

## Current Cigarette Smoking Among Adults — United States, 2005–2012

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### 50th Anniversary of the First Surgeon General's Report on Smoking and Health

On January 17, 2014, 50 years after the first Surgeon General's report on smoking and health, the Surgeon General will release *The Health Consequences of Smoking—50 Years of Progress* (1). The report will be released at a White House press conference at 9:30 a.m. Eastern on January 17, with a live webcast available at <http://whitehouse.gov/live>.

The report will provide a retrospective of the past 50 years of tobacco use prevention and control efforts and discuss the current status of the tobacco use epidemic, including newly documented health consequences of smoking and exposure to secondhand smoke. It will also include a discussion of potential “endgame” strategies to eliminate the health and economic burden of tobacco use in the United States.

Evidence-based tobacco control efforts have averted nearly 8 million deaths since 1964 but remain underutilized (2). High-impact media campaigns, excise taxes, access to cessation medication and counseling, smoke-free laws, comprehensive tobacco control programs, and product regulation are critical to ending the tobacco use epidemic.

#### References

1. US Department of Health and Human Services. The health consequences of smoking—50 years of progress: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at <http://www.surgeongeneral.gov/initiatives/tobacco>.
2. Holford TR, Meza R, Warner KE, et al. Tobacco control and the reduction in smoking-related premature deaths in the United States, 1964–2012. *JAMA* 2014;311:164–71.

Despite significant declines during the past 30 years, cigarette smoking among adults in the United States remains widespread, and year-to-year decreases in prevalence have been observed only intermittently in recent years (1,2). To assess progress made toward the *Healthy People 2020* objective of reducing the proportion of U.S. adults who smoke cigarettes to  $\leq 12\%$  (objective TU-1.1),\* this report provides the most recent national estimates of smoking prevalence among adults aged  $\geq 18$  years, based on data from the 2012 National Health Interview Survey (NHIS). The findings indicate that the proportion of U.S. adults who smoke cigarettes fell to 18.1% in 2012. Moreover, during 2005–2012, the percentage of ever smokers who quit increased significantly, from 50.7% to 55.0%, and the proportion of daily smokers who smoked  $\geq 30$  cigarettes per day (CPD) declined significantly, from 12.6% to 7.0%. Proven population-level interventions, including tobacco price increases, high-impact antitobacco mass media

\*Additional information available at <http://healthypeople.gov/2020/topicsobjectives2020>.

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campaigns, comprehensive smoke-free laws, and barrier-free access to help quitting, are critical to decreasing cigarette smoking and reducing the health and economic burden of tobacco-related diseases in the United States (3).

NHIS is an annual, nationally representative, in-person survey of the noninstitutionalized U.S. civilian population. Questions about cigarette smoking are directed to one randomly selected adult from each surveyed family. In 2012, a total of 34,525 adults aged  $\geq 18$  years were selected and participated, yielding a 61.2% response rate. Current smokers were respondents who reported smoking  $\geq 100$  cigarettes during their lifetime and, at the time of interview, reported smoking every day or some days. Former smokers were respondents who reported smoking  $\geq 100$  cigarettes during their lifetime but currently did not smoke. The mean number of CPD was calculated among daily current smokers. A quit attempt was defined as a report by a current smoker that they stopped smoking for  $>1$  day during the preceding year because they were trying to quit smoking, or a report by a former smoker that they quit smoking during the preceding year.<sup>†</sup> Quit ratios were defined as the ratio of former smokers to ever smokers.

Data were adjusted for nonresponse and weighted to provide nationally representative estimates. Current smoking was assessed overall and by sex, age, race/ethnicity, education,

poverty status,<sup>§</sup> U.S. Census region,<sup>¶</sup> and disability/limitation status.<sup>\*\*</sup> Differences between groups were assessed using the chi-squared statistic and 95% confidence intervals. Quit ratios were calculated overall and by age group. Logistic regression was used to analyze overall trends in prevalence, CPD, and quit ratios during 2005–2012, controlling for sex, age, and race/ethnicity. The Wald test was used to determine statistical significance of trends from 2005 to 2012 ( $p < 0.05$ ).

<sup>§</sup> Based on reported family income and 2011 poverty thresholds published by the U.S. Census Bureau.

<sup>¶</sup> *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

<sup>\*\*</sup> Disability defined based on self-reported presence of selected impairments, including vision, hearing, cognition, and movement. Limitations in performing activities of daily living defined based on response to the question, "Because of a physical, mental, or emotional problem, does [person] need the help of other persons with personal care needs, such as eating, bathing, dressing, or getting around inside this home?" Limitations in performing instrumental activities of daily living defined based on response to the question, "Because of a physical, mental, or emotional problem, does [person] need the help of other persons in handling routine needs, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?" Any disability/limitation defined as a "yes" response pertaining to at least one of the disabilities/limitations listed (i.e., vision, hearing, cognition, movement, activities of daily living, or instrumental activities of daily living).

<sup>†</sup> Additional information available at [http://www.healthindicators.gov/indicators/smoking-cessation-attempts-by-adult-smokers-percent\\_1513/profile](http://www.healthindicators.gov/indicators/smoking-cessation-attempts-by-adult-smokers-percent_1513/profile).

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TABLE. Percentage of persons aged ≥18 years who were current cigarette smokers,\* by selected characteristics — National Health Interview Survey, United States, 2005 and 2012

