

Section IV  
Societal Level Influences on Tobacco Use

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Chapter 11  
Federal, State, and Local Tobacco Control Policy and  
Tobacco-Related Health Disparities

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## Introduction

A variety of tobacco control policies and programs at the federal, state, and local levels have strong potential to address many current tobacco-related health disparities (TRHD). This chapter considers the scope of comprehensive tobacco control policies and programs at the federal, state, and local levels and their differential impact on various populations. The impact of specific tobacco control policies such as cigarette taxation and price, smoke-free policies, efforts to reduce youth access to tobacco, and policies to increase access to smoking cessation services are also explored.

## Comprehensive Tobacco Control Programs in States

In 1989 California became the first state to create a comprehensive statewide tobacco control program. In 1988 voters in California passed Proposition 99, which raised the cigarette excise tax by 25 cents per pack.<sup>1</sup> A portion of the revenue generated from the tax increase was allocated to anti-tobacco initiatives, including anti-tobacco media campaigns, community education programs, school-based education programs, as well as tobacco control research, surveillance, and evaluation activities. Massachusetts followed suit in 1992 by passing Proposition 1, which raised the cigarette tax by 25 cents per pack.<sup>2</sup> Tax revenues in Massachusetts were used to fund initiatives, including a large anti-smoking media campaign, school and community anti-smoking education programs, and increased enforcement of local tobacco ordinances. Subsequent to these two programs, initiatives to raise tobacco taxes were successful in several other states, and a portion of the revenues generated from these taxes were used to fund large-scale tobacco control programs.<sup>3</sup>

Tobacco control programs in some states are funded by those states' individual settlements with cigarette manufacturers or through the Master Settlement Agreement (MSA) reached on November 23, 1998, with the major tobacco companies.<sup>3-5</sup> Under the MSA, 46 states, five U.S. territories, and the District of Columbia settled their lawsuits against the nation's major tobacco companies, giving up certain future legal claims, and the tobacco companies agreed to make annual payments to the states to compensate them for health care costs for tobacco-related illness.<sup>4,5</sup> (Four states reached earlier individual settlements with the tobacco companies.) The total amount of the annual payments required of the tobacco companies is estimated at \$246 billion over the first 25 years.<sup>6</sup> To finance the settlement, the tobacco companies raised the wholesale price of cigarettes by 45 cents/pack.<sup>7</sup> More information on the Master Settlement Agreement is provided below.

In its *Best Practices for Comprehensive Tobacco Control Programs—2014*, the Centers for Disease Control and Prevention (CDC)<sup>8</sup> recommended that states annually spend a combined \$3.3 billion, or \$10.53 per capita, to maintain comprehensive tobacco control programs. However, states have typically appropriated significantly less than the CDC's recommended amounts. For example, in fiscal year (FY) 2017, it is estimated that the states and the District of Columbia combined will collect \$26.6 billion from the tobacco settlement and tobacco taxes, but will spend only \$494 million (1.8%) on tobacco control programs.<sup>6</sup> Table 11.1 shows state-level FY 2017 tobacco control appropriations in relation to CDC-recommended expenditures.<sup>6,8</sup> In comparison, total marketing expenditures for the major U.S. cigarette companies in 2014 were \$8.49 billion.<sup>9</sup>

**Table 11.1 FY 2017 Funding for State Tobacco Prevention Programs**

State	FY 2017 Current Annual Funding (\$M)	CDC Annual Recommendation* (\$M)	FY 2017 Percentage of CDC's Recommendation	Current Rank (Based on Percentage of CDC's Recommendation)
Alabama	1.5	55.9	2.7	42
Alaska	9.5	10.2	93.0	2
Arizona	18.4	64.4	28.6	16
Arkansas	9.0	36.7	24.5	19
California	75.7	347.9	21.8	21
Colorado	23.2	52.9	43.8	10
Connecticut	0.0	32.0	0.0	50
Delaware	6.4	13.0	48.9	7
District of Columbia	1.0	10.7	9.3	31
Florida	67.8	194.2	34.9	14
Georgia	1.8	106.0	1.7	43
Hawaii	6.8	13.7	49.3	5
Idaho	2.9	15.6	18.4	23
Illinois	9.1	136.7	6.7	35
Indiana	5.9	73.5	8.0	34
Iowa	5.2	30.1	17.4	25
Kansas	0.8	27.9	3.0	40
Kentucky	2.4	56.4	4.2	37
Louisiana	7.0	59.6	11.7	27
Maine	7.8	15.9	49.1	6
Maryland	10.6	48.0	22.0	20
Massachusetts	3.9	66.9	5.8	36
Michigan	1.6	110.6	1.4	45
Minnesota	22.0	52.9	41.7	11
Mississippi	10.7	36.5	29.4	15
Missouri	0.1	72.9	0.1	49
Montana	6.4	14.6	44.1	8
Nebraska	2.6	20.8	12.4	26
Nevada	1.0	30.0	3.3	39
New Hampshire	0.1	16.5	0.8	48
New Jersey	0.0	103.3	0.0	51
New Mexico	5.7	22.8	24.9	18
New York	39.3	203.0	19.4	22

Table 11.1 continued

State	FY 2017 Current Annual Funding (\$M)	CDC Annual Recommendation* (\$M)	FY 2017 Percentage of CDC's Recommendation	Current Rank (Based on Percentage of CDC's Recommendation)
North Carolina	1.1	99.3	1.1	46
North Dakota	9.9	9.8	100.9	1
Ohio	13.5	132.0	10.3	28
Oklahoma	23.5	42.3	55.6	3
Oregon	9.8	39.3	25.0	17
Pennsylvania	13.9	140.0	9.9	29
Rhode Island	0.4	12.8	2.9	41
South Carolina	5.0	51.0	9.8	30
South Dakota	4.5	11.7	38.5	13
Tennessee	1.1	75.6	1.5	44
Texas	10.2	264.1	3.9	38
Utah	7.5	19.3	38.9	12
Vermont	3.4	8.4	40.2	9
Virginia	8.2	91.6	9.1	33
Washington	2.3	63.6	3.6	47
West Virginia	3.0	27.4	11.1	24
Wisconsin	5.3	57.5	9.2	32
Wyoming	4.2	8.5	49.4	4

\*CDC annual recommendations are based on the CDC's *Best Practices for Comprehensive Tobacco Control Programs 2014*.<sup>8</sup>  
 Source: Campaign for Tobacco-Free Kids 2016.<sup>6</sup>

A combination of federal and private funding has been used to support multistate efforts to reduce tobacco use. The first major multistate effort was the American Stop-Smoking Intervention Study for Cancer Prevention (ASSIST), a partnership between the National Cancer Institute (NCI), the American Cancer Society (ACS), and 17 state health departments, conducted between 1991 and 1998. ASSIST focused on tobacco control policies in four areas: eliminating SHS exposure, increasing the price of tobacco products, restricting tobacco advertising and promotions, and reducing youth access to tobacco products.<sup>10</sup> During this same period, the CDC funded the remaining states (excluding California) and the District of Columbia under its Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program.<sup>11</sup> In 1999 these two programs were replaced by the CDC-funded National Tobacco Control Program, which currently (2017) supports tobacco control efforts in all 50 states, the 5 U.S. territories, and the District of Columbia.<sup>12</sup> In addition, from 1993 to 2004 the Robert Wood Johnson Foundation's SmokeLess States program, administered by the American Medical Association, funded coalitions to strengthen tobacco control policies in nearly all states.<sup>13</sup>

## Impact on Tobacco Use

Evaluations of major individual state programs provide compelling evidence that these programs are associated with reduced tobacco use.<sup>10,14–18</sup> In California, for example, as a result of the California Tobacco Control Program (CTCP) adult smoking prevalence declined by 51.1% between 1988 (the year before the program began) and 2014, from 23.7% to 11.6%. This represents approximately 3.3 million fewer adult smokers in the state. The decline in prevalence was most pronounced during the early years of the program.<sup>19</sup>

After adopting large-scale, comprehensive state tobacco control programs, Arizona, Florida, Massachusetts, and Oregon saw large reductions in smoking.<sup>20–28</sup> The Community Preventive Services Task Force<sup>18</sup> found that states with a comprehensive tobacco control program saw a median additional annual reduction in adult tobacco use prevalence of 45% (range: 18% to 89% reduction) compared to the rest of the country. Similarly, U.S. states or localities with comprehensive tobacco control programs had greater reductions in smoking prevalence among young people than states or localities without such programs.<sup>18</sup>

The health benefits of reduced tobacco use after the implementation of comprehensive tobacco control programs are increasingly apparent. For example, in California the estimated rate of death caused by heart disease and lung cancer has fallen sharply.<sup>28–31</sup> A study by Pierce and colleagues<sup>31</sup> concluded that, as a direct result of the CTCP, California will have faster declines in lung cancer than the rest of the nation for the next several decades. In addition, several studies have examined the economic effects of the CTCP. Lightwood and Glantz<sup>32</sup> estimated that this program saved \$134 billion in health care expenditures between 1989 and 2008. These authors found that reductions of one percentage point in current smoking prevalence and a one-pack per year reduction in cigarette consumption per smoker in California are associated with \$35.4 (standard error [SE] \$9.85) and \$3.14 (SE \$0.786) reductions in per capita health care expenditure, respectively (2010 dollars). A study by Max and colleagues<sup>33</sup> found that if tobacco control funding in California were increased from the 2011 level to the CDC-recommended level, health care savings would reach \$4.7 billion for the years 2012–2016.

A few national-level analyses have examined the impact of state tobacco control programs on cigarette smoking. An early analysis that compared per capita cigarette sales in ASSIST states to sales in non-ASSIST states found that sales declined 28% faster in the ASSIST states in the first several years after the program began (sales trends in the two groups of states were similar in the years before the ASSIST program).<sup>34</sup>

Farrelly and colleagues examined the effect of state-level per capita tobacco control expenditures on state-level per capita cigarette sales for the period from 1981 through 2000.<sup>35</sup> After controlling for potential confounding covariates, they concluded that investments in tobacco control programs had reduced overall cigarette consumption. Their findings suggested that if states had funded tobacco control efforts at the minimum CDC-recommended levels, the rate of decline in cigarette consumption would have doubled from 1994 through 2000.

A 2008 study by Farrelly and colleagues employed survey data from 1985 to 2003 to examine the impact of tobacco control expenditures on adult smoking prevalence rates.<sup>36</sup> They found that increases in state per capita tobacco control spending were associated with significant declines in smoking prevalence. Tobacco control expenditures were found to be more effective in reducing smoking rates among people age 25 and older than among those ages 18–24. The authors concluded that if states had

spent the minimum CDC-recommended level of expenditures on tobacco control efforts, there would have been 2.2 million fewer adult smokers than observed between 1985 and 2003.

### Impact on TRHD

Evaluations of state-specific tobacco control programs show that comprehensive tobacco control programs have substantial effects on smoking prevalence rates among youths and young adults. For example, a study by Pierce and colleagues<sup>37</sup> found it likely that the comprehensive CTCP kept new adolescent cohorts from experimenting with cigarettes, and this decline in experimentation translated into a decline in California young adult smoking prevalence that was not observed in the rest of the United States. Another report published by the CTCP found that smoking prevalence among California adolescents was similar to that in the rest of the nation at the onset of the CTCP, but by 2005 California adolescents smoked 50% less than adolescents in the rest of the country.<sup>38</sup>

Similarly, in Massachusetts, current smoking among high school students declined by 27% between 1995 and 2001, whereas the nationwide rate dropped by only 18%.<sup>39</sup> During this time, the Massachusetts Tobacco Control Program was extremely active in tobacco control efforts. A New York State Department of Health report documenting trends in youth smoking following the implementation of New York's tobacco control program concluded that current smoking among middle school students declined by 68.6% (from 10.2% to 3.2%) between 2000 and 2010. In addition, current smoking among high school students declined by 53.5% (from 27.1% to 12.6%), and current smoking by young adults ages 18–24 declined by 30.0% (from 33.0% to 23.1%) between 2000 and 2009.<sup>40</sup>

A nationally representative multivariate econometric study conducted by Tauras and colleagues<sup>41</sup> examined the impact of state-level tobacco control expenditures on youth smoking prevalence and on smoking intensity, as measured by average number of cigarettes smoked. This study used data on 8th-, 10th-, and 12th-grade students collected as part of the Monitoring the Future (MTF) surveys conducted from 1991 through 2000. While controlling for cigarette prices, smoke-free laws, youth access laws, and demographic and socioeconomic factors, the researchers found a strong inverse relationship between per capita tobacco control funding at the state level and smoking prevalence rates among adolescents.<sup>41</sup> They also found that per capita tobacco control expenditures had a strong negative impact on the average number of cigarettes smoked by adolescent smokers. The researchers estimated that adolescent smoking prevalence would have been 3.3% to 13.5% lower than that observed in the 1990s if states had funded their tobacco control efforts at the minimum CDC-recommended levels.

Many evaluations have found that state-specific comprehensive tobacco control programs have had significant effects on adult smoking prevalence rates across various socioeconomic status (SES) and racial/ethnic subgroups. For example, in California all racial/ethnic groups experienced large declines in smoking prevalence rates (>25%) between 1990 and 2005, except Asian American/Pacific Islander women, whose smoking prevalence declined by only 11%.<sup>38</sup>

Studies show that in California, as elsewhere in the United States, smoking is inversely related to income and educational attainment. Smoking prevalence among adults in California declined between 1990 and 2005 across all age groups, racial/ethnic groups, education levels, and for both sexes. The largest declines in prevalence were observed among young adults, college graduates, individuals with the highest incomes, and non-Hispanic whites. In 2005, smoking prevalence among college graduates was less than half the prevalence among people who did not attend college: Only 7.4% of college

graduates in California were current smokers in 2005, the lowest level reported for any educational group.<sup>38</sup> Between 1990 and 2005, smoking prevalence among college graduates declined by 40%, a greater decrease in smoking prevalence than was found in any other educational group; this reduction was consistent for both genders, with women's prevalence declining by 42.9% and men's prevalence declining by 37.3%.<sup>38</sup>

Given the strong association between education and income, people with higher incomes are expected to have lower smoking prevalence rates. Indeed, in 2005, California households that reported annual incomes greater than \$50,000 had the lowest smoking prevalence (14.4% for \$50,000–\$75,000, and 11.9% for >\$75,000), and those with the lowest incomes had the highest smoking prevalence (20.7% for <\$10,000, and 19.3% for \$10,000–\$20,000).<sup>38</sup> Individuals with the highest annual incomes also had the largest declines in smoking prevalence between 1990 and 2005—a 23.8% decline for people with incomes of \$50,000–\$75,000 (from 18.9% in 1990 to 14.4% in 2005), and a 33.2% decline for those with incomes over \$75,000 (from 16.9% in 1990 to 11.3% in 2005); smoking prevalence declined by 17.6% for people with incomes under \$10,000 (from 25.1% in 1990 to 20.7% in 2005), and 12.6% for those with incomes between \$10,000 and \$20,000 (from 22.1% in 1990 to 19.3% in 2005).<sup>38</sup>

Similar patterns can be found in other states and localities after the implementation of comprehensive tobacco control programs. For example, Frieden and colleagues<sup>42</sup> examined changes in smoking prevalence in New York City one year after the 2002 implementation of a comprehensive tobacco control program, which included increased cigarette excise taxes, enhanced smoke-free policies, increased cessation services, and public education efforts. This study found that smoking declined among all age groups, race/ethnicities, and education levels, among both men and women, and among both native- and foreign-born populations. However, declines in prevalence were larger among young people, women, people in both the lowest and highest income groups, those with higher educational levels, and heavy smokers. Almost half (45.3%) of all smokers reported that the tax increase influenced their motivation to quit smoking.<sup>42</sup>

In 2006, the New York City Department of Health and Mental Hygiene implemented an extensive television-based anti-tobacco media campaign. At the same time, the New York State Department of Health aired a statewide anti-tobacco media campaign. A CDC report found that overall, the prevalence of smoking among New York City residents decreased from 18.9% in 2005 to 17.5% in 2006.<sup>43</sup> While the overall change in prevalence was not statistically significant, the decline was significant among men and among Hispanics. The CDC report also found significant decreases in smoking prevalence between 2002 and 2006 for many population groups in New York City, including young adults (34.9% decline; from 23.8% in 2002 to 15.5% in 2006), Asian Americans/Pacific Islanders (30.1% decline; from 15.3% in 2002 to 10.7% in 2006), women (22.7% decline; from 19.8% in 2002 to 15.3% in 2006), college graduates (20.7% decline; from 16.4% in 2002 to 13.0% in 2006), individuals with some college but no degree (20.6% decline; from 24.3% in 2002 to 19.3% in 2006), Hispanics (20.5% decline; from 21.5% in 2002 to 17.1% in 2006), non-Hispanic whites (17.2% decline; from 23.9% in 2002 to 19.8% in 2006), non-Hispanic blacks (14.9% decline; from 20.8% in 2002 to 17.7% in 2006), and men (15% decline; from 23.4% in 2002 to 19.9% in 2006). Smoking prevalence among New York City residents with only a high school education declined by 10% (from 23.9% in 2002 to 21.5% in 2006), and smoking prevalence among people who did not graduate from high school declined by 6.1% (from 24.5% in 2002 to 23.0% in 2006), although neither decline was statistically significant.



