

Great American Smokeout — November 19, 2015

Sponsored by the American Cancer Society, the Great American Smokeout is an annual event that encourages smokers to make a plan to quit, or to plan in advance and quit smoking on that day, in an effort to stop smoking permanently (1). The 40th annual Great American Smokeout will be held on November 19, 2015.

In the more than 50 years since the first Surgeon General's report on smoking and health, cigarette smoking among U.S. adults has been reduced by half. However, since 1964, an estimated 20 million persons have died because of smoking, which is the leading preventable cause of disease, disability, and death in the United States (2).

About two out of three adult smokers want to quit smoking cigarettes, and more than half made a quit attempt in the preceding year (2). However, in 2014, an estimated 16.8% (approximately 40 million) of U.S. adults still smoke (3). Getting effective help through counseling and medications can increase the chances of quitting by as much as three-fold (4).

Additional information and support for quitting smoking is available by telephone at 800-QUIT-NOW (800-784-8669). CDC's Tips from Former Smokers campaign offers additional quit resources at <http://www.cdc.gov/tips>.

References

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Current Cigarette Smoking Among Adults — United States, 2005–2014

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Tobacco smoking is the leading cause of preventable disease and death in the United States, resulting in approximately 480,000 premature deaths and more than \$300 billion in direct health care expenditures and productivity losses each year (1). To assess progress toward achieving the *Healthy People 2020* objective of reducing the percentage of U.S. adults who smoke cigarettes to $\leq 12.0\%$,* CDC assessed the most recent national estimates of smoking prevalence among adults aged ≥ 18 years using data from the 2014 National Health Interview Survey (NHIS). The percentage of U.S. adults who smoke cigarettes declined from 20.9% in 2005 to 16.8% in 2014. Among daily cigarette smokers, declines were observed in the percentage who smoked 20–29 cigarettes per day (from 34.9% to 27.4%) or ≥ 30 cigarettes per day (from 12.7% to 6.9%). In 2014, prevalence of cigarette smoking was higher among males,

*Objective TU-1.1. Additional information available at <https://www.healthypeople.gov/2020/topics-objectives/topic/tobacco-use/objectives>.

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adults aged 25–44 years, multiracial persons and American Indian/Alaska Natives, persons who have a General Education Development certificate, live below the federal poverty level, live in the Midwest, are insured through Medicaid or are uninsured, have a disability or limitation, or are lesbian, gay, or bisexual. Proven population-based interventions, including tobacco price increases, comprehensive smoke-free laws, high impact mass media campaigns, and barrier-free access to quitting assistance, are critical to reduce cigarette smoking and smoking-related disease and death among U.S. adults.[†]

NHIS is an annual, nationally representative, in-person survey of the noninstitutionalized U.S. civilian population. The NHIS core questionnaire is administered to a randomly selected adult in each sampled family. The 2014 NHIS included 36,697 respondents aged ≥18 years; the response

rate was 58.9%. Current cigarette smokers were respondents who reported smoking ≥100 cigarettes during their lifetimes and, at the time of interview, reported smoking every day or some days. Former cigarette smokers were respondents who reported smoking ≥100 cigarettes during their lifetime but currently did not smoke.

Data were adjusted for differences in the probability of selection and nonresponse, and weighted to provide nationally representative estimates. Current smoking was assessed overall and by sex, age, race/ethnicity, education, poverty status,[§] U.S. Census region,[¶]

[§] Based on reported family income; 2005 estimates are based on reported family income and 2004 poverty thresholds published by the U.S. Census Bureau, and 2014 estimates are based on reported family income and 2013 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.

[†] CDC. *Best Practices for Comprehensive Tobacco Control Programs — 2014*. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/tobacco/stateandcommunity/best_practices/index.htm.

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health insurance coverage,** disability/limitation status,†† and sexual orientation.§§ The mean number of cigarettes smoked per day was calculated among daily smokers. Differences between groups were assessed using a Wald *F*-test, with statistical significance defined as $p < 0.05$. Logistic regression was used to analyze trends using annual NHIS data from 2005 through 2014. Percentage changes in prevalence rates between 2005 and 2014 were calculated.

Current cigarette smoking among U.S. adults declined from 20.9% (45.1 million persons) in 2005 to 16.8% (40.0 million) in 2014, representing a 19.8% decrease ($p < 0.05$ for trend) (Figure 1). Cigarette smoking was significantly lower in 2014 (16.8%) than in 2013 (17.8%) ($p < 0.05$). In 2014, prevalence

was higher among males (18.8%) than females (14.8%), and was highest among adults aged 25–44 years (20.0%) and lowest among persons aged ≥ 65 years (8.5%) (Table). Among racial and ethnic groups, smoking prevalence was highest among American Indian/Alaska Natives (29.2%) and multiracial adults (27.9%), and lowest among Asians (9.5%). Among adults aged ≥ 25 years, prevalence was highest among persons

Summary

What is already known on this topic?

Smoking is the leading cause of preventable disease and death in the United States, resulting in more than 480,000 premature deaths and over \$300 billion in direct health care expenditures and productivity losses each year.

What is added by this report?

Cigarette smoking among U.S. adults declined from 20.9% in 2005 (45.1 million smokers) to 16.8% in 2014 (40.0 million); cigarette smoking declined a full percentage point from 2013 to 2014 alone. However, disparities in smoking prevalence persist. In 2014, cigarette smoking prevalence was higher among adults on Medicaid (29.1%) and uninsured adults (27.9%) than among adults with private health insurance (12.9%).

What are the implications for public health practice?