Characteristic	Men				Women				Total			
	2005 (n = 13,762)		2012 (n = 15,273)		2005 (n = 17,666)		2012 (n = 19,252)		2005 (N = 31,428)		2012 (N = 34,525)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
<b>Overall</b>	23.9	(22.9–24.9)	20.5	(19.6–21.4)	18.1	(17.4–18.8)	15.8	(15.1–16.5)	20.9	(20.3–21.5)	18.1	(17.5–18.7)
<b>Age group (yrs)</b>												
18–24	28.0	(25.0–31.0)	20.1	(17.1–23.1)	20.7	(18.3–23.1)	14.5	(12.3–16.7)	24.4	(22.4–26.4)	17.3	(15.5–19.2)
25–44	26.8	(25.4–28.3)	25.4	(23.8–27.1)	21.4	(20.2–22.6)	17.8	(16.6–19.0)	24.1	(23.1–25.1)	21.6	(20.5–22.7)
45–64	25.2	(23.7–26.7)	20.2	(18.8–21.6)	18.8	(17.7–19.9)	18.9	(17.6–20.2)	21.9	(21.0–22.8)	19.5	(18.6–20.5)
≥65	8.9	(7.6–10.2)	10.6	(9.3–12.0)	8.3	(7.3–9.3)	7.5	(6.6–8.5)	8.6	(7.8–9.4)	8.9	(8.1–9.7)
<b>Race/Ethnicity<sup>†</sup></b>												
White	24.0	(22.8–25.2)	21.1	(19.9–22.2)	20.0	(19.1–20.9)	18.4	(17.4–19.3)	21.9	(21.1–22.7)	19.7	(18.9–20.4)
Black	26.7	(23.9–29.5)	22.1	(19.9–24.4)	17.3	(15.6–19.0)	14.8	(13.2–16.3)	21.5	(19.9–23.1)	18.1	(16.7–19.4)
Hispanic	21.1	(19.2–23.0)	17.2	(15.2–19.2)	11.1	(9.8–12.4)	7.8	(6.6–8.9)	16.2	(15.0–17.4)	12.5	(11.3–13.7)
American Indian/Alaska Native	37.5	(20.7–54.3)	25.5	(15.5–35.6)	26.8	(15.5–38.1)	18.7	(9.3–28.0)	32.0	(22.3–41.7)	21.8	(15.0–28.6)
Asian <sup>§</sup>	20.6	(15.7–25.5)	16.7	(13.7–19.8)	6.1	(3.7–8.5)	5.5	(4.0–7.0)	13.3	(10.4–16.2)	10.7	(9.1–12.3)
Multiple race	26.1	(16.3–35.9)	28.6	(21.0–36.3)	23.5	(14.8–32.2)	23.9	(17.6–30.2)	24.8	(17.7–31.9)	26.1	(21.3–31.0)
<b>Education<sup>¶</sup></b>												
0–12 years (no diploma)	29.5	(27.2–31.8)	29.5	(26.9–32.0)	21.9	(20.1–23.7)	20.2	(18.0–22.3)	25.5	(24.0–27.0)	24.7	(23.0–26.4)
8th grade or less	21.0	(17.7–24.3)	20.2	(16.9–23.4)	13.4	(11.1–15.7)	10.6	(8.2–13.1)	17.1	(15.1–19.1)	15.2	(13.2–17.3)
9–11th grade	36.8	(33.3–40.3)	38.5	(34.2–42.8)	29.0	(26.1–31.9)	26.4	(23.1–29.8)	32.6	(30.3–34.9)	32.1	(29.4–34.9)
12th grade, no diploma	30.2	(23.5–36.9)	25.5	(20.0–31.1)	22.2	(16.9–27.5)	23.7	(17.9–29.6)	26.0	(21.8–30.2)	24.7	(20.6–28.7)
GED	47.5	(41.4–53.6)	45.8	(39.6–51.9)	38.8	(33.6–44.0)	37.5	(31.6–43.3)	43.2	(39.0–47.4)	41.9	(37.5–46.4)
High school graduate	28.8	(27.0–30.6)	27.0	(25.0–29.0)	20.7	(19.3–22.1)	19.5	(17.8–21.2)	24.6	(23.5–25.7)	23.1	(21.8–24.5)
Some college, no diploma	26.2	(24.4–28.0)	22.6	(20.4–24.8)	19.5	(18.0–21.0)	19.4	(17.6–21.2)	22.5	(21.4–23.6)	20.9	(19.4–22.4)
Associate degree	26.1	(23.3–28.9)	18.7	(16.2–21.3)	17.1	(15.0–19.2)	17.2	(15.2–19.3)	20.9	(19.2–22.6)	17.9	(16.2–19.6)
Undergraduate degree	11.9	(10.5–13.3)	10.0	(8.5–11.4)	9.6	(8.3–10.9)	8.3	(7.1–9.6)	10.7	(9.8–11.6)	9.1	(8.1–10.1)
Graduate degree	6.9	(5.3–8.5)	6.3	(4.7–7.9)	7.4	(6.0–8.8)	5.5	(4.4–6.6)	7.1	(6.0–8.2)	5.9	(5.0–6.9)
<b>Poverty status<sup>**</sup></b>												
At or above poverty level	23.7	(22.6–24.8)	19.1	(18.1–20.1)	17.6	(16.7–18.5)	15.0	(14.1–15.9)	20.6	(19.9–21.3)	17.0	(16.4–17.7)
Below poverty level	34.3	(31.1–37.5)	33.9	(31.0–36.9)	26.9	(24.5–29.3)	23.5	(21.5–25.5)	29.9	(27.9–31.9)	27.9	(26.2–29.6)
Unspecified	21.2	(19.2–23.2)	15.9	(13.5–18.2)	16.1	(14.8–17.4)	11.8	(10.1–13.4)	18.4	(17.2–19.6)	13.6	(12.2–15.0)
<b>U.S. Census region<sup>††</sup></b>												
Northeast	20.7	(18.6–22.8)	17.3	(15.3–19.4)	17.9	(16.3–19.5)	15.7	(13.9–17.6)	19.2	(17.8–20.6)	16.5	(15.1–17.9)
Midwest	27.3	(25.3–29.3)	22.7	(20.8–24.5)	21.3	(19.8–22.8)	18.6	(17.1–20.1)	24.2	(23.0–25.4)	20.6	(19.4–21.8)
South	25.3	(23.6–27.0)	22.4	(20.8–24.0)	18.5	(17.3–19.7)	17.2	(15.9–18.4)	21.8	(20.6–23.0)	19.7	(18.6–20.7)
West	20.1	(18.3–21.9)	17.7	(16.1–19.4)	13.9	(12.6–15.2)	10.8	(9.5–12.1)	17.0	(16.0–18.0)	14.2	(13.1–15.3)
<b>Disability/Limitation<sup>§§</sup></b>												
Any disability/limitation	—¶¶	—¶¶	25.5	(22.7–28.4)	—¶¶	—¶¶	20.3	(17.9–22.8)	—¶¶	—¶¶	22.7	(20.9–24.4)
No disability/limitation	—¶¶	—¶¶	18.6	(17.4–19.9)	—¶¶	—¶¶	14.5	(13.5–15.5)	—¶¶	—¶¶	16.5	(15.7–17.3)

**Abbreviations:** CI = confidence interval; GED = General Education Development certificate.

\* Persons who reported smoking at least 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. Excludes 296 (2005) and 269 (2012) respondents whose smoking status was unknown.

† Excludes 45 (2005) and 68 (2012) respondents of unknown race. Unless indicated otherwise, all racial/ethnic groups are non-Hispanic; Hispanics can be of any race.

§ Does not include Native Hawaiians or Other Pacific Islanders.

¶ Among persons aged ≥25 years. Excludes 339 (2005) and 112 (2012) persons whose educational level was unknown.

\*\* Family income is reported by the family respondent who might or might not be the same as the sample adult respondent from whom smoking information is collected. 2005 estimates are based on reported family income and 2004 poverty thresholds published by the U.S. Census Bureau, and 2012 estimates are based on reported family income and 2011 poverty thresholds published by the U.S. Census Bureau.

†† *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

§§ Disability defined based on self-reported presence of selected impairments, including vision, hearing, cognition, and movement. Limitations in performing activities of daily living defined based on response to the question, "Because of a physical, mental, or emotional problem, does [person] need the help of other persons with personal care needs, such as eating, bathing, dressing, or getting around inside this home?" Limitations in performing instrumental activities of daily living defined based on response to the question, "Because of a physical, mental, or emotional problem, does [person] need the help of other persons in handling routine needs, such as everyday household chores, doing necessary business, shopping, or getting around for other purposes?" Any disability/limitation defined as a "yes" response pertaining to at least one of the disabilities/limitations listed (i.e., vision, hearing, cognition, movement, activities of daily living, or instrumental activities of daily living).

¶¶ Questions pertaining to disabilities/limitations were not included in the 2005 National Health Interview Survey.

In 2012, an estimated 18.1% (42.1 million) of U.S. adults were current cigarette smokers. Of these, 78.4% (33.0 million) smoked every day, and 21.6% (9.1 million) smoked some days. Overall smoking prevalence declined from 20.9% in 2005 to 18.1% in 2012 ( $p < 0.05$  for trend) (Table). In 2012, prevalence was significantly higher among males (20.5%) than females (15.8%) and among persons aged 18–24 years (17.3%), 25–44 years (21.6%), and 45–64 years (19.5%) than among those aged  $\geq 65$  years (8.9%). By race/ethnicity, prevalence was highest among respondents reporting multiple races (26.1%) and lowest among Asians (10.7%). By education, prevalence was highest among persons with a graduate education development certificate (41.9%) and lowest among those with a graduate (5.9%) or undergraduate (9.1%) degree. Prevalence was significantly higher among persons living below the poverty level (27.9%) than those living at or above this level (17.0%). By U.S. Census region, prevalence was significantly higher in the South (19.7%) and Midwest (20.6%) than the West (14.2%) and Northeast (16.5%). Respondents who reported having a disability/limitation with activities of daily living (disability/limitation) had a significantly higher prevalence (22.7%) than those with no disability/limitation (16.5%).

