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# Drowsy Driving — 19 States and the District of Columbia, 2009–2010

According to the National Highway Traffic Safety Administration (NHTSA), 2.5% of fatal motor vehicle crashes (approximately 730 in 2009) and 2.0% of all crashes with non-fatal injuries (approximately 30,000 in 2009) involve drowsy driving (*1*). However, although data collection methods make it challenging to estimate the number of crashes that involve drowsy drivers, some modeling studies have estimated that 15% to 33% of fatal crashes might involve drowsy drivers (*2,3*). Fatalities and injuries are more likely in motor vehicle crashes that involve drowsy driving compared with non-drowsy driving crashes (*1,4*). To assess the state-level self-reported prevalence of falling asleep while driving, CDC analyzed data from a set of questions about insufficient sleep administered through the Behavioral Risk Factor Surveillance System (BRFSS) during 2009–2010. Among 147,076 respondents in 19 states and the District of Columbia (DC),* 4.2% reported having fallen asleep while driving at least one time during the previous 30 days. Reports of falling asleep while driving were more common among adults who reported usually sleeping ≤6 hours per day, snoring, or unintentionally falling asleep during the day compared with other adults who did not report these characteristics. Drivers should avoid driving while drowsy and learn the warning signs of drowsy driving.

BRFSS is a state-based, random-digit–dialed telephone survey of noninstitutionalized adults aged ≥18 years that is administered by state health departments each year in collaboration with CDC. Based on Council of American Survey and Research Organizations (CASRO) guidelines, response rates† for the states that used the optional sleep questions during 2009–2010 had a median of 52.1% and ranged from 39.1% (Oregon in 2010) to 68.8% (Nebraska in 2010).

Respondents were asked, "During the past 30 days, have you ever nodded off or fallen asleep, even just for a brief moment, while driving?" Drowsy driving was defined as those with an affirmative response, whereas no drowsy driving included those who responded "no," "don't drive," "don't have a license," or "don't know/not sure." Respondents also were asked, "On average, how many hours of sleep do you get in a 24-hour period?" "Do you snore?" "During the past 30 days, for about how many days have you felt you did not get enough rest or sleep?" and "During the past 30 days, for about how many days did you find yourself unintentionally falling asleep during the day?" Age-adjusted prevalence of falling asleep while driving and 95% confidence intervals (CIs) were calculated by state, and by selected sociodemographic and other sleep-related characteristics. For comparisons of prevalence between subgroups, statistical significance ($p<0.05$) was determined by using t-tests. All indicated differences between subgroups are statistically significant.





*Arkansas (2010), California (2009, 2010), Connecticut (2010), Delaware (2010), Georgia (2009), Hawaii (2009, 2010), Illinois (2009), Kansas (2009, 2010), Louisiana (2009), Maryland (2009, 2010), Michigan (2010), Minnesota (2009, 2010), Missouri (2010), Nebraska (2009, 2010), Nevada (2010), New York (2009), Oregon (2010), Texas (2009), and Wyoming (2009). DC used the module in 2010.

†The percentage of persons who completed interviews among all eligible persons, including those potential respondents for whom eligibility was not established.

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Among 147,076 respondents, 4.2% (unadjusted prevalence = 4.1%) reported having fallen asleep while driving during the previous 30 days (Table 1). Men were more likely to report drowsy driving than women (5.3% versus 3.2%). Drowsy driving prevalence decreased with age, from >4.9% among adults aged 18–44 years to 1.7% among those aged ≥65 years. Non-Hispanic whites were less likely to report drowsy driving than other racial/ethnic groups (3.2% versus 6.1% for non-Hispanic blacks, 5.9% for Hispanics, and 6.0% for persons of other race/ethnicity). Retired respondents (1.0%), students or homemakers (2.1%), and unemployed respondents (3.1%) were less likely to report drowsy driving than those who were employed (5.1%) or unable to work (6.1%). Educational attainment was not associated with drowsy driving. Among the states that used the sleep module, drowsy driving prevalence ranged from 2.5% in Oregon to 6.1% in Texas.

Drowsy driving was associated with other sleep-related characteristics. Adults who reported frequent insufficient sleep, a daily sleep duration of ≤6 hours, snoring, or unintentionally falling asleep during the day reported drowsy driving more frequently than those who did not report those characteristics (Table 2). Short sleep duration (≤6 hours) and snoring, suggestive of obstructive sleep apnea, each were related independently to drowsy driving (Figure).

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## Editorial Note

In 2006, the Institute of Medicine released a report emphasizing the public health importance of sleep and including a discussion of drowsy driving.[§] As a result of increased attention to the consequences of insufficient sleep, *Healthy People 2020* added a set of sleep health objectives, including one to reduce the rate of motor vehicle crashes caused by drowsy driving.[¶]

Previous surveys have addressed the topic of drowsy driving, but this report presents the findings from the largest number of U.S. survey respondents to date. The finding that 4% of respondents reported falling asleep while driving during the previous month agrees with previous smaller studies. In a survey of 4,010 drivers sponsored by NHTSA, 4.2% reported falling asleep while driving during the past month, and 11% reported this experience in the past year (*5*). The corresponding results from a survey of 2,000 U.S. residents sponsored by the AAA Foundation for Traffic Safety in 2010 were identical (4% and 11%) (*3*).

[§] Available at http://books.nap.edu/catalog.php?record_id=11617.

[¶] Information available at http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=38.

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**TABLE 1. Age-adjusted* prevalence of falling asleep while driving during the preceding 30 days, by selected demographic characteristics and state — Behavioral Risk Factor Surveillance System, 19 states and the District of Columbia, 2009–2010†**

| Characteristic | No.§ | No. who reported falling asleep while driving | % | (95% CI) |
|---|---|---|---|---|
| **Total** | **147,076** | **4,301** | **4.2** | **(3.9–4.6)** |
| **Sex** | | | | |
| Men | 56,321 | 2,181 | 5.3 | (4.7–5.9) |
| Women | 90,755 | 2,120 | 3.2 | (2.9–3.5) |
| **Age group (yrs)** | | | | |
| 18–24 | 4,361 | 192 | 4.9 | (3.8–6.2) |
| 25–34 | 12,200 | 583 | 6.3 | (5.1–7.7) |
| 35–44 | 20,231 | 881 | 5.5 | (4.8–6.3) |
| 45–54 | 29,362 | 1,025 | 3.5 | (3.1–4.0) |
| 55–64 | 33,054 | 865 | 2.6 | (2.2–2.9) |
| ≥65 | 47,868 | 755 | 1.7 | (1.5–1.9) |
| **Race/Ethnicity** | | | | |
| White, non-Hispanic | 110,539 | 2,638 | 3.2 | (2.9–3.5) |
| Black, non-Hispanic | 11,700 | 516 | 6.1 | (5.1–7.4) |
| Hispanic | 10,104 | 506 | 5.9 | (5.1–6.8) |
| Other, non-Hispanic¶ | 13,459 | 605 | 6.0 | (4.3–8.3) |
| **Education Level** | | | | |
| <High school diploma or GED | 11,906 | 374 | 4.8 | (4.0–5.8) |
| High school diploma or GED | 40,637 | 1,131 | 4.0 | (3.5–4.6) |
| At least some college | 94,069 | 2,782 | 4.2 | (3.8–4.7) |
| **Employment status** | | | | |
| Employed | 75,010 | 2,978 | 5.1 | (4.7–5.6) |
| Unemployed | 8,237 | 226 | 3.1 | (2.4–4.0) |
| Retired | 42,262 | 591 | 1.0 | (0.5–1.7) |
| Unable to work | 8,024 | 257 | 6.1 | (4.0–9.3) |
| Student/Homemaker | 12,951 | 225 | 2.1 | (1.6–2.7) |
| **State** | | | | |
| Arkansas | 3,800 | 118 | 3.9 | (2.9–5.3) |
| California | 17,608 | 601 | 4.8 | (4.3–5.4) |
| Connecticut | 6,409 | 147 | 3.0 | (2.2–4.0) |
| Delaware | 4,155 | 101 | 2.8 | (2.0–3.8) |
| District of Columbia | 3,600 | 85 | 2.6 | (2.0–3.3) |
| Georgia | 5,466 | 188 | 4.1 | (3.2–5.1) |
| Hawaii | 12,601 | 535 | 5.7 | (5.1–6.5) |
| Illinois | 5,555 | 129 | 2.9 | (2.3–3.7) |
| Kansas | 12,912 | 330 | 2.9 | (2.5–3.4) |
| Louisiana | 8,531 | 272 | 3.8 | (3.2–4.5) |
| Maryland | 8,281 | 261 | 4.4 | (3.7–5.4) |
| Michigan | 5,768 | 154 | 3.5 | (2.8–4.5) |
| Minnesota | 14,135 | 344 | 3.1 | (2.6–3.7) |
| Missouri | 5,137 | 125 | 3.3 | (2.4–4.5) |
| Nebraska | 10,208 | 286 | 2.9 | (2.4–3.6) |
| Nevada | 3,665 | 82 | 3.0 | (2.1–4.2) |
| New York | 3,162 | 92 | 3.6 | (2.7–4.7) |
| Oregon | 5,007 | 86 | 2.5 | (1.8–3.3) |
| Texas | 5,357 | 198 | 6.1 | (4.6–8.2) |
| Wyoming | 5,719 | 167 | 3.9 | (3.1–4.9) |
| *Median (range)* | — | — | *3.4* | *(2.5–6.1)* |

**Abbreviations:** CI = confidence interval; GED = General Educational Development certificate.
* Age adjusted to the 2000 projected U.S. population.
† The sleep module was used by California, Georgia, Hawaii, Illinois, Kansas, Louisiana, Maryland, Minnesota, Nebraska, New York, Texas, and Wyoming in 2009, and by Arkansas, California, Connecticut, Delaware, District of Columbia, Hawaii, Kansas, Maryland, Michigan, Minnesota, Missouri, Nebraska, Nevada, and Oregon in 2010.
§ Unweighted sample. Categories might not sum to survey total because of missing responses.
¶ Asian, Native Hawaiian or Pacific Islander, American Indian/Alaska Native, and multiracial.