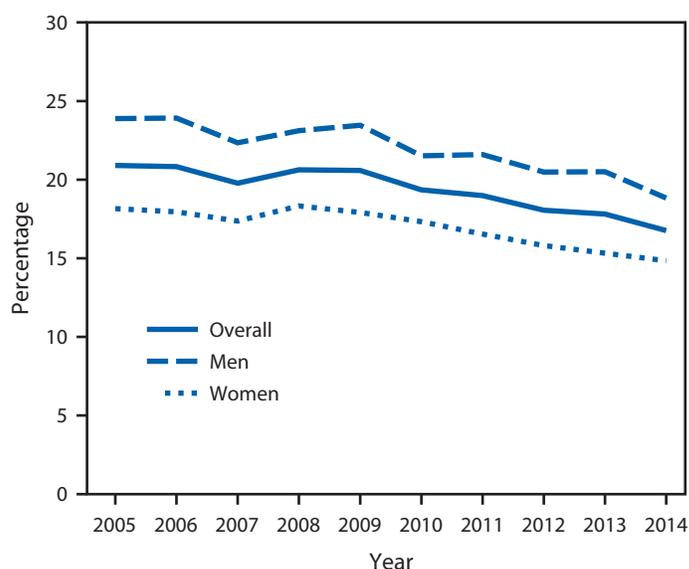
Proven population-based interventions, including tobacco price increases, comprehensive smoke-free laws, high-impact tobacco education mass media campaigns, and barrier-free access to quitting assistance, are critical to reduce cigarette smoking and smoking-related disease and death among U.S. adults.

** *Medicaid only*: Anyone reporting having Medicaid coverage, but no other insurance coverage, at the time of the interview. Persons reporting both Medicaid and “private insurance” were included in the “private insurance” category. *Medicare only*: Anyone reporting having Medicare coverage, but no other insurance coverage, at the time of the interview. Persons reporting both Medicare and “private insurance” were included in the “private insurance” category. *Private insurance*: Any comprehensive private insurance plan (including health maintenance and preferred provider organizations), obtained through an employer, purchased directly, or purchased through local or community programs, and excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons (132 respondents) were covered by both “other public insurance” and private plans and were included in both categories. For 2014, this group also included plans purchased through the Health Insurance Marketplace or a state-based exchange. *Other public insurance*: Includes Children’s Health Insurance Program, state-sponsored or other government-sponsored health plan, and military plans. A small number of persons (132 respondents) were covered by both “other public insurance” and private plans and were included in both categories. This does not include anyone reporting any Medicare or Medicaid coverage. *Uninsured*: Having no private health insurance, Medicare, Medicaid, Children’s Health Insurance Program, state-sponsored or other government-sponsored health plan, or military plan, or having only Indian Health Service coverage, or having only a private plan that paid for one type of service, such as accidents or dental care. Those who were dual eligible (enrolled in both Medicaid and Medicare) or reported Medicaid or Medicare and any other coverage were excluded unless they also had “private” insurance coverage.

†† 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 was 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). In 2014, the American Community Survey questions were asked of a random half of the respondents from the 2014 Person File. For population estimates, the specific adult disability weight was doubled to account for the half of respondents who were not asked these questions.

§§ Starting in 2013, sexual orientation questions were added to NHIS. To determine sexual orientation, adult respondents were asked, “Which of the following best represents how you think of yourself?” with response options of gay (“lesbian or gay” for female respondents), straight, that is, “not gay” (“not lesbian or gay” for female respondents), bisexual, something else, and I don’t know the answer.

FIGURE 1. Percentage of adults who were current cigarette smokers* overall and by sex — National Health Interview Survey, United States, 2005–2014



* Persons who reported smoking ≥ 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days.

TABLE. Percentage of adults who were current cigarette smokers,* by selected characteristics — National Health Interview Survey, United States, 2005 and 2014