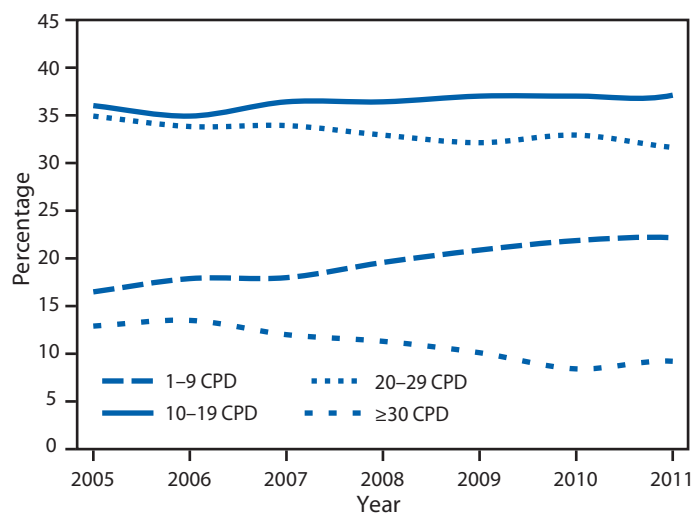
Among daily smokers, declines in mean CPD occurred from 16.7 in 2005 to 14.6 in 2012 ( $p < 0.05$  for trend). During 2005–2012, increases occurred in the proportion of daily smokers who smoked 1–9 CPD (16.4% to 20.8%) and 10–19 CPD (36.0% to 41.2%), whereas declines occurred in those smoking 20–29 CPD (34.9% to 31.0%) and  $\geq 30$  CPD (12.6% to 7.0%) (Figure 1) ( $p < 0.05$  for trend).

Among current smokers and former smokers who quit during the preceding year, 52.9% had made a quit attempt for  $> 1$  day. The overall quit ratio (i.e., the ratio of former to ever smokers) increased from 50.7% in 2005 to 55.0% in 2012 (Figure 2) ( $p < 0.05$ ). Quit ratios were lowest among adults aged 18–24 years and highest among those aged  $\geq 65$  years in each survey year. During 2005–2012, the largest increase in quit ratios (22.7% to 26.5% [ $p < 0.05$ ]) and decline in smoking prevalence (24.4% to 17.3% [ $p < 0.05$ ]) occurred among those aged 18–24 years.

### Editorial Note

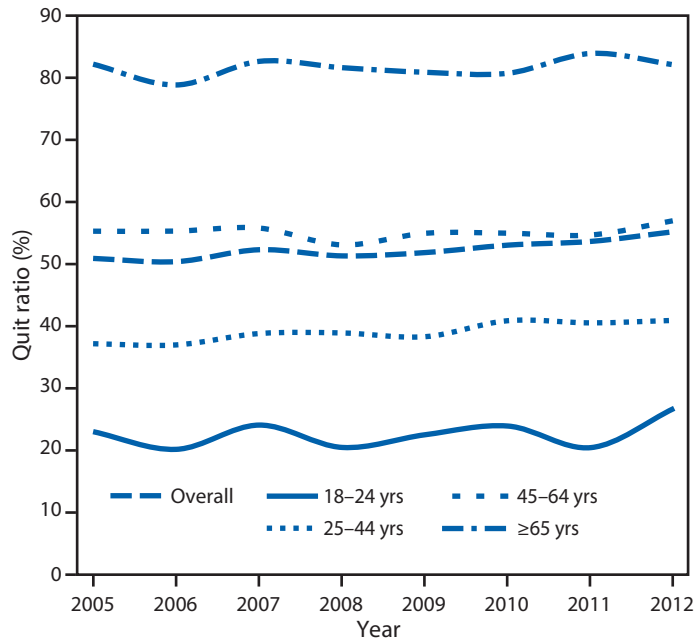
During 2005–2012, cigarette smoking prevalence declined among U.S. adults, and the quit ratio (i.e., the percentage of ever smokers who had quit) increased. During the same period, the proportion of daily smokers who smoked  $\geq 30$  CPD also declined. Adults aged 18–24 years had the greatest decrease in cigarette smoking prevalence; however, this decline might be attributable, in part, to the use of other tobacco products, such as flavored little cigars, which are especially popular with this age group (4).

**FIGURE 1. Percentage of daily smokers\* aged  $\geq 18$  years, by number of cigarettes smoked per day (CPD) — National Health Interview Survey, United States, 2005–2012**



\* Persons who reported smoking  $\geq 100$  cigarettes during their lifetime and who, at the time of the survey, reported smoking cigarettes every day.

**FIGURE 2. Quit ratios\* among ever smokers† aged  $\geq 18$  years, overall and by age group — National Health Interview Survey, United States, 2005–2012**



\* Defined as the ratio of former smokers to ever smokers for each survey year.

† Persons who reported smoking  $\geq 100$  cigarettes during their lifetime.

The decline in overall smoking prevalence from 20.9% in 2005 to 18.1% in 2012 is encouraging and likely reflects the success of tobacco control efforts across the country. However, given the slowing decline in adult smoking in recent years, continued implementation of evidence-based interventions outlined in the World Health Organization MPOWER



**What is already known about this topic?**

Approximately one in five U.S. adults smoke cigarettes, and certain population groups have a higher prevalence of smoking. Despite significant declines during the past 30 years, cigarette smoking among adults in the United States remains widespread, and year-to-year decreases in prevalence have been observed only intermittently in recent years.

**What is added by this report?**

Overall smoking prevalence declined significantly during 2005–2012 (from 20.9% to 18.1% [ $p < 0.05$ ]). In addition, among daily smokers, the average number of cigarettes smoked per day declined from 16.7 in 2005 to 14.6 in 2012 ( $p < 0.05$  for trend). During the same period, the largest increase in the percentage of ever smokers who quit (from 22.7% to 26.5% [ $p < 0.05$ ]) and the largest declines in smoking prevalence (from 24.4% to 17.3% [ $p < 0.05$ ]) were observed among persons aged 18–24 years.

**What are the implications for public health practice?**

Effective public health interventions that can continue progress toward meeting the *Healthy People 2020* target to reduce U.S. adult cigarette smoking to  $\leq 12\%$  include a combination of tobacco price increases, high-impact antitobacco mass media campaigns, comprehensive smoke-free laws, and barrier-free access to help quitting.

package is critical.<sup>††</sup> These include increasing the price of tobacco products, implementing and enforcing comprehensive smoke-free laws, warning about the dangers of tobacco use with antismoking media campaigns, and increasing access to help quitting. Such population-based interventions have been shown to reduce population smoking prevalence (3).

In recent years, major advances were made in tobacco control. These include the 2009 Family Smoking Prevention and Tobacco Control Act, which granted the Food and Drug Administration the authority to regulate the manufacture, distribution, and marketing of tobacco products.<sup>§§</sup> Additionally, the 2009 Children's Health Insurance Program Reauthorization Act<sup>¶¶</sup> raised the federal tax rate for cigarettes from \$0.39 to \$1.01 per pack, and the 2010 Patient Protection and Affordable Care Act<sup>\*\*\*</sup> provided expanded coverage for evidence-based smoking-cessation treatments for many persons in the United States. Finally, in 2012, CDC debuted Tips from Former Smokers (TIPS),<sup>†††</sup> the first federally funded, nationwide, paid-media tobacco education campaign in the United States. During the campaign, calls to the quitline

portal 1-800-QUIT-NOW increased 132%, and the number of unique visitors to a smoking cessation website (<http://www.smokefree.gov>) increased 428% (5). Additionally, an estimated 1.6 million quit attempts were attributable to the campaign (6).

Disparities in smoking prevalence described in this report are consistent with previous studies (2). Variations across racial/ethnic groups might be attributable, in part, to targeted tobacco product marketing or differences in the social acceptability of smoking, whereas disparities by education might be related to differences in understanding of the health hazards of smoking and increased vulnerability to tobacco marketing. Differences by disability/limitation status might be attributable, in part, to smoking-attributable disability in smokers and increased stress associated with disabilities (7). The high smoking prevalence observed among some population groups underscores the need for enhanced implementation and reach of proven strategies to prevent and reduce tobacco use among these groups.

The findings in this report are subject to at least six limitations. First, smoking status was self-reported and not validated by biochemical testing. However, self-reported smoking status correlates highly with serum cotinine levels (8). Second, small sample sizes for certain population groups resulted in less precise estimates. Third, data could not be disaggregated for specific racial/ethnic subgroups; although smoking prevalence was lowest among Hispanics and non-Hispanic Asians, variability in smoking prevalence exists among Hispanic and Asian subpopulations (9). Fourth, because NHIS does not include institutionalized populations and persons in the military, results might not be generalizable to these groups. Fifth, the NHIS response rate of 61.2% might have resulted in nonresponse bias, even after adjustment for nonresponse. Finally, these estimates might differ from those derived from other surveillance systems. For example, the National Survey on Drug Use and Health consistently yields higher current smoking estimates than NHIS (10). These differences can be explained, in part, by the varying survey methodologies, the types of surveys administered, and the definitions of current smoking that are used. However, trends in prevalence are comparable across surveys.