Although it is clear that falling asleep while driving is dangerous, drowsiness impairs driving skills even if drivers manage to stay awake. Drowsiness slows reaction time, makes drivers less attentive, and impairs decision-making skills (*6*), all of which can contribute to motor vehicle crashes. Sleep-related crashes are more likely to happen at night or during the midafternoon, when drivers are more likely to be sleepy (*4,7*). These crashes often involve a single vehicle going off the road, with no evidence of braking or other attempt to prevent the crash (*4*). But sleep-related crashes also make up a disproportionate portion of rear-end and head-on collisions (*7*). Importantly, drowsy driving crashes are more likely to result in injuries and fatalities than non-drowsy driving crashes (*4*).

The findings in this report are subject to at least four limitations. First, only data from households with landline telephones were analyzed. Second, estimates of falling asleep while driving are based on self-report, likely resulting in underestimates. Previous studies have shown that persons often are not aware that they have fallen asleep (*8*). Third, data were not collected for all states and might not be generalizable to the rest of the United States. In addition, response rates for the states that used the optional sleep module during 2009–2010 were relatively low, ranging from 39.1% to 68.8% (median: 52.1%). Finally, BRFSS does not survey persons aged <18 years, thereby excluding young drivers, who might be at increased risk for drowsy driving (*4*).

The best way to prevent drowsy driving is to recognize and address the conditions that lead to sleepiness. Those at increased risk for drowsy driving include commercial drivers, persons who work at night or long shifts, drivers with untreated sleep disorders, drivers who use sedating medications, and anyone who does not get adequate sleep (*9*). Drivers should ensure that they get enough sleep (7–9 hours), seek treatment for sleep disorders, and refrain from alcohol use before driving. In their guide for employers of shift workers (i.e., anyone who works beyond the typical workday, including night shift, rotating shift, or long shift workers), NHTSA suggests that

### What is already known on this topic?

Drowsy driving is an important contributor to motor vehicle crashes and fatalities. Techniques to stay awake while driving, such as turning up the radio, opening the window, and turning up the air conditioner, have not been found to be effective. Warning signs of drowsy driving include frequent yawning or blinking, difficulty remembering the past few miles driven, missing exits, drifting from one's lane, or hitting a rumble strip.

### What is added by this report?

Overall prevalence of self-reported falling asleep while driving during the previous 30 days was 4.2%. State-level prevalence ranged from 2.5% in Oregon to 6.1% in Texas. Persons who reported snoring or usually sleeping ≤6 hours per day were more likely to report falling asleep while driving.

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

Improved surveillance and more research will be needed to improve sleep health among U.S. adults and reduce the prevalence drowsy driving. Public health workers should educate themselves and their communities on the substantial impact that insufficient sleep and sleep disorders have on the ability to drive safely. Physicians can advise patients on lifestyle changes to improve sleep and refer patients with more serious sleep problems to a sleep specialist.

employers consider providing alternate transportation home for employees or allowing naps at work.** However, once on the road, it is also important to recognize the symptoms of drowsiness and act appropriately, by pulling over to rest until fully rested or by changing drivers. Techniques to stay awake while driving, such as turning up the radio, opening the window, and turning up the air conditioner, have not been found to be effective (*10*). Warning signs of drowsy driving include frequent yawning or blinking, difficulty remembering the past few miles driven, missing exits, drifting from one's lane, or hitting a rumble strip.†† The only safe thing for drivers to do if they start to feel tired while driving is to get off the road and rest until no longer drowsy. In addition, continued research into and development of improved drowsy driving countermeasures is warranted, as outlined in a report from the National Center on Sleep Disorders Research/NHTSA Expert Panel on Driver Fatigue and Sleepiness.§§ Better methods to estimate the number of crashes caused by drowsy driving will improve surveillance for this problem and increase the capacity to identify effective interventions.

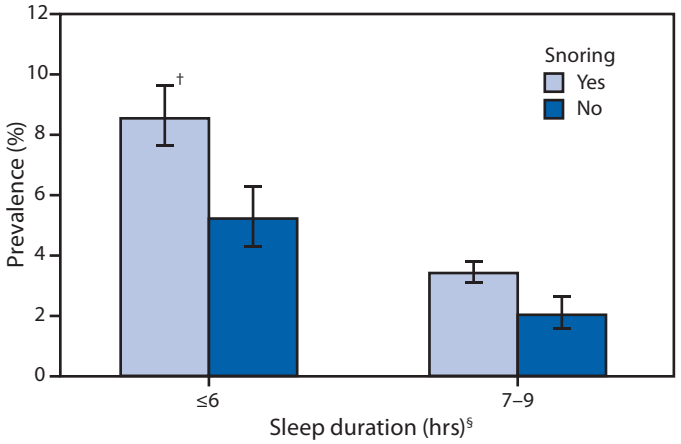
** Available at http://www.nhtsa.gov/people/injury/drowsy_driving1/human/drows_driving/resource/resource.html.
†† Information available at http://drowsydriving.org/about/warning-signs.
§§ Available at http://www.nhtsa.gov/people/injury/drowsy_driving1/drowsy.html.

**TABLE 2. Age-adjusted* prevalence of falling asleep while driving during the preceding 30 days, by selected sleep-related characteristics — Behavioral Risk Factor Surveillance System, 19 states and the District of Columbia, 2009–2010†**

| Characteristic | No.§ | No.§ who reported falling asleep while driving | % | (95% CI) |
|---|---|---|---|---|
| **Frequent insufficient sleep (≥14 days of insufficient rest or sleep during preceding 30 days)** | | | | |
| Yes | 34,114 | 1,866 | 6.8 | (6.2–7.4) |
| No | 112,737 | 2,432 | 3.2 | (2.9–3.7) |
| **Average sleep duration (hrs)** | | | | |
| ≤6 | 46,427 | 2,256 | 6.7 | (6.1–7.5) |
| 7–9 | 93,301 | 1,866 | 2.6 | (2.3–2.9) |
| ≥10 | 6,015 | 137 | 3.9 | (2.5–6.0) |
| **Snoring** | | | | |
| Yes | 71,597 | 2,571 | 5.6 | (5.1–6.2) |
| No | 75,437 | 1,728 | 3.2 | (2.8–3.6) |
| **Unintentionally fell asleep during the day (≥1 day during preceding 30 days)** | | | | |
| Yes | 52,603 | 3,016 | 8.6 | (7.9–9.5) |
| No | 94,344 | 1,278 | 1.8 | (1.5–2.0) |

**Abbreviation:** CI = confidence interval.
* Age adjusted to the 2000 projected U.S. population.
† The sleep module was used by California, Georgia, Hawaii, Illinois, Kansas, Louisiana, Maryland, Minnesota, Nebraska, New York, Texas, and Wyoming in 2009, and by Arkansas, California, Connecticut, Delaware, District of Columbia, Hawaii, Kansas, Maryland, Michigan, Minnesota, Missouri, Nebraska, Nevada, and Oregon in 2010.
§ Unweighted sample. Categories might not sum to survey total because of missing responses.

**FIGURE. Age-adjusted* prevalence of falling asleep while driving during the preceding 30 days, by usual sleep duration and snoring — Behavioral Risk Factor Surveillance System, 19 states and the District of Columbia, 2009–2010**




* Age adjusted to the 2000 projected U.S. population.
† 95% confidence interval.
§ Estimates for sleep duration ≥10 hours were not reliable because of small cell size; relative standard error >0.3.

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# Cervical Cancer Screening Among Women Aged 18–30 Years — United States, 2000–2010

Screening women for cervical cancer can save lives. However, among young women, cervical cancer is relatively rare (*1,2*), and too-frequent screening can lead to high costs and adverse events associated with overtreatment (*3*). Before 2012, cervical cancer screening guidelines of the American College of Obstetricians and Gynecologists (ACOG), American Cancer Society (ACS), and U.S. Preventive Services Task Force (USPSTF) differed on age to start and how often to get screened for cervical cancer. (*4*). In 2012, however, all three organizations recommended that 1) screening by Papanicolau (Pap) test should not be used for women aged <21 years, regardless of initiation of sexual activity, and 2) a screening interval of 3 years should be maintained for women aged 21–30 years. ACS and ACOG explicitly recommend against yearly screening (*5–7*). To assess trends in Pap testing before the new guidelines were introduced, CDC analyzed 2000–2010 data from the Behavioral Risk Factor Surveillance System (BRFSS) for women aged 18–30 years. CDC found that, among women aged 18–21 years, the percentage reporting never having been screened increased from 26.3% in 2000 to 47.5% in 2010, and the proportion reporting having had a Pap test in the past 12 months decreased from 65.0% to 41.5%. Among those aged 22–30 years, the proportion reporting having had a Pap test within the preceding 12 months decreased from 78.1% to 67.0%. These findings showed that Pap testing practices for young women have been moving toward the latest guidelines. However, the data also showed a concerning trend: among women aged 22–30 years, who should be screened every 3 years, the proportion who reported never having had a Pap test increased from 6.6% to 9.0%. More effort is needed to promote acceptance of the latest evidence-based recommendations so that all women receive the maximal benefits of cervical cancer screening.