Characteristic	Men			Women			Total		
	2005 (n = 13,762)	2014 (n = 16,398)	% decline from 2005 to 2014	2005 (n = 17,666)	2014 (n = 20,299)	% decline from 2005 to 2014	2005 (N = 31,428)	2014 (N = 36,697)	% decline from 2005 to 2014
	Weighted % (95% CI)	Weighted % (95% CI)	2014	Weighted % (95% CI)	Weighted % (95% CI)	2014	Weighted % (95% CI)	Weighted % (95% CI)	2014
Overall	23.9 (22.9–24.8)	18.8[†] (18.0–19.7)	21.1[§]	18.1 (17.4–18.9)	14.8[†] (14.0–15.7)	18.2[§]	20.9 (20.3–21.5)	16.8[†] (16.1–17.4)	19.8[§]
Age group (yrs)									
18–24	28.0 (25.0–31.1)	18.5 [†] (15.6–21.3)	34.2 [§]	20.7 (18.3–23.1)	14.8 [†] (10.6–19.1)	28.4	24.4 (22.4–26.4)	16.7 [†] (14.0–19.3)	31.6 [§]
25–44	26.8 (25.4–28.2)	22.9 [†] (21.4–24.4)	14.4 [§]	21.4 (20.2–22.6)	17.2 [†] (16.0–18.5)	19.5 [§]	24.1 (23.1–25.1)	20.0 [†] (19.1–21.0)	16.8 [§]
45–64	25.2 (23.7–26.7)	19.4 [†] (17.8–20.9)	23.2 [§]	18.8 (17.7–20.0)	16.8 [†] (15.5–18.1)	10.9	21.9 (21.0–22.9)	18.0 [†] (17.0–19.1)	17.7 [§]
≥65	8.9 (7.6–10.2)	9.8 (8.5–11.0)	(9.5) [¶]	8.3 (7.3–9.3)	7.5 (6.4–8.5)	9.8	8.6 (7.8–9.3)	8.5 (7.7–9.3)	0.8
Race/Ethnicity**									
White	24.0 (22.8–25.2)	19.3 [†] (18.1–20.4)	19.8 [§]	20.0 (19.1–20.9)	17.2 [†] (16.0–18.5)	13.7 [§]	21.9 (21.1–22.7)	18.2 [†] (17.3–19.1)	16.9 [§]
Black	26.7 (23.9–29.4)	22.1 [†] (19.8–24.4)	17.1 [§]	17.3 (15.5–19.0)	13.7 [†] (12.1–15.2)	20.9 [§]	21.5 (19.8–23.1)	17.5 [†] (16.1–18.8)	18.6 [§]
Hispanic	21.1 (19.3–23.0)	14.8 [†] (13.2–16.4)	30.0 [§]	11.1 (9.8–12.4)	7.6 [†] (6.5–8.6)	31.7 [§]	16.2 (15.1–17.4)	11.2 [†] (10.2–12.2)	31.2 [§]
AI/AN	37.5 (20.7–54.3)	25.6 (12.5–38.7)	31.7	26.8 (15.6–38.1)	32.5 (17.4–47.5)	(20.9) [¶]	32.0 (22.2–41.7)	29.2 (19.7–38.7)	8.6
Asian ^{††}	20.6 (15.7–25.5)	14.5 (11.1–17.8)	29.8 [§]	6.1 (3.7–8.5)	5.1 (3.5–6.7)	16.5	13.3 (10.4–16.3)	9.5 (7.7–11.2)	29.1 [§]
Multiple race	26.1 (16.3–36.0)	33.4 (23.4–43.3)	(27.7) [¶]	23.5 (14.8–32.2)	23.2 (15.6–30.8)	1.3	24.8 (17.7–31.8)	27.9 (21.7–34.1)	(12.6) [¶]
Education level^{§§}									
0–12 yrs (no diploma)	29.5 (27.2–31.8)	26.6 (24.2–29.0)	9.9	21.9 (20.0–23.7)	19.5 (17.5–21.5)	11.0	25.5 (24.0–27.1)	22.9 (21.3–24.5)	10.1
8th grade or less	21.0 (17.7–24.3)	16.4 (13.2–19.6)	21.9	13.4 (11.1–15.6)	11.3 (8.9–13.8)	15.2	17.1 (15.1–19.0)	13.7 (11.6–15.7)	19.7
9th–11th grade	36.8 (33.3–40.2)	33.3 (29.4–37.3)	9.3	29.0 (26.1–31.8)	25.9 (22.5–29.4)	10.4	32.6 (30.4–34.9)	29.5 (26.9–32.2)	9.5
12th grade (no diploma)	30.2 (23.5–36.9)	29.8 (23.2–36.3)	1.4	22.2 (16.9–27.5)	21.0 (15.1–26.8)	5.4	26.0 (21.8–30.2)	25.7 (21.4–30.1)	1.0
GED	47.5 (41.5–53.6)	46.6 (40.2–53.0)	2.0	38.8 (33.6–44.0)	38.9 (32.9–44.8)	(0.1) [¶]	43.2 (39.1–47.4)	43.0 (38.7–47.4)	0.5
High school graduate	28.8 (27.0–30.7)	24.7 (22.8–26.6)	14.4	20.7 (19.3–22.2)	18.8 (16.8–20.8)	9.4	24.6 (23.4–25.7)	21.7 (20.3–23.0)	11.8
Some college (no degree)	26.2 (24.0–28.4)	19.8 [†] (17.7–21.9)	24.4 [§]	21.1 (19.2–22.9)	19.6 (17.6–21.5)	7.2	23.5 (22.1–24.9)	19.7 [†] (18.3–21.1)	16.3 [§]
Associate degree	26.1 (23.2–28.9)	21.2 [†] (16.3–26.1)	18.5	17.1 (15.0–19.3)	13.7 (11.8–15.6)	20.1	20.9 (19.2–22.6)	17.1 [†] (14.5–19.6)	18.4 [§]
Undergraduate degree	11.9 (10.5–13.3)	9.1 [†] (7.7–10.5)	23.6 [§]	9.6 (8.3–10.8)	6.9 [†] (5.8–8.0)	28.1 [§]	10.7 (9.8–11.6)	7.9 [†] (7.1–8.8)	26.0 [§]
Graduate degree	6.9 (5.3–8.5)	5.8 (4.5–7.1)	16.1	7.4 (5.9–8.8)	5.0 (3.8–6.3)	31.6 [§]	7.1 (6.0–8.3)	5.4 [†] (4.5–6.3)	24.0 [§]
Poverty status^{¶¶}									
At or above poverty level	23.7 (22.6–24.7)	17.5 [†] (16.5–18.4)	26.2 [§]	17.6 (16.8–18.5)	13.1 [†] (12.2–14.0)	25.8 [§]	20.6 (19.9–21.3)	15.2 [†] (14.6–15.9)	26.1 [§]
Below poverty level	34.3 (31.0–37.5)	30.4 (27.5–33.2)	11.3	26.9 (24.5–29.3)	23.3 [†] (21.3–25.4)	13.2 [§]	29.9 (27.9–31.9)	26.3 [†] (24.6–28.1)	11.9 [§]
Unspecified	21.2 (19.2–23.2)	14.9 [†] (11.8–17.9)	29.8 [§]	16.1 (14.8–17.5)	17.7 (12.0–23.3)	(9.6) [¶]	18.4 (17.2–19.6)	16.4 (13.0–19.9)	10.8
U.S. Census region^{***}									
Northeast	20.7 (18.6–22.9)	17.1 [†] (14.9–19.3)	17.5	17.9 (16.4–19.5)	13.6 [†] (11.8–15.3)	24.3 [§]	19.2 (17.8–20.6)	15.3 [†] (13.9–16.7)	20.5 [§]
Midwest	27.3 (25.3–29.3)	21.7 [†] (19.7–23.7)	20.5 [§]	21.3 (19.8–22.8)	19.7 [†] (17.2–22.2)	7.2	24.2 (23.0–25.3)	20.7 [†] (18.9–22.4)	14.4 [§]
South	25.3 (23.6–27.0)	19.8 [†] (18.5–21.0)	22.0 [§]	18.5 (17.3–19.7)	14.9 [†] (13.6–16.3)	19.2 [§]	21.8 (20.6–23.0)	17.2 [†] (16.3–18.1)	20.9 [§]
West	20.1 (18.3–21.9)	15.8 [†] (14.0–17.5)	21.4 [§]	13.9 (12.6–15.2)	10.6 [†] (9.5–11.7)	24.0 [§]	17.0 (16.0–18.0)	13.1 [†] (12.1–14.2)	22.7 [§]
Health insurance coverage^{†††}									
Medicaid only	38.0 (32.7–43.2)	32.7 (28.5–36.8)	14.0	33.5 (30.2–36.7)	27.1 [†] (24.6–29.5)	19.1 [§]	34.9 (32.1–37.8)	29.1 [†] (27.0–31.2)	16.7 [§]
Medicare only	13.8 (10.9–16.7)	15.5 (13.2–17.8)	(12.6) [¶]	11.6 (9.4–13.8)	10.1 (8.3–11.9)	12.8	12.5 (10.7–14.3)	12.5 (10.9–14.0)	0.2
Private insurance	19.7 (18.7–20.8)	14.3 [†] (13.3–15.4)	27.4 [§]	15.1 (14.4–15.9)	11.6 [†] (10.5–12.7)	23.3 [§]	17.3 (16.7–18.0)	12.9 [†] (12.2–13.7)	25.4 [§]
Other public insurance	32.8 (27.1–38.4)	26.0 (21.5–30.5)	20.5	24.2 (19.7–28.7)	16.1 [†] (12.3–20.0)	33.4 [§]	28.2 (24.6–31.9)	21.1 [†] (18.3–24.0)	25.1 [§]
Uninsured	38.0 (35.5–40.5)	31.5 [†] (28.8–34.2)	17.1 [§]	27.6 (25.4–29.7)	23.5 (21.2–25.9)	14.6	33.3 (31.5–35.0)	27.9 [†] (26.0–29.7)	16.2 [§]
Disability/Limitation^{§§§}									
Yes	— ^{¶¶¶}	25.2 (22.6–27.8)	— ^{¶¶¶}	— ^{¶¶¶}	19.3 (17.4–21.2)	— ^{¶¶¶}	— ^{¶¶¶}	21.9 (20.3–23.5)	— ^{¶¶¶}
No	— ^{¶¶¶}	18.9 (17.8–20.1)	— ^{¶¶¶}	— ^{¶¶¶}	13.6 (12.5–14.7)	— ^{¶¶¶}	— ^{¶¶¶}	16.1 (15.2–16.9)	— ^{¶¶¶}
Sexual orientation^{****}									
Straight	— ^{¶¶¶}	18.7 (17.8–19.6)	— ^{¶¶¶}	— ^{¶¶¶}	14.6 (13.7–15.6)	— ^{¶¶¶}	— ^{¶¶¶}	16.6 (15.9–17.3)	— ^{¶¶¶}
Gay/Lesbian/Bisexual	— ^{¶¶¶}	23.1 (16.4–29.8)	— ^{¶¶¶}	— ^{¶¶¶}	24.5 (19.1–29.9)	— ^{¶¶¶}	— ^{¶¶¶}	23.9 (19.8–27.9)	— ^{¶¶¶}