Sustained, comprehensive state tobacco control programs funded at CDC-recommended levels accelerate progress toward reducing the health burden and economic impact of tobacco-related diseases in the United States (3). However, during 2013, despite combined revenue of \$25.7 billion from settlement payments and tobacco taxes for all states, only \$459.5 million (1.8%) was spent on state comprehensive tobacco control programs, representing only 12.4% of the CDC-recommended level of funding for all states combined;

<sup>††</sup> Additional information available at [http://www.who.int/tobacco/mpower/mpower\\_report\\_full\\_2008.pdf](http://www.who.int/tobacco/mpower/mpower_report_full_2008.pdf).

<sup>§§</sup> Additional information available at <http://www.fda.gov/tobaccoproducts>.

<sup>¶¶</sup> Additional information available at <http://www.cms.gov/chipra>.

<sup>\*\*\*</sup> Additional information available at <http://www.dol.gov/ebsa/healthreform>.

<sup>†††</sup> Additional information available at <http://www.cdc.gov/tobacco/campaign/tips>.

moreover, only two states (Alaska and North Dakota) currently fund tobacco control programs at CDC-recommended levels.<sup>§§§</sup> Implementation of comprehensive tobacco control policies and programs can result in a substantial reduction in tobacco-related morbidity and mortality and billions of dollars in savings from averted medical costs (3).

<sup>§§§</sup> Robert Wood Johnson Foundation. Broken promises to our children: the 1998 state tobacco settlement fourteen years later. A report on the states' allocation of the tobacco settlement dollars. Princeton, NJ: Robert Wood Johnson Foundation; 2012. Available at [http://www.tobaccofreekids.org/content/what\\_we\\_do/state\\_local\\_issues/settlement/FY2013/1.%202012%20State%20Report%20-%20Full.pdf](http://www.tobaccofreekids.org/content/what_we_do/state_local_issues/settlement/FY2013/1.%202012%20State%20Report%20-%20Full.pdf).

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## Zinc Deficiency–Associated Dermatitis in Infants During a Nationwide Shortage of Injectable Zinc — Washington, DC, and Houston, Texas, 2012–2013

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Injectable zinc, a vital component of parenteral nutrition (PN) formulations, has been in short supply in the United States since late 2012. In December 2012, three premature infants with cholestasis hospitalized in Washington, DC, experienced erosive dermatitis in the diaper area and blisters on their extremities, a condition that can be associated with zinc deficiency (1). All three infants were receiving PN because they had extreme cholestasis and were unable to be fed by mouth or tube. The PN administered to each infant was zinc deficient. Injectable zinc normally is added to PN for premature or medically compromised infants (e.g., those with cholestasis) by the hospital pharmacy because the amount of zinc needed by each patient differs; however, the pharmacy had run out of injectable zinc. No alternatives were available; other preparations of parenteral trace elements either contained insufficient zinc to meet infants' requirements or had the potential to cause trace element toxicity in infants with cholestasis (2). The dermatitis of one infant resolved after the patient was able to take nutrition by mouth. The other two infants were found to have low serum zinc levels. In January 2013, CDC was notified of four additional cases of zinc deficiency among infants with cholestasis who received zinc-deficient PN in a hospital in Houston, Texas. In collaboration with the Food and Drug Administration (FDA), the two hospitals obtained emergency shipments of injectable zinc. No additional cases were reported. Current injectable zinc supplies have been increasing as FDA collaborates with pharmaceutical companies to import emergency supplies. FDA is working to establish temporary backup sources should future shortages occur.

On December 18, 2012, three cases of zinc deficiency disorder in premature infants were diagnosed in Washington, DC. Among the three infants, two were born at 24 weeks' gestation, and one was born at 29 weeks' gestation. Birth weights ranged from 551 g to 734 g (Table). The hospital caring for the infants had exhausted its supply of injectable zinc in November 2012. Infants typically receive injectable zinc and other trace elements as part of PN. Because of extreme cholestasis and prematurity in all three infants, they were unable to receive zinc through oral or enteral feedings. Among cholestatic infants, other preparations of zinc-containing parenteral trace elements might cause trace element toxicity; therefore, no alternatives to the

injectable zinc supplements were available. On January 3, 2013, the District of Columbia Department of Health and CDC began case investigations. For this investigation, a case of zinc deficiency disorder was defined as an infant receiving zinc-deficient PN who had either a below-normal serum zinc level ( $<70 \mu\text{g/dL}$ ) or dermatitis consistent with zinc deficiency disorder. The objectives of the investigation were to 1) identify and describe cases of zinc deficiency disorder among infants at greatest risk for zinc deficiency, including those who were born at  $<37$  weeks' gestation, those weighing  $<1,500$  g at birth, and those with chronic or permanent gastrointestinal dysfunction; 2) investigate the cause of the injectable zinc shortage; and 3) describe the need to monitor symptoms of micronutrient deficiency during micronutrient shortages.

After consulting with CDC, on January 10, 2013, the American Academy of Pediatrics (AAP) informed its members, which include approximately 3,000 neonatologists and 800 neonatal intensive care units nationwide, of the injectable zinc shortage. The members were asked to report to AAP and their respective state health department if their hospitals were experiencing a critical shortage of zinc. AAP compiled and forwarded all responses to CDC. On January 21, a neonatologist in Houston, Texas, reported four additional cases of zinc deficiency disorder to CDC. Among these four infants, two were born at gestational ages  $>37$  weeks; one was born at 33 weeks, and one was born at 25 weeks. All four infants had cholestasis. Birth weights of these four infants ranged from 690 g to 2,950 g (Table). The Houston hospital also had exhausted its supplies of injectable zinc in November 2012. By January 22, 2013, a total of 17 hospitals in 10 states had reported shortages of zinc and other micronutrients. No additional cases of zinc deficiency disorder were identified. By the end of January, FDA was able to facilitate emergency shipment of injectable zinc to all 17 hospitals.

Each of the seven infants experienced zinc deficiency disorder after receiving zinc-deficient PN as a result of the nationwide shortage. The time from initiation of PN to diagnosis of zinc deficiency disorder ranged from 4 to 34 weeks; the exact number of weeks each infant was on zinc-deficient PN is unknown. Six patients were characterized as having low serum zinc levels (range:  $14\text{--}56 \mu\text{g/dL}$  [normal:  $70\text{--}120 \mu\text{g/dL}$ ]) and low alkaline

TABLE. Seven infants with physician-diagnosed zinc deficiency disorder, by selected characteristics — Washington, DC, and Houston, Texas, 2012–2013

Patient	Sex	Gestational age (wks)	Birth weight (g)	Cholestasis	Race/Ethnicity	Received PN	Dermatitis	PN duration before diagnosis (wks)	Serum zinc level ( $\mu\text{g}/\text{dL}$ )*	Serum alkaline phosphatase level (U/L) <sup>†</sup>	Bacterial infection	Infant death
1	M	24	734	Yes	Black, non-Hispanic	Yes	Yes	10	NA	192	No	No
2	M	24	673	Yes	Black, non-Hispanic	Yes	Yes	15	14	62	No	No
3	F	29	551	Yes	Black, non-Hispanic	Yes	Yes	10	56	32	No	No
4	M	37	2,950	Yes	White, Hispanic	Yes	Yes	18	16	74	No	No
5	M	25	690	Yes	White, non-Hispanic	Yes	Yes	34	41	73	Yes <sup>§</sup>	Yes
6	F	37	2,620	Yes	White, Hispanic	Yes	Yes	5	25	110	Yes <sup>¶</sup>	Yes
7	M	33	1,599	Yes	Black, Hispanic	Yes	No	4	34	92	Yes <sup>**</sup>	No

**Abbreviations:** PN = parenteral nutrition; NA = not available.

\* Lowest serum zinc level measured by laboratory testing; normal range = 70–120  $\mu\text{g}/\text{dL}$ .