BRFSS is a state-based, random-digit–dialed telephone survey of the noninstitutionalized, U.S. civilian adult population aged ≥18 years. During 2000–2010, women respondents were asked, "Have you ever had a Pap test?" Those answering "yes" were asked about the timing of their last test. Pap test status was categorized into four mutually exclusive groups (never, within 12 months, within 13–24 months, and within 25–36 months). Women who reported having had their last Pap test >36 months ago (<5%) were not categorized. Survey response rates ranged from 46.0% to 55.7% over the 10-year study period.

Data were collected during 2000–2010 from 125,297 women aged 18–30 years who lived in the 50 states and the District of Columbia. Pap test status was analyzed by age group, race/ethnicity, U.S. Census region,* and health-care coverage status. Unadjusted logistic regression models were used to test for statistical differences in Pap testing behaviors over the 10-year period, with year treated as a categorical variable. Percentages and 95% confidence intervals were calculated; differences in percentages were considered statistically significant at p≥0.05. All analyses were performed using statistical software to account for the complex sampling design.

Among women aged 18–21 years, an increase from 26.3% in 2000 to 47.5% in 2010 was observed in the percentage reporting never having been tested (Table 1), and a decrease from 65.0% in 2000 to 41.5% in 2010 was observed in the percentage reporting a Pap test within the preceding 12 months (Figure). Among women in this age group, an increase in reporting never having been tested was observed in all racial/ethnic categories (Table 1).

Among women aged 22–30 years, a decrease from 78.1% in 2000 to 67.0% in 2010 was observed in the percentage reporting a Pap test within the preceding 12 months (Table 2). From 2000 to 2010, increases were observed in the percentages of women aged 22–30 years who reported having had a Pap test within the preceding 13–24 (9.8% to 15.3%) and 25–36 months (2.6% to 4.5%) (Figure). Among women in this age group, increases in reported Pap tests within the preceding 13–36 months were observed in all racial/ethnic categories (Table 2).

Whereas more women who did not need screening reported not being screened, an increase also was observed in the number of women who did need screening but reported not being screened. Among women aged 18–21 years, the percentage who reported never having had a Pap test increased from 26.3 to 47.5%, whereas, among women aged 22–30 years, the percentage who reported never having had a Pap test increased from 6.6% in 2000 to 9.0% in 2010.

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

**TABLE 1. Percentage of women aged 18–21 years who reported never having received a Pap test, by age, race/ethnicity, U.S. Census region, and health-care coverage status — Behavioral Risk Factor Surveillance System, United States, 2000 and 2010**

| Characteristic | 2000 | | | 2010 | | | % change 2000 to 2010 |
|---|---|---|---|---|---|---|---|
| | Sample size | % | (95% CI) | Sample size | % | (95% CI) | |
| **Total** | **961** | **26.3** | **(24.0–28.7)** | **1,468** | **47.5** | **(44.8–50.3)** | **80.0** |
| **Age (yrs)** | | | | | | | |
| 18 | 405 | 43.3 | (38.3–48.4) | 635 | 67.2 | (62.7–71.5) | 55.0 |
| 19 | 239 | 30.5 | (25.7–35.7) | 390 | 53.8 | (48.5–59.0) | 75.4 |
| 20 | 182 | 19.3 | (15.1–24.3) | 233 | 38.3 | (32.6–44.4) | 98.4 |
| 21 | 135 | 12.8 | (9.7–16.8) | 210 | 27.5 | (22.7–33.0) | 114.8 |
| **Race/Ethnicity** | | | | | | | |
| White, non-Hispanic | 655 | 24.9 | (22.3–27.6) | 900 | 44.7 | (41.5–48.0) | 79.5 |
| Black, non-Hispanic | 74 | 17.6 | (12.1–24.8) | 120 | 30.3 | (23.6–38.0) | 72.0 |
| Hispanic | 128 | 30.0 | (23.3–37.6) | 248 | 55.6 | (49.2–61.8) | 85.3 |
| Other/Multiracial | 98 | 50.4 | (40.3–60.4) | 184 | 65.1 | (53.7–75.1) | 28.8 |
| **U.S. Census region*** | | | | | | | |
| Northeast | 178 | 28.8 | (23.7–34.4) | 237 | 50.1 | (43.7–56.5) | 74.7 |
| Midwest | 187 | 24.0 | (19.6–29.0) | 307 | 44.2 | (38.8–49.8) | 84.2 |
| South | 317 | 23.8 | (20.6–27.4) | 422 | 38.7 | (33.9–43.6) | 61.8 |
| West | 279 | 30.7 | (25.0–37.1) | 502 | 58.2 | (53.5–62.8) | 89.3 |
| **Health-care coverage** | | | | | | | |
| Covered | 714 | 25.1 | (22.6–27.8) | 1,089 | 47.8 | (44.7–50.9) | 89.6 |
| Not covered | 210 | 26.8 | (22.0–32.3) | 317 | 45.0 | (39.4–50.8) | 68.3 |

**Abbreviations:** Pap = Papanicolaou; CI = confidence interval.

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

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## Editorial Note

Advances in scientific knowledge have led to recent cervical cancer screening recommendations to begin Pap testing at age 21 years and receive screening every 3 years. Among young women, invasive cervical cancer is rare, with approximately 125 women aged <25 years receiving a cervical cancer diagnosis annually. Most precancerous lesions detected by Pap testing regress, even without treatment (*1,2*). Previous studies also have shown that frequent testing and overtreatment of women can lead to harm associated with diagnostic procedures (*3*), including adverse birth outcomes (*6,8*).

The findings in this report show that increasing numbers of women are being screened at an age and with a frequency consistent with the latest guidelines. However, these data also show that, in 2010, among women aged 22–30 years, 9.0% reported never having had a Pap test. Public health initiatives to increase screening among these women should continue.

### What is already known on this topic?

Cervical cancer screening by Papanicolau (Pap) test reduces cancer deaths by detecting precancerous lesions early so that they can be treated before cancer develops. Annual screening beginning as early as age 18 years is no longer recommended. Evidence-based guidelines from the American Cancer Society, American College of Obstetricians and Gynecologist, and U.S. Preventive Services Task Force in 2012 call for screening to begin no earlier than age 21 years and with an interval of 3 years between routine Pap tests for women aged 22–30 years.

### What is added by this report?

Analyses of Behavioral Risk Factor Surveillance System data show that Pap test initiation at later ages and longer screening intervals began before the release of the new guidelines. From 2000 to 2010, the proportion of women aged 18–21 years who had never been screened increased from 26.3% to 47.5%, and among women aged 22–30 years, the proportion who reported having a Pap test within the preceding 12 months decreased from 78.1% to 67.0%. These favorable trends are partially counterbalanced by an unfavorable trend; the prevalence of women aged 22–30 years reporting having never been screened increased from 6.6% in 2000 to 9.0% in 2010.

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

Newer cervical cancer screening guidelines allow screening to focus on women who are at highest risk for cervical cancer. Monitoring screening behaviors of women eligible for screening will be an important step to further reduce disparities in cervical cancer screening.

**TABLE 2. Percentage of women aged 22–30 years who reported never having received a Pap test or having received a Pap test within the preceding 12 months, or within the preceding 13–36 months, by age group, race/ethnicity, U.S. Census region, and health-care coverage status — Behavioral Risk Factor Surveillance System, United States, 2000 and 2010**