See table footnotes on next page.

with a General Education Development certificate (43.0%) and lowest among those with a graduate degree (5.4%). Persons living below the poverty level had a higher smoking prevalence (26.3%) than persons at or above this level (15.2%). By U.S. Census region, prevalence was highest in the Midwest (20.7%) and lowest in the West (13.1%). Adults reporting a disability or limitation had a higher smoking prevalence

(21.9%) than persons reporting no disability or limitation (16.1%). Prevalence also was higher among lesbian, gay, or bisexual adults (23.9%) than among straight adults (16.6%). From 2005 to 2014, the percentage of adults who were former cigarette smokers did not change significantly (21.5% and 21.9%, respectively).

TABLE. (Continued) Percentage of adults who were current cigarette smokers,* by selected characteristics — National Health Interview Survey, United States, 2005 and 2014**Abbreviations:** AI/AN = America Indian/Alaska Native; CI = confidence interval; GED = General Education Development certificate.

- * Persons who reported smoking ≥ 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days. Excludes 296 (2005) and 200 (2014) respondents whose smoking status was unknown.
- [†] Denotes significant linear trend during 2005–2014 ($p < 0.05$), adjusted for sex, age, and race/ethnicity as applicable. Although the table only presents data from the surveys in 2005 and 2014, data from all the surveys for 2005 through 2014 were used in the trend analysis.
- [§] Denotes significant difference in prevalence ($p < 0.05$) between 2005 and 2014.
- [¶] Indicates an increase in the relative percentage change from 2005 to 2014.
- ** Excludes 30 (2005) and 62 (2014) respondents of non-Hispanic 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 162 (2014) persons whose education 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 2014 estimates are based on reported family income and 2013 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.
- ^{†††} *Medicaid only:* Anyone reporting having Medicaid coverage, but no other insurance coverage, at the time of the interview. Persons reporting both Medicaid and “private insurance” were included in the “private insurance” category. *Medicare only:* Anyone reporting having Medicare coverage, but no other insurance coverage, at the time of the interview. Persons reporting both Medicare and “private insurance” were included in the “private insurance” category. *Private insurance:* Any comprehensive private insurance plan (including health maintenance and preferred provider organizations), obtained through an employer, purchased directly, or purchased through local or community programs, and excludes plans that pay for only one type of service, such as accidents or dental care. A small number of persons (132 respondents) were covered by both “other public insurance” and private plans and were included in both categories. For 2014, this group also included plans purchased through the Health Insurance Marketplace or a state-based exchange. *Other public insurance:* Includes Children’s Health Insurance Program, state-sponsored or other government-sponsored health plan, and military plans. A small number of persons (132 respondents) were covered by both “other public insurance” and private plans and were included in both categories. This does not include anyone reporting any Medicare or Medicaid coverage. *Uninsured:* Having no private health insurance, Medicare, Medicaid, Children’s Health Insurance Program, state-sponsored or other government-sponsored health plan, or military plan, or having only Indian Health Service coverage, or having only a private plan that paid for one type of service, such as accidents or dental care. Those who were dual eligible (enrolled in both Medicaid and Medicare) or reported Medicaid or Medicare and any other coverage were excluded unless they also had “private” insurance coverage.
- ^{§§§} 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 was 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). In 2014, the American Community Survey questions were asked of a random half of the respondents from the 2014 Person File. For population estimates, the specific adult disability weight was doubled to account for the half of respondents who were not asked these questions.
- ^{¶¶¶} Questions pertaining to disabilities/limitations and sexual orientation were not included in the 2005 National Health Interview Survey.
- **** Response options provided on the National Health Interview Survey were “straight, that is, not gay” for men, and “straight, that is, not gay or lesbian” for women.