Levy and colleagues<sup>44</sup> examined the effects of cigarette prices and comprehensive tobacco control programs with significant media campaigns on smoking among women of low SES, as defined by educational attainment. Using four waves of the Tobacco Use Supplement to the Current Population Survey (TUS-CPS) between 1992 and 2002, the authors found women in the low education group (less than a high school diploma) were particularly responsive to price and to anti-smoking media campaigns; state media campaigns were associated with a 14% lower likelihood of being a current smoker among women in the low education group, compared to 11% for women in the medium education group (high school degree or GED through bachelor's degree); no effect of media campaigns was seen among high-education women (graduate-level education).

### Master Settlement Agreement

As noted above, in November 1998, the Attorneys General of 46 states, 5 U.S. territories, and the District of Columbia entered into the Master Settlement Agreement with the nation's five major tobacco companies. In addition to financial compensation, the MSA imposed restrictions on participating manufacturers' marketing practices, including: (1) forbidding direct or indirect tobacco marketing to youth; (2) prohibiting tobacco advertisements on public transit and on billboards; (3) prohibiting the use of cartoon characters in cigarette advertising, promotion, and packaging; (4) eliminating paid tobacco product placement in media outlets; (5) restricting tobacco company sponsorship of sports, arts, and cultural events; and (6) restricting free samples to adult-only facilities. Tobacco companies agreed to finance the creation of the American Legacy Foundation (renamed the Truth Initiative in 2015), a national nonprofit entity focused on reducing death and disease caused by tobacco use. The MSA also required companies to make available online millions of previously internal company documents (initially made public as a result of Minnesota's 1998 settlement with major cigarette manufacturers) and to disband industry-funded research groups that misled the public about the harms associated with tobacco use.<sup>45</sup>

A number of studies show that the MSA and the four separate state settlements were associated with a significant decrease in smoking, largely due to the accompanying increase in cigarette prices. For example, Sloan and Trogon<sup>46</sup> used national data from the Behavioral Risk Factor Surveillance System (BRFSS) and estimated that by 2002, the settlements had decreased smoking among young people ages 18–20 by 3.5%, and among people age 21 and older by 1–2%. Another study found that the California state tax increase plus the price increase resulting from the MSA reduced cigarette consumption, although this study could not distinguish the separate effects of the MSA price increase.<sup>7</sup>

A number of observers have expressed disappointment in the overall effect of the MSA.<sup>47–49</sup> According to Jones and Silvestri, “the MSA has not resulted in a clear and straightforward intensification of state tobacco control efforts. . . . MSA resources have been significantly diverted from tobacco control and treatment into other state policy activities.”<sup>50,p.697</sup> Links between the MSA and changes in TRHD are possible but have not been examined. For example, MSA advertising restrictions may have reduced youth exposure to print tobacco advertisements,<sup>51</sup> but this may have been offset by shifts of promotional spending to point-of-sale locations.<sup>52</sup> To the extent that the concentration of tobacco retail outlets with point-of-sale tobacco advertising is higher in low-SES than in high-SES communities, MSA advertising restrictions may have inadvertently led to increased tobacco promotion in low-income neighborhoods and exacerbated TRHD.<sup>53–55</sup>

## Federal Tobacco Control Policy

### Food and Drug Administration Regulation of Tobacco

On June 22, 2009, the Family Smoking Prevention and Tobacco Control Act (Tobacco Control Act)<sup>56</sup> was signed into law, granting the Food and Drug Administration (FDA) the authority to regulate tobacco products “for the protection of the public health” and creating the Center for Tobacco Products (CTP) within FDA.<sup>56</sup> One purpose of the Tobacco Control Act is to ensure that FDA “has the authority to address issues of particular concern to public health officials, especially the use of tobacco by young people and dependence on tobacco.”<sup>57</sup> The Tobacco Control Act allows FDA to adopt tobacco product standards if appropriate for the protection of the public health, requiring the agency to consider scientific evidence concerning:

“(i) the risks and benefits to the population as a whole, including users and nonusers of tobacco products; (ii) the increased or decreased likelihood that existing users of tobacco products will stop using such products; and (iii) the increased or decreased likelihood that those who do not use tobacco products will start using such products.”<sup>58</sup>

The Tobacco Control Act also established a 12-member advisory committee, known as the Tobacco Products Scientific Advisory Committee (TPSAC).<sup>59</sup>

The Tobacco Control Act has the potential to reduce TRHD by decreasing the toxicity, addiction potential, and/or attractiveness of products favored by specific population groups or by affecting the production and marketing of tobacco products targeted toward vulnerable populations.<sup>60</sup> In particular, the Tobacco Control Act provides FDA with the regulatory authority to reduce tobacco’s impact on different populations via several mechanisms, including (1) disclosure and communication of harmful and potentially harmful constituents of tobacco products; (2) required graphic health warnings on cigarette packaging and advertising and larger text warnings for smokeless tobacco packaging and advertisements (FDA is also authorized to require larger health warnings on other tobacco products); (3) premarket evaluation of new tobacco products; (4) provisions restricting the marketing and sales of tobacco products; and (5) promulgation of tobacco product standards, including the authority to ban menthol as a characterizing flavor in tobacco products.

In general, the Tobacco Control Act does not preempt local jurisdictions’ additional or more stringent regulations related to tobacco products. The statute does preempt state and local laws in several discrete topic areas reserved for federal regulation (e.g., product standards and premarket review). However, as described further below, it explicitly preserves the authority of local jurisdictions to establish requirements in a range of other areas (e.g., sales, distribution, and advertising of tobacco products) that are “in addition to, or more stringent than” the requirements of the Tobacco Control Act or regulations promulgated under its authority. Specific provisions of the Tobacco Control Act and their potential to reduce TRHD are discussed below.

### *Disclosure of Harmful and Potentially Harmful Constituents in Tobacco Products*

The Tobacco Control Act requires tobacco manufacturers and importers to report the levels of harmful and potentially harmful constituents (HPHCs)—chemicals or chemical compounds in tobacco products or tobacco smoke that cause or could cause harm to smokers or nonsmokers—found in their tobacco products and in tobacco smoke. FDA must publish HPHC quantities by brand and sub-brand of tobacco product in a way that people find understandable and not misleading.<sup>61</sup>

The Tobacco Control Act enables FDA to request documents concerning research activities related to health, behavioral, or physiologic effects of tobacco products or their ingredients, components, or additives. FDA can also request documents on marketing research or marketing practices and the effectiveness of such practices.<sup>56</sup> Scientific analysis of tobacco industry documents have produced findings relevant to TRHD, including evidence that (1) the companies targeted marketing to African American smokers and other groups, (2) they used the civil rights movement to promote menthol cigarettes to African Americans, and (3) they “manipulate menthol content in cigarettes”<sup>62,p.ii20</sup> to make them more appealing, especially to young people, and easier to smoke.<sup>62–66</sup>

### *Graphic Warning Labels on Cigarettes*

The Tobacco Control Act mandates the inclusion of graphic health warning labels covering 50% of the front and back of the cigarette pack, and warnings covering 20% of advertisements. Additionally, graphic warning labels on smokeless tobacco products must cover 30% of the front and back of the packaging and 20% of advertisements. In August 2012, the U.S. Court of Appeals for the D.C. Circuit upheld a lower court decision that the particular graphic warnings adopted by FDA violated the First Amendment.<sup>67</sup> The court remanded the matter to the agency, and FDA has undertaken research to support a new rulemaking.<sup>68</sup> A more recent lawsuit was filed by public health organizations challenging the legality of the time it is taking FDA to promulgate this new rule.<sup>69</sup> As of July 2017, this case is still in litigation.

Abundant evidence demonstrates that graphic health warning labels—typically the most visible health information presented to smokers—are a powerful informational intervention. For example, NCI Tobacco Control Monograph 21, *The Economics of Tobacco and Tobacco Control*, concluded that “large pictorial health warning labels on tobacco packages are effective in increasing smokers’ knowledge, stimulating their interest in quitting, and reducing smoking prevalence. These warnings may be an especially effective tool to inform children and youth and low literacy populations about the health consequences of smoking.”<sup>70,p.305</sup> Research suggests that the effectiveness of graphic warning labels is mediated by certain contexts, such as the tobacco control environment and social norms surrounding tobacco use.<sup>71</sup> Some messages can be more effective with some groups than with others, supporting the rotation of graphic warning labels to effectively communicate with multiple population groups.<sup>71</sup> Research conducted in Canada finds that graphic warning labels decrease the odds of being a smoker and increase the odds of making a quit attempt.<sup>72</sup>

Graphic warning labels also have strong potential to decrease youth smoking initiation.<sup>71</sup> For example, research conducted in Australia suggests that graphic warnings increase youths’ cognitive processing of anti-smoking messages, decrease intention to smoke among youths who have not initiated smoking, and increase thoughts about cessation among smoking youths.<sup>73</sup> Similarly, American youths who see pictorial warning labels are more likely to notice and talk about the labels, and young smokers who see warning labels are more likely to report considering cessation.<sup>74</sup>

American consumers rate graphic warning labels as the most effective way to convey information about the health risks of smoking, with no differences by race/ethnicity or education.<sup>75</sup> However, smokers with lower education levels are less likely to recall the messages in text-only warnings than smokers with higher education levels, which is particularly concerning given the inverse relationship between educational attainment and smoking status.<sup>71</sup> Pictorial warnings more effectively convey information about the health effects of smoking than text-only warnings in populations with low literacy rates.<sup>74</sup>

### *New and Modified-Risk Tobacco Products*

Historically, the tobacco industry has introduced new products targeted to specific groups as a strategy to attract those market segments—in particular, women, young adults, and racial/ethnic groups.<sup>77–80</sup> For example, in 1990, R.J. Reynolds planned to test-market a cigarette brand (Uptown) explicitly targeted to African Americans; after substantial public outcry from local groups, the planned test market was shelved.<sup>78,81</sup> “Slim” cigarettes, with a longer cigarette shaft length and light-colored packaging, is another example of products meant to appeal to a market segment—in this case, women.<sup>74</sup> FDA regulation of tobacco products has the potential to reduce TRHD by preventing the introduction of products tailored to appeal to specific populations.

In addition, analysis of internal tobacco industry documents and other sources finds evidence that as early as the 1960s, tobacco companies sought to create products that would increase the social acceptability of smoking, reduce secondhand smoke exposure to bystanders, or be perceived as reducing the harm to consumers of the product. This included products that were purported to heat rather than burn tobacco, such as the Ariel cigarette (British American Tobacco), and Premier and Eclipse cigarettes (both by R.J. Reynolds).<sup>82</sup> Although none of these “heat not burn” tobacco products were commercially successful, the introduction of these and other “potential reduced harm products” highlights the importance of tobacco product regulation to ensure that misleading health claims will not harm public health.<sup>83,84</sup> More recently, the expansion of the e-cigarette market has raised similar challenges.<sup>82,85,86</sup>

As noted in the Tobacco Control Act, “the dangers of products sold or distributed as modified risk tobacco products that do not in fact reduce risk are so high that there is a compelling governmental interest in ensuring that statements about modified risk tobacco products are complete, accurate, and relate to the overall disease risk of the product.”<sup>87,88[Finding 40]</sup> Therefore, the Tobacco Control Act requires FDA to conduct a premarket review for all new and “modified risk” tobacco products; FDA has the authority to review new tobacco product applications and to reject products that do not meet the statutory requirement. Under Section 911, FDA-CTP will not allow products to be marketed as “modified risk” unless the applicant company can provide evidence that such a product, when actually used by consumers, will significantly reduce the risk of tobacco-related disease to individuals and will benefit public health.<sup>88</sup>

Another example of tobacco industry product diversification was the introduction of “light” and “low-tar” cigarettes. As noted in the Tobacco Control Act, Congress found that “studies have demonstrated that there has been no reduction in risk on a population-wide basis from ‘low tar’ and ‘light’ cigarettes, and such products may actually increase the risk of tobacco use.”<sup>88[Finding 39]</sup> Also, “many smokers mistakenly believe that ‘low tar’ and ‘light’ cigarettes cause fewer health problems than other cigarettes. As the National Cancer Institute has also found, mistaken beliefs about the health consequences of smoking ‘low tar’ and ‘light’ cigarettes can reduce the motivation to quit smoking entirely and thereby lead to disease and death.”<sup>88[Finding 38]</sup> For this reason, the Tobacco Control Act prohibits tobacco companies from making reduced harm claims like “light,” “low,” or “mild” without filing an application for a modified risk tobacco product and obtaining an authorization to market as such.<sup>88</sup> Following FDA’s ban on descriptors (light, low, mild) tobacco companies have made use of pack colors, numbers, and other means to convey a message of reduced harm to consumers; studies suggest these alternate means are effective at conveying false beliefs about product risk.<sup>75,89</sup>

### *Restricting Marketing and Sales*

The Tobacco Control Act grants FDA the power to impose restrictions on the advertising and promotion of tobacco products. Specifically, the Act states that FDA “may by regulation require restrictions on the sale and distribution of a tobacco product, including restrictions on the access to, and the advertising and promotion of, the tobacco product,” if it determines this to be appropriate for the protection of the public health.<sup>90</sup> Additionally, FDA “may by regulation impose restrictions on the advertising and promotion of a tobacco product consistent with and to full extent permitted by the first amendment to the Constitution.”<sup>90</sup> Given the role of targeted marketing in promoting tobacco use by vulnerable populations, restrictions on tobacco advertising and promotion have the potential to substantially reduce TRHD.

Restrictions on marketing and sales have strong potential to reduce low-income, urban, and racial/ethnic minority youths’ exposure to tobacco advertising. As described in chapter 10, a number of studies have found that tobacco advertising, especially exterior advertising and advertising that promotes menthol cigarettes, is most common in low-income and minority neighborhoods.<sup>54,62,91–95</sup> Similarly, studies have found that point-of-sale cigarette advertising has increased, especially in predominantly African American neighborhoods.<sup>92,96</sup> Because greater exposure to cigarette advertising is associated with increased receptivity to such advertising<sup>97</sup> and with youth smoking initiation,<sup>98</sup> restricting marketing and advertising has the potential to reduce TRHD.

### *Tobacco Product Standards*

The Tobacco Control Act banned cigarettes with characterizing flavors, other than menthol and tobacco, as of 3 months after the date of enactment of the law. In addition, the Tobacco Control Act allows FDA to adopt product standards appropriate for the protection of public health, regarding the construction, components, ingredients, additives, constituents (including smoke constituents), and properties of the tobacco product. FDA has the ability to require the reduction or elimination of an additive, constituent, or component of a tobacco product, and may set limits on the nicotine yield of tobacco products, but cannot require the nicotine yields of a tobacco product be reduced to zero.<sup>58</sup>

A number of studies have suggested that mandating reductions in a tobacco product’s nicotine content could improve public health by reducing the rate of transition from experimentation to nicotine dependence and by facilitating cessation.<sup>99,100</sup> Research suggests that cigarettes with very low nicotine content lead to several positive outcomes, including reduced nicotine exposure, reduced smoking intensity, and reduced cigarette dependence.<sup>101,102</sup> However, it is not known if mandating reduced cigarette nicotine yields would have a differential impact on youth, or by race/ethnicity, SES, or other factors. Additionally, support for mandating reduced cigarette nicotine yields may vary by racial/ethnic status and SES. Pearson and colleagues found that Hispanics and African Americans are 1.6–2.6 times more likely than whites to support requiring nicotine reductions; support for requiring nicotine reductions was 2.3–2.9 times greater among high school graduates or people with some high school education than among otherwise similar people with a college degree.<sup>103</sup>

Although the Tobacco Control Act’s ban on characterizing flavors did not include menthol, FDA has the authority to issue a product standard on menthol. As described in chapter 2, menthol cigarette use differs substantially by population group and is highest among African Americans. The Tobacco Control Act required the Tobacco Products Scientific Advisory Committee to study the impact of the use of menthol in cigarettes on the public health, including such use among children, African Americans, Hispanics, and

other racial and ethnic minority groups, and issue a report and recommendations within one year.<sup>56</sup> The resulting TPSAC report, *Menthol Cigarettes and Public Health: Review of the Scientific Evidence and Recommendations*, concluded that “removal of menthol cigarettes from the marketplace would benefit public health in the United States,”<sup>104,p.225</sup> Surveys of menthol smokers suggest that a ban on menthol cigarettes would reduce smoking prevalence; a substantial fraction (35% to 40%) of menthol smokers report that if menthol cigarettes were banned, they would quit smoking.<sup>103,105</sup> Additionally, simulation modeling examining the potential impact of a menthol ban suggests that a menthol ban that resulted in 30% of menthol smokers quitting and a 30% reduction in initiation among those who would have started as menthol smokers would save between 323,000 and 633,000 lives, almost one-third of these being among African Americans.<sup>106</sup>

### *Regulation of Other Tobacco Products*

The Tobacco Control Act provided FDA with the immediate authority to regulate cigarettes, cigarette tobacco, roll-your-own tobacco, and smokeless tobacco. The Act also provides that other tobacco products, such as cigars (including little cigars and cigarillos), pipe tobacco, waterpipe tobacco (hookah), and electronic cigarettes, may be brought under FDA authority by regulation.<sup>107</sup> In 2014, FDA signaled its intention to extend authority to these previously unregulated products via a proposed rule; the final “deeming” rule was published on May 10, 2016, and became effective on August 8, 2016.<sup>108</sup>

The deeming rule’s provisions extend FDA’s regulatory authority to all tobacco products, including e-cigarettes and other electronic nicotine delivery systems (ENDS), cigars, waterpipe tobacco, pipe tobacco, nicotine gels, and dissolvables that did not previously fall under the FDA’s authority.<sup>108</sup> It requires health warnings on roll-your-own tobacco, cigarette tobacco, and certain newly regulated tobacco products and also bans free samples. In addition, manufacturers of newly regulated tobacco products that were not on the market as of February 15, 2007, will be required to show that products meet the applicable public health standard set by the law, and those manufacturers will have to receive marketing authorization from the FDA. The rule also restricts youth access to newly regulated tobacco products by (1) not allowing products to be sold to people younger than 18 and requiring age verification via photo ID; and (2) not allowing tobacco products to be sold in vending machines (unless in an adult-only facility). Finally, the rule provides a foundation for future FDA actions related to newly deemed tobacco products.<sup>108</sup> Some requirements went into effect on August 8, 2016 (such as the minors’ access provisions, the ban on free samples, and the requirement for premarket review for any modified risk claims), but there were staggered deadlines for other provisions (such as the health warnings and the reporting of ingredients and HPHCs). As of July 2017, six pending lawsuits were challenging the deeming rule.<sup>109</sup>

To the extent that other tobacco products are differentially used by various population groups, the provisions of the deeming rule have the potential to reduce TRHD. For example, consumption of little cigars and cigarillos is concentrated among African Americans, males, young adults, youths, and at the intersections of these race, gender, and age groups.<sup>110–113</sup> Surveillance of these products can be challenging because of the diversity of products on the market.<sup>111,114</sup> Little cigars often have filters, are sold in packs of 20, and may be similar in size to cigarettes; cigarillos more closely resemble cigars and come in a wide variety of sizes, filter tips, and wrapper types.