| Characteristic | 2000 | | | 2010 | | | % change 2000 to 2010 |
|---|---|---|---|---|---|---|---|
| | Sample Size | % | (95% CI) | Sample Size | % | (95% CI) | |
| **Never had a Pap test** | | | | | | | |
| **Total** | **728** | **6.6** | **(5.8–7.3)** | **832** | **9.0** | **(8.1–10.0)** | **36.4** |
| **Age group (yrs)** | | | | | | | |
| 22–24 | 334 | 10.4 | (8.6–12.4) | 364 | 16.9 | (14.5–19.5) | 62.5 |
| 25–27 | 220 | 6.0 | (5.0–7.4) | 239 | 7.4 | (6.1–8.8) | 23.3 |
| 28–30 | 174 | 3.3 | (2.7–4.1) | 229 | 4.3 | (3.5–5.3) | 30.3 |
| **Race/Ethnicity** | | | | | | | |
| White, non-Hispanic | 373 | 4.1 | (3.5–4.7) | 402 | 6.6 | (5.6–7.7) | 61.0 |
| Black, non-Hispanic | 57 | 5.9 | (3.8–9.1) | 103 | 7.3 | (5.4–9.8) | 23.7 |
| Hispanic | 151 | 11.6 | (9.2–14.6) | 165 | 10.3 | (8.0–13.1) | -11.2 |
| Other/Multiracial | 146 | 20.6 | (16.3–25.8) | 152 | 25.4 | (20.8–30.5) | 23.3 |
| **U.S. Census region*** | | | | | | | |
| Northeast | 176 | 8.3 | (6.6–10.3) | 161 | 9.6 | (7.6–11.9) | 15.7 |
| Midwest | 161 | 5.7 | (4.6–7.1) | 144 | 6.5 | (5.1–8.4) | 14.0 |
| South | 225 | 5.9 | (5.0–7.1) | 290 | 8.6 | (7.1–10.5) | 45.8 |
| West | 166 | 7.0 | (5.2–9.3) | 237 | 11.3 | (9.4–13.5) | 61.4 |
| **Health-care coverage** | | | | | | | |
| Covered | 506 | 5.1 | (4.5–5.8) | 497 | 7.0 | (6.1–8.1) | 37.3 |
| Not covered | 217 | 11.4 | (9.3–13.9) | 328 | 14.6 | (12.4–17.1) | 28.1 |
| **Pap test within the preceding 12 mos†** | | | | | | | |
| **Total** | **12,120** | **78.1** | **(77.0–79.2)** | **9,353** | **67.0** | **(65.6–68.4)** | **-14.2** |
| **Age group (yrs)** | | | | | | | |
| 22–24 | 3,515 | 77.8 | (75.6–79.9) | 1,940 | 61.6 | (58.6–64.5) | -20.8 |
| 25–27 | 4,049 | 79.2 | (77.3–81.0) | 2,965 | 67.4 | (65.0–69.7) | -14.9 |
| 28–30 | 4,556 | 77.5 | (75.7–79.2) | 4,448 | 70.8 | (68.9–72.6) | -8.6 |
| **Race/Ethnicity** | | | | | | | |
| White, non-Hispanic | 8,688 | 80.5 | (79.2–81.6) | 6,021 | 68.8 | (67.1–70.4) | -14.5 |
| Black, non-Hispanic | 1,440 | 82.5 | (79.1–85.5) | 1,250 | 71.1 | (67.3–74.7) | -13.8 |
| Hispanic | 1,257 | 71.5 | (67.8–75.0) | 1,304 | 66.3 | (62.8–69.7) | -7.3 |
| Other/Multiracial | 682 | 63.0 | (57.3–68.4) | 723 | 52.1 | (47.0–57.1) | -17.3 |
| **U.S. Census region*** | | | | | | | |
| Northeast | 2,414 | 79.6 | (77.0–82.0) | 1,799 | 70.2 | (67.2–73.1) | -11.8 |
| Midwest | 2,725 | 78.6 | (76.4–80.7) | 1,910 | 69.3 | (66.3–72.2) | -11.8 |
| South | 4,279 | 79.1 | (77.5–80.7) | 3,479 | 67.1 | (64.7–69.3) | -15.2 |
| West | 2,702 | 74.7 | (71.5–77.6) | 2,165 | 62.9 | (60.1–65.6) | -15.8 |
| **Health-care coverage** | | | | | | | |
| Covered | 10,162 | 82.4 | (81.3–83.5) | 7,672 | 73.4 | (71.9–74.8) | -10.9 |
| Not covered | 1,945 | 63.2 | (60.0–66.2) | 1,667 | 48.5 | (45.6–51.4) | -23.3 |

See table footnotes on page 1041.

Interventions designed to increase women's comfort with and knowledge of the rationale behind changes in the screening recommendations might be instrumental in addressing resistance to less frequent screenings (*9*). However, with more consistent screening guidelines in 2012, a greater number of women aged 18–30 years might be expected to conform with recommendations for when to start and how often to get screened.

The findings in this report are subject to at least three limitations. First, these results might not be representative of all women in the United States because of the low survey response rates and noncoverage of cellular telephone users during the 2000–2010 study period. Second, all information was self-reported and not confirmed by review of medical records. Finally, this survey did not consider whether Pap testing behaviors varied by human papillomavirus (HPV) vaccination status or by timing of sexual initiation.† HPV vaccination is expected to reduce the incidence of cervical cancer substantially. Future national surveys of cervical cancer screening should be able to distinguish between the prevalences of cervical cancer screening in HPV-vaccinated and unvaccinated populations. Surveys also should be able to

† Women aged >21 years who have not engaged in sexual intercourse might not need a Pap test, depending on circumstances. The decision should be made at the discretion of the women and her physician. Additional information is available at http://www.cdc.gov/cancer/cervical/pdf/guidelines.pdf.

**TABLE 2. (*Continued*) Percentage of women aged 22–30 years who reported never having received a Pap test or having received a Pap test within the preceding 12 months, or within the preceding 13–36 months, by age group, race/ethnicity, U.S. Census region, and health-care coverage status — Behavioral Risk Factor Surveillance System, United States, 2000 and 2010**

| Characteristic | 2000 | | | 2010 | | | % change 2000 to 2010 |
|---|---|---|---|---|---|---|---|
| | Sample size | % | (95% CI) | Sample size | % | (95% CI) | |
| **Pap test within the preceding 13–36 months†** | | | | | | | |
| **Total** | **1,899** | **12.4** | **(11.6–13.3)** | **2,758** | **19.8** | **(18.7–20.9)** | **59.7** |
| **Age group (yrs)** | | | | | | | |
| 22–24 | 455 | 10.4 | (9.0–12.0) | 576 | 18.5 | (16.4–20.8) | 77.9 |
| 25–27 | 618 | 11.6 | (10.2–13.1) | 908 | 20.9 | (19.0–23.0) | 80.2 |
| 28–30 | 826 | 15.0 | (13.6–16.6) | 1,274 | 20.0 | (18.4–21.7) | 33.3 |
| **Race/Ethnicity** | | | | | | | |
| White, non-Hispanic | 1,391 | 12.5 | (11.6–13.6) | 1,791 | 20.0 | (18.6–21.4) | 60.0 |
| Black, non-Hispanic | 154 | 9.3 | (7.5–11.4) | 283 | 18.2 | (15.2–21.7) | 95.7 |
| Hispanic | 225 | 13.3 | (11.0–16.1) | 413 | 20.5 | (17.8–23.4) | 54.1 |
| Other/Multiracial | 118 | 13.4 | (9.7–18.3) | 244 | 19.1 | (15.5–23.4) | 42.5 |
| **U.S. Census region*** | | | | | | | |
| Northeast | 305 | 10.2 | (8.6–12.1) | 429 | 18.2 | (15.9–20.8) | 78.4 |
| Midwest | 414 | 12.6 | (11.0–14.4) | 518 | 20.0 | (17.6–22.7) | 58.7 |
| South | 623 | 12.0 | (10.8–13.2) | 952 | 18.8 | (17.2–20.7) | 56.7 |
| West | 557 | 14.6 | (12.5–17.1) | 859 | 21.9 | (19.7–24.3) | 50.0 |
| **Health-care coverage** | | | | | | | |
| Covered | 1,327 | 10.5 | (9.7–11.4) | 1,838 | 17.1 | (16.0–18.3) | 62.9 |
| Not covered | 570 | 19.1 | (16.9–21.5) | 915 | 27.7 | (25.2–30.4) | 45.0 |

**Abbreviations:** Pap = Papanicolau; CI = confidence interval.

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

† Women receiving a Pap test >36 months before the interview are included in the denominator; these women accounted for 2% of the population in 2000 and 4.2% in 2010.

account for HPV testing, which is recommended with the Pap test as an alternative screening strategy in women aged ≥30 years but explicitly not recommended for screening in women aged <30 years. Both of these newer interventions will affect how to interpret screening rates and intervals.

This report provides baseline measurements for the prevalence of Pap testing among women aged 18–30 years before the 2012 cervical cancer screening guidelines were issued. Early adoption of the 2009 ACOG guidelines recommending that Pap testing begin at age 21 years regardless of sexual history (*10*) or increased knowledge of the potential harms associated with screening women of childbearing age might explain the increases in women aged 18–21 years reporting never having been screened and women in that age group reporting having an increased interval (>12 months) since their most recent Pap test.