Overall in 2014, higher smoking prevalences were reported among persons insured by Medicaid only (29.1%; 5.5 million) and persons who were uninsured (27.9%; 8.8 million) than among persons insured by private health insurance (12.9%; 19.6 million) or Medicare only (12.5%; 2.3 million). Among those covered by Medicaid only, prevalences were higher among adults aged 25–44 years (35.6%) and those aged 45–64 years (29.7%) than among those aged 18–24 years (18.2%) (Figure 2).

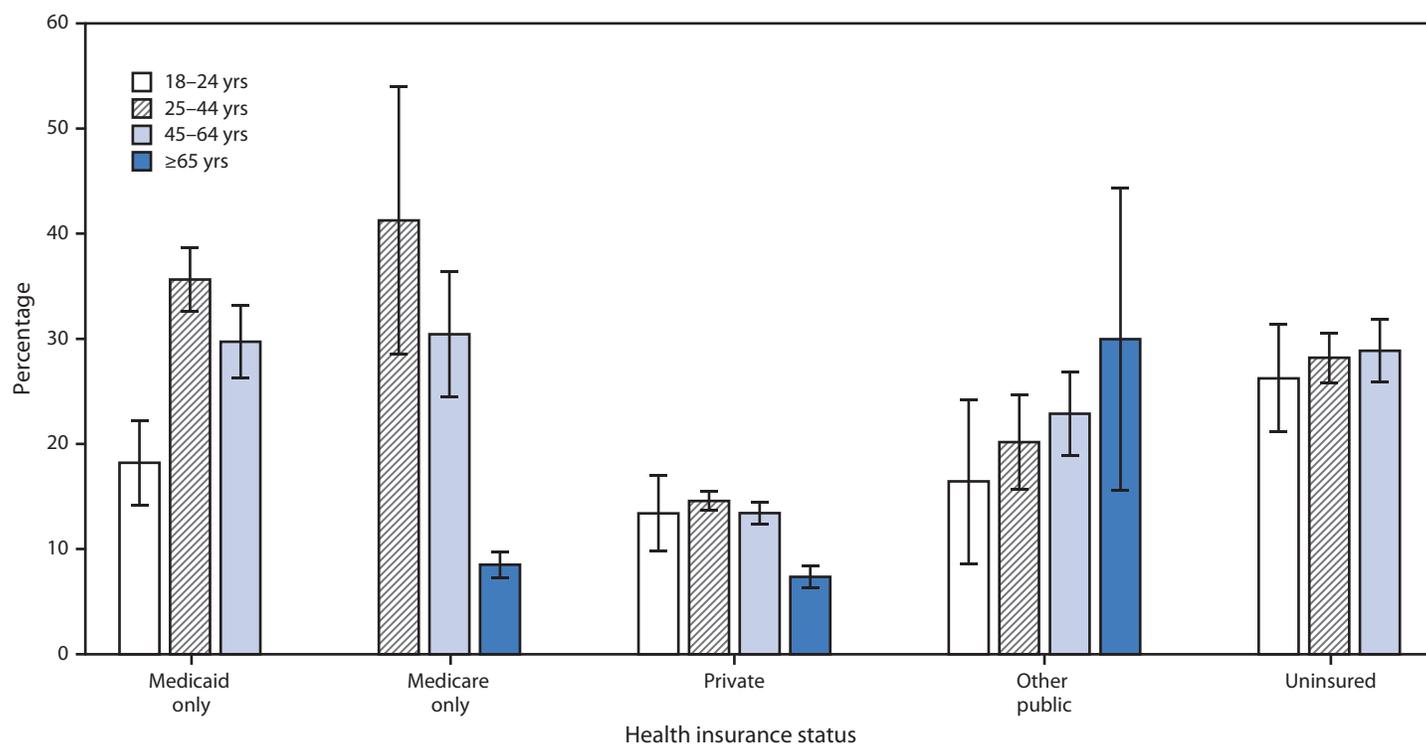
Among current smokers during 2005–2014, the number of daily smokers decreased from 36.4 million (80.8% of all smokers) to 30.7 million (76.8%), while the number of some-days smokers increased from 8.7 million (19.2%) to 9.3 million (23.2%) ($p < 0.05$ for trends). Among daily smokers, the mean number of cigarettes smoked per day declined from 16.7 in 2005 to 13.8 in 2014 ($p < 0.05$ for trend). During 2005–2014, increases occurred in the percentage of daily smokers who smoked 1–9 (16.4% to 26.9%) or 10–19 cigarettes per day (36.0% to 38.8%), whereas declines occurred among those

who smoked 20–29 (34.9% to 27.4%) or ≥ 30 cigarettes per day (12.7% to 6.9%) (Figure 3) ($p < 0.05$ for trend).

Discussion

During 2005–2014, the prevalence of cigarette smoking among U.S. adults declined from 20.9% to 16.8%, including by a full percentage point during 2013–2014 alone, indicating marked progress toward achieving the *Healthy People 2020* goal of reducing cigarette smoking prevalence to $\leq 12.0\%$. Adults aged 18–24 years experienced the greatest decrease in cigarette smoking prevalence; however, recent reports suggest that use of noncigarette tobacco products, including e-cigarettes and hookahs, is common among youth and young adults (2,3). The extent to which emerging tobacco products, such as e-cigarettes, might have contributed to the observed decline in cigarette smoking in recent years is uncertain. E-cigarette use was first assessed in NHIS in 2014, so it is not possible to assess long term patterns of e-cigarette use relative to cigarette use with

FIGURE 2. Percentage of adults who were current cigarette smokers,* by health insurance status† and age group — National Health Interview Survey, United States, 2014



* Persons who reported smoking ≥ 100 cigarettes during their lifetime and who, at the time of interview, reported smoking every day or some days.