With passage of the Tobacco Control Act, cigarettes with characterizing flavors other than tobacco or menthol are banned. However, as of 2017, characterizing flavors were not prohibited in non-cigarette

tobacco products, such as e-cigarettes, hookah, and cigars (premium cigars, cigarillos, and little filtered cigars). Data from the 2013-2014 National Adult Tobacco Survey show that more than one-third of cigar smokers (36.2%) used flavored cigars in the past 30 days; flavored cigar use was highest among young adults (48.3%).<sup>115</sup> Differences in the preference for flavored tobacco products, including cigars and cigarillos, have also been observed by gender, race/ethnicity, income, education, sexual orientation, and transgender identification.<sup>115,116</sup> In 2016, FDA took action against four companies for “selling flavored cigarettes that are labeled as little cigars or cigars, which is a violation of the Family Smoking Prevention and Tobacco Control Act.”<sup>117</sup>

The lower price and the availability of flavorings could contribute to the popularity of little cigars and cigarillos among youths and young adults. As described in chapter 2, cigar use by U.S. youths increased during 2011-2012 and then declined for 2013-2014 and remained unchanged for 2014-2015.<sup>118</sup> Results from the 1997–2015 YRBS suggest a relatively stable trend in cigar use among females and fluctuating trends among non-Hispanic black high school students. From 2013 to 2015, cigar smoking increased among African American high school students.<sup>118</sup> These statistics could reflect promotional efforts in that little cigars and cigarillos are disproportionately available, advertised, and priced lower in some lower income, younger, and predominantly African American neighborhoods.<sup>119,120</sup> Variation in state-level taxation and tobacco industry marketing highlights the need for federal regulation of little cigars and cigarillos to help reduce TRHD.

### Preservation and Expansion of State and Local Authority

The Tobacco Control Act preserves nearly all authority of states and local governments to regulate various aspects of tobacco products. States may impose specific bans or restrictions on the time, place, and manner—but not the content—of cigarette advertising. They may prohibit or restrict the distribution of free samples of smokeless tobacco in any location (FDA may prohibit or restrict them to only “qualified adult-only facilities.”) States may adopt or continue to enforce all requirements pertaining to tobacco products that are in addition to, or more stringent than, the requirements of the new law relating to or prohibiting the sale or distribution of tobacco products; the possession, exposure, or access to tobacco products; the advertising and promotion of tobacco products; the use of tobacco products by individuals of any age; information reporting to the state; and measures relating to fire safety standards for tobacco products.

Thus, the Tobacco Control Act gives local authorities expanded power to address local problems, particularly among the most at-risk populations. As described in the Center for Public Health Systems Science publication *Point-of-Sale Strategies: A Tobacco Control Guide*:

The 1965 Federal Cigarette Labeling and Advertising Act (FCLAA) and its amendments preempted states and communities from imposing requirements related to cigarette advertising or promotion based on concerns about smoking or health. The Tobacco Control Act changed this provision by allowing states and communities, where allowed by state law, to restrict or regulate the time, place, and manner (but not the content) of cigarette advertising and promotion. For example, states and many communities are now authorized to enact advertising restrictions, limit the size of product ads, and regulate the location of ads in stores. However, states and communities considering these strategies will need to make sure that the policies pursued do not violate the First Amendment.<sup>121,p.6</sup>

As a result, a number of communities have moved to address tobacco product sales through zoning, licensing, and other ordinances.<sup>122</sup> Additionally, the Tobacco Control Act does not constrain states' authority to engage in many other tobacco control activities, including raising tobacco taxes; enacting and enforcing smoke-free laws; funding comprehensive tobacco control programs; implementing counter-marketing campaigns; restricting the sale, distribution, and possession of tobacco products; and implementing measures to counter smuggling and tax evasion.<sup>123</sup>

### Youth Access Policies and Gender and Race/Ethnicity

Limiting young people's ability to purchase tobacco products is a well-established component of a comprehensive strategy to prevent youth smoking.<sup>8</sup> Youth obtain cigarettes from social sources (e.g., friends or family members) and from commercial sources. As explained in NCI Tobacco Control Monograph 21, "youth access policies are intended to reduce opportunities for minors to obtain tobacco products from commercial sources, with the goals of preventing youth from beginning to smoke, decreasing cigarette consumption, changing social norms with respect to smoking, and decreasing young people's overall smoking prevalence."<sup>70,p.402</sup>

The 1992 Synar Amendment to the Alcohol, Drug Abuse and Mental Health Services Administration (ADAMHA) Reorganization Act (Public Law 102-321, Section 1926)<sup>124</sup> required that all states and territories legally prohibit the sale of tobacco to minors by the middle of 1995. Prior to passage of the Synar Amendment, youths obtained cigarettes from commercial sources with relative ease.<sup>125–129</sup> The Synar Amendment, which requires state legislative action, has been supplemented by local (city and county) ordinances in the 27 states where such ordinances are not restricted by state preemption.<sup>130</sup> The Synar Amendment requires states to enforce youth access laws through compliance checks and to report progress to the Secretary of the U.S. Department of Health and Human Services (HHS). States that do not comply with Synar annual goals can have their Substance Abuse Prevention and Treatment block grant monies reduced.<sup>131</sup>

The Tobacco Control Act gave FDA the authority to regulate the distribution of tobacco products at the federal level in order to reduce tobacco use by minors.<sup>56</sup> This youth access regulation, in effect as of June 2010, established a federal age of 18 for tobacco purchase, required photo identification for buyers younger than age 27, banned vending machines and self-service tobacco displays, except in adult-only establishments, and authorized state contracts for compliance-check inspections.<sup>56</sup> The FDA youth access regulations also apply to areas previously exempt from the federal Synar Amendment requirements, such as American Indian reservations.

FDA has implemented a robust retailer enforcement program, through which the agency conducts inspections, and when violations are found, takes enforcement action such as issuing Warning Letters; for repeat violations, FDA may seek Civil Money Penalties or No-Tobacco-Sale Orders. The Food, Drug, and Cosmetic Act also authorizes FDA to contract with states, territories, and tribes to inspect retail establishments, including the undercover use of minors to attempt to purchase tobacco products, and to determine whether retailers are in compliance with other youth access restrictions. In addition, FDA conducts surveillance of promotion, advertising, and labeling, including online marketing, to monitor compliance with the Food, Drug, and Cosmetic Act and FDA regulations.

A study by DiFranza and colleagues<sup>132</sup> examined the association of youth tobacco use rates from the 2003 Monitoring the Future (MTF) survey and merchant compliance from the 1997–2003 state Synar



reports. These authors found that the odds of daily smoking among 10th graders in 2003 were reduced by 2% for each 1% increase in merchant compliance. Johnston and colleagues,<sup>133</sup> also using MTF data, found that the percentage of students who reported that getting cigarettes was “fairly or very easy” declined from 77.8% in 1992 to 49.9% in 2013 for 8th graders, and from 89.1% in 1992 to 71.4% in 2013 for 10th graders. Data from the 2001–2015 Youth Risk Behavior Surveys (YRBS), presented in Table 11.2, also show a general decline in the proportion of youth smokers who reported usually buying their own cigarettes commercially—from 19.0% in 2001 to 12.6% in 2015.<sup>134</sup> NCI Tobacco Control Monograph 21 concluded that “youth access policies, when consistently enforced, can reduce commercial access to tobacco products among underage youth,” and that “strongly enforced youth access policies that successfully disrupt the commercial supply of tobacco products to underage youth can reduce youth tobacco use, although the magnitude of this effect is relatively small.”<sup>70,p.419</sup>

**Table 11.2 Percentage and Number of U.S. High School Students Who Usually Obtained Their Own Cigarettes by Buying Them in a Store or Gas Station, 2001–2015**

Category	2001 (%, 95% CI, n)	2003 (%, 95% CI, n)	2005 (%, 95% CI, n)	2007 (%, 95% CI, n)	2009 (%, 95% CI, n)	2011 (%, 95% CI, n)	2013 (%, 95% CI, n)	2015 (%, 95% CI, n)
Total	19.0 (16.8–21.4) 2,586	18.8 (16.3–21.7) 2,512	15.2 (12.7–18.2) 2,152	16.0 (12.8–19.9) 1,939	14.1 (11.7–17.0) 2,266	14.0 (11.5–16.9) 1,835	18.1 (14.4–22.4) 1,344	12.6 (9.7–16.1) 1,198
<b>Gender</b>								
Female	13.1 (10.8–15.9) 1,306	13.7 (9.9–18.6) 1,208	11.7 (8.6–15.6) 1,077	11.3 (8.0–15.6) 893	9.6 (6.9–13.2) 1,098	10.2 (7.6–13.7) 832	15.6 (11.4–21.0) 595	7.7 (4.8–12.2) 564
Male	25.4 (22.3–28.9) 1,273	24.3 (20.8–28.1) 1,298	18.8 (15.7–22.5) 1,072	20.0 (16.0–24.8) 1,043	18.3 (15.6–21.5) 1,159	17.1 (13.5–21.3) 996	20.4 (16.2–25.5) 748	16.5 (12.7–21.2) 625
<b>Race/Ethnicity</b>								
Black	24.0 (16.5–33.5) 245	22.1 (16.7–28.7) 384	21.6 (12.1–35.5) 280	19.3 (13.3–27.3) 227	19.7 (12.5–29.8) 187	13.7 (8.5–21.2) 167	23.5 (13.2–38.3) 161	N/A 69
Hispanic	16.6 (12.9–21.0) 607	23.1 (17.8–29.4) 655	17.4 (11.5–25.5) 495	13.8 (8.8–21.2) 516	13.3 (9.3–18.6) 625	14.9 (11.2–19.5) 534	21.1 (15.5–28.0) 311	17.5 (12.7–23.7) 302
White	19.2 (16.6–22.1) 1,509	17.5 (14.5–21.0) 1,331	14.1 (11.6–17.1) 1,196	15.9 (21.1–20.6) 992	14.1 (11.3–17.5) 1,248	13.9 (10.6–18.0) 902	17.2 (12.7–22.9) 739	9.7 (6.9–13.6) 696

Notes: Data shown are: percentage, confidence interval, and cell size for respondents who reported smoking in the previous 30 days. N/A = fewer than 100 respondents for the subgroup.

Source: Centers for Disease Control and Prevention 2001–2015.<sup>134</sup>

Youth access laws have largely focused on restricting minors’ ability to purchase cigarettes in person from legal businesses. However, among the provisions of the Prevent All Cigarette Trafficking (PACT) Act of 2010 is a requirement for Internet and other mail-order tobacco retailers to check the age and identification of all customers at the time of purchase and at the time of delivery.<sup>135</sup> Purchases via the

Internet and vending machines represented a small proportion of total cigarette purchases by youths (about 9%, depending upon age) as reported in the 2014 National Youth Tobacco Survey (NYTS).<sup>136</sup>

Whether all youth benefit equally from youth access laws is unclear, and enforcement of these laws is likely to have changed over time. Some evidence suggests that race/ethnicity and gender may be associated with differential likelihood of being able to purchase tobacco. Landrine and colleagues<sup>137</sup> examined combined data on all purchase attempts (n = 3,361) reported annually from 1999 to 2003 in California to meet the Synar Amendment requirements. They found that black 15-year-olds and Asian 16-year-olds were more likely to be sold cigarettes (22.2% and 22.6%, respectively) and that black girls were more likely to successfully purchase cigarettes (23.2%) compared with the overall purchase rate of 14.7% for California youths in these years. These differences were almost entirely explained by clerk behavior: 25% of the clerks failed to request youth age identification, and they were responsible for 95% of the cigarette sales.<sup>137</sup> In 2014, Lipperman-Kreda and colleagues<sup>138</sup> found that at the community level, higher percentage of minors, higher education, and a greater percentage of African Americans were associated with increased likelihood of a successful purchase of cigarettes by young buyers.

The 2015 NYTS obtained details about all the sources from which youths obtained tobacco products. Table 11.3 shows that the most common source for high school students who used tobacco products was buying the products themselves, which was reported by 14.8% to 30.7% of students, depending on demographics. Substantial proportions of students reported obtaining tobacco products by giving others money to buy them (18.2%–24.2%) and borrowing or “bumming” them (11.9%–16.9%).<sup>139</sup> Overall, the data suggest that youths who use tobacco, including youths of color, are able to obtain tobacco products from a variety of sources.

**Table 11.3 High School Students’ Usual Source of Tobacco Products in the Past Month, NYTS, 2015**

Sex, race/ethnicity	Bought them myself (%)	Had someone else buy them for me (%)	Asked someone to give me some (%)	Someone offered them to me (%)	Bought them from another person (%)	Took them from a store or another person (%)	Other (%)
Male	30.7	19.9	11.9	18.0	6.7	3.3	9.5
Female	14.8	23.3	16.9	27.5	5.3	3.3	8.8
<b>Race/Ethnicity</b>							
White, Non-Hispanic	24.2	22.3	13.7	22.6	5.9	3.6	7.8
Black, Non-Hispanic	26.4	24.2	13.5	15.5	7.0	3.0	10.5
Hispanic	22.0	18.2	15.1	23.9	6.7	3.3	10.9
Asian, Non-Hispanic	21.5	22.3	14.0	18.2	5.8	7.4	10.7

Note: NYTS = National Youth Tobacco Survey.  
 Source: Centers for Disease Control and Prevention 2015.<sup>139</sup>

Several studies of commercial access have tested the hypothesis that neighborhood context is an important factor that might be related to differential sources of cigarettes for youth. In the 2010 California study by Landrine and colleagues cited above, neighborhood ethnicity (white versus Latino)

had no effect on purchase success.<sup>137</sup> Similarly, Widome and colleagues<sup>140</sup> failed to find neighborhood demographic characteristics that predicted the likelihood of tobacco sales to minors. In a study of 50 California cities, Lipperman-Kreda and colleagues<sup>138</sup> found that several city characteristics were associated with compliance with underage sale laws (i.e., percentage of minors, education level, percentage of African Americans in the population). However, the units of analysis were entire midsize cities (50,000 to 150,000 people), so the results cannot be extrapolated to individual neighborhoods.

Few studies have looked at the context of neighborhood influences on youth access to cigarettes. A qualitative study of young adult smokers in African American neighborhoods in Baltimore revealed an informal but ubiquitous market for single cigarettes, or “loosies.”<sup>141</sup> Although the sale of single cigarettes is prohibited by federal law,<sup>142</sup> single cigarettes were reported to be available for purchase in stores; outside stores, bars, clubs, and subway stations; and from individuals who had purchased or stolen a pack for that purpose. Although not expressly marketed to youths, single cigarettes were likely available to them, and probably reduced the initial cost of smoking. Sales of single cigarettes have also been documented in Philadelphia and New York City and likely occur in other jurisdictions as well.<sup>143,144</sup>

Additionally, some localities have implemented ordinances to ban the sale of flavored tobacco products to youths. New York City prohibited all sales of flavored tobacco products (cigars/cigarillos/little cigars, smokeless tobacco, and others) in 2009, with enforcement beginning in 2010. An analysis of the impact of the ban found that in addition to decreased sales of flavored tobacco products, youth use of both flavored and any tobacco product declined significantly after enforcement of the ban.<sup>145</sup> Chicago became the first U.S. city to restrict the sale of all flavored tobacco products, including menthol tobacco products.<sup>4</sup> This ordinance resulted from the Healthy Chicago Initiative, a multidimensional approach to achieving public health goals, including reducing tobacco use, which engaged the public health community, clergy, educational institutions, charitable organizations, local elected officials, concerned residents, and advocates from around the country. Although the ordinance was later rescinded and replaced with a measure that increased the age of sale for tobacco products from 18 to 21,<sup>146</sup> the effort illustrates the value of using a multidimensional approach to identifying and developing public health policies at the local level. In June 2017, the city of San Francisco banned the sale of flavored tobacco products, as well as flavored electronic cigarette liquids.<sup>147</sup> The legislation prohibited the sale of all flavored tobacco products, including menthol-flavored products.