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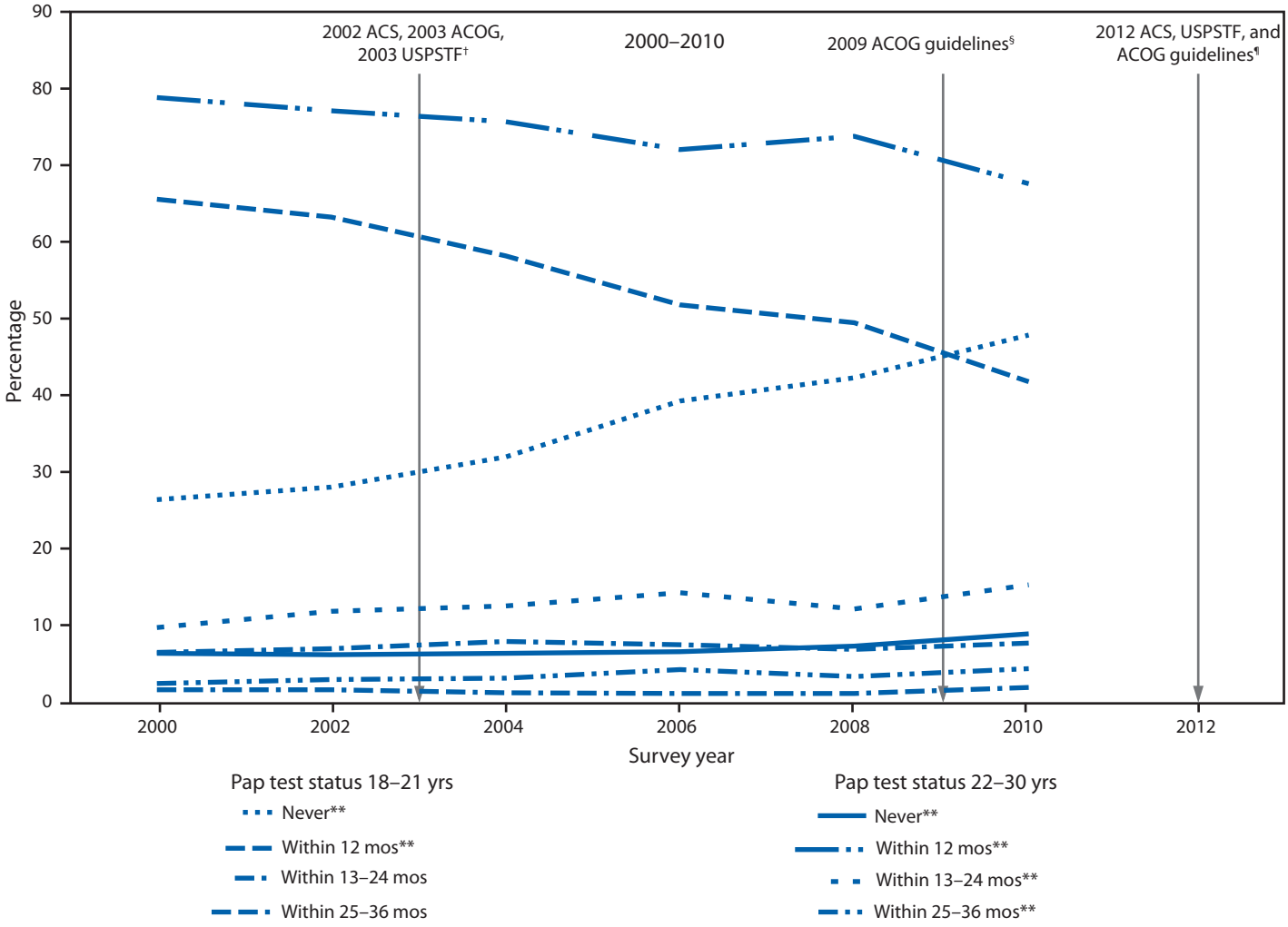
**FIGURE. Prevalence of Pap testing among women aged 18–30 years, by age group — Behavioral Risk Factor Surveillance System, United States, 2000–2010***




**Abbreviations:** Pap = Papanicolaou; ACS = American Cancer Society; ACOG = American College of Obstetricians and Gynecologists; USPSTF = U.S. Preventive Services Task Force.

* Data are not shown for women not screened within 36 months of interview (<5%).

† 2002 ACS and 2003 ACOG guidelines recommended Pap testing begin approximately 3 years after onset of vaginal intercourse but no later than age 21 years, with routine screenings every 2–3 years for women aged <30 years with three negative cytology tests. 2003 USPSTF guidelines recommended Pap testing begin within 3 years after onset of vaginal intercourse or at age 21 years (whichever occured first), with routine screenings at least every 3 years.

§ 2009 ACOG guidelines recommended Pap testing begin at age 21 years, with routine screenings every 2 years until age 29 years.

¶ 2012 USPTF and ACS guidelines recommend Pap testing begin at age 21 years, with routine screenings every 3 years.

** Significant change over time ($p \leq 0.05$).

# Cervical Cancer Screening Among Women by Hysterectomy Status and Among Women Aged ≥65 Years — United States, 2000–2010

Since 2003, major U.S. organizations consistently have recommended against screening most women for cervical cancer after a total hysterectomy for benign disease. Starting in 2003 and becoming consistent across organizations in 2012, guidelines also state that women with a history of adequate screening no longer should be screened after age 65 years. Reports have shown that many of those women continue to receive Papanicolaou (Pap) testing, contrary to recommendations. To measure recent screening behaviors and trends in accordance with evidence-based recommendations, biennial cross-sectional data from the Behavioral Risk Factor Surveillance System (BRFSS) on women aged ≥30 years were analyzed and stratified by hysterectomy status and by age (30–64 years and ≥65 years). The proportion of women reporting having had a hysterectomy who reported a recent (within 3 years) Pap test declined from 73.3% in 2000 to 58.7% in 2010. Declines among women having had a hysterectomy were significant among those aged 30–64 years, from 81.0% in 2000 to 68.5% in 2010, and among those aged ≥65 years, from 62.0% to 45.0%. Among women aged ≥65 years with no history of hysterectomy, recent Pap testing also declined significantly, from 73.5% to 64.5%. Although recommendations have resulted in reductions in screening posthysterectomy and of those aged ≥65 years, many women still are being screened who will not benefit from it.

Routine screening for cervical cancer by Pap testing is no longer recommended for women who have undergone a total hysterectomy (the removal of the uterus, including the cervix) or for adequately screened women after age 65 years.* Before 2003, the American College of Obstetricians and Gynecologists (ACOG) recommended regular screening be continued posthysterectomy, the American Cancer Society (ACS) did not address screening posthysterectomy, and the U.S. Preventive Services Task Force (USPSTF) stated that most women did not benefit from posthysterectomy screening (Table 1). In late 2002 and 2003, when the three organizations updated their guidelines, they all recommended that most women having had total hysterectomies for benign reasons should no longer be screened regularly, and USPSTF recommended that women aged >65 years with a history of normal screening results should no longer be routinely screened (Table 1). Updates in 2009 and 2012 did not significantly change recommendations not to screen women posthysterectomy, and as of 2012, ACOG and ACS also recommended against routinely screening women aged >65 years with a history of normal screening results. Biennial cross-sectional data from BRFSS were analyzed to measure recent screening behaviors and trends in accordance with evidence-based recommendations on screening.

BRFSS is a state-based, random-digit–dialed telephone survey of the noninstitutionalized, U.S. civilian adult population aged ≥18 years. Trained interviewers ask questions about general health status and healthy behaviors. The BRFSS questionnaire is comprised of core questions and optional modules. The Women's Health section is included in the core questions biennially; during 2000–2010, each adult female respondent was asked whether she had ever had a Pap smear or test,† (described as "a test for cancer of the cervix"). Respondents also were asked, "How long has it been since you had your last Pap test?" and if they had had a hysterectomy. Overall survey response rates ranged between 46.0% and 55.7% over the 10 years.§ Of the sample population, 97.8% responded to the question "have you ever had a Pap smear/test?" and 97.4% responded to the question "have you had a hysterectomy?" No questions were asked about the reason for the hysterectomy or whether the cervix was removed.

Weighted analyses were performed to account for the complex sampling design. Percentages and 95% confidence intervals (CIs) were calculated for women aged ≥30 years reporting a recent Pap test (defined as a Pap test within the past 3 years), and were stratified by hysterectomy status and age. Unadjusted logistic regression models were used to test for differences in Pap testing behaviors over the 10-year period, with the year treated as a categorical variable. Statistically significant differences from 2000 to 2010 had a p-value <0.05. Age was limited to ≥30 years, because only 1.6% of women aged <30 years reported hysterectomies. These proportions were then examined according to race/ethnicity (white, non-Hispanic, black, non-Hispanic, other/multiracial, and Hispanic), U.S. Census region (Northeast, Midwest, South, and West), and health-care coverage (covered by insurance or another payer, and not covered).

## Screening of Women Who Reported Having Had a Hysterectomy

Numbers of women reporting a recent Pap test were stratified by hysterectomy status, age, race/ethnicity, U.S. Census region, and health-care coverage (Table 2). The proportion of women aged 30–64 years who reported both a recent Pap test and

*Adequate screening is defined by American College of Obstetricians and Gynecologists and American Cancer Society guidelines as women who have had three consecutive negative cytology results or two consecutive negative co-test results within the 10 years before stopping screening, with the most recent test occurring within the past 5 years. The U.S. Preventive Services Task Force does not define adequate screening. Continued screening is recommended for women at increased risk, such as women with a history of invasive cervical cancer or high-grade cervical neoplasia, diethylstilbestrol (DES) exposure, or immunosuppression.

† BRFSS language for questions on Pap exams was changed from "Pap smear" in 2000 and 2002 to "Pap test" in 2004, 2006, 2008, and 2010.

§ Data available at http://www.cdc.gov/brfss/technical_infodata/quality.htm.