† Data not shown for Medicaid beneficiaries aged ≥ 65 years, Medicare beneficiaries aged 18–24 years, and uninsured persons aged ≥ 65 years because of unstable estimates (relative standard error > 30). Error bars represent the 95% confidence interval for each estimate.

this dataset; in 2014, 3.7% of adults currently used e-cigarettes every day or some days, with use differing by age, race/ethnicity, and cigarette smoking status (4). E-cigarettes have been promoted for smoking cessation (1); however, the U.S. Preventive Services Task Force has concluded that the current evidence is insufficient to recommend e-cigarettes for tobacco cessation in adults, including pregnant women.^{¶¶} No change occurred in the percentage of former cigarette smokers over time, suggesting that some of the decline in cigarette smoking might be driven by overall reductions in smoking initiation.

Observed disparities in smoking prevalence are consistent with previous studies (5). Differences by race/ethnicity might be partly explained by sociocultural influences and norms related to the acceptability of tobacco use (6). Differences in prevalence among persons with different types of health insurance coverage might be partly attributable to variations in tobacco cessation treatment coverage and access to evidence-based cessation treatments across health insurance types (7).

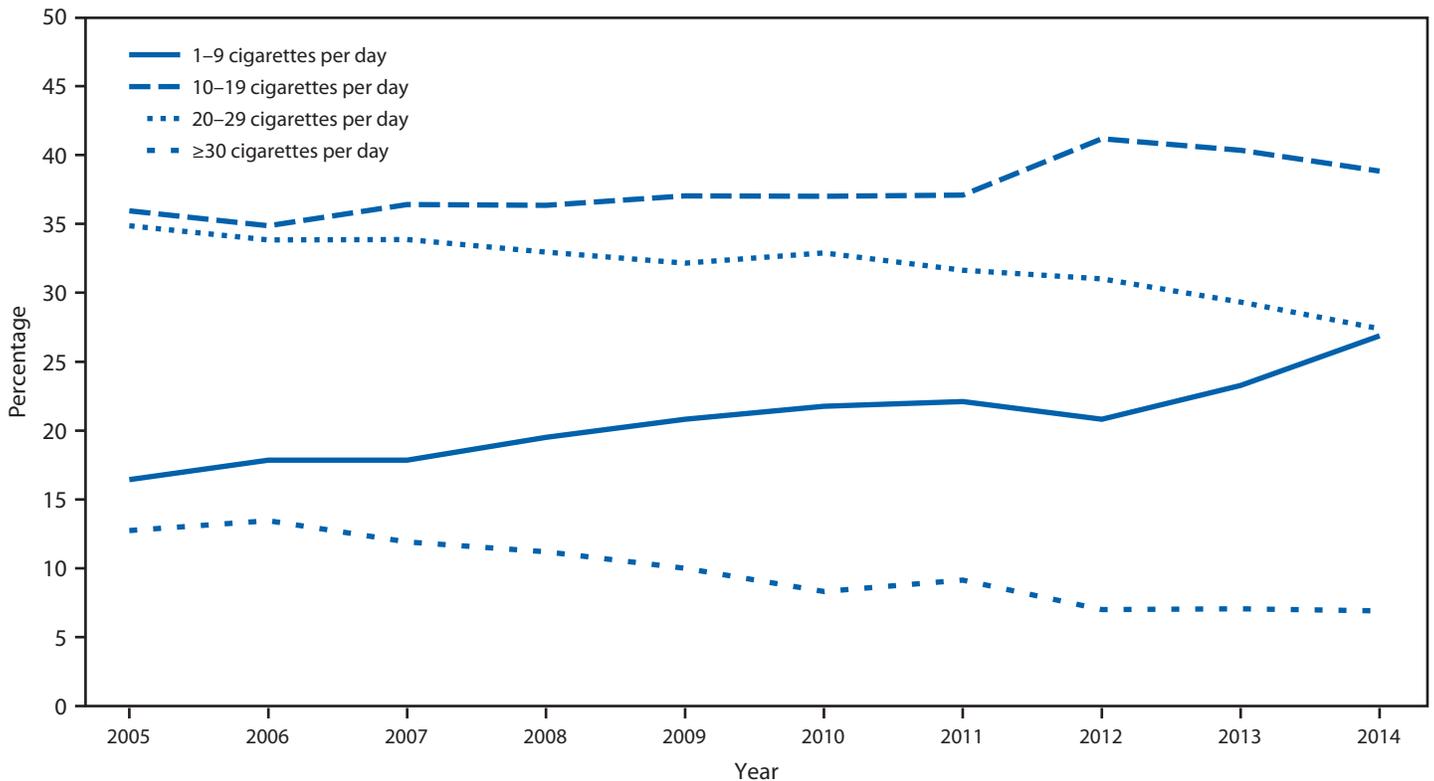
^{¶¶} Additional information available at <http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1>.

Higher prevalences among persons with disabilities and limitations might be related, in part, to smoking-attributable disability in smokers and possible higher stress associated with disabilities (8). These disparities underscore the importance of enhanced implementation of proven strategies to prevent and reduce tobacco use.

Ongoing changes in the U.S. health care system offer opportunities to improve the use of clinical preventive services among adults. The Patient Protection and Affordable Care Act of 2010 (ACA) is increasing the number of Americans with health insurance and is expected to improve tobacco cessation coverage (7). The ACA requires most private insurers to cover tobacco cessation (7); a guidance document issued in May 2014 further clarified this ACA provision.^{***} However, neither private insurers nor state Medicaid programs consistently provide comprehensive coverage of evidence-based cessation treatments (7,9). In 2015, although all 50 state Medicaid programs covered some tobacco cessation treatments for some Medicaid enrollees, only nine states covered individual

^{***} Additional information available at <http://www.dol.gov/ebsa/faqs/faq-aca19.html>.

FIGURE 3. Percentage of daily smokers* aged ≥18 years, by number of cigarettes smoked per day — National Health Interview Survey, United States, 2005–2014



* Persons who reported smoking ≥100 cigarettes during their lifetime and who, at the time of interview, reported smoking cigarettes every day.

and group counseling and all seven FDA-approved cessation medications for all Medicaid enrollees (9). Cessation coverage has the greatest impact when promoted to smokers and health care providers (7,9).