The 2009 Tobacco Control Act directed FDA to convene an expert panel to study the implications of raising the minimum age to purchase tobacco products. The resulting report, *Public Health Implications of Raising the Minimum Age of Legal Access to Tobacco Products*, published in 2015 by the Institute of Medicine (now known as the National Academy of Medicine), analyzed the potential effects of raising the minimum legal age of access to 21 and to 25 and concluded that increasing the minimum age of legal access to tobacco will “likely prevent or delay initiation of tobacco use by adolescents and young adults”<sup>136,p.2</sup> and “will likely lead to substantial reductions in smoking-related mortality.”<sup>136,p.3</sup> Although FDA is not permitted to raise the minimum legal age of sale, states and localities are free to do so. As of August 2017, more than 250 localities and 5 states had raised the legal age of sale of tobacco products to 21 years.<sup>3</sup>

## Tobacco Tax Policies and Price

The price of tobacco products is a major factor determining their use<sup>100,148,149</sup>; although many factors affect the price of cigarettes paid by the consumer, the factor that is most amenable to the influence of policy is cigarette taxes. NCI Tobacco Control Monograph 21 concluded that:

- A substantial body of research, which has accumulated over many decades and from many countries, shows that significantly increasing the excise tax and price of tobacco products is the single most consistently effective tool for reducing tobacco use.<sup>70,p.151</sup>
- Significant increases in tobacco taxes and prices reduce tobacco use by leading some current users to quit, preventing potential users from initiating use, and reducing consumption among current users.<sup>70,p.151</sup>
- Tobacco use by young people is generally more responsive to changes in taxes and prices of tobacco products than tobacco use by older people.<sup>70,p.151</sup>
- Lower income populations often respond more to tobacco tax and price increases than higher income populations. As a result, significant tobacco tax and price increases can help reduce the health disparities resulting from tobacco use.<sup>70,p.585</sup>

In the United States, the federal government, all 50 states, the District of Columbia, Puerto Rico, Guam, Northern Marianas, and many local governments impose taxes on cigarettes. There are two types of excise taxes on tobacco products in the United States—specific and *ad valorem*. A specific excise tax is a fixed monetary amount of tax per quantity, volume, or weight of tobacco products (e.g., dollars per pack, carton, or kilogram). Specific excise taxes do not fluctuate with the price of tobacco. *Ad valorem* taxes, on the other hand, are a fixed percentage of the value of the tobacco product (e.g., a percentage of the wholesale or retail price). Thus, *ad valorem* taxes increase or decrease as cigarette and other tobacco prices change. In the United States, cigarettes are taxed through specific excise taxes.<sup>70</sup> However, states with sales tax also apply their sales tax (i.e., a non-excise, *ad valorem* tax) to cigarettes; most apply it to the cigarette price inclusive of the excise tax.

### Federal Cigarette Tax Policy

The federal tax on cigarettes increased from \$0.39 per pack to \$1.0066 per pack on April 1, 2009, a level that was still in effect as of 2017. The revenue generated from the 2009 tobacco tax increase is being used to fund an expansion of the State Children’s Health Insurance Program (SCHIP). The 2009 federal tax increase was the first federal cigarette tax increase since the two-stage increase mandated by the Balanced Budget Act of 1997, which raised the federal cigarette tax from \$0.24 per pack to \$0.34 per pack on January 1, 2000, and from \$0.34 per pack to \$0.39 per pack on January 1, 2002. (See Table 11.4.)

**Table 11.4 Federal Cigarette Excise Taxes for Selected Dates, 1993–2016**

Effective Date	Tax per Pack of 20 Cigarettes
January 1, 1993	\$0.24
January 1, 2000	\$0.34
January 1, 2002	\$0.39
April 1, 2009	\$1.0066

Sources: Orzechowski and Walker 2009<sup>285</sup>; Campaign for Tobacco Free Kids 2017.<sup>3</sup>

In addition to raising the federal cigarette excise tax, the 2009 increase also applied the same tax rate to cigarette-like small cigars (from \$0.037 cents per pack to \$1.0066 cents per pack) and to roll-your-own tobacco (from \$0.045 cents per pack to \$1.0066 cents per pack).<sup>150</sup> Substantial differences remain between federal taxes on cigarettes, small cigars, roll-your-own tobacco, and other tobacco products, including regular cigars and smokeless tobacco; non-cigarette tobacco products are generally taxed at lower rates than cigarettes.

**State and Local Tobacco Tax Policy**

All 50 states, the District of Columbia, Puerto Rico, Guam, and Northern Marianas currently impose an excise tax on cigarettes. As of April 1, 2017, state excise tax rates ranged from a low of \$0.17 per pack in Missouri to \$4.35 per pack in New York<sup>3</sup> (see Table 11.5). In 2017 the average state cigarette tax was \$1.69 per pack across all 50 states and the District of Columbia, although the average tax remains much lower (\$0.485 per pack) in tobacco-growing states.<sup>3</sup> State excise taxes have increased considerably over time; from 2002 to 2017, 48 states and the District of Columbia increased their excise taxes on cigarettes at least once. Combined, the states and the District of Columbia have passed more than 128 separate excise tax increases since January 1, 2002.<sup>3</sup> Since the federal tax increase in 2009, some states have increased excise tax rates on non-cigarette tobacco products, although in most states the tax rate on these products remains markedly lower than the cigarette excise tax rate.<sup>151</sup> These changes in federal and state taxes, combined with manufacturers’ efforts to adjust product weight to qualify for lower taxes, are believed to partially account for increased cigar use, and could contribute to TRHD among groups that favor these products, notably African Americans, youths, and young adults.<sup>110,112,152,153</sup>

**Table 11.5 State/Local Cigarette Excise Tax, 2017**

State/Locality	Excise Tax (\$)	Rank	State/Locality	Excise Tax (\$)	Rank
Alabama	0.675	40	Nebraska	0.64	41
Alaska	2.00	14	Nevada	1.80	20
Arizona	2.00	14	New Hampshire	1.78	21
Arkansas	1.15	34	New Jersey	2.70	10
California	2.87	9	New Mexico	1.66	24
Colorado	0.84	38	New York	4.35	1
Connecticut	3.90	2	North Carolina	0.45	47
Delaware	1.60	25	North Dakota	0.44	48

Table 11.5 continued

State/Locality	Excise Tax (\$)	Rank	State/Locality	Excise Tax (\$)	Rank
District of Columbia	2.50	13	Ohio	1.60	25
Florida	1.339	30	Oklahoma	1.03	36
Georgia	0.37	49	Oregon	1.32	31
Hawaii	3.20	5	Pennsylvania	2.60	11
Idaho	0.57	45	Rhode Island	3.75	3
Illinois	1.98	19	South Carolina	0.57	45
Indiana	0.995	37	South Dakota	1.53	27
Iowa	1.36	29	Tennessee	0.62	42
Kansas	1.29	32	Texas	1.41	28
Kentucky	0.60	43	Utah	1.70	22
Louisiana	1.08	35	Vermont	3.08	6
Maine	2.00	14	Virginia	0.30	50
Maryland	2.00	14	Washington	3.025	8
Massachusetts	3.51	4	West Virginia	1.20	33
Michigan	2.00	14	Wisconsin	2.52	12
Minnesota	3.04	7	Wyoming	0.60	43
Mississippi	0.68	39	Puerto Rico	3.40	
Missouri	0.17	51	Guam	3.00	
Montana	1.70	22	Northern Marianas	1.75	

Note: Table shows all cigarette tax rates in effect as of April 1, 2017.

Source: Campaign for Tobacco-Free Kids 2017.<sup>3</sup>

Hundreds of municipalities and counties also tax cigarettes, with most applying a relatively small tax compared with state tax rates. However, on occasion, cities and counties have implemented large tax increases. For example, on January 1, 2011, the city of Anchorage, Alaska, increased the tax on cigarettes by \$0.75 per pack, yielding a total city cigarette tax of \$2.21. In 2002, New York City increased its tax on cigarettes from 8 cents per pack to \$1.50 per pack. Similarly, the city of Chicago and Cook County, Illinois, raised taxes on cigarettes. In 2017, the combination of federal, state, and local taxes meant that individuals purchasing cigarettes in New York City paid \$6.86 per pack in taxes, and Chicagoans paid \$7.17 per pack in taxes.<sup>3</sup>

### Impact of Cigarette Tax Policy and Price on Cigarette Demand

One of the fundamental principles of economics—the downward-sloping demand curve—holds that as the real price of a good increases, the consumption of that good falls. At one time, some researchers believed that cigarettes would be an exception to this fundamental principle, given the addictive nature of nicotine. However, numerous econometric studies conducted over the past four decades, including several studies that explicitly modeled the addictive properties of cigarettes, have confirmed that an inverse relationship exists between cigarette prices and cigarette consumption.

The years 1997–2002 witnessed one of the largest increases in the inflation-adjusted price of cigarettes in the United States. The real price of cigarettes increased by 71.1% during this period, partly because of significant increases in the wholesale price of cigarettes. Between 1998 and 2003, wholesale cigarette prices increased 122%,<sup>154</sup> largely as a result of the costs associated with the four individual state tobacco settlement expenses and expenses related to the MSA. The increased retail price was also partly the result of the two federal tax increases and numerous increases in state excise taxes. Cigarette tax increases led to proportional or more than proportional increases in the retail price of cigarettes. It is important to note that because excise taxes are per-unit taxes, the inflation-adjusted value of the tax will fall over time unless these taxes are increased regularly; in fact, given the importance of tax in determining the price of cigarettes, infrequent increases in the tax will likely result in declines in inflation-adjusted cigarette prices over time.

Economists measure how responsive cigarette consumption is to changes in the real price of cigarettes using a concept known as the price elasticity of demand, defined as the percentage change in the amount of cigarettes consumed that results from a 1% change in the price of cigarettes. For example, a price elasticity of  $-0.5$  means that a 10% increase in price will result in a 5% decrease in consumption.

A substantial body of economic research has estimated the price elasticity of demand for cigarettes. The findings from this research clearly demonstrate that the consumption of cigarettes is inversely related to the price of cigarettes. The consensus estimate from reviews of the literature is that the overall price elasticity of demand for cigarettes in the United States falls in a narrow range of  $-0.3$  to  $-0.5$ .<sup>14,148,155</sup> These reviews suggest that approximately one-half of the effect of price increases on cigarette consumption comes from decreases in smoking prevalence rates, with the remaining effect of price increases coming from decreases in smoking intensity among those who continue to smoke. Among adults, much of the impact of price increases on smoking prevalence is driven by increased cessation; among youth, much of the impact of price increases on smoking is attributable to decreased initiation.<sup>14,148,155</sup>

### Impact of Price on Cigarette Demand by Age

Economic theory predicts that adolescents and young adults will be much more responsive to price changes than older adults; that is, the demand for cigarettes among adolescents and young adults is expected to be more price elastic than the demand among older adults. There are several reasons for this prediction. First, the fraction of disposable income spent on cigarettes by young smokers is likely to be larger than that spent by adult smokers.<sup>156</sup> Economic theory predicts that the greater the share of disposable income a good takes up, the more responsive individuals will be to price changes. Second, adolescents and young adults typically have a greater propensity to discount the future than adults<sup>156</sup>—that is, young people place a relatively greater importance on short-term costs of smoking such as the purchase price of cigarettes, than on long-term costs of smoking such as its future health effects. Third, young smokers are likely to be more sensitive to price because they are likely to have shorter smoking histories than adults and therefore may be less addicted than long-time smokers.<sup>157</sup> Fourth, adolescents and young adults are likely to be more influenced by their peers (friends, siblings) than adults are; compared with older adults, young people are more likely to smoke if their peers also smoke.<sup>157</sup> This finding implies that an increase in the cigarette price would not only reduce youth smoking directly but would also reduce it indirectly by decreasing peer smoking.

Numerous econometric studies examining the determinants of youth and young adult cigarette use have been conducted since the 1980s. With few exceptions, these studies have taken advantage of natural experiments occasioned by government changes in cigarette taxes and/or prices. Consistent with economic theory, these studies have found demand for cigarettes among youth and young adults is inversely related to cigarette prices, and most studies have found that the absolute value of the price elasticity of demand is larger for youth and young adults than for older adults. Higher prices appear to deter smoking initiation, decrease the probability of smoking escalation, and increase smoking cessation by young adults.

Lewit and colleagues<sup>157</sup> were the first to assess the impact of cigarette prices on smoking by U.S. youth. Using data from the nationally representative 1966–1970 National Health and Nutrition Examination Survey (NHANES)(Cycle III), this study estimated an overall price elasticity of  $-1.44$ . The strongest impact of price was seen on prevalence, for which the price elasticity was estimated to be  $-1.20$ ; the price elasticity for consumption among young smokers was  $-0.25$ . A follow-up study by Lewit and Coate used the 1976 Health Interview Survey to estimate smoking prevalence and intensity of smoking for populations defined by gender and age.<sup>158</sup> This study found that young adults (ages 20–25 years) were the most responsive to changes in price, with an estimated total price elasticity of demand equal to  $-0.89$ . The authors estimated the total price elasticity of demand for adults ages 26 through 35 at  $-0.47$ , and for adults ages 36 through 74 at  $-0.45$ .

In the early 1990s, two other U.S. studies cast doubt on these early studies by finding that price elasticity among young people was not greater than among adults. Chaloupka<sup>159</sup> used data from the second NHANES, conducted from 1976 to 1980, to estimate the cigarette demand equations. Applying Becker and Murphy's theoretical model of rational addiction, he found young adults ages 17–24 to be insensitive to changes in price, whereas individuals age 25–64 showed a significant long-run response to a change in price, with an estimated long-run price elasticity of demand in the range of  $-0.46$  to  $-0.31$ .

Similarly, Wasserman and colleagues<sup>160</sup> used data on 1,891 adolescents ages 12–17 from the second NHANES (1976–1980) and data on adults taken from several waves of the National Health Interview Survey (NHIS) conducted in the 1970s and 1980s to estimate cigarette demand equations.<sup>160</sup> They focused on the effects of cigarette prices while controlling for state policies restricting smoking in public places and a host of socioeconomic and demographic variables. These researchers found no statistically significant differences in the price elasticity of demand among youth versus adult smokers. They attributed much of the difference between their findings and those of Lewit and colleagues' previous studies<sup>157,158</sup> to their inclusion of a measure reflecting the magnitude of restrictions on smoking in public places and its correlation with cigarette prices. When Wasserman and colleagues excluded the smoking restrictions measure from their models, they obtained price elasticities similar to those found by earlier studies. Thus, they argued that price elasticity estimates were affected by an omitted variables bias when the smoking restrictions measure was not included.

Beginning in the mid-1990s, however, a series of papers were published that supported the early findings of Lewit and colleagues<sup>157,158</sup> that young people are indeed more price responsive than older people. These studies were based on data covering a period of greater variation in tax and price, which allowed for more precise estimates of the impact of price. For example, Chaloupka and Grossman<sup>156</sup> used data on 8th-, 10th-, and 12th-grade students taken from the 1992, 1993, and 1994 MTF longitudinal surveys and calculated a total price elasticity for youth smoking of  $-1.31$ . However, in contrast to Lewit and colleagues' finding<sup>157</sup> that most of the impact of price was on smoking prevalence, Chaloupka and



Grossman<sup>156</sup> found that approximately one-half of the effect of price was on smoking prevalence and one-half was on smoking intensity. This study controlled for other smoking-related interventions, such as restrictions on smoking in public places and schools as well as youth access restrictions, and refuted Wasserman and colleagues' earlier contention that previous studies reporting price effects had been affected by an omitted variables bias.

A CDC report authored by Farrelly and Bray<sup>161</sup> estimated cigarette demand equations in the United States using data from the National Health Interview Surveys that had included tobacco smoking items (conducted in 1976–1980, 1983, 1985, and 1987–1993). They estimated total price elasticities of demand for different age groups:  $-0.58$  for young adults ages 18–24 years,  $-0.42$  for adults ages 25–39 years, and  $-0.10$  for adults age 40 and older. The total price elasticity of demand for young adults,  $-0.58$ , is more than double the total price elasticity of demand for all respondents, which was  $-0.25$ .

Lewit and colleagues<sup>162</sup> assessed the impact of cigarette prices on youth smoking prevalence and intentions to smoke using data from cross-sectional surveys of 9th-grade students in the 22 U.S. and Canadian sites that were part of the Community Intervention Trial for Smoking Cessation in 1990 and 1992.<sup>162</sup> They concluded that the price elasticity of demand for 9th-graders was  $-0.87$  and that intentions to smoke among nonsmokers were somewhat more price-elastic, with an estimated elasticity of  $-0.95$ .

Tauras and Chaloupka<sup>163</sup> followed individuals from each cohort in the 1976–1993 MTF longitudinal surveys of high school seniors through a maximum of seven follow-ups. Using an individual fixed effects model, they linked increases in cigarette prices to significant reductions in both the number of young adults who smoked and the intensity with which they smoked. The estimated total average price elasticity of demand was found to be  $-0.79$ , with price having a smaller effect on smoking prevalence than on smoking intensity.