**TABLE 1. Evolution of cervical cancer screening recommendations, based on hysterectomy* status and age — American Cancer Society, American College of Obstetricians and Gynecologists, and U.S. Preventive Services Task Force, 1995–2012**

| | Recommendation | | |
|---|---|---|---|
| **Category** | **Before 2002/2003** | **2002/2003** | **Current (2012)** |
| **American Cancer Society (ACS)** | | | |
| Screening after total hysterectomy | No mention made of screening posthysterectomy.<br>"All women who are, or have been, sexually active, or have reached age 18 should have an annual Pap test and pelvic examination. After a woman has had more than 3 consecutive satisfactory normal annual examinations, the Pap test may be performed less frequently at the discretion of the physician." | "Cervical cancer screening is not indicated for women who have had a total hysterectomy (with removal of the cervix) for benign gynecologic disease. Women with a history of CIN2/3, or for whom it is not possible to document the absence of CIN2/3 prior to/or as the indication for the hysterectomy, should be screened until three normal/negative cervical cytology tests and no abnormal/positive cytology tests (within a 10-year period) are achieved." | "Women at any age following a hysterectomy with removal of the cervix who have no history of CIN2+ should not be screened for vaginal cancer using any modality. Evidence of adequate negative prior screening is not required." |
| Age limits on screening | No mention made of an upper age limit. | "Women with an intact cervix who are age 70 and older may elect to cease cervical cancer screening if they have had both three or more negative cervical cytology tests, and have had no abnormal/positive cytology tests within the 10-year period prior to age 70." | "Women aged older than 65 years with evidence of adequate negative prior screening and no history of CIN2+ within the last 20 years should not be screened for cervical cancer. Following spontaneous regression or appropriate management of CIN2, CIN3, or adenocarcinoma in situ, routine screening should continue for at least 20 years (even if this extends screening past age 65 years)." |
| **American College of Obstetricians and Gynecologists (ACOG)** | | | |
| Screening after total hysterectomy | "The cost-effectiveness of cytologic screening for vaginal neoplasia after removal of the cervix for benign disease has not been demonstrated. Nonetheless, periodic cytologic evaluation of the vagina in such cases, based on the above risk factors, is warranted." | "Women who have undergone hysterectomy with removal of the cervix for benign indications and who have no prior history of CIN2 or CIN3 or worse may discontinue routine cytology testing." | "In women who have had a hysterectomy with removal of the cervix (total hysterectomy) and have never had CIN 2 or higher, routine cytology screening and HPV testing should be discontinued and not restarted for any reason." |
| Age limits on screening | No mention made of an upper age limit. | "Evidence is inconclusive to establish an upper age limit for cervical cancer screening. If screening is discontinued, risk factors should be assessed during the annual examination to determine if reinitiating screening is appropriate." | "Screening by any modality should be discontinued after age 65 years in women with evidence of adequate negative prior screening results and no history of CIN 2 or higher." |
| **U.S. Preventive Services Task Force (USPSTF)** | | | |
| Screening after total hysterectomy | "Women who have undergone a hysterectomy in which the cervix was removed do not require Pap testing, unless it was performed because of cervical cancer or its precursors." | "The USPSTF recommends against routine Pap smear screening in women who have had a total hysterectomy for benign disease." (D recommendation)† | "The USPSTF recommends against screening for cervical cancer in women who have had a hysterectomy with removal of the cervix and who do not have a history of a high-grade precancerous lesion (cervical intraepithelial neoplasia [CIN] grade 2 or 3) or cervical cancer." (D recommendation)† |
| Age limits on screening | "There is insufficient evidence to recommend for or against an upper age limit for Pap testing, but recommendations can be made on other grounds to discontinue regular testing after age 65 in women who have had regular previous screenings in which the smears have been consistently normal." (C recommendation)† | "The USPSTF recommends against routinely screening women older than age 65 for cervical cancer if they have had adequate recent screening with normal Pap smears and are not otherwise at high risk for cervical cancer." (D recommendation)† | "The USPSTF recommends against screening for cervical cancer in women older than age 65 years who have had adequate prior screening and are not otherwise at high risk for cervical cancer." (D recommendation)† |

See table footnotes on page 1045.

**TABLE 1. (*Continued*) Evolution of cervical cancer screening recommendations, based on hysterectomy* status and age — American Cancer Society, American College of Obstetricians and Gynecologists, and U.S. Preventive Services Task Force, 1995–2012**

**Abbreviation:** Pap = Papanicolau; CIN = cervical intraepithelial neoplasia.
**Sources:**
*ACS recommendations*:
Before 2002/2003: Smith RA, Mettlin CJ, Davis KH, Eyre H. American Cancer Society guidelines for early detection of cancer. CA Cancer J Clin 2000;50:34–49.
2002/2003: Saslow D, Runowicz CD, Solomon D, et al. American Cancer Society guideline for the early detection of cervical neoplasia and cancer. CA Cancer J Clin 2002;52:342–62.
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*ACOG recommendations:*
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*USPSTF recommendations:*
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2003: US Preventive Services Task Force. Screening for cervical cancer: recommendations and rationale. In: Guide to clinical preventive services, 3rd ed. Rockville, MD: US Preventive Services Task Force; 2003. Available at http://www.uspreventiveservicestaskforce.org/3rduspstf/cervcan/cervcanrr.pdf.
Current (2012): US Preventive Services Task Force. Screening for cervical cancer: U.S. Preventive Services Task Force recommendation statement 2012. Rockville, MD: US Preventive Services Task Force; 2012. Available at http://www.uspreventiveservicestaskforce.org/uspstf11/cervcancer/cervcancerrs.htm.
* Total hysterectomy, defined as the removal of the uterus, including the uterine cervix.
† USPSTF strength of recommendation: C = insufficient evidence to recommend for or against the inclusion of the condition in a periodic health examination, but recommendations may be made on other grounds; D = fair evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination.

having had a hysterectomy declined significantly, from 81.0% (CI = 79.8%–82.1%) in 2000 to 68.5% (CI = 67.7%–69.3%) in 2010 (Figure). Women aged 30–64 years of all races/ethnicities who had a hysterectomy reported fewer recent Pap tests in 2010 than in 2000. The proportion of women aged 30–64 years who had a hysterectomy and who reported recent Pap testing declined significantly in all U.S. Census regions, with the steepest drop (15.6%) in the West. Steep declines in recent screening among women aged ≥65 years who had a hysterectomy also were observed, although 45.0% of these women still reported a recent Pap test in 2010.

## Screening of Women Who Did Not Report Having Had a Hysterectomy

Among women of all ages without a hysterectomy, the proportion of women reporting a recent Pap test fell. The greatest decline was among women aged ≥65 years, from 73.5% (CI = 72.0%–74.9%) in 2000 to 64.5% (CI = 63.8%–65.3%) in 2010 (Table 2). Among women aged 30–64 years, with no history of hysterectomy, and who therefore should be screened, slight but statistically significant decreases in recent Pap testing occurred for white women and black women, and across all U.S. Census regions. Women aged 30–64 years who did not have health-care coverage and had not had a hysterectomy were less likely to have a recent Pap test in 2010 (68.7%) than in 2000 (74.4%).

### Reported by

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### Editorial Note

Cervical cancer screening has resulted in well-documented declines in cervical cancer incidence and mortality (*1*). However, the net benefits of screening some women, particularly women who have undergone hysterectomy and adequately screened women aged >65 years, might be outweighed by the net harm (e.g., false-positive tests leading to needless patient anxiety and invasive procedures) (*2*). Despite consistent guidelines by three national organizations (USPSTF, ACS, and ACOG) recommending against routine screening for cervical cancer posthysterectomy, the proportion of women aged <30 years who have had a hysterectomy and recently have been screened declined only 15 percentage points, and approximately 59% of these women still reported recent (in the past 3 years) Pap testing in 2010.

Analyses conducted before current recommendations were in place showed that many women who had hysterectomies continued to receive cervical cancer screening. A 2001 analysis found that 78% of women who had hysterectomies reported recent screening (*3*). A more recent study suggested that physicians were continuing to recommend Pap tests posthysterectomy in 2006 and 2007, despite guidelines recommending against such testing (*4*). Proponents of continued screening after hysterectomy have raised concerns about vaginal cancer and its precursors (*5*). However, vaginal cancer is rare, and the value of cytology tests to detect vaginal cancer in the absence of a cervix is unknown (*6*). Approximately 90% of hysterectomies are conducted for