The findings in this report are subject to at least five limitations. First, smoking status was self-reported and not validated by biochemical testing; however, self-reported smoking status correlates highly with serum cotinine levels (10). Second, because NHIS does not include institutionalized populations and persons in the military, results are not generalizable to these groups. Third, the NHIS response rate of 58.9% might have resulted in nonresponse bias. Fourth, the questionnaire did not assess gender identity; including transgender persons might yield higher smoking estimates among sexual minorities. Finally, these estimates might differ from other surveys on tobacco use. These differences in estimates can be partially explained by varying survey methodologies, types of surveys administered, and definitions of current smoking; however, trends in prevalence are comparable across surveys.

Sustained comprehensive state tobacco control programs funded at CDC-recommended levels could accelerate progress

toward reducing the health and economic burden of tobacco-related diseases in the United States (1). However, during 2015, states will spend only \$490.4 million (1.9%) of combined revenues of \$25.6 billion from settlement payments and tobacco taxes for all states on comprehensive tobacco control programs,^{†††} representing <15% of the CDC-recommended level of funding for all states combined. Moreover, only two states (Alaska and North Dakota) currently fund tobacco control programs at CDC-recommended levels. Implementation of comprehensive tobacco control interventions can result in substantial reductions in tobacco-related morbidity and mortality and billions of dollars in savings from averted medical costs (1). Additionally, states can work with health care systems, insurers, and purchasers of health insurance to improve coverage and utilization of tobacco cessation treatments and to implement health systems changes that make tobacco dependence treatment a standard of clinical care (7,9).

^{†††} Robert Wood Johnson Foundation. *Broken Promises to Our Children: a State-by-State Look at the 1998 State Tobacco Settlement 16 Years Later*. A report on the states' allocation of the tobacco settlement dollars. Princeton, NJ: Robert Wood Johnson Foundation; December 2014. Available at <http://www.tobaccofreekids.org/microsites/statereport2015/>.

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Increase in Incidence of Congenital Syphilis — United States, 2012–2014

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Congenital syphilis (CS) occurs when a mother infected with syphilis transmits the infection to her child during pregnancy. CS can cause severe illness, miscarriage, stillbirth, and early infant death. However, among pregnant women with syphilis who deliver after 20 weeks gestation, maternal treatment with penicillin is 98% effective at preventing CS (1). In the United States, the rate of CS decreased during 1991–2005 but increased slightly during 2005–2008 (2). To assess recent trends in CS, CDC analyzed national surveillance data reported during 2008–2014, calculated rates, and described selected characteristics of infants with CS and their mothers. The overall rate of reported CS decreased from 10.5 to 8.4 cases per 100,000 live births during 2008–2012, and then increased to 11.6 cases per 100,000 live births in 2014, the highest CS rate reported since 2001. From 2012 to 2014, reported cases and rates of CS increased across all regions of the United States. To reduce CS, the timely identification of and response to increases in syphilis among women of reproductive age and men who have sex with women are essential. All women should have access to quality prenatal care, including syphilis screening and adequate treatment, during pregnancy (3).

CS is a nationally notifiable disease with case data reported to CDC by all 50 states and the District of Columbia through the National Notifiable Diseases Surveillance System.* For surveillance purposes, the definition of a CS case includes both stillbirths and infants with clinical evidence of CS, as well as stillbirths and infants born to mothers with untreated or inadequately treated syphilis, regardless of the infant's manifestation

of clinical disease. CDC analyzed cases of CS reported during 2008–2014, describing selected demographic and clinical features of infants with CS and their mothers. CS rates were calculated as cases per 100,000 live births by using U.S. natality data published by the National Center for Health Statistics (4). Rates of primary and secondary (P&S) syphilis, a measure that combines two stages of recently acquired infectious syphilis to monitor incident disease, were calculated among women as cases per 100,000 women by using U.S. Census population estimates (5). Because 2014 natality and Census data were not yet available, CS and P&S rates for 2014 were calculated by using 2013 denominators.

Disease Trends

The number of CS cases declined in the United States during 2008–2012 from 446 to 334 cases (10.5 to 8.4 cases per 100,000 live births), reflecting trends in rates of P&S syphilis among women, which decreased from 1.5 to 0.9 cases per 100,000 women (Figure). During this period, all regions of the United States experienced a decrease in CS rates except the Midwest, where the rate increased 62% (from 4.2 to 6.8 cases per 100,000 live births) (Table 1).[†] The increase in CS in the Midwest was attributed primarily to increases in CS rates in Illinois and Ohio, which occurred 1–2 years after observed increases in P&S syphilis among women in these states (6). Substantial declines occurred in all other regions (51% in the Northeast, 46% in the West, and 16% in the South), leading to an overall national decline in CS rates to the lowest level since 2005.

Racial disparities in CS rates between non-Hispanic blacks (blacks) and non-Hispanic whites (whites) increased during 2008–2012, because relative decreases in rates of CS were greater among whites (21%) than blacks (11%). As has been observed previously, the majority of CS cases (57%) in 2012 continued to be among infants whose mothers were black (2).

During 2012–2014, the number of reported CS cases in the United States increased from 334 to 458, representing an increase in rate from 8.4 to 11.6 cases per 100,000 live births.