Almost all econometric research conducted in the 2000s confirmed earlier findings of an inverse relationship between price response and age. Ross and Chaloupka<sup>164</sup> examined the effect of cigarette prices on smoking among high school students in the United States and estimated total price elasticities of demand of  $-0.67$  when using average state prices, and  $1.02$  when using perceived prices among youth. Tauras and colleagues<sup>165</sup> investigated the impact of cigarette prices and tobacco control policies on youth and young adult smoking from the late 1990s through the early 2000s in the United States, a period characterized by significant changes in cigarette prices and taxes. Using the first five waves of data (1997–2001) from the 1997 National Longitudinal Survey of Youth (NLSY) and controlling for unobserved year and individual characteristics, they also found a strong negative impact of cigarette prices and taxes on young people's smoking prevalence and intensity. Specifically, they estimated a total price elasticity of cigarette demand of  $-0.83$ , a price elasticity of demand of smoking prevalence of  $-0.31$ , and a price elasticity of demand of smoking intensity of  $-0.52$ .

Sloan and Trogon<sup>46</sup> used data from the Behavioral Risk Factor Surveillance System from the 1990s and early 2000s to estimate smoking prevalence equations among young adults (ages 18–20) and older adults (21 and older). Using both state and year fixed effects, the authors estimated smoking prevalence elasticity of demand for young adults at  $-0.27$  and concluded that smoking prevalence was more price-elastic in young adults than in older adults. They also found that the absolute value of the price elasticity of smoking prevalence declined monotonically with age, with the exception of individuals age 65 and older.

Unlike several previous studies that had used dichotomous state indicators to indirectly control for state-level anti-smoking sentiment, DeCicca and colleagues<sup>166,167</sup> used factor analysis to evaluate attitudinal and belief items from the TUS-CPS administered during the 1990s to develop a direct measure of state-specific anti-smoking sentiment. By linking this anti-smoking sentiment measure to youth smoking data from the 1992 and 2000 waves of the National Education Longitudinal Study (NELS), these authors found price to have a strong, significant, negative impact on smoking prevalence and intensity in young smokers. Estimated price elasticities of smoking prevalence and intensity ranged from  $-0.59$  to  $-0.76$  for the 1992 data and from  $-0.3$  to  $-0.66$  for the 2000 data. Although price consistently had a strong negative influence on the intensity of cigarette use by young smokers in the 2000 cross-section, the price effects lost statistical significance when the direct measure of anti-smoking sentiment was included in the smoking prevalence equations. Using the 2000 wave of data, the authors compared models using the various measures of anti-smoking sentiment. Price was found to have a negative, significant impact on smoking prevalence among youths only when the direct measure of anti-smoking sentiment was excluded. Thus, DeCicca and colleagues question the adequacy of other proxy measures to control for anti-smoking sentiment. However, some caution should be used in interpreting models that include a direct measure of anti-smoking sentiment because state smoking prevalence is likely to influence the state level of anti-smoking sentiment and vice versa, resulting in simultaneity bias.

Carpenter and Cook<sup>168</sup> used national, state, and local YRBS data from 1991 to 2005 to test three alternative methods of dealing with anti-smoking sentiment. First, they estimated a cross-sectional model that relied on intra-state variation in cigarette taxes to identify the impact of price on youth smoking. Second, they estimated a fixed effects model that controlled for area (i.e., state, local) fixed effects and year fixed effects to discern whether the effects were influenced by time or location. Year fixed effects were simply dichotomous indicators for each year of data that was employed, less one year that is intentionally omitted from the equation as the reference category. The same formula was applied for area fixed effects; dichotomous indicators were developed for each location, less one location that is intentionally omitted as the reference category. Employing the same measure of anti-smoking sentiment used by DeCicca and colleagues,<sup>167</sup> Carpenter and Cook found clear and consistent evidence of a negative, significant effect of cigarette taxes on smoking prevalence in the cross-sectional and fixed effects models. Even more importantly, using DeCicca and colleagues' measure of anti-smoking sentiment as well as tax effects from national and state samples, they found a strong negative effect of taxes on smoking prevalence among youths, alleviating concerns raised by that earlier work; estimated price elasticities for youth smoking prevalence were  $-0.56$  in the national sample and  $-0.25$  in the state sample.<sup>168</sup>

### **Differentiating the Impact of Price on Cigarette Smoking Initiation, Prevalence, and Cessation Efforts**

Many researchers examining the impact of price on adolescent smoking prevalence have found that much of the effect of price is felt in relation to smoking initiation. For young adults and adults, on the other hand, price seems to have its strongest effects in the areas of smoking escalation and cessation. Several recent studies have attempted to directly quantify the impact of price on smoking initiation among youths and on smoking escalation and cessation among young adults. Most recent studies, including those described below, have used longitudinal data that track individuals' smoking behavior and other determinants over time. For modeling smoking transitions, longitudinal data is preferred over cross-sectional data with retrospective information.

The first study to examine the impact of price on youth smoking initiation using longitudinal data was conducted by Tauras and colleagues.<sup>169</sup> This study used data from three cohorts of students enrolled in the 8th and 10th grades in 1991, 1992, and 1993 as part of the longitudinal component of the MTF project. The authors examined three alternative measures of smoking initiation, including the transitions from not smoking to smoking any positive amount, smoking at least 1–5 cigarettes per day on average, and smoking at least one-half pack per day on average. The average price elasticity of initiation of any smoking was estimated at  $-0.27$ ; for smoking an average of at least 1 to 5 cigarettes per day, the estimate was  $-0.81$ ; and for smoking an average of at least one-half pack per day, the estimated price elasticity was  $-0.96$ . These estimates imply that youth smoking initiation is quite responsive to changes in cigarette prices.

As Cawley and colleagues<sup>170,171</sup> conclude, smoking initiation among adolescent girls is significantly influenced by weight-related factors (e.g., self-described overweight, body mass index, reports of trying to lose weight), while smoking initiation among adolescent boys is significantly affected by cigarette prices, with neither factor being significant for the opposite gender. For boys, Cawley and colleagues<sup>170</sup> found that price had a greater impact on the initiation of more regular smoking, estimating elasticities of  $-0.86$  for any smoking initiation, and  $-1.49$  for initiation of frequent smoking. However, for girls, Cawley and colleagues<sup>171</sup> found a price elasticity of initiation of  $-0.24$  compared to  $-1.2$  for boys. These findings suggest that gender-specific differences in the impact of price may account for the mixed findings about price and initiation from previous studies.

DeCicca and colleagues<sup>166</sup> also examined the influence of price and tax on smoking initiation by youths and young adults, using data from the 1988, 1990, 1992, and 2000 waves of the NELS. They found price to have a strong, significant, negative influence on smoking initiation when state fixed effects were excluded from the model. However, when state fixed effects were included in the regressions, price failed to reach significance at conventional levels. The authors concluded that unobserved state-level heterogeneity (possibly anti-smoking sentiment), not price, drove youth and young adult smoking initiation.

In another analysis, DeCicca and colleagues<sup>167</sup> used data from the 1992 and 2000 waves of the NELS to examine the influence of cigarette excise taxes on smoking initiation by young adults (ages 18 and 26). The researchers used three strategies in their identification of effects: (1) they considered intra-state variation in cigarette taxes to identify the impact of price on smoking initiation; (2) they included the direct measure of anti-smoking sentiment developed by DeCicca and colleagues<sup>166</sup> in their equations; (3) they compared the effect of cigarette taxes among young adults who had moved across state lines between 1992 and 2000 to those young adults who had remained in the same state. Cigarette taxes were found to have a significant negative impact on young adult smoking initiation only among those who had remained in the same state during this time period. The authors concluded that cigarette prices have little impact on smoking initiation. The results of this study should be considered in light of several factors. First, models that rely solely on intra-state variation in taxes give only weak evidence of a negative effect of taxes on smoking prevalence; that is, the price effect fails to reach 5% significance levels of a two-tailed test. Second, anti-smoking sentiment might develop simultaneously with smoking. Third, these results reflected a sample of individuals who had initiated smoking later in life (nonsmokers in high school but smokers by modal age 26); most adults who have ever smoked initiate smoking before this age. The smoking initiation process for older individuals might be significantly different from that for younger people.

A few studies have examined the impact of cigarette price on cessation behavior among young adults. Tauras and Chaloupka<sup>172</sup> were the first to model quit attempts using the longitudinal component of the MTF study by employing a semiparametric Cox regression to assess the probability that smokers would make a transition from smoking to nonsmoking. The authors found that the likelihood that both men and women would make a quit attempt increased significantly when cigarette prices were higher. The estimated price elasticity of transitioning to a nonsmoking status ranged between 0.27 and 0.92 for men and between 0.34 and 0.71 for women; thus, for example, a 10% increase in price would raise the probability of quitting by as much as 10%.

Expanding on the original study, Tauras<sup>173</sup> used the longitudinal component of the MTF study and employed a stratified Cox regression to model multiple quit attempts by young adults. Findings confirmed the positive relationship between cigarette prices and quit attempts, suggesting that a 10% increase in the price of cigarettes increases the likelihood of quit attempts among young adults by approximately 3.5%.

The previously mentioned study by DeCicca and colleagues<sup>167</sup> looked at the influence of cigarette excise taxes on cessation behavior among young adults, using data from the 1992 and 2000 waves of the NELS. Using intra-state variations in cigarette excise taxes, they found young adults to be responsive to tax changes. The price elasticity of prompting cessation behavior was estimated to be 0.93. The price elasticity of cessation declined to 0.47 when the direct measure of anti-smoking sentiment was added. Again, the authors compared the effect of variations in cigarette taxes on the smoking behavior of young adults who had moved across state lines between 1992 and 2000 with that of young adults who had remained in the same state in these 2 years. This analysis found that cigarette taxes had a positive impact on young adult smoking cessation only for those who had moved to a different state between 1992 and 2000. The price elasticity of cessation behavior among young adult movers was relatively large—1.49. The authors concluded that despite the lack of significance of price in this specification, which was most likely attributable to the small sample size ( $n = 321$ ), price is likely to play a strong role in cessation behavior among young adults.

Tauras<sup>174</sup> examined the impact of cigarette prices on progression to established smoking among young adults in the United States—specifically, transitions from non-daily to daily smoking and from light smoking intensity (defined as 1–5 cigarettes per day on average) and moderate smoking intensity (an average of 10 cigarettes per day) to higher intensities of smoking. Baseline surveys from the 1976–1993 longitudinal components of MTF were used, with follow-up surveys through 1995. The data were adjusted for residence in a tobacco-producing state or in the state of Utah and for area fixed effects to capture census division differences in anti-smoking sentiment. Cigarette prices were found to have a strong negative impact on all smoking transitions estimated. For example, the estimated mean price elasticities were  $-0.646$  for daily use,  $-0.576$  for moderate intensity, and  $-0.412$  for heavy intensity, which would mean that a 10% increase in cigarette prices would decrease daily use by approximately 6.46%, moderate intensity by about 5.76%, and heavy intensity by about 4.12%. These findings clearly demonstrate that cigarette price increases will prevent many young adults from progressing to higher intensities of smoking.

### Impact of Price on Cigarette Demand by Socioeconomic Status

The Surgeon General's report *Reducing Tobacco Use*<sup>14</sup> identified the elimination of TRHD as a major goal for the field. Similarly, Healthy People 2020, which delineates 10-year national objectives for

improving the health of the nation, includes as one of its four overarching goals: “achieve health equity, eliminate disparities, and improve the health of all groups.”<sup>175</sup> Although tobacco use causes disease and preventable death in all population segments, individuals from lower SES groups bear a disproportionate share of the overall health burden. As described below, the empirical evidence from the United States and other countries on demand for cigarettes among low-SES individuals, as defined by lower incomes and education, indicates that lower SES groups have a stronger response to cigarette price changes than higher SES groups.

A growing number of studies have examined differences in the price responsiveness of individuals by various SES measures. Chaloupka’s 1991 study, previously mentioned, was the first to investigate the price sensitivity of different socioeconomic groups in the United States. He estimated cigarette demand equations using the Becker–Murphy model of rational addiction and data from the second NHANES. This study found that individuals with fewer years of formal education were more responsive to changes in cigarette prices than individuals with more formal education. The price elasticity of demand ranged between  $-0.62$  and  $-0.57$  for those with fewer years of education. More-educated individuals were found to be unresponsive to changes in cigarette prices.

Using NHIS data from the 14 years of surveys between 1976 and 1993, Farrelly and colleagues estimated smoking prevalence and smoking intensity equations for various U.S. populations.<sup>176</sup> They found lower income adults to be much more price responsive than higher income adults. Total price elasticity of demand among adults with incomes at or below the median income for the sample was  $-0.43$ , whereas those with incomes above the median in the sample had a total price elasticity of demand of  $-0.10$ . The price effect of the high-income group was imprecise, however, and the estimate was not significantly different from zero. If the imprecise elasticity for the high-income group is accepted, these findings imply that low-income individuals are more than four times as responsive to changes in cigarette prices as high-income individuals.

Hersch<sup>177</sup> used data from the September 1992, January 1993, and May 1993 waves of the TUS-CPS to estimate smoking demand by income and gender. Hersch found the total price elasticity of demand for low-income women to be  $-1.71$  (prevalence elasticity was  $-0.99$ ; intensity elasticity,  $-0.72$ ), and total price elasticity of demand for low-income men,  $-1.18$  (prevalence elasticity,  $-0.58$ ; intensity elasticity,  $-0.60$ ). Among middle-income respondents, the corresponding estimated total price elasticity of demand for women was  $-0.61$  (prevalence elasticity,  $-0.06$ ; intensity elasticity,  $-0.55$ ) and for men,  $-0.84$  (prevalence elasticity,  $-0.40$ ; intensity elasticity,  $-0.44$ ). High-income males and females did not have a significant price response. Hersch concluded that cigarettes do not constitute a large enough share of the household budget for high-income individuals to influence their smoking behavior.

Using U.S. survey data, studies by Gruber and Koszegi,<sup>178</sup> Stehr,<sup>179</sup> and DeCicca and McLeod<sup>180</sup> confirmed the finding that price responsiveness and income are inversely related. A study by Franks and colleagues,<sup>181</sup> however, sparked a debate on the effects of cigarette prices on cigarette consumption and the role that SES plays in price responsiveness. This study extracted data from the 1984–2004 BRFSS and estimated the price elasticity of smoking prevalence among different socioeconomic groups during the years 1984–1996, before the MSA was signed, and in 1997–2004, after the MSA was signed. The authors found that the price elasticity of smoking prevalence in the pre-MSA years was  $-0.45$  in the lowest income group and  $-0.22$  in the highest income group—a finding consistent with previous studies. However, in the post-MSA period, they found that none of the income groups were responsive to

cigarette price changes. These researchers concluded that “increasing cigarette prices [might] no longer be an effective policy tool and [could] impose a disproportionate burden on poor smokers.”<sup>181,p.1873</sup>

Farrelly and Engelen<sup>182</sup> reevaluated Franks and colleagues’ cigarette-demand equations using slightly different periods to identify the pre-MSA (1990–October 1998) and post-MSA (November 1998–2006) periods and came to a different conclusion. They found that although price effects were smaller in the post-MSA period than in the pre-MSA period for middle- and high-income individuals, the lowest income group was still responsive to price.

A 2008 study by Colman and Remler<sup>183</sup> using U.S. survey data from 1992 to 2003 also suggested that low-income individuals are relatively more price-elastic. Using TUS-CPS data, they found the price elasticity of demand to be  $-0.37$  for the low-income group,  $-0.35$  for the middle-income, and  $-0.20$  for the high-income group.