**TABLE 2. Percentage of women reporting recent Papanicolaou (Pap) test (within 3 years), by selected characteristics and hysterectomy status — Behavioral Risk Factor Surveillance System, 2000–2010***

| | Recent Pap test (within 3 yrs) | | | | | | | Recent Pap test (within 3 yrs) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No hysterectomy | | | | | | | Hysterectomy | | | | |
| | 2000 (N = 54,349) | | 2010 (N = 130,749) | | Absolute difference, 2000–2010 | Total % reporting hysterectomy | | 2000 (N = 16,970) | | 2010 (N = 42,653) | | Absolute difference, 2000–2010 |
| Characteristic | % | (95% CI) | % | (95% CI) | % | 2000 | 2010 | % | (95% CI) | % | (95% CI) | % |
| **Total** | **86.4** | **(85.9–86.8)** | **83.9** | **(83.6–84.2)** | **-2.5†** | **27.3** | **25.3** | **73.3** | **(72.3–74.2)** | **58.7** | **(58.1–59.3)** | **-14.6†** |
| **Age group (yrs)** | | | | | | | | | | | | |
| 30–39 | 91.2 | (90.5–91.9) | 90.6 | (90.0–91.2) | -0.6† | 6.2 | 5.3 | 83.4 | (77.7–87.9) | 80.1 | (76.7–83.2) | -3.3† |
| 40–49 | 88.7 | (87.8–89.6) | 87.7 | (87.1–88.3) | -1.0† | 19.0 | 15.6 | 83.4 | (81.4–85.1) | 75.6 | (73.9–77.3) | -7.8† |
| 50–64 | 87.2 | (86.2–88.1) | 84.3 | (83.7–84.8) | -2.9† | 38.3 | 31.9 | 79.4 | (78.1–80.8) | 64.2 | (63.3–65.2) | -15.2† |
| ≥65 | 73.5 | (72.0–74.9) | 64.5 | (63.8–65.3) | -9.0† | 45.2 | 46.7 | 62.0 | (60.4–63.6) | 45.0 | (44.2–45.8) | -17.0† |
| **Age 30–64 yrs** | **(n = 46,069)** | | **(n = 101,572)** | | | | | **(n = 11,430)** | | **(n = 24,443)** | | |
| **Total** | **89.3** | **(88.8–89.8)** | **87.6** | **(87.3–87.9)** | **-1.7†** | **21.4** | **18.9** | **81.0** | **(79.8–82.1)** | **68.5** | **(67.7–69.3)** | **-12.5†** |
| **Race/Ethnicity** | | | | | | | | | | | | |
| White/non-Hispanic | 90.0 | (89.4–90.4) | 88.1 | (87.8–88.5) | -1.9† | 21.8 | 19.5 | 79.2 | (77.9–80.4) | 66.6 | (65.6–67.5) | -12.6† |
| Black/non-Hispanic | 90.7 | (89.2–92.0) | 88.8 | (87.7–89.8) | -1.9† | 23.6 | 22.7 | 88.4 | (85.9–90.5) | 77.3 | (75.1–79.3) | -11.1† |
| Other/Multiracial | 83.4 | (80.0–86.3) | 81.1 | (79.2–82.8) | -2.3 | 16.6 | 14.4 | 79.9 | (71.9–86.1) | 62.1 | (57.4–66.5) | -17.8† |
| Hispanic | 86.3 | (84.2–88.2) | 87.3 | (86.2–88.4) | 1.0 | 18.2 | 14.4 | 86.4 | (81.6–90.1) | 73.7 | (70.2–76.9) | -12.7† |
| **U.S. Census region** | | | | | | | | | | | | |
| Northeast | 90.8 | (89.8–91.7) | 89.3 | (88.7–90.0) | -1.5† | 14.6 | 12.4 | 82.5 | (79.7–85.0) | 71.6 | (69.4–73.6) | -10.9† |
| Midwest | 89.3 | (88.4–90.2) | 88.3 | (87.6–88.9) | -1.0† | 20.5 | 18.8 | 80.9 | (78.8–82.8) | 66.5 | (64.7–68.3) | -14.4† |
| South | 88.8 | (88.0–89.5) | 86.2 | (85.6–86.8) | -2.6† | 26.0 | 23.3 | 82.3 | (80.9–83.6) | 71.4 | (70.2–72.6) | -10.9† |
| West | 88.6 | (87.3–89.9) | 87.5 | (86.8–88.1) | -1.1† | 20.8 | 17.0 | 77.5 | (73.9–80.8) | 61.9 | (59.9–63.8) | -15.6† |
| **Health-care coverage** | | | | | | | | | | | | |
| Covered | 91.6 | (91.1–92.0) | 90.9 | (90.6–91.2) | -0.7† | 21.6 | 19.1 | 81.9 | (80.7–83.0) | 71.0 | (70.2–71.9) | -10.9† |
| Not covered | 74.4 | (72.5–76.3) | 68.7 | (67.4–70.0) | -5.7† | 19.7 | 17.9 | 74.5 | (70.8–77.8) | 52.8 | (50.2–55.5) | -21.7† |
| **Age ≥65 yrs** | **(n = 8,280)** | | **(n = 29,177)** | | | | | **(n = 5,540)** | | **(n = 18,210)** | | |
| **Total** | **73.5** | **(72.0–74.9)** | **64.5** | **(63.8–65.3)** | **-9.0†** | **45.2** | **46.7** | **62.0** | **(60.4–63.6)** | **45.0** | **(44.2–45.8)** | **-17.0†** |
| **Race/Ethnicity** | | | | | | | | | | | | |
| White/non-Hispanic | 73.6 | (72.1–75.1) | 64.0 | (63.3–64.8) | -9.6† | 45.7 | 46.5 | 60.4 | (58.7–62.1) | 43.1 | (42.3–43.9) | -17.3† |
| Black/non-Hispanic | 70.2 | (63.9–75.8) | 69.1 | (66.0–72.0) | -1.1 | 47.3 | 52.5 | 75.9 | (70.3–80.7) | 57.3 | (54.4–60.2) | -18.6† |
| Other/Multiracial | 67.6 | (50.5–80.9) | 62.5 | (58.1–66.7) | -5.1 | 31.2 | 42.0 | 62.9 | (47.3–76.2) | 42.4 | (37.4–47.6) | -20.5† |
| Hispanic | 79.3 | (70.9–85.8) | 68.9 | (64.7–72.8) | -10.4 | 40.6 | 44.4 | 67.4 | (57.6–75.9) | 53.1 | (48.3–57.8) | -14.3 |
| **U.S. Census region** | | | | | | | | | | | | |
| Northeast | 69.9 | (66.4–73.2) | 66.3 | (64.8–67.8) | -3.6† | 37.5 | 36.5 | 61.1 | (57.0–65.2) | 49.1 | (47.1–51.1) | -12.0† |
| Midwest | 71.9 | (69.3–74.3) | 61.5 | (60.0–62.9) | -10.4† | 41.3 | 46.3 | 56.5 | (53.3–59.7) | 40.9 | (39.3–42.6) | -15.6† |
| South | 75.0 | (73.0–76.9) | 66.2 | (64.9–67.4) | -8.8† | 49.8 | 52.1 | 64.7 | (62.5–66.9) | 49.1 | (47.9–50.3) | -15.6† |
| West | 77.7 | (73.2–81.6) | 63.3 | (61.6–64.9) | -14.4† | 50.0 | 47.1 | 63.4 | (59.2–67.3) | 37.9 | (36.1–39.8) | -25.5† |
| **Health-care coverage** | | | | | | | | | | | | |
| Covered | 73.9 | (72.4–75.3) | 64.9 | (64.1–65.6) | -9.0† | 45.4 | 46.8 | 62.1 | (60.5–63.7) | 45.0 | (44.2–45.8) | -17.1† |
| Not covered | 54.4 | (43.1–65.3) | 49.3 | (42.1–56.5) | -5.1 | 37.7 | 39.4 | 54.2 | (40.9–66.9) | 43.8 | (35.8–52.1) | -10.4 |

**Abbreviation:** CI = confidence interval.

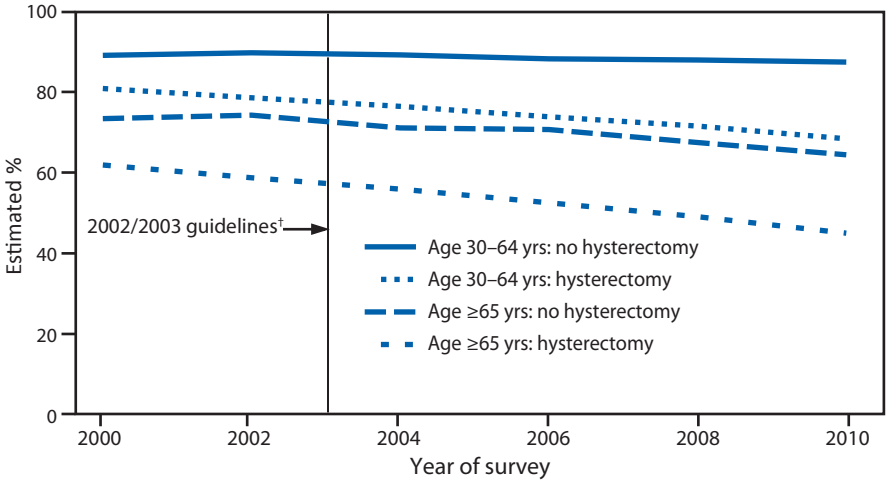
* Unknown and missing values not included. Among respondents, 595 women with complete Pap test data did not have information on hysterectomy status. Race/ethnicity information was missing for 1,943 women with no hysterectomy and 1,027 women with a hysterectomy; health insurance information was missing for 296 women with no hysterectomy and 156 women with a hysterectomy.

† Denotes statistically significant ($p<0.05$) trend for even years 2000–2010.

benign reasons, and the cervix is removed in approximately 94% of hysterectomies, so only a small proportion of women need continued screening after a hysterectomy (*3,7*). In addition, the positive predictive value of screening among adequately screened postmenopausal women is low, and lesions detected and treated among this population are unlikely to progress to cancer (*2*).