<sup>†</sup> Lowest serum alkaline phosphatase level measured by laboratory testing; normal range = 150–420 U/L.

<sup>§</sup> *Staphylococcus aureus*.

<sup>¶</sup> Methicillin-resistant *Staphylococcus aureus*.

\*\* *Escherichia coli* and *Kluyvera ascorbata*.

phosphatase levels (range: 32–125 U/L [normal: 150–420 U/L]). Alkaline phosphatase levels typically are high in patients with cholestasis, but the zinc deficiency disorder in these infants resulted in low alkaline phosphatase levels. The serum zinc level for the first patient was not measured because suspicion of zinc deficiency disorder occurred after the infant had taken oral feedings containing zinc and the dermatitis had resolved.

All seven infants had cholestasis. Six of the seven had dermatitis consistent with zinc deficiency disorder, and three experienced bacterial infections. One infant experienced recurrent sepsis and liver failure before receiving zinc-deficient PN. This infant did not have dermatitis but had a low serum zinc level (Table). The infant died, and an autopsy was not performed. It is uncertain whether zinc deficiency disorder had a role in his death. After an emergency shipment of zinc was received by two hospitals, the remaining six infants received zinc in their PN, and all six infants improved clinically. Zinc and alkaline phosphatase levels returned to normal ranges, and the infants' skin lesions resolved. Five of the six infants were discharged home. One infant remained hospitalized for 6 months for treatment of conditions unrelated to zinc deficiency disorder; that infant died in October 2013 from conditions unrelated to zinc deficiency disorder.

According to FDA, only two domestic manufacturers' injectable zinc compounds are used in PN (American Regent and Hospira, Inc.). In fall 2012, American Regent informed FDA that it would be experiencing shortages of multiple chemicals, including zinc sulfate, because of delays in manufacturing. These delays resulted from drug quality concerns identified by the company, which included problems of particulate matter in the injectable products. FDA then contacted Hospira to determine whether they could meet the increase in zinc demand. Hospira representatives stated that the company was operating

at maximum capacity and was unable to meet the increased demand; thus, the shortage continued to worsen in early January 2013. American Regent was able to release injectable zinc sulfate on January 22, but shortages continued. Hospira planned to release injectable zinc sulfate again by the end of 2013. One foreign manufacturer, Laboratoire Aguetant, and its authorized U.S. distributor, Baxter Healthcare, in conjunction with the FDA, have initiated temporary importation of an injectable zinc solution into the U.S. market to address this shortage.

FDA is continuing to work with American Regent and Hospira to expedite release of injectable zinc sulfate. Information for health-care providers regarding the zinc shortages and expected release dates of new supplies of injectable zinc is provided by FDA on its drug shortage website (<http://www.fda.gov/drugs/drugsafety/drugshortages/ucm050792.htm>). Finally, FDA is working with pharmaceutical companies to establish temporary backup sources for micronutrients should future shortages occur. When FDA uses regulatory discretion to allow a company to import a drug temporarily during a shortage, FDA ensures that the overseas manufacturing facility meets FDA quality standards and that its products (in terms of formulation and labeling) do not present undue risks for patients.

### Editorial Note

Zinc is an essential trace element that functions as a cofactor for certain enzymes involved in metabolism and cell growth (2,3); zinc supports immune function, protein metabolism, development of the gastrointestinal tract, and genetic processes (3). Acute zinc deficiency disorder is characterized by dermatitis around the limbs and body orifices, diarrhea, and impaired immune function, whereas chronic zinc deficiency disorder can lead to liver or kidney failure (2). A rare genetic disorder, acrodermatitis enteropathica, shares the same clinical manifestations



**What is already known on this topic?**

Nationwide shortages of parenteral micronutrients have continued to occur in recent years. These shortages can lead to clinically significant micronutrient deficiencies among patients who depend on prolonged parenteral nutrition. Premature infants are especially vulnerable, and certain micronutrient deficiencies can be lethal.

**What is added by this report?**

The nationwide shortage of injectable zinc that began in late 2012 led to seven reported cases of zinc deficiency disorder in vulnerable infants. Among these infants, six experienced severe dermatitis, and three experienced invasive bacterial infections. The Food and Drug Administration is now temporarily permitting the importation and sale of an injectable zinc product.

**What are the implications for public health practice?**

Hospitals with limited stocks of injectable zinc should consider reserving supplies for infants with the highest risk for deficiency (e.g., those who are premature [born at <37 weeks' gestation] or have very low birth weight [<1,500 g] and those with chronic or permanent gastrointestinal dysfunction). If shortages occur, monitoring patients on parenteral nutrition for signs and symptoms of micronutrient deficiencies is crucial.

as acute zinc deficiency disorder but is a metabolic disorder of zinc absorption. Zinc is a standard component in PN. Premature infants administered PN require 400  $\mu\text{g}/\text{kg}/\text{body weight}/\text{day}$  of zinc to maintain serum levels and promote growth, whereas 200  $\mu\text{g}/\text{kg}/\text{body weight}/\text{day}$  of zinc is sufficient for full-term infants on PN (4). Additionally, PN might be needed for prolonged periods for very low birth weight infants (<1,500 g) and infants with chronic gastrointestinal dysfunction.

Studies have reported progressively decreasing serum zinc levels among infants on zinc-deficient PN, particularly premature infants and low birth weight infants (3,5). Although zinc deficiency disorder can have serious health implications among all age groups, infants are particularly vulnerable because their systemic zinc reserves are not fully developed and they are totally dependent on breast milk or formula. Therefore, the American Society for Clinical Nutrition recommends adding injectable zinc to PN for all infants and children, with priority for those who are premature, have low birth weight, or have chronic gastrointestinal dysfunction (4).

Zinc deficiencies among infants are difficult to identify for multiple reasons, including nonspecific signs and symptoms. The most common signs of zinc deficiency disorder include dermatitis and growth impairment, which can be attributed to multiple causes. Zinc deficiency disorder–associated dermatitis, which is a physical manifestation, is present in only the most severe cases. For premature infants, withdrawal of the amount of blood required to measure the serum zinc level might compromise the

health of the infant; therefore, routine testing is not performed, which might explain, in part, why no other cases were reported.

Physicians who prescribe PN should recognize the potential risks for micronutrient deficiency, including zinc deficiency, among premature infants who require increased amounts or are unable to receive adequate doses. During shortages, clinicians might need to reserve micronutrients for the most vulnerable populations. According to FDA, shortages also are ongoing for other PN micronutrient components (e.g., selenium, chromium, and copper); FDA is working with manufacturers to prioritize which micronutrients to produce and to identify other sources for the micronutrients. Until the manufacture of these micronutrients increases, shortages will continue. Hospitals with limited stocks of injectable zinc should consider reserving available supplies for infants with the highest risk for deficiency. Whenever PN without the standard micronutrients is administered to patients, either as a result of shortages or other considerations, monitoring for signs and symptoms of micronutrient deficiencies is recommended. Health-care providers should always consider the specific clinical situation when applying these guidelines for individual clinical care.

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## CDC Grand Rounds: A Public Health Approach to Prevention of Intimate Partner Violence

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Intimate partner violence (IPV) is a serious, and preventable, public health problem in the United States. IPV can involve physical and sexual violence, threats of physical or sexual violence, and psychological abuse, including stalking (1). It can occur within opposite-sex or same-sex couples and can range from one incident to an ongoing pattern of violence. On average, 24 persons per minute are victims of rape, physical violence, or stalking by an intimate partner in the United States (2). These numbers underestimate the problem because many victims do not report IPV to police, friends, or families. In 2010, IPV contributed to 1,295 deaths, accounting for 10% of all homicides for that year (3). The combined medical, mental health, and lost productivity costs of IPV against women are estimated to exceed \$8.3 billion per year (4). In addition to the economic burden of IPV, victims are more likely to experience adverse health outcomes, such as depression, anxiety, posttraumatic stress disorder symptoms, suicidal behavior, sexually transmitted infections, and unintended pregnancy (5).

