6.1)
Poland, 2003	19.6 (15.1–25.1)	17.1 (14.1–20.5)
Romania, 2004	21.5 (16.1–28.0)	14.3 (11.4–17.7)
Russian Federation, 2004	26.9 (23.5–30.6)	23.9 (20.6–27.4)
Serbia, 2008	9.3 (6.3–13.4)	8.9 (6.6–11.9)
Slovakia, 2007	26.5 (23.2–29.9)	23.4 (20.7–26.4)
Slovenia, 2007	15.2 (10.7–21.2)	23.0 (18.7–27.9)
Tajikistan, 2004	1.5 (0.9–2.5)	0.5 (0.3–0.9)
Turkey, 2003	9.4 (8.2–10.9)	3.5 (2.9–4.3)
Ukraine, 2005	27.6 (24.0–31.5)	20.6 (16.9–24.8)
Uzbekistan, 2008 (Tashkent)	2.4 (0.7–7.3)	1.2 (0.3–4.3)
<b>South East Asia</b>	<b>4.7</b> <b>(4.1 – 5.4)</b>	<b>2.2</b> <b>(1.7 – 2.7)</b>

Data Table for Figure 3.15 Continued

WHO region and WHO member state, territory, or special administrative region, and year	Males % (95% confidence interval)	Females % (95% confidence interval)
Bangladesh, 2007	2.9 (1.7–5.0)	1.1 (0.3–3.2)
Bhutan, 2006	18.3 (13.8–23.8)	6.3 (4.1–9.6)
East Timor, 2006	50.6 (41.6–59.6)	17.3 (10.7–26.8)
India, 2006	5.4 (4.3–6.7)	1.6 (1.0–2.6)
Indonesia, 2006	23.9 (18.5–30.3)	1.9 (1.2–2.8)
Maldives, 2007	0.9 (0.4–2.0)	6.6 (4.6–9.6)
Myanmar, 2007	8.5 (6.2–11.6)	1.3 (0.6–2.6)
Nepal, 2007	5.7 (3.9–8.3)	1.9 (1.0–3.5)
Sri Lanka, 2007	1.6 (0.7–3.7)	0.9 (0.2–3.5)
Thailand, 2005	17.4 (15.2–20.0)	4.8 (3.6–6.4)
<b>Western Pacific</b>	18.3 (17.6 – 19.1)	6.4 (6.0 – 6.8)
American Samoa, 2005 <sup>b</sup>	18.3 (14.6–22.8)	15.1 (11.7–19.3)
Cambodia, 2003	4.6 (2.4–8.6)	0.2 (0.0–1.6)
China, 2005 (Macau) <sup>e</sup>	11.0 (8.1–14.8)	9.8 (7.0–13.6)
China, 2005 (Shanghai)	2.7 (1.4–5.2)	0.8 (0.3–1.8)
Cook Islands, 2008	28.2 (26.5–29.9)	31.5 (29.9–33.1)
Fiji, 2005	6.7 (3.8–11.6)	3.1 (1.6–6.0)
Guam, 2002 <sup>b</sup>	25.2 (21.7–29.2)	19.7 (16.3–23.5)
Lao People's Democratic Republic, 2007 (Vientiane Capital)	4.9 (2.7–8.6)	1.3 (0.7–2.5)
Malaysia, 2003	36.3 (30.6–42.5)	4.2 (3.0–5.9)
Micronesia, 2007	36.9 (29.9–44.5)	19.8 (15.9–24.5)
Mongolia, 2007	11.0 (7.6–15.6)	3.3 (1.4–7.3)
New Zealand, 2008	14.5 (8.6–23.4)	20.6 (15.5–26.9)

**Data Table for Figure 3.15**      **Continued**

<b>WHO region and WHO member state, territory, or special administrative region, and year</b>	<b>Males % (95% confidence interval)</b>	<b>Females % (95% confidence interval)</b>
Northern Mariana Islands, 2004 <sup>f</sup>	26.6 (23.6–29.9)	31.5 (28.2–34.9)
Palau, 2005	31.0 (26.9–35.5)	22.6 (18.1–27.8)
Papua New Guinea, 2007	52.1 (47.3–56.8)	35.8 (30.0–42.0)
Philippines, 2007	23.4 (19.7–27.7)	12.0 (9.4–15.1)
Republic of Korea (South), 2008	10.8 (8.8–13.2)	6.3 (4.9–7.9)
Samoa, 2007	16.0 (10.3–24.0)	12.7 (8.2–19.2)
Singapore, 2000	10.5 (8.8–12.4)	7.5 (6.2–9.1)
Solomon Islands, 2008	24.3 (17.2–33.3)	23.4 (16.3–32.3)
Tuvalu, 2006	33.2 (32.9–33.6)	22.1 (21.9–22.4)
Vanuatu, 2007	28.2 (26.1–30.3)	11.4 (10.1–12.7)
Viet Nam, 2007 (Hanoi)	5.0 (2.8–8.9)	1.0 (0.5–1.9)

Source: WHO 2009.

Note: **CI** = confidence interval; **NA** = question not asked; **WHO** = World Health Organization.

<sup>a</sup>Territory of United Kingdom

<sup>b</sup>Territory of United States

<sup>c</sup>United Nations Relief and Works Agency

<sup>d</sup>United Nations Administered Province

<sup>e</sup>Special Administrative Region of China

<sup>f</sup>Commonwealth in political union with the United States