Evidence from other high-income countries also supports an inverse relationship between SES and price responsiveness. For example, Townsend and colleagues<sup>184</sup> found that individuals in the highest social class in Great Britain exhibited little price responsiveness, whereas individuals in the lowest social class showed a significant response to changes in cigarette prices, with a price elasticity of demand close to  $-1.0$ . Similarly, Siahpush and colleagues,<sup>185</sup> using monthly survey data from the 1991–2006 Australian population surveys, concluded that smoking prevalence of low-income individuals was significantly more responsive to price changes than that of medium- or high-income individuals. Specifically, they found the prevalence price elasticity of demand to be  $-0.32$  for low-income groups,  $-0.04$  for medium-income, and  $-0.02$  for high-income groups. Hill and colleagues, in a 2014 review of the literature, examined English-language articles from countries at advanced stages of the tobacco epidemic and found strong evidence that increases in tobacco prices have a pro-equity effect on socioeconomic disparities in smoking.<sup>186</sup>

The World Bank’s report *Curbing the Epidemic: Governments and the Economics of Tobacco Control*<sup>187</sup> presented evidence suggesting that low-income, developing countries have larger price elasticities in absolute value when compared with high-income, developed countries. This finding was extended and confirmed by NCI Tobacco Control Monograph 21, which stated:

Much of the recent evidence indicates that demand for tobacco products in LMICs is at least as responsive to price as demand in HICs, and likely more responsive. In HICs, most estimates of elasticities of demand range from  $-0.2$  to  $-0.6$ , clustering around  $-0.4$ . In LMICs, elasticity estimates range from  $-0.2$  to  $-0.8$ , clustering around  $-0.5$ . Thus, in HICs a 10% increase in the price of cigarettes may be expected to decrease tobacco consumption by 4%, while in LMICs a 10% increase in price may be expected to decrease consumption by 5%.<sup>70,p.150</sup>

Researchers have also considered the question of tobacco taxes and equity, noting the importance of ensuring that tobacco control measures reach those who are most burdened by TRHD. Tobacco taxes are often seen as regressive—that is, the poor who are more likely to smoke and have less income to spend pay a larger share of their income on tobacco taxes—and this argument is often used by the tobacco industry to oppose tobacco tax increases.<sup>188</sup> However, because lower income populations are generally more responsive to tobacco tax and price increases than higher income populations, a tax increase will have a greater impact on, and thus provide a greater benefit to, low-income smokers than higher income

smokers. Indeed, research demonstrates that increased tobacco taxes can reduce inequities in tobacco use.<sup>70,189–191</sup> Allocating a portion of the revenue from higher tobacco taxes to programs that serve the needs of low-income populations, including tobacco control and other health programs, can increase the pro-equity effect of tobacco taxes.<sup>189</sup>

### Impact of Price on Cigarette Demand by Race/Ethnicity

Many studies find that African American and Hispanic adolescents and adults are more responsive to changes in cigarette prices than white adolescents and adults. This finding is supported by the significant decline in smoking prevalence rates among African American and Hispanic adolescents and adults between 1997 and 2004, a period of dramatic price increases in the United States. In some instances, the estimated price response was found to be extremely large. For example, Chaloupka and Pacula<sup>192</sup> were the first to examine racial differences in the impact of cigarette prices, youth access laws, and smoke-free policies on adolescent smoking prevalence. Using 1992, 1993, and 1994 MTF survey data and controlling for demographic and socioeconomic variables such as parental education and youth income from all sources, the researchers found that African American adolescents were more responsive to price changes than white adolescents. The estimated prevalence price elasticity of demand was  $-1.11$  for black compared to  $-0.64$  for white adolescents, which suggests that black adolescent smoking prevalence is nearly twice as responsive to changes in cigarette prices as the smoking prevalence of white adolescents.

Using several different youth surveys, Gruber and Zinman<sup>193</sup> estimated separate cigarette demand equations for white and non-white youths and for white and black youths. Using the MTF survey, these authors found that both white and non-white 8th- and 10th-graders were unresponsive to price changes. White 12th-graders were also unresponsive to price changes, but non-white 12th-graders were extremely responsive; their price elasticity of demand was an estimated  $-4.35$ . This extremely high price elasticity estimate among the older non-white group could not be further analyzed because the non-white racial category could not be disaggregated into different racial/ethnic categories. Using the YRBS, Gruber and Zinman compared the price responsiveness of black and white youths by age. Younger teenagers were defined as 8th-, 9th-, or 10th-graders; 12th-grade students were classified as older teenagers. Again, both younger and older white teenagers as well as younger black teenagers were found to be unresponsive to price changes. Older black teenagers, however, were responsive to price changes, with an extremely high estimated price elasticity of demand of  $-17.51$ , a prevalence elasticity of  $-9.26$ , and a conditional demand elasticity of  $-8.25$ . Lastly, using the Vital Statistics Natality data, these researchers found that black teen mothers were unresponsive to cigarette price changes compared with white teen mothers, who significantly decreased cigarette consumption when prices increased. These conflicting findings and the extremely high price elasticity estimates for non-whites and blacks are thought to reflect the relative stability of cigarette taxes—that is, lack of within-state variation in cigarette prices—during the period when the data were collected (1991–1997).

DeCicca and colleagues<sup>194</sup> used NELS data to examine the impact of cigarette prices on smoking among white, black, and Hispanic adolescents. Unlike previous studies of the determinants of smoking prevalence or average smoking, this study examined the determinants of smoking initiation. Cigarette price was found to be an insignificant determinant of smoking initiation by white adolescents, but it had a negative effect on smoking initiation by black and Hispanic adolescents.

Farrelly and colleagues<sup>176</sup> used NHIS data (1976–1993) to analyze the effect of cigarette prices on adult smoking prevalence and intensity by race/ethnicity. They found that cigarette prices were an important

determinant of black and Hispanic smoking prevalence and average consumption. Although cigarette prices were inversely related to average cigarette consumption among whites, prices were not found to be associated with smoking prevalence among whites. The estimated total price elasticity estimates of demand suggested that black adults were more than twice as price responsive as white adults, and that Hispanics were more than six times as price responsive as white adults. Specifically, the total estimated price elasticity of demand was  $-0.15$  for whites,  $-0.35$  for blacks, and  $-0.93$  for Hispanics.

Several other studies conducted between 2000 and 2017 found similar effects of cigarette price by age and race/ethnicity.<sup>186,195</sup> Using data from the 1991 through 2010 MTF surveys, Tauras and colleagues<sup>196</sup> found that higher cigarette prices will reduce smoking prevalence rates among black, Hispanic, female, and low-SES youth groups faster than the overall youth population and other population groups. The researchers found that black and Hispanic youth had the strongest response, with price elasticities estimated to be  $-0.718$  and  $-0.444$ , respectively.

The Community Preventive Services Task Force<sup>197</sup> conducted extensive reviews on cigarette price elasticity among various populations; these studies consistently showed larger price elasticity estimates among low-income tobacco users and among young people. The Task Force concluded that interventions to increase the price of tobacco products are an effective approach to reducing TRHD by income and age. The Task Force also found that price elasticity estimates were greatest for Hispanic populations, followed by African Americans, and concluded that price interventions may have the potential to reduce TRHD associated with race and ethnicity.

Hawkins and colleagues<sup>198</sup> assessed the effects of tobacco control policies, including state cigarette taxes, on pregnant women and infants. These researchers found that white and black mothers with the least amount of education (0–11 years) had the strongest responses to cigarette taxes; they also had the highest prevalence of maternal smoking during pregnancy (42.4% and 20.0%, respectively) and the poorest birth outcomes. Among these mothers, tax increases also reduced the risk of having low-birth-weight, preterm, and small-for-gestational-age babies, but increased the risk of having large-for-gestational-age babies.

Overall, econometric research has generally found Hispanic and black adolescents and adults to be more responsive to changes in cigarette prices than whites. However, it is possible that the differential response to price could reflect unobserved socioeconomic differences or other factors.

## Smoke-Free Policy

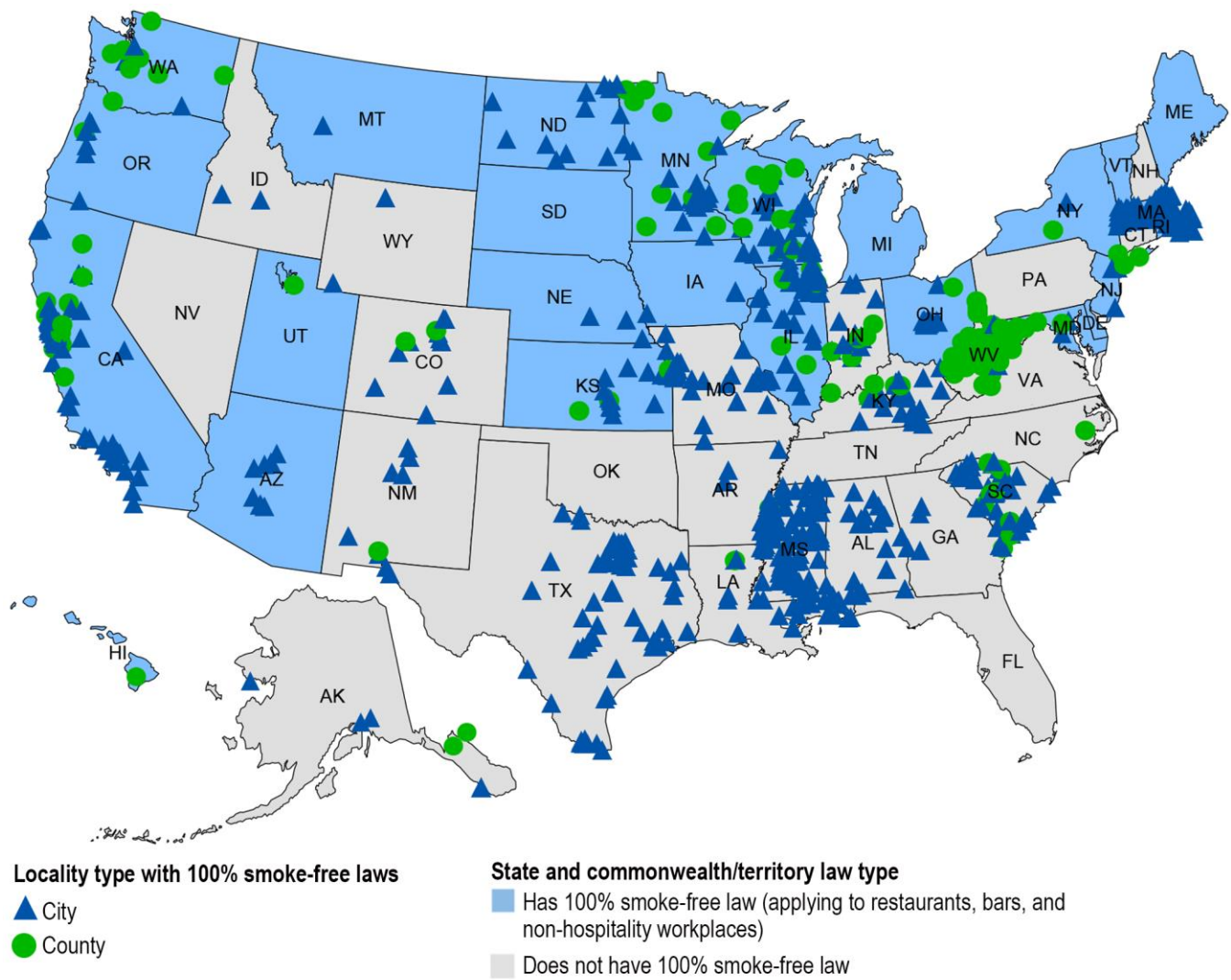
Strong progress has been made over the past three decades in protecting the public from exposure to secondhand smoke (SHS). Legislation restricting smoking in public places and worksites has been enacted in many jurisdictions across the United States, and existing laws have been made stronger and more comprehensive.<sup>199</sup>

The earliest laws restricting smoking were intended to prevent fires and food contamination, but as evidence emerged about the adverse health consequences of SHS exposure, laws were adopted to protect public health. Momentum to establish new policies increased significantly with the release of the 1986 Surgeon General's report *The Health Consequences of Involuntary Smoking*, which concluded that exposure to SHS causes disease, including lung cancer, in healthy nonsmokers; that children of parents who smoke were at increased risk of respiratory diseases; and that simply separating smokers from



nonsmokers does not eliminate nonsmokers' exposure to SHS.<sup>200</sup> This report contributed to passage of federal regulations banning smoking on domestic airplane flights of 2 hours or less and eventually on virtually all domestic flights (in 1990) and all international flights (in 2000) departing from or arriving in the United States.<sup>201</sup> Findings from *The Health Consequences of Involuntary Smoking* were confirmed and expanded by many subsequent reports, including a second Surgeon General's report<sup>202</sup> and reports by the Environmental Protection Agency,<sup>203</sup> the California Environmental Protection Agency,<sup>204</sup> and the International Agency for Research on Cancer.<sup>205,206</sup> To protect children from exposure to SHS, federal law (the Pro-Children Act of 1994) prohibits smoking in indoor facilities which regularly provide services to children, including education, day care, health care, and early childhood development (e.g., Head Start, the Special Supplemental Nutrition Program for Women, Infants, and Children).<sup>207,208</sup> As shown in Figure 11.1, as of April 2017, about half of U.S. states had laws requiring workplaces, restaurants, and bars to be 100% smoke free.

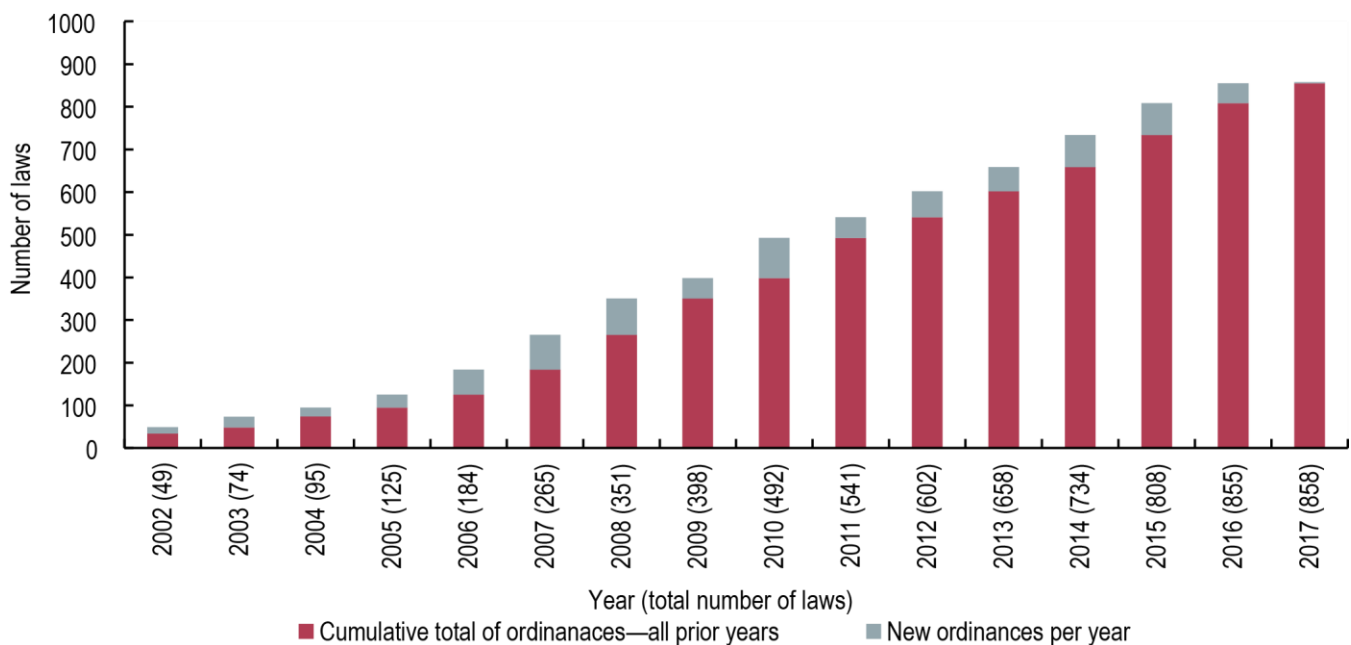
Figure 11.1 100% Smoke-Free Policies in the United States, 2017



Source: Adapted from Americans for Nonsmokers' Rights 2017.<sup>209</sup>

According to the Americans for Nonsmokers' Rights Foundation (ANRF), as of July 3, 2017, 36 states and the District of Columbia had laws in effect requiring non-hospitality workplaces, restaurants, bars, and/or state-run gambling establishments to be 100% smoke free.<sup>209</sup> Additionally, 1,395 municipalities had a 100% smoke-free provision in effect at the local level in workplaces, restaurants, and/or bars, and 915 municipalities required all three venues—workplaces, restaurants, and bars—to be 100% smoke free. ANRF estimates that as of July 3, 2017, 58.3% of the total U.S. population was covered by a state or local policy that made restaurants, workplaces, and bars 100% smoke free, and 65.5% of the population is covered by a policy that required restaurants and bars to be 100% smoke free.<sup>209</sup> Figure 11.2 illustrates the growth in the number of these comprehensive policies at the local level over the past two decades.