Among victims of IPV, women are at least three times more likely than men to experience injury from partner violence. Women also are more likely to experience severe physical (24.3%) and sexual violence from a partner, and twice as likely to be killed (2,5). However, in the United States, 13.8% of men also have experienced severe physical violence at some point in their lives (2).

Partner violence often begins at a young age. Based on results from the 2011 Youth Risk Behavior Survey, approximately 9% of high school students reported date-related physical violence by a boyfriend or girlfriend (6). Among females who experienced rape, physical violence, or stalking by an intimate partner, 22.4% experienced some form of IPV for the first time at age 11–17 years, 47.1% at age 18–24 years, and 21.1% at age 25–34 years. Among males who experienced rape, physical violence, or stalking by an intimate partner, 15.0% experienced

some form of IPV for the first time at age 11–17 year, 38.6% at age 18–24 years, and 30.6% at age 25–34 years (Figure) (2). Many persons who experience IPV while young continue to encounter a pattern of abuse well into adulthood.

The causes of IPV are complex and often the product of multiple individual, relationship, community, and societal factors. Such factors include engaging in aggressive or delinquent behavior as a youth, heavy alcohol or drug use, witnessing or experiencing violence as a child, marital conflict, dominance and control in a relationship, and unemployment (7). Much less is known about community and societal risk factors for IPV, such as high rates of poverty and cultural and social norms that support violence (8).

### Importance of Surveillance

Data collected and interpreted through public health surveillance support efforts to prevent IPV. CDC uses the National Intimate Partner and Sexual Violence Survey (NISVS)\* to collect information on nonfatal IPV. The data are used to identify populations at risk, inform prevention efforts, monitor the problems, and assess trends over time. NISVS is the first system to provide national and state data on IPV, sexual violence, and stalking to guide prevention.

CDC also operates the National Violent Death Reporting System (NVDRS).† This is a state-based surveillance system that collects information from various sources about violent deaths, including IPV-related homicides. The information is collected from death certificates, police reports, and coroner/medical examiner reports and stored in an encrypted database. Currently, NVDRS operates in 18 states, consolidating data on violent deaths, unintentional firearm deaths, and deaths of undetermined intent. State and local violence prevention practitioners use these data to guide their prevention programs, policies, and practices. The data also are used to understand the magnitude, trends, and characteristics of violent deaths, and to help evaluate state and local prevention programs and strategies.

### A Public Health Approach to Prevention

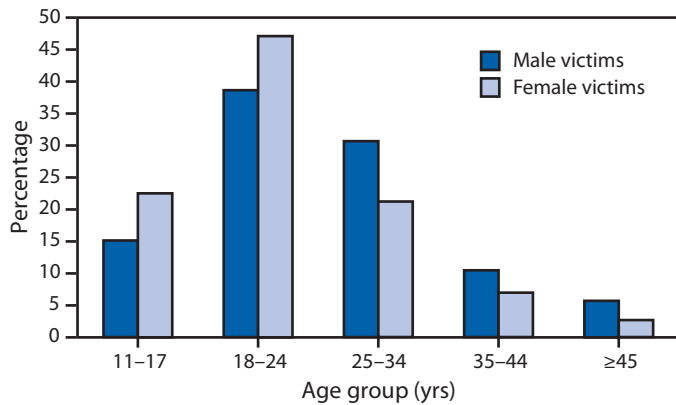
Public health has a role in building capacity and expertise within communities to develop and implement evidence-based

*This is another in a series of occasional MMWR reports titled CDC Grand Rounds. These reports are based on grand rounds presentations at CDC on high-profile issues in public health science, practice, and policy. Information about CDC Grand Rounds is available at <http://www.cdc.gov/about/grand-rounds>.*

\* Additional information available at <http://www.cdc.gov/violenceprevention/nisvs>.

† Additional information available at <http://www.cdc.gov/violenceprevention/nvdrs>.

**FIGURE. Age at occurrence of first intimate partner violence experience among males and females who experienced rape, physical violence, or stalking by an intimate partner — National Intimate Partner and Sexual Violence Survey, United States, 2010**



IPV prevention strategies that target known risk factors. These infrastructure-building efforts can work to identify programs, practices, and policies that moderate or reduce IPV risks, facilitate the scale-up of effective primary and secondary prevention strategies, and ensure wide-spread adoption of those strategies.

Of those strategies that have been evaluated, some are effective in changing knowledge and attitudes, but not actual behaviors (9), and a small but growing number have been shown to reduce partner violence and/or victimization (10,11). Current strategies include youth and parent-focused programs, therapeutic approaches with at-risk couples, community-based programs, and economic and policy-focused approaches. Most of the programs that effectively change behavior target adolescents and prevention of dating violence (10,11). Less is known about effective prevention approaches with adult populations, although some programs with adults have shown promise (12,13). Helping teens learn to establish healthy, nonviolent relationships might reduce the prevalence of adult partner violence over time. The evidence base for effective prevention of intimate partner violence is growing and evolving, and new strategies are being implemented and evaluated (14).

CDC's Dating Matters<sup>§</sup> project is testing strategies that build on what is known about the prevention of teen dating violence. Developed for youth in high-risk urban communities, Dating Matters promotes healthy relationships and prevention of dating violence by combining a variety of prevention strategies that engage youth, their parents, and educators (15,16). In addition, communities assess and inform local policy to support efforts to foster safe and healthy relationships for youth and sustain evidence-based prevention programs. CDC is

<sup>§</sup> Additional information available at <http://www.cdc.gov/violenceprevention/datingmatters>.

currently supporting the implementation and evaluation of Dating Matters in four urban communities before disseminating the prevention strategies more widely.

The Family Violence Prevention Services Act (FVPSA), reauthorized in 2010 as part of the Child Abuse Prevention and Treatment Act,<sup>¶</sup> gives CDC the authority to invest federal funds to support coordinated community responses to address partner violence. Using FVPSA funds, CDC supported the Domestic Prevention Enhancements and Leadership Through Alliances (DELTA) program,<sup>\*\*</sup> with a focus on primary prevention of IPV. Through DELTA, CDC funded 14 state domestic violence coalitions (SDVCs) to engage local partners in data-driven planning, prevention-focused training and technical assistance, and state and local support for prevention efforts. These efforts are geared toward identifying, implementing, and evaluating primary IPV prevention strategies.

In 2013, CDC launched DELTA Focusing on Outcomes for Communities United with States (DELTA FOCUS),<sup>††</sup> which funds 10 SDVCs. DELTA FOCUS grantees support IPV prevention at the national, state, and local levels through strategies that address the structural determinants of health at the outer layers (societal and community) of the social-ecological model of public health.<sup>§§</sup> This means, in addition to addressing individual and relationship factors associated with IPV outcomes, grantees support work to change the environments and conditions in which people live, work, and play. To do this, economic and social policies and processes and norms that shape the health of individuals and communities must be addressed. This might involve strategies that integrate issues related to education, employment, social norms, gender equality, and more.

One IPV prevention effort that has focused on teen dating violence is the Start Strong: Building Healthy Teen Relationships initiative,<sup>¶¶</sup> funded by the Robert Wood Johnson Foundation in partnership with Blue Shield of California Foundation. Start Strong was begun in 2008 as a 4-year initiative and has been the largest private sector investment in teen dating violence prevention so far. The initiative identified innovative yet practical solutions to prevent teen dating violence and promote healthy relationships among persons aged 11–14 years in 11 communities. Using the social-ecological model of public health, Start Strong includes strategies to

<sup>¶</sup> Child Abuse Prevention and Treatment Act, Pub. L. No. 111-320, 124 Stat. 3459 (December 20, 2010). Available at <http://www.gpo.gov/fdsys/pkg/PLAW-111publ320/pdf/PLAW-111publ320.pdf>.

<sup>\*\*</sup> Additional information available at <http://www.cdc.gov/violenceprevention/delta>.

<sup>††</sup> Additional information available at <http://www.dev.cdc.gov/violenceprevention/deltafocus>.

<sup>§§</sup> Additional information available at <http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html>.