Some groups of women are not screened as often as they should be. Of particular concern, one third of women aged 30–64 years with no health-care coverage and no history of hysterectomy reported not having a recent Pap test in 2010. Women not receiving recommended screening and followup are at increased risk for cervical cancer mortality (*1*). Underscreening among

**FIGURE. Percentage of women who had a recent Papanicolaou (Pap) test (within 3 years), by hysterectomy status and age group — Behavioral Risk Factor Surveillance System, United States, 2000–2010***




* Even years only. All trends are statistically significant using linear test of trend ($p<0.05$). Percentages are weighted to the noninstitutionalized, U.S. civilian population.

† 2002 American Cancer Society, 2003 American College of Obstetricians and Gynecologists, and 2003 U.S. Preventive Services Task Force Pap test guidelines published.

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

Since 2003, major U.S. organizations consistently have recommended against screening women for cervical cancer posthysterectomy and after age 65 years, but reports have shown that many of those women continue to receive Papanicolaou (Pap) testing, contrary to recommendations.

**What is added by this report?**

Pap test use among women who have had a hysterectomy has declined by 15 percentage points from 2000 to 2010. However 60% of women who have had a hysterectomy still report recent Pap testing, indicating unnecessary screening a majority of this population.

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

Health-care providers and the public need to know that most women do not need cervical cancer screening after a hysterectomy or after age 65 years, so that women are not harmed by unnecessary treatment.

women with less education, no usual source of health care, and no health-care coverage is well-documented and a persistent cause of health disparities (*8*).

The findings in this report are subject to at least five limitations. First, validation studies of self-reported Pap test data have shown that women might over-report being screened with a Pap test and under-report the time since the last test (*9*), but self-reported hysterectomy status generally is reliable (*10*). Second, information on the timing of recent Pap tests relative to the timing of hysterectomy is not available, so a small number of hysterectomies could have been performed after the Pap test (*7*). Third, BRFSS data do not contain information on reasons for hysterectomy, whether the cervix was removed with the uterus or not, whether women had normal screening histories in the past 10 years, whether women had high-grade precancer, or other reasons for which women might need continued screening. Fourth, the survey response rates were low, ranging from 40.0% to 55.7%. Finally, BRFSS is limited to noninstitutionalized populations and, during the period studied, used only landline telephones.

This study used a large, state-based national survey to document 10-year trends in Pap testing among women aged ≥30 years, by hysterectomy status and age. Declines in Pap testing among women having had a hysterectomy and among women aged ≥65 years showed improved concordance between guidelines and practice. However, estimates of the BRFSS data show that nearly 22 million women with hysterectomies might have received unnecessary screening, contrary to consistent recommendations by USPSTF, ACS, and ACOG that have been in place for nearly a decade. Research is needed to determine how to further reduce unnecessary screening. Monitoring Pap test prevalence among U.S. women is important to ensure that resources are targeted to women with the most need.

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# Notes from the Field

## Serogroup C Invasive Meningococcal Disease Among Men Who Have Sex With Men — New York City, 2010–2012

On September 27, 2012, the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) alerted health-care providers and the public about 12 cases of invasive serogroup C *Neisseria meningitidis* disease (SCMD) occurring in NYC since August 2010 among men who have sex with men (MSM). Cases were identified through existing mandatory notifiable disease reporting and classified according to the Council of State and Territorial Epidemiologists case definitions (*1*). By December 31, 2012, a total of 18 cases had been identified among MSM. For 2012, the incidence rate of invasive meningococcal disease among MSM aged 18–64 years was 12.6 per 100,000 persons, compared with 0.16 among non-MSM males aged 18–64 years. MSM and non-MSM population denominators were obtained from the 2010 NYC Community Health Survey (*2*) a telephone-based survey of approximately 10,000 NYC residents.

All 18 patients were hospitalized, and five deaths occurred. The age range among patients was 21–59 years (median: 32 years). Nine lived in Brooklyn, four in Manhattan, two in the Bronx, and two in Queens; one was homeless. Nine were black, and four were Hispanic. Ten were infected with human immunodeficiency virus (HIV), including eight of 12 cases reported during 2012. Eleven of 12 isolates were closely related (>85%) by pulsed field gel electrophoresis (*3*) to a strain from a 2006 SCMD outbreak in Brooklyn (*4*); the last six out of seven patients' isolates were indistinguishable from each other. At least seven patients had met multiple sexual partners online.

On October 4, 2012, DOHMH recommended administration of meningococcal vaccine to HIV-infected male NYC residents who had intimate contact with any man met online, through a smartphone application, or at a bar or party since September 1, 2012. On November 29, DOHMH expanded its recommendation to HIV-uninfected men with the same high-risk behaviors who reside in areas of Brooklyn where recent cases have clustered. In addition, DOHMH publicized this outbreak among the population at risk through advertising, mass e-mail messages on MSM websites, posters distributed at MSM bars and clubs, and outreach to community leaders and physician's groups.

More information regarding invasive meningococcal disease and this outbreak is available on the CDC and DOHMH websites (*5*). Public health departments should be alert for cases of SCMD in MSM and should ask SCMD patients about sexual history, travel history (including travel to NYC), and HIV status to help determine if this outbreak is spreading to other juridictions.

### Reported by

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# Announcement

## Cervical Cancer Awareness Month — January 2013

January is Cervical Cancer Awareness Month. Cervical cancer is highly preventable because screening tests for cervical cancer and vaccines to prevent human papillomavirus (HPV), which is the main cause of cervical cancer, are available. However, half of cervical cancers occur among women rarely or never screened for cancer, and another 10%–20% of cancers occur among women who were screened but did not receive adequate follow-up care. When cervical cancer is found early, it is highly treatable and associated with long survival and good quality of life.

For women aged 21–65 years, regular cervical cancer screening can help prevent cancer. The Papanicolaou (Pap) test detects precancers, which are cell changes on the cervix that might become cancerous if they are not treated appropriately. Women should start getting Pap tests at age 21 years and every 3 years thereafter. Women who are aged ≥30 years may choose to have an HPV test along with the Pap test. If both test results are normal, additional testing is not needed for 5 years. Specific recommendations from the three major organizations that issue guidelines on cervical cancer screening are available at http://www.cdc.gov/cancer/cervical/pdf/guidelines.pdf.

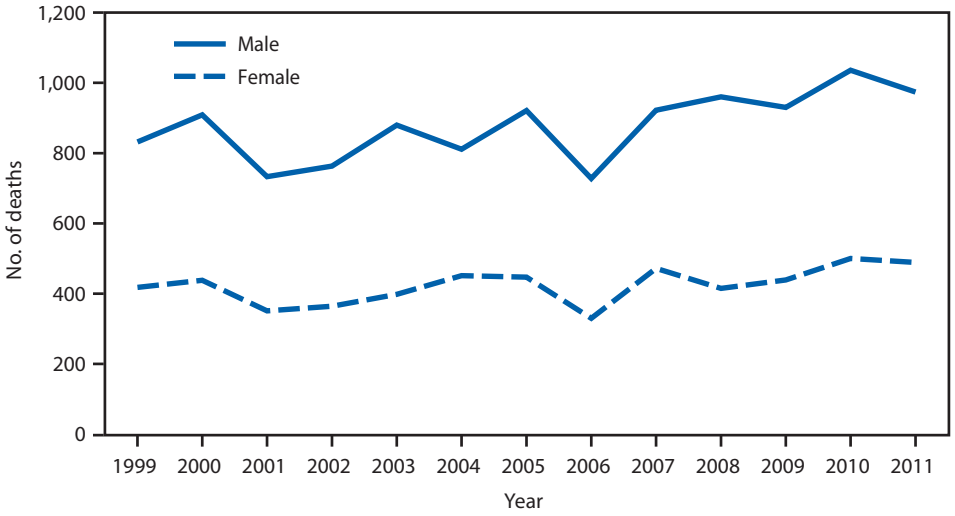
To help prevent cervical cancer, vaccines are available to prevent HPV infection. HPV vaccines offer the greatest health benefit to persons who receive all 3 doses before exposure to HPV through sexual activity. Routine HPV vaccination is recommended for girls and boys at age 11 or 12 years. Vaccination also is recommended for females through age 26 years and for males through age 21 years who have not been vaccinated previously. Any man who has sex with other men, and men with compromised immune systems (including human immunodeficiency virus infection), also may be vaccinated through age 26 years.

Information about HPV vaccines is available at http://www.cdc.gov/hpv/vaccine.html. Additional information about CDC programs that promote early detection and treatment of cervical cancer is available from the National Breast and Cervical Cancer Early Detection Program at http://www.cdc.gov/cancer/nbccedp.

# QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

## Number of Hypothermia-Related Deaths,* by Sex — National Vital Statistics System, United States,† 1999–2011§




* Deaths attributed to exposure to excessive natural cold as underlying and contributing causes of death, which were coded as X31, T68, and T69 according to the *International Classification of Diseases, 10th Revision*.
† U.S. residents only.
§ Data for 2011 are preliminary.

From 1999 to 2011, a total of 16,911 deaths in the United States, an average of 1,301 per year, were associated with exposure to excessive natural cold. The highest yearly total of hypothermia-related deaths (1,536) was in 2010 and the lowest (1,058) in 2006. Approximately 67% of hypothermia-related deaths were among males.

**Source:** National Vital Statistics System. Mortality public use data files, 1999–2010. Available at http://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

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