**Figure 11.2 Local Smoke-Free Laws Covering Workplaces, Restaurants, and Bars, 2002–2017**



*Notes:* This figure only includes ordinances or regulations that have effective dates through 2017, do not allow smoking in attached bars or separately ventilated rooms, and do not have size exemptions. The jurisdictions affected by county-level laws vary widely. Workplaces are defined as both public and private non-hospitality workplaces, including, but not limited to, offices, factories, and warehouses. Restaurants include any attached bar in the restaurant. *Source:* Adapted from Americans for Nonsmokers' Rights 2017.<sup>209</sup>

In general, research has demonstrated that smoke-free state and local policies are self-enforcing and that compliance is high within a short time after implementation.<sup>210–212</sup> As a result, these policies are highly effective in reducing nonsmokers' exposure to SHS.<sup>202,213</sup>

In addition to protecting nonsmokers from exposure to SHS, smoke-free policies contribute to reducing cigarette smoking because they strengthen social norms against smoking, limit opportunities for smoking, and increase the inconvenience of smoking.<sup>206,214</sup> Comprehensive reviews of the research on the impact of smoke-free workplace policies by NCI,<sup>215</sup> the Community Preventive Services Task Force,<sup>18,213</sup> the Surgeon General,<sup>202</sup> and the International Agency for Research on Cancer,<sup>206</sup> among others, have found that these policies are effective in prompting cessation and in reducing cigarette consumption overall. For example, NCI Tobacco Control Monograph 21 concludes that “comprehensive smoke-free policies reduce exposure to SHS; compliance with these policies is generally high, and

public support for them is strong,” and that “comprehensive smoke-free policies in workplaces reduce active smoking behaviors including cigarette consumption and smoking prevalence.”<sup>70,p.221</sup>

A 2015 report by the CDC<sup>216</sup> estimated the percentage of the U.S. nonsmoking population exposed to SHS by evaluating levels of serum cotinine, a metabolite of nicotine and marker of SHS exposure. This report concluded that the prevalence of serum cotinine greater than or equal to 0.05 ng/mL in the nonsmoking U.S. population (ages 3 and older) declined significantly from 1999-2000 (52.5%) to 2011-2012 (25.3%). Much of this decline can be attributed to a significant increase in the number of state and local laws prohibiting smoking in indoor workplaces and other public places and to a decrease in smoking prevalence rates.<sup>216</sup> Increasingly, smoke-free policies are being extended to previously unregulated areas, including outdoor spaces (such as beaches, public parks, and outdoor dining areas of restaurants), private cars (especially when children are present), and multiunit housing.<sup>70,p.204</sup>

In addition, a growing number of households, including those with smokers, have adopted rules banning smoking in the home. In November 2016, the U.S. Department of Housing and Urban Development (HUD) finalized a rule that requires the nation’s public housing agencies to implement a smoke-free policy for all public housing indoor areas. HUD has estimated that, as of 2016, over 600 U.S. public housing agencies have voluntarily implemented smoke-free policies in at least some of the properties they manage.<sup>217</sup> Such policies have the potential to protect the more than 7 million people who are served by public housing in the United States, many of them families with children.<sup>218</sup> By 2011, about 83% of U.S. households had smoke-free home rules in place, although a much higher percentage of households with no smokers had smoke-free home rules (95%) compared to households with smokers (61%).<sup>217</sup> Studies have also documented disparities in rates of adoption of home smoking bans. For example, using data from the TUS-CPS, Zhang and colleagues,<sup>220</sup> found that in homes with children, complete home smoking bans were less likely among households of single parents, low-income people, smokers, parents with less than a college education or without an infant in the home. Mills and colleagues<sup>221</sup> found that home smoking bans were less common in African American households than in other racial/ethnic households.

### Impact of Smoke-Free Policy by Age

Numerous studies have shown that smoke-free policies effectively reduce smoking in specific age cohorts. To assess the association between statewide smoke-free policies and smoking prevalence among adolescents ages 12–17, Chiqui<sup>222</sup> used an index developed by the ImpacTeen Project (a partnership of nationally recognized health experts that focuses on youth substance use, obesity, and physical activity) that reflects the number of places covered by these policies and the extent of their restrictions, which range from no restrictions to a complete ban. Although the analysis did not control for other factors that affect smoking prevalence or for the potential for reverse causality between prevalence and state policies, the inverse relationship found by the authors between smoking prevalence and smoke-free laws is consistent with the growing body of multivariate research, discussed below, that does take confounding into account.<sup>222</sup>

Wasserman and colleagues<sup>160</sup> were among the first researchers to employ multivariate regression techniques to assess the impact of public smoking restrictions on teenage smoking decisions. Using data from the second NHANES (conducted 1976–1980) on 1,891 adolescents ages 12–17, the authors concluded that restrictions on smoking in public places have a strong, negative, and statistically significant ( $p < 0.05$ ) impact on the total number of cigarettes smoked by adolescents; restrictions on

smoking were found to have a much larger effect on adolescents' decision on whether to smoke or not than on the average number of cigarettes they consumed.

Chaloupka and Grossman<sup>156</sup> used data from the 1992, 1993, and 1994 MTF surveys of 8th-, 10th-, and 12th-grade students to estimate smoking prevalence and smoking intensity demand equations. They found that relatively strong restrictions on smoking in public places significantly reduced the probability that adolescents would smoke but had little impact on the average number of cigarettes adolescents smoked. However, these researchers found that restrictions on smoking in schools reduced average cigarette consumption among young smokers.

Tauras and Chaloupka<sup>163</sup> used longitudinal data from the 1976–1995 MTF surveys to estimate cigarette demand equations for young adults in the United States. Using an individual fixed effects approach, this study concluded that restrictions on smoking in public places and private worksites had a strong negative impact on young adults' intensity of smoking and likelihood of smoking. Using data from the 1991–2000 MTF surveys of 8th-, 10th-, and 12th-grade students, Tauras<sup>174</sup> found that smoking restrictions in public places had a strong negative effect on the prevalence of smoking by young people and on smoking intensity among young smokers.

Chaloupka and Wechsler<sup>223</sup> used data from the 1993 Harvard Alcohol Study to examine the determinants of cigarette smoking among U.S. college students. In addition to estimating a total price elasticity of demand of  $-1.11$  for college students, they found that laws limiting smoking in restaurants and schools significantly lowered smoking prevalence rates among college students and decreased their average cigarette consumption.

Using data from the 1992-1993 TUS-CPS for males of different age groups (16–24, 25–44, and >44 years), Ohsfeldt and colleagues<sup>224</sup> found that restrictions on smoking in public places and private worksites negatively affected the likelihood of current use of cigarettes or smokeless tobacco products among all three age groups, but the effect varied by age. Workplace laws were found to have a greater impact on males older than age 24 than on males ages 16–24, and restrictions on smoking in “other” places were also found to have more impact on the probability of smoking among males older than age 24 than among younger males.

Farkas and colleagues<sup>225</sup> also used data from the TUS-CPS but, in contrast to Ohsfeldt and colleagues, they used all the waves between 1992-1993 and 1995-1996 to examine the association between smoking restrictions in the workplace and at home and smoking among adolescents ages 15–17. They found that adolescents who lived in smoke-free households were significantly less likely to be smokers than adolescents who lived in households without a smoking ban, even after controlling for the presence of smokers in the household. Moreover, adolescents who worked in smoke-free worksites were significantly less likely to be smokers compared with adolescents whose workplaces had no smoking restrictions.

Other studies suggest that stronger smoking restrictions reduce the probability of smoking escalation among young people. For example, Wakefield and colleagues<sup>226</sup> used 1996 data on U.S. high school students to determine the relationship between smoking uptake and restrictions on smoking at home, at school, and in public places. Levels of smoking uptake were defined by individual smoking histories, current smoking levels, and intentions to smoke in the future. The authors found that more restrictive policies on smoking at home, more comprehensive bans on smoking in public places, and enforced bans

on smoking in schools were associated with a greater likelihood of being at an earlier stage of smoking uptake.<sup>226</sup>

Siegel and colleagues<sup>227</sup> examined the effect of local restaurant smoking regulations on the progression to established smoking among adolescents, starting with a cohort of 2,623 Massachusetts youths (ages 12–17) at baseline and following up with them 2 years later. Adolescents living in towns with complete smoking bans in restaurants had less than one-half the odds of progression to established smoking compared with youths living in towns with weak restaurant regulations.<sup>227</sup>

Tauras<sup>174</sup> used the longitudinal component of the MTF survey from 1976 to 1995 to examine the determinants of smoking uptake transitions among adults ages 18–32 in the United States. He examined the transition from non-daily to daily smoking and from light smoking intensity (defined as 1–5 cigarettes per day) and moderate smoking intensity (10 cigarettes per day on average) to higher intensities of smoking. Private worksite restrictions and restrictions on smoking in other public places were found to have a significant negative impact on the probability of progression to moderate smoking intensity levels among the age group studied.<sup>174</sup>

A series of papers by Tauras and colleagues<sup>169</sup> estimated the effect of tobacco policies on the smoking cessation decisions of young adults in the United States. Using the longitudinal component of MTF from 1976 to 1995, they found that stronger restrictions on smoking in private worksites and other public places increased the probability of successful smoking cessation by young adults. The average hazard ratio across the alternative specifications, which included private worksite restrictions as a covariate, indicated that individuals who resided in states that regulated smoking in private worksites had a 4.55% greater probability of quitting smoking than individuals who resided in states that did not regulate smoking in private worksites. Using the same MTF data, Tauras and Chaloupka<sup>172</sup> examined the impact of smoking restrictions on quit attempts by gender. They found that an index variable designed to capture the overall magnitude of smoke-free laws in each state had a positive, significant effect on attempts by young women to stop smoking, but the effect on quit attempts by males failed to reach significance.

Smoke-free laws and policies might also contribute to different age-related declines in exposure to SHS; overall, self-reported exposure to SHS declined by approximately 70% from the late 1980s through 2002 in the United States.<sup>228</sup> Similarly, studies show declines in nonsmokers' SHS exposure, as measured by serum cotinine levels. For example, the CDC estimates that the proportion of U.S. nonsmokers exposed to SHS declined from 52.5% in 1999–2000 to 25.3% in 2011–2012.<sup>216</sup> Despite reductions in exposure for all the groups that were examined, significant disparities in SHS exposure by age still existed during 2011–2012. SHS exposure was highest among children ages 3–11 (40.6%) and lower among children ages 12–19 (33.8%). The prevalence of SHS exposure among adults (age 20+) in 2011–2012 was 21.3%. Among children ages 3–11 years, 67.9% of non-Hispanic blacks were exposed to SHS compared with 37.2% of non-Hispanic whites, and 29.9% of Mexican Americans.<sup>216</sup>

The primary source of SHS exposure for children is the home.<sup>228</sup> A CDC study found that the proportion of households that have rules against smoking increased from 43% during 1992–1993 to 83% in 2010–2011.<sup>229</sup> This increase in households with smoke-free home rules coincided with a decline in self-reported home SHS exposure among nonsmokers age 4 and older from 20.9% in 1988–1994 to 10.2% in 1999–2004, and a decline in any SHS exposure (as measured by serum cotinine) from 83.9% to 46.4% over the same period.<sup>230</sup> However, the percentage decrease in home SHS exposure was smaller in

children than adults. Self-reported SHS exposure in the home declined 37.7% for respondents ages 4–11, 44.9% for those ages 12–19, and 59.8% for those age 20 and older.<sup>230</sup>

Children may also be exposed to SHS in cars and in locations such as private daycare centers, restaurants, shopping malls, grocery stores, and other locations. One study found that geometric mean cotinine levels decreased from 0.12 ng/mL in 1988–1994 to 0.05 ng/mL in 2003–2006 among children ages 4–16 who were not exposed to SHS in the home.<sup>231</sup> In comparison, mean cotinine levels did not change among those ages 4–16 who were exposed to SHS at home. The decline in cotinine levels among children without home SHS exposure may be attributed to the increase in state and local smoke-free laws.

Using data from the 1999–2006 NHANES, Dove and colleagues<sup>231</sup> examined the association between smoke-free policies and serum cotinine levels among nonsmoking children and youth (ages 3–19) with and without home SHS exposure. These researchers found that among nonsmoking youth who reported no exposure to SHS in the home (about 80% of the sample), those who lived in counties with extensive smoke-free policies were significantly less likely (0.61 times) to have detectable serum cotinine compared with youths living in counties without smoke-free policies. Almost all youth exposed to SHS in the home (about 20% of the sample) had detectable serum cotinine, and level of serum cotinine did not differ by county smoke-free policy status after adjusting for individual and county covariates (e.g., demographics, region of the country). These results emphasize the importance of both smoke-free policies and home smoking restrictions to reduce children's and youths' SHS exposure.

### Impact of Smoke-Free Policy by Socioeconomic Status and Race/Ethnicity

Studies show that substantial disparities exist in nonsmokers' SHS exposure. For example, during 2011–2012, the CDC<sup>118</sup> found a significantly higher prevalence of cotinine concentrations (0.05–10 g/mL) among individuals living below the poverty level (43.2%) than for those at or above the poverty level (21.2%). Similarly, during 2011–2012, Homa and colleagues<sup>216</sup> found a higher prevalence of cotinine concentrations (0.05–10 ng/mL) among those with less than a high school degree (27.6%), a high school diploma or equivalent (27.5%), or some college or associate degree (21.2%) than among college graduates (11.8%). Moreover, during 2011–2012, the CDC found higher prevalence of cotinine concentrations (0.05–10 ng/mL) among non-Hispanic blacks (46.8%) than among Mexican Americans (23.9%) and non-Hispanic whites (21.8%).<sup>216</sup>

Between 1999–2000 and 2011–2012, declines in SHS exposure (defined as a serum cotinine level) were observed for all groups defined by race/ethnicity and socioeconomic status, but disparities in declines were also observed. In terms of race/ethnicity, declines in SHS exposure during this period were smallest among non-Hispanic blacks (36.6% decline; from 73.8% in 1999–2000 to 46.8% in 2011–2012), followed by Mexican Americans (46% decline; from 44.3% in 1999–2000 to 23.9% in 2011–2012), and non-Hispanic whites (56.2% decline; from 49.8% in 1999–2000 to 21.8% in 2011–2012).<sup>216</sup> By poverty status, declines in SHS exposure during this period were smallest among those living below the poverty level (39.7% decline; from 71.6% in 1999–2000 to 43.2% in 2011–2012) and larger for those living at or above the poverty level (56.6% decline; from 48.8% in 1999–2000 to 21.2% in 2011–2012).<sup>216</sup> Finally, by education, smaller declines in SHS exposure were generally observed for those with lower levels of educational attainment.<sup>216</sup>

Some studies have examined the differential effects of smoke-free policies on smoking by SES and racial/ethnic groups. Some evidence suggests that smoke-free laws have a weaker effect on smoking by low-SES individuals and racial/ethnic minority groups, compared to members of other groups. Chaloupka and Pacula<sup>192</sup> were the first to examine differences in the impact of tobacco control policies on adolescent smoking prevalence by race. Using data from the 1992, 1993, and 1994 MTF surveys, they found that smoke-free laws had a significant negative impact on smoking prevalence rates among adolescent white males, but no effect on adolescents of any other racial group. As an indicator of smoke-free laws, this study used the fraction of the population in the person's county of residence that was subject to state or local smoke-free restrictions in private worksites, restaurants, retail stores, schools, and other public places. In their models, the authors controlled for the existence of smoke-free laws but not their level of enforcement. If differential policy enforcement were correlated with race/ethnicity, this could account for the lack of impact of smoke-free policies on some groups.

Workplace smoke-free restrictions reduced smoking prevalence and smoking intensity across all demographic groups in nearly all industries studied by Farrelly and colleagues<sup>232</sup> using data from the 1992-1993 TUS-CPS. With respect to race/ethnicity, the authors found that a 100% smoke-free workplace policy decreased the prevalence of smoking by 6.2% for non-Hispanic whites, 3.5% for non-Hispanic African Americans, 1.5% for Hispanics, and 5.7% for other race/ethnicity groups. The percentage declines in smoking prevalence associated with a smoke-free environment were observed across various levels of educational attainment, with the largest effects found among workers with a college degree (28.4%), and the smallest effects among high school dropouts (13.7%).

Several studies have considered the combined effects of smoke-free laws and cigarette prices on groups of different SES and race/ethnicity. Dinno and Glanz's 2009 study<sup>233</sup> concluded that smoke-free laws and cigarette prices reduce smoking prevalence and intensity in a similar fashion for all socioeconomic and racial/ethnic groups. Using the February 2002 wave of the TUS-CPS, they estimated models that not only controlled for smoke-free laws, cigarette prices, and individual characteristics but also included interaction terms among the policy variables (e.g., smoke-free laws, prices) and among educational attainment, household income, and race/ethnicity. Both smoke-free laws and cigarette prices were found to have a significant negative influence on smoking prevalence and intensity for the overall population. In general, the interaction terms indicated that the effects of smoke-free laws and cigarette prices did not change with educational attainment, household income, or race/ethnicity. The one exception was the significant interaction term between smoke-free laws and being black, implying that blacks could have a differential response to smoke-free laws than the general population. The authors further stratified the regression by employment status and found that the interaction term (between being black and smoke-free laws) became nonsignificant for employed as opposed to unemployed blacks. Some caution should be used when interpreting the results of this study because the analysis used only 1 month of survey data.