<sup>¶¶</sup> Available at <http://startstrong.futureswithoutviolence.org/learn-more>.

educate and engage youths in and out of the school setting, and to educate and engage teen influencers (e.g., parents, caregivers, older teens, teachers, and other school personnel). Strategies to improve outcomes through increased awareness and behavioral change also rely on coordinated improvements in school district policies promoting prevention and response and using creative social marketing and social media efforts focused on youths and parents.

In 1993, Futures Without Violence was established as the Department of Health and Human Services National Health Resource Center on Domestic Violence.<sup>\*\*\*</sup> Beginning with 12 emergency departments across the United States, this initiative created the first organized opportunity for doctors, nurses, social workers, domestic violence prevention advocates, and police to join forces as equal partners to address IPV. It has since been expanded into five multistate initiatives in various health and public health programs. The focus is to build consensus around recommended violence intervention practices among health-care and public health leaders by understanding what can be done and what changes to the existing health-care systems are necessary. This effort has resulted in improvements to professional training curricula; changes to medical records, charting, and coding techniques; community partnerships; policy improvements; and leadership development. Futures Without Violence is also building on opportunities created by the Affordable Care Act.<sup>†††</sup> Those include reimbursement for screening and counseling for IPV to facilitate recommendations made by the U.S. Preventive Services Task Force and other organizations to integrate IPV screening, assessment, counseling, and referral into teen pregnancy prevention and other adolescent and reproductive health programs, well-women visits, and home visitation programs.

## The Future of IPV Prevention

Raising awareness and developing rigorous evidence-based programs, practices, and policies to prevent IPV are essential to stopping violent behavior before it starts. Efforts to effectively prevent the start of IPV also need to focus on healthy relationships across the lifespan, with a particular emphasis on children and youth. Early education and prevention provide the best hope for creating healthy futures and fostering a society without domestic violence.

More research on longitudinal risk for IPV and protective factors is needed to better understand what works, and rigorous evaluation of prevention strategies that are being implemented is critical. Programs, practices, and policies need to be developed

<sup>\*\*\*</sup> Additional information available at <http://www.futureswithoutviolence.org/content/features/detail/790>.

<sup>†††</sup> Patient Protection and Affordable Care Act of 2010. Pub. L. No. 114-48 (March 23, 2010), as amended through May 1, 2010. Available at <http://www.healthcare.gov/law/full/index.html>.

that are culturally based and responsive to the populations at greatest risk, and evidence needs to be gathered on how best to scale-up effective approaches to ensure widespread adoption.

Given the social and environmental complexities of IPV, collaborators within and outside public health need to be involved in finding solutions. The problem of IPV can only be addressed if the focus is shifted from responding to acts of violence to preventing violence before it starts. This will require the involvement of many key sectors, including education, the media, housing and community development, criminal justice, transportation, and private industry. Public health entities and SDVCs have a history of being effective champions of multidisciplinary and multisector initiatives (17,18). Ultimately, rigorous evaluation of the outcomes of prevention efforts makes it possible to determine the long-term impact on population health, inform policy decisions, and build effective strategies to prevent IPV.

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## Notes from the Field

### Acute Illness Associated with Use of Pest Strips — Seven U.S. States and Canada, 2000–2013

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Dichlorvos-impregnated resin strips (DDVP pest strips) are among the few organophosphate products still available for indoor residential use. The residential uses for most other organophosphate products, including most DDVP products, were canceled because they posed unreasonable risks to children (1). DDVP pest strips act by inhibiting acetylcholinesterase activity in the brain and nerves of insect pests and are designed to gradually release DDVP vapor for up to 4 months (2,3). Acute illnesses in humans associated with nonlethal acute exposures usually resolve completely, but recovery is not always rapid (2). To assess the frequency of acute illnesses associated with DDVP pest strips, cases from 2000 through June 2013 were sought from the 12 states that participate in the Sentinel Event Notification System for Occupational Risks (SENSOR)–Pesticides Program, the National Pesticide Information Center (NPIC), and Health Canada.\* A total of 31 acute DDVP pest strip–related illness cases were identified in seven U.S. states and Canada. The majority of these illnesses resulted from use of the product in commonly occupied living areas (e.g., kitchens and bedrooms), in violation of label directions. Although 26 of the 31 cases involved mild health effects of short duration, five persons had moderate health effects. Illnesses caused by excess exposure to DDVP pest strips can be reduced by educating the public about the proper usage of DDVP pest strips and with improvements in label directions.

Cases were defined and classified based on the strength of evidence for DDVP exposure and health effects consistent with and following exposure to DDVP pest strips.† Information

was collected on demographic characteristics, event location, health effects, outcomes (e.g., hospitalization), contributing factors, reporting source, illness severity,<sup>§</sup> and work-relatedness.

From 2000 to 2013, a total of 31 (30 possible and one probable) cases of acute DDVP pest strip–related illness were identified in the United States (24 cases) and Canada (seven). The 24 U.S. cases were reported to SENSOR or NPIC from seven states; the seven Canada cases were reported to Health Canada from across the country. Twenty-six (84%) of the 31 cases were classified as of low severity, and 24 (77%) of the patients were female (Table). Among the 22 cases for which age was known, the mean age of patients was 48 years. Twenty-four (77%) of the exposures occurred in private residences. The most commonly reported affected body systems and their symptoms were neurologic (68%) (e.g., headache), respiratory (55%) (e.g., dyspnea), and gastrointestinal (42%) (e.g., nausea) (Table). Five of the 31 persons had health effects considered moderate, including asthma attack, respiratory distress requiring hospitalization, paresthesias, and incoordination.

A total of 20 (65%) of the 31 cases involved label<sup>¶</sup> violations, mostly use of DDVP pest strips in areas occupied by persons ≥4 hours/day. For the remaining 11 cases, information was not sufficient to determine if whether usage of DDVP pest strips resulted in a label violation (Table). Contributing factors other than using strips in occupied areas included excessive application (two cases), placing strips in sealed bags to treat infested items (four), lack of skin protection (e.g., gloves or prompt skin washing) (four), placing strips in closets and pantries (three), cutting and tearing strips into smaller pieces (three), and using a heater and fan to accelerate vapor dissemination from strips (three).

In the 11 cases for which it was unclear whether a label violation had occurred, exposure might have resulted from misunderstanding of label directions. Currently in the United States, DDVP pest strips are offered in three different sizes: 16 g, 65 g, and 80 g. Label directions differ across sizes, but also can differ across brands of the same size. For example, whereas all labels specify that one 65 g or 80 g strip will treat up to 900–1,200 cubic feet, not all labels advise against using

\*SENSOR-Pesticides consists of state health departments in 12 states that conduct surveillance of pesticide-related illness (<http://www.cdc.gov/niosh/topics/pesticides/overview.html>). Five of the 12 states reported acute DDVP pest strip–related illness (Michigan, North Carolina, New York, Texas, and Washington); the other seven states (California, Florida, Iowa, Louisiana, Nebraska, New Mexico, and Oregon) did not identify any acute DDVP pest strip–related illness during 2000–2013. NPIC, an organization that provides pesticide-related information to the public and health-care professionals and captures human/animal pesticide exposure incidents reported by callers, reported acute DDVP pest strip–related illness from four states (New Mexico, New York, Ohio, and Texas) (<http://npic.orst.edu/about.html>). There was no overlap in the New York and Texas cases reported by SENSOR-Pesticides and NPIC.

† Probable cases are based on a mix of objective and subjective data about exposure and health effects, and possible cases are based on subjective exposure and health effects data. The complete case definition is available at <http://www.cdc.gov/niosh/topics/pesticides/pdfs/casedef.pdf>.

§ Standardized coding was used to determine severity of illness (available at <http://www.cdc.gov/niosh/topics/pesticides/pdfs/pest-sevindexv6.pdf>). Low severity cases usually resolve without treatment and cause minimal time lost from work (<3 days). Moderate severity cases are not life threatening but require medical treatment and result in <6 days lost from work.

¶ Pesticide product labels provide legally enforceable information on how to safely handle and apply pesticides. The label is the law. The U.S. Environmental Protection Agency approves the labels and enforces them with the assistance of state agencies.

**TABLE. Characteristics of patients (N = 31) with acute dichlorvos (DDVP) pest strip–related illness — seven U.S. states and Canada, 2000–2013**

Characteristic	No.	(%)
<b>Age group (yrs)</b>		
≤19	1	(3)
20–64	24	(77)
≥65	4	(13)
Unknown	2	(6)
<b>Sex</b>		
Female	24	(77)
Male	7	(23)
<b>Body system/Organ affected*</b>		
Neurologic	21	(68)
Respiratory	17	(55)
Gastrointestinal	13	(42)
Other	11	(35)
Skin	7	(23)
Eye	7	(23)
<b>Case classification</b>		
Possible	30	(97)
Probable	1	(3)
<b>Severity of illness†</b>		
Low	26	(84)
Moderate	5	(16)
<b>Route of exposure‡</b>		
Respiratory	28	(90)
Dermal	5	(16)
<b>Location of exposure</b>		
Home	24	(77)
Workplace (Store/Office)	3	(10)
Other (Boat/Car)	3	(10)
Unknown	1	(3)
<b>Label violation status</b>		
Applied DDVP in areas occupied by humans ≥4 hours/day	18	(58)
Excessive application	2	(6)
Undetermined¶	11	(35)

\* Sum exceeds 100% because some patients had more than one affected body system/organ.

† Low severity cases usually resolve without treatment and cause minimal time lost from work (<3 days). Moderate severity cases are not life threatening but require medical treatment and result in <6 days lost from work.

‡ The sum exceeds 100% because two cases had both routes of exposure.

¶ Insufficient data were available to determine whether the DDVP strip usage resulted in a label violation.

the product in smaller spaces, nor do they all provide a clear warning against excessive application. Moreover, some labels list offices as appropriate places for strip placement even though these are typically occupied for ≥4 hours/day. Finally, although some strips are approved for bed bug control, the directions for use are substantially different for bed bugs versus other insect infestations, which might confuse some users and lead to improper use.\*\* Preventing DDVP pest strip–related illnesses requires educating the public regarding how to correctly use DDVP pest strips and how to control insect pests using methods with the least possible health and environmental hazards.

\*\* Control of bedbugs involves placing the bed bug–infested items in a sealed bag along with the strip, whereas for control of other insects, the strip should be hung in the desired location.

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## Notice to Readers

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### Enhanced Availability of Data for Nationally Notifiable Diseases

Provisional data for cases of selected diseases and conditions reported through the National Notifiable Diseases Surveillance System (NNDSS) by the 50 states, New York City, the District of Columbia, and U.S. territories are collated and published weekly in *MMWR*. Beginning with the January 10, 2014, issue, these data are now available at <https://data.cdc.gov> in various sortable, machine-readable formats that will make them more usable for analyses. Each weekly issue of *MMWR* includes a link that takes users to that week's dataset, from which they can link to the new formats.

Previously available options for downloading historical data also continue to be available. For example, a portable document format (PDF) version (and for most issues, a hypertext markup language [HTML] version) of the NNDSS tables for issues from 1994 to the present can still be downloaded from

the *MMWR* website ([http://www.cdc.gov/mmwr/mmwr\\_wk/wk\\_cv.html](http://www.cdc.gov/mmwr/mmwr_wk/wk_cv.html)), and a tab-delimited text file can be exported from CDC's WONDER system (<http://wonder.cdc.gov/mmwr/mmwr morb.asp>). CDC WONDER contains NNDSS data from 1996 to the present. For older data, complete editions of *MMWR* volumes 1–30 can be downloaded in PDF format from CDC Stacks (<http://stacks.cdc.gov>). Third-party groups have been able to collect historical NNDSS data from *MMWR* and additional sources. An example of such an external collection is Project Tycho (<http://www.tycho.pitt.edu>).

Users also should note that a report with final NNDSS data is published in a weekly issue of *MMWR* approximately 8 months after the end of the calendar year. The *Summary of Notifiable Diseases — United States* ([http://www.cdc.gov/mmwr/mmwr\\_nd/index.html](http://www.cdc.gov/mmwr/mmwr_nd/index.html)) is published annually, approximately 18 months after the end of the calendar year.



## Errata

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### Vol. 63, No. 1

In the report, “Lung Cancer Incidence Trends Among Men and Women — United States, 2005–2009,” multiple errors occurred. On page 2, in the second column, the second full sentence should read, “Lung cancer incidence rates decreased most rapidly among adults aged 35–44 years, decreasing **6.5%** per year among men and **5.8%** per year among women (Table 1).”

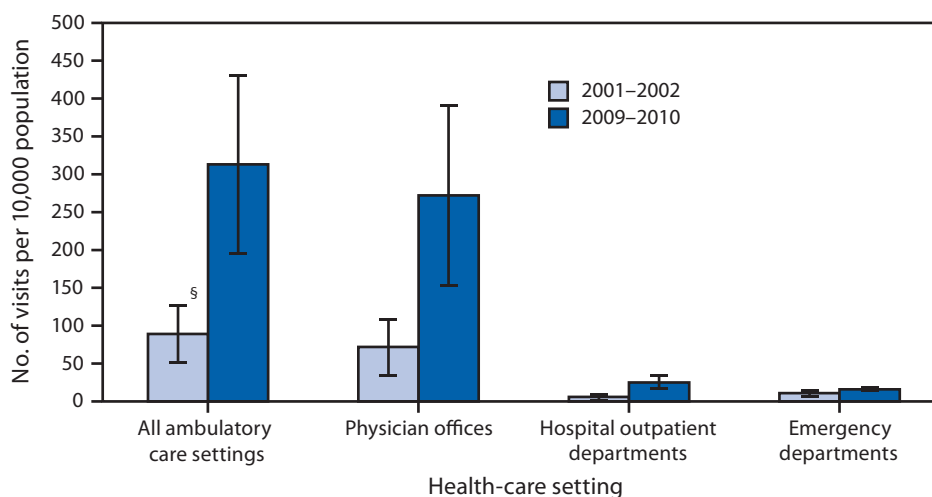
On page 3, the title of the Figure should read, “FIGURE. Rate\* of invasive lung cancer cases among men and women, by age group — **United States, 2005–2009.**” In the summary box, the last sentence should read, “Continued attention to local, state, and national population-based tobacco prevention and control strategies **is** needed to achieve further reductions in tobacco use among men and women of all ages to reduce lung cancer in the United States.”

On page 3, in Table 1, under the heading Men, the column of APC (%) values, from top to bottom, should read, “-2.6<sup>†</sup>, **0.6**, -6.5<sup>†</sup>, -2.9<sup>†</sup>, -4.3<sup>†</sup>, -2.7<sup>†</sup>, -1.7.<sup>†</sup>” Under the heading Women, in the column showing RR women to men, the second value should read, “**1.1**”; the column of APC (%) values, from top to bottom, should read, “-1.1<sup>†</sup>, **1.1**, -5.8<sup>†</sup>, -0.1, -3.7<sup>†</sup>, -0.8, -0.1.”

## QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

## Rate\* of Ambulatory Care Visits for Chronic Kidney Disease,<sup>†</sup> by Health-Care Setting — United States, 2001–2002 and 2009–2010



\* Per 10,000 population, based on 2-year annual averages. Rates were calculated using U.S. Census Bureau 2000-based postcensal civilian noninstitutionalized population estimates.

<sup>†</sup> Defined as any listed diagnosis codes 403.00–403.91, 404.00–404.93, or 585 based on the *International Classification Of Diseases, Ninth Edition, Clinical Modification*.

<sup>§</sup> 95% confidence interval.

From 2001–2002 to 2009–2010, the rate of ambulatory care visits overall for chronic kidney disease more than tripled in the United States, from 89 to 313 visits per 10,000 population. Visit rates increased for physician offices, from 72 to 272 per 10,000 population, and for hospital outpatient departments, from 6 to 25 per 10,000 population, but the chronic kidney disease visit rate for emergency departments did not change.

**Sources:** National Ambulatory Medical Care Survey, National Hospital Ambulatory Medical Care Survey. Available at <http://www.cdc.gov/nchs/ahcd.htm>.

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