The response is also likely to depend on whether an individual's workplace is covered by a smoke-free law; disparities in workplace coverage have been documented. For example, Shopland<sup>234</sup> found that Hispanic males (58.8%) and Hispanic females (69.9%) were less likely to be covered by workplace smoking policies compared with white males (63.5%), white females (74.1%), black males (63.5%), and black females (72.2%). Occupation also plays a role; blue-collar workers were less likely to be protected by smoke-free laws than white-collar workers.<sup>235</sup>

## Tobacco Treatment Policy

The health benefits of smoking cessation have been well established,<sup>236–239</sup> and results from the 50-year follow-up to the British Doctors' Study have demonstrated the importance of quitting smoking before age 30 to avoid most tobacco-related mortality.<sup>236,237</sup> Additionally, research has clearly shown that quitting smoking is beneficial regardless of age or health status. The 1990 Surgeon General's report *The Health Benefits of Smoking Cessation* concludes that “smoking cessation has major and immediate health benefits for men and women of all ages. Benefits apply to persons with and without smoking-related disease.”<sup>239,p.8</sup>

The first U.S. Clinical Practice Guideline, *Smoking Cessation Clinical Practice Guideline, No. 18*, was published in 1996 and updated in 2000 and 2008.<sup>240–242</sup> These guidelines highlight the “5 A's” (Ask, Advise, Assess, Assist, Arrange) and recommend counseling and pharmacotherapies as effective interventions for tobacco cessation. The 2008 update to the Guideline states that the chances of successful quitting could be significantly improved by use of additional smoking cessation pharmacotherapies; stronger support for counseling interventions, including quitlines; and health care coverage of tobacco dependence treatments.<sup>242</sup>

To complement the Clinical Practice Guidelines, the Task Force on Community Preventive Services recommended (1) increasing the unit price of tobacco products, (2) reducing client out-of-pocket costs for effective cessation therapies, (3) developing multicomponent interventions that include client telephone support, (4) using mass media education campaigns combined with other interventions, and (5) incorporating provider reminder systems and provider education programs.<sup>213</sup> However, the use of evidence-based treatments for smoking cessation remains low, despite these strong recommendations, meta-analyses of clinical studies demonstrating the efficacy of cessation treatments,<sup>243</sup> and the increasing availability of low-cost cessation treatments. In 2015, approximately 55.4% of adult smokers reported a past-year quit attempt, and of those, nearly 70% attempted to quit without counseling or a pharmacologic treatment.<sup>244</sup>

NHIS data show that use of evidence-based cessation treatments among adults also varies by age, race/ethnicity, and access to health care. In 2015, young adults (ages 18–24), non-Hispanic blacks, Hispanics, and people without health insurance were less likely to use counseling and/or medications to quit smoking compared with older adults, non-Hispanic whites, and insured individuals.<sup>244</sup> A study of patients served by health centers supported by the Health Resources and Services Administration found that in 2009, approximately 31% of adult health center patients were current smokers; 83% of current smokers reported wanting to quit smoking, and 68% reported receiving some form of tobacco cessation counseling.<sup>245</sup> Patients with two or more chronic health conditions were twice as likely to report receiving counseling, compared with patients with no chronic health conditions. Additionally, Hispanic patients were less likely to receive cessation counseling, compared with smokers of other race/ethnicities. These results support a growing body of evidence demonstrating that younger smokers, racial/ethnic minorities, individuals with socioeconomic disadvantages, and those without health insurance are less likely to receive advice to quit from a health professional.<sup>229,246–250</sup>

The low rate of using evidence-based cessation treatments has also been shown to persist more among racial/ethnic minority groups than non-Hispanic whites, regardless of insurance status.<sup>247,251</sup> Of particular concern is the limited use of evidence-based treatments by young adults<sup>252</sup> and non-Hispanic blacks. Although the frequency of quit attempts is greater among these groups than among older adults and non-Hispanic whites, members of these groups tend to experience lower rates of cessation



success.<sup>229,253</sup> Also, low-SES smokers are less likely to make a quit attempt and to quit successfully, compared with other smokers.<sup>229</sup> As discussed in chapter 2, smoking prevalence among LGBT populations is higher than the national average, but no studies of cessation rates and use of evidence-based cessation treatment among LGBT populations were identified.

Data from the National Ambulatory Medical Care Survey and NHIS indicate potential disparities in screening for tobacco use; 62.7% of outpatient visits during 2005–2008 included screening, with Hispanic patients less likely to receive screening than non-Hispanic white patients.<sup>248</sup> Tobacco use screening also varied by health insurance status: Patients covered by private insurance, Medicare, Medicaid, or SCHIP, and self-payers were more likely to be screened than patients with another source of coverage or unknown insurance status, or patients who had a no-charge visit or whose visits were paid for by charity.

### Building Consumer Demand for Cessation Services

The 2006 NIH State-of-the-Science Conference on Tobacco Use included a focus on increasing the reach, use, and impact of evidence-based cessation services by building consumer demand for these services, including among diverse populations.<sup>254</sup> The conference detailed effective strategies to promote cessation products and services to smokers, and emphasized the need to make treatments more attractive to smokers so as to create sustained demand. The 2007 Institute of Medicine report *Ending the Tobacco Problem: A Blueprint for the Nation*<sup>17</sup> further emphasized the need to expand treatment use by aligning cessation treatments and the policies that support their use and delivery across all levels of the health care and public health systems. This report called for a coordinated, comprehensive strategy to dramatically increase the number of smokers who quit each year.<sup>17</sup>

The data indicate significant differences in the use of tobacco cessation counseling and treatments by type of insurance coverage, SES, race/ethnicity, and age.<sup>229,246,247,249,250</sup> A number of strategies have been suggested to ensure that tobacco cessation is consistently integrated into health care delivery:

- Using a tobacco user identification system in every clinic<sup>241,242,255–257</sup>
- Providing education, resources, and feedback to promote provider intervention<sup>241,255,257</sup>
- Dedicating staff to provide tobacco dependence treatment and assessing its delivery in staff performance evaluations<sup>241,255,257</sup>
- Promoting hospital policies that support and provide inpatient tobacco dependence services<sup>241,255,257</sup>
- Including tobacco dependence treatments (counseling and medication) identified as effective in the guidelines as paid or covered services for all subscribers to health insurance packages.<sup>241–243,255,257</sup>

Workplace interventions have the potential to reduce TRHD by reducing barriers to treatments in certain populations, including blue-collar and service workers, who have higher smoking rates<sup>258,259</sup> and lower levels of protection from SHS.<sup>230</sup> Cessation interventions such as individual counseling and pharmacological treatments have been shown to be as effective in the workplace as in other settings.<sup>260</sup> The evidence on interventions addressing social and environmental support, workplace competitions and incentives, and comprehensive programs is limited and does not show a clear benefit in helping smokers quit at work, largely because a significant difference in cessation between treatment and control groups has not been found.<sup>260</sup> Nine of ten studies of worksite social support, environmental support, and

incentives failed to detect any differences between treatment and control groups, which was also the case in seven of eight studies of multicomponent programs aimed at improving employees' health, including smoking cessation programs.<sup>260</sup>

In 2010 the U.S. Department of Health and Human Services published *Ending the Tobacco Epidemic, A Tobacco Control Strategic Action Plan for the U.S. Department of Health and Human Services*, a strategic action plan to coordinate tobacco control efforts across the Department.<sup>261</sup> The report noted the significant disparities in smoking prevalence that exist by race/ethnicity, SES, geographic area and many other factors, and proposed a number of strategies to reduce TRHD, including: (1) expanding Medicaid and Medicare health insurance coverage to include comprehensive, evidence-based cessation treatment; (2) targeting interventions to locations serving high-risk populations—for example, public housing, substance abuse facilities, mental health facilities, and others; and (3) expanding research and surveillance related to high-risk populations, including American Indians/Alaska Natives and other racial/ethnic minority groups, LGBT groups, low-SES individuals, and individuals with mental illnesses.<sup>261</sup>

The Patient Protection and Affordable Care Act of 2010 (ACA)<sup>262</sup> includes tobacco cessation in several sections related to disease prevention, including (1) prohibiting states from excluding coverage for tobacco cessation medications from their Medicaid programs, (2) covering the cost of tobacco dependence treatments for pregnant women without requiring cost-sharing or co-pays, and (3) eliminating copayments for Medicare preventive services that are rated A or B by the U.S. Preventive Services Task Force, which includes tobacco use counseling and treatment for all adults.<sup>263</sup> These changes were also part of the August 2010 Medicare expansion of coverage for smoking and tobacco use cessation counseling to beneficiaries who use tobacco but do not have signs or symptoms of tobacco-related disease.<sup>264</sup>

Evidence for the potential impact of broad access to cessation services comes from the United Kingdom, whose National Health Service (NHS) “stop smoking services” provide behavioral support and medication to adult smokers. In 2010-2011 these services were provided to 700,000 adult smokers, representing 8% of the 9 million smokers in the United Kingdom, with 54% of stop smoking service users eligible for free prescription medication.<sup>265</sup> Subsequent fully adjusted analyses of the effectiveness of the NHS provision of specialist behavioral support plus medication indicated that smoking abstinence in this group was more than three times higher than in users who were not in treatment, though smokers in the two lowest social grades made less use of the NHS specialist services than the other treatment options (medication and brief advice, over-the-counter nicotine replacement therapy [NRT], and no treatment).<sup>266</sup>

In the United States, expanded coverage of cessation treatments at the state level has produced substantial population-level effects on smoking prevalence. In Massachusetts, mandated health care insurance and the inclusion of tobacco cessation medications and behavioral interventions into the MassHealth Medicaid program have helped reduce access barriers, resulting in a 26% decrease in state smoking prevalence over approximately 2 years (July 1, 2006–December 31, 2008). Broad promotion of tobacco cessation coverage led 37% of Medicaid smokers to use the cessation benefit during this period.<sup>267</sup> Longitudinal analyses demonstrated significant annual declines in Massachusetts Medicaid claims for hospitalizations for acute myocardial infarction and acute coronary heart disease during these years.<sup>268</sup> Expanding Medicaid coverage for cessation treatments helped Massachusetts reach low-income, low-education smokers, who are less likely to quit successfully. Richard and colleagues<sup>269</sup>

found that the short-term return on investment for the smoking cessation program in Massachusetts was between \$1.63 and \$1.84 per person.

Similar results were found in New York City, where large-scale distribution of free nicotine patches in 2003 was shown to reach a diverse population of smokers. Of the recipients, 64% were non-white, foreign-born, or resided in low-income neighborhoods.<sup>270</sup> Abstinence at 12-months among New York City quitline callers who received the free nicotine patches was shown to be 1.78 times higher compared to quitline callers a year earlier who did not receive the free nicotine patches,<sup>271</sup> providing further support for the potential of widespread cessation services to improve cessation success in lower income, racial/ethnic minority smokers.

In 2012, Athar and colleagues<sup>272</sup> estimated the increase in the number of quitters and the savings in Medicaid medical expenditures associated with expanding Medicaid coverage of nicotine replacement therapy to the entire adult Medicaid population in Alabama, Georgia, and Maine. By expanding Medicaid coverage of nicotine replacement therapy from only pregnant women to all adult Medicaid enrollees, the state of Alabama could expect 1,873 to 2,810 additional quitters (\$526,203 and \$789,305 in savings of annual Medicaid expenditures); Georgia, 2,911 to 4,367 additional quitters (\$1,455,606 and \$2,183,409 in savings); and Maine, 1,511 to 2,267 additional quitters (\$431,709 and \$647,564 in savings).

### Additional Policy Interventions to Close the Access Gap

Additional types of policy interventions, including adequate funding for the use and promotion of state-sponsored telephone quitlines,<sup>273</sup> could also help narrow the gap in access to cessation treatments. Studies of quitlines in California<sup>274</sup> and other states<sup>273</sup> have shown that more African Americans than white smokers used quitlines, indicating that quitlines could play an important role in reducing disparities in cessation. A randomized controlled trial of quitline effectiveness conducted by the American Cancer Society also showed that African American users had quit rates similar to non-Hispanic whites, demonstrating the potential of using telephone counseling to reduce disparities in cessation by race/ethnicity.<sup>275</sup>

Facilitating access to quitlines might not automatically result in increased demand for quitline services among all smokers. A study of the Colorado quitline showed that Latino smokers, LGBT smokers, those with private insurance, and those with no insurance were more likely to report never intending to call the quitline, compared with non-Latino smokers, heterosexual smokers, and smokers with Medicaid insurance.<sup>276</sup> This study noted that the predominant reason for not intending to call the quitline was “no need for assistance,”<sup>276</sup> underscoring the need to increase smokers’ awareness of the quitting process and to improve their knowledge of available treatment options.

Other policy interventions that may improve the use of cessation treatments include health care system changes to prompt, guide, and incentivize tobacco treatments; promotion of evidence-based treatments via the Internet; and research to improve the long-term effectiveness of evidence-based treatments via individually tailored, stepped-care approaches.<sup>272</sup> Recent studies modeling the implementation of these policies to improve the reach, use, and impact of smoking cessation treatments show that in isolation, each policy could increase the population quit rate between 4% and 40%.<sup>277</sup> However, implementing all five policies in combination was projected to increase the quit rate 150% over the baseline population quit rate.

The 2009 American Recovery and Reinvestment Act, which included the Health Information Technology for Economic and Clinical Health (HITECH) Act, could also enhance smoking cessation efforts. One of the major goals of the HITECH Act was to accelerate the adoption of electronic health records (EHR) through the creation of Medicaid and Medicare EHR Incentive Programs, with payments totaling \$27 billion over 10 years to “meaningful EHR users.”<sup>278</sup> The HITECH Act defines three stages of “meaningful use,” with Stage 1 (2011-2012) focusing on capturing patient data and sharing that data with the patient or other health care professionals.<sup>279</sup> In line with the 2008 Public Health Service recommendations,<sup>242</sup> one of the 15 core objectives constituting “meaningful use” in Stage 1 is to “record [the] smoking status for patients 13 years or older.”<sup>279,p.42</sup>

Currently (2017), few studies address the influence of EHR tobacco screening on health care provider and patient behaviors related to smoking cessation,<sup>280</sup> but some have shown increases in the documentation of tobacco use status,<sup>280</sup> delivery of the “5A’s,”<sup>281,282</sup> or other provider counseling, referrals to a quitline,<sup>283,284</sup> and the proportion of patients setting a quit date. Tobacco screening via EHR systems has strong potential to reduce disparities in ascertaining smoking status and delivering evidence-based treatments, but additional research is needed to address whether widespread EHR systems will translate into increased cessation-promoting behaviors among providers and patients.<sup>280</sup>

## Chapter Summary

As this chapter describes, tobacco control policies at the federal, state, and local levels have considerable potential to reduce TRHD.

In 1989, California became the first U.S. state to implement a comprehensive tobacco control program. The experience of California and other states has demonstrated that these programs reduce tobacco use, reduce tobacco-related mortality, and reduce health-care spending. Strong empirical evidence also shows that comprehensive tobacco control programs have had significant effects on smoking prevalence rates across SES and racial/ethnic groups. Although the CDC provides guidance for appropriate spending on state-level programs, states typically appropriate considerably less than what is recommended.

The 1998 Master Settlement Agreement between the Attorneys General of 46 states, 5 U.S. territories, and the District of Columbia with the nation’s major tobacco companies, provided financial compensation to the states, imposed some restrictions on the marketing practices of the participating manufacturers, created the American Legacy Foundation (renamed the Truth Initiative in 2015), broadened access to previously internal company documents, and disbanded two industry-funded research groups. The specific impact of the MSA on TRHD has not been well studied.

A variety of federal policies also have the potential to reduce TRHD. The 2009 Family Smoking Prevention and Tobacco Control Act provided the FDA with the authority to regulate the manufacture, marketing, and distribution of tobacco products. The Act has strong potential to lessen tobacco’s impact on diverse populations and to reduce TRHD, through steps such as requiring graphic health warnings on cigarette packaging and advertising, and through promulgating tobacco product standards. In addition, the Act preserves the ability of states and localities to enact requirements in certain domains that are more stringent than those promulgated by FDA. This is especially important given the leading role often played by states and localities in putting forward innovative tobacco control policies, including those focused on reducing TRHD.

Youth access policies, when consistently enforced, can reduce commercial access to tobacco products among underage youth, and can help reduce youth smoking prevalence. Cigarettes are accessible to youths by a variety of means, with retail stores still an important source despite local and state laws banning sales to minors, and despite several relevant federal laws (the 1992 Synar Amendment, the 2009 Tobacco Control Act, and the 2010 Prevent All Cigarette Trafficking Act). Some evidence suggests that compliance with youth access laws depends on the demographic characteristics of the young purchasers; differential compliance with these laws can be an important factor contributing to disparities in adult tobacco use because today's youth consumer is tomorrow's adult consumer. Although curtailing commercial sources of cigarettes for youths is necessary, it is not sufficient to eliminate the supply of cigarettes to youths, because social sources of cigarettes often remain available. This chapter includes a discussion of efforts by states and localities to reduce tobacco use, especially among youth, by banning the sale of flavored tobacco products, and by increasing the minimum legal age of sale of tobacco products to 21 years.

A very strong body of evidence demonstrates that significant increases in tobacco taxes are the most consistently effective policy tool to reduce tobacco use among both youth and adults. Youth, young people, and low-SES populations are especially sensitive to significant tax and price increases, highlighting the potential for tobacco taxes to contribute to reducing TRHD.

The empirical evidence demonstrates that smoke-free policies are effective at protecting nonsmokers from exposure to SHS and in reducing cigarette smoking among adolescents and adults alike. As of 2017, nearly 60% of the U.S. population was covered by a state or local policy prohibiting smoking in all workplaces, including restaurants and bars. Despite this, disparities in coverage remain, especially by geographic region. Some evidence suggests that the impact of smoke-free policies may differ by SES and by race/ethnicity; smoke-free laws appear to have a weaker effect on smoking among low-SES individuals and/or racial/ethnic minority groups, in part because individuals in these groups are less likely to work in venues covered by these policies. Adoption of smoke-free home rules, often with the purpose of protecting infants and children in the home, are increasingly common. As of 2011, more than 80% of all U.S. households had adopted such rules, although nonsmoking households were far more likely to have adopted them than smoking households (95% vs. 61%). Differences in adoption of smoke-free home rules were also found by SES, race/ethnicity, and other demographic variables, contributing to differential exposure to SHS among children and later TRHD.

Quitting smoking is beneficial, regardless of the individual's age or health status, and effective tobacco dependence treatments are available. However, the use of evidence-based treatments is quite low, and varies by age, race/ethnicity, and access to health care; in general, younger smokers, racial/ethnic minority groups, low-SES people and people without health insurance are less likely than others to receive advice to quit from a health professional. As the experience of Massachusetts has shown, expanded access to tobacco dependence treatment through a state's Medicaid program can have a substantial impact on reducing tobacco use and tobacco-related disease among low-SES smokers.

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