* During 2008–2014, a case of congenital syphilis (CS) was defined as illness in an infant from whom lesional, placental, umbilical cord, or autopsy material specimens demonstrated *Treponema pallidum* by darkfield microscopy, fluorescent antibody, or other specific stain; an infant whose mother had untreated or inadequately treated syphilis at delivery; or an infant or child who has a reactive treponemal test for syphilis and any of the following: 1) evidence of CS on physical examination; 2) evidence of CS on radiographs of long bones; 3) a reactive cerebrospinal fluid (CSF) venereal disease research laboratory test; 4) an elevated CSF cell count or protein (without other causes); or 5) a reactive fluorescent treponemal antibody absorbed-19S-immunoblobulin M (IgM) antibody test or IgM enzyme-linked immunosorbent assay. This definition includes fetal deaths occurring after 20-weeks gestation or in which the fetus weighed >500 grams and the mother had untreated or inadequately treated syphilis at delivery. Adequate treatment was defined as completion of a penicillin-based regimen, in accordance with CDC treatment guidelines, appropriate for the mother's stage of infection, and initiated ≥30 days before delivery. A slightly modified case definition took effect in 2015 and can be accessed at <http://www.cdc.gov/nndss/conditions/congenital-syphilis/case-definition/2015>. These changes add polymerase chain reaction as an acceptable method for demonstrating the presence of *T. pallidum* in specimens; remove the use of IgM antibody testing and assays for defining cases of CS; and add suggested parameters for defining abnormal CSF cell count and protein levels in infants.

[†] *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.

TABLE 1. Number and rate* of congenital syphilis (CS) cases by race/ethnicity of mother and region of birth of infant — United States, 2008–2014[†]

Characteristic	2008		2009		2010		2011		2012		2013		2014	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Race/ethnicity of mother														
White, non-Hispanic	67	2.9	65	2.9	63	2.9	50	2.3	50	2.3	61	2.8	80	3.7
Black, non-Hispanic	226	35.9	216	35.1	216	36.3	211	35.9	189	32.1	185	31.4	225	38.2
Hispanic	135	13.0	128	12.8	91	9.6	73	8.0	80	8.8	92	10.2	110	12.2
Asian/Pacific Islander	7	2.9	11	4.6	9	3.8	14	5.7	6	2.3	9	3.5	18	7.0
American Indian/Alaska Native	6	13.8	5	11.8	1	2.5	2	5.0	2	5.1	5	12.8	5	12.8
Other	1	N/A	2	N/A	3	N/A	3	N/A	4	N/A	3	N/A	7	N/A
Unknown	4	N/A	4	N/A	4	N/A	5	N/A	3	N/A	4	N/A	13	N/A
Region of birth of infant[§]														
Northeast	37	5.5	30	4.5	26	4.0	23	3.6	17	2.7	17	2.7	30	4.8
Midwest	37	4.2	41	4.7	45	5.3	41	4.9	57	6.8	53	6.4	71	8.5
South	265	16.4	263	16.7	253	16.6	234	15.5	206	13.7	213	14.1	234	15.5
West	107	10.1	97	9.5	63	6.4	60	6.2	54	5.5	76	7.9	123	12.8
Total	446	10.5	431	10.4	387	9.7	358	9.1	334	8.4	359	9.1	458	11.6

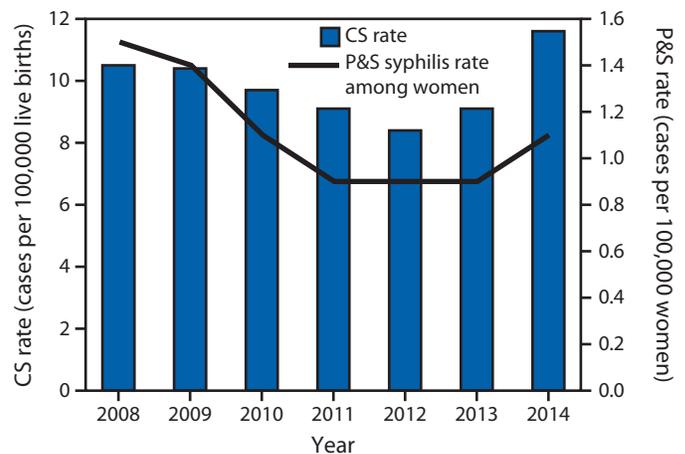
* CS rates during 2008–2013 were calculated as cases per 100,000 live births by using annual live birth data as denominators. Available at <http://wonder.cdc.gov/nativity-current.html>.

[†] The CS rates for 2014 were calculated by using 2014 case counts and 2013 denominators.

[§] *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.

As has been observed with earlier CS trends (2), the increase in CS rates during 2012–2014 reflected an increase in the rate of P&S syphilis among women (22.2% increase, from 0.9 to 1.1 cases per 100,000 women) during the same period (Figure). Increases in CS rates occurred in all regions but were greatest in the West, where the rate more than doubled (from 5.5 to 12.8 cases per 100,000 live births) (Table 1). In total, 19 states reported an increase in number of CS cases and CS rates during 2012–2014, including California (from 35 to 99 cases; 6.9 to 20.0 cases per 100,000 live births), Florida (from 37 to 47 cases; 17.4 to 21.8 per 100,000 live births), Louisiana (from 33 to 46 cases; 52.7 to 72.8 per 100,000 live births), Michigan (from 7 to 15 cases; 6.2 to 13.2 per 100,000 live births), and New York (from 8 to 22 cases; 3.3 to 9.3 per 100,000 live births). Although there was an overall national increase, the number of CS cases and CS rates decreased in multiple large states, including Texas (from 78 to 74 cases; 20.4 to 19.1 per 100,000 live births) and Ohio (from 19 to 15 cases; 13.7 to 10.8 per 100,000 live births).

All racial/ethnic groups experienced an increase in case counts and rates of CS during 2012–2014 (Table 1). The CS rate among whites, blacks, and Hispanics increased 61%, 19%, and 39%, respectively. In 2014, the rate among blacks remained approximately 10 times the rate among whites and three times the rate among Hispanics.

FIGURE. Congenital syphilis (CS) rate* among infants aged <1 year and rate of primary and secondary (P&S) syphilis among women[†] — United States, 2008–2014[§]

* CS rates during 2008–2013 were calculated by using annual live birth data as denominators. Available at <http://wonder.cdc.gov/nativity-current.html>.

[†] P&S syphilis rates during 2008–2013 were calculated by using bridged race U.S. Census population estimates as denominators. Available at <http://wonder.cdc.gov/bridged-race-v2013.html>.

[§] The CS rate and P&S syphilis rate for 2014 were calculated by using 2014 case counts and 2013 denominators.

Clinical Characteristics

The proportion of CS cases resulting in stillbirth and early infant death increased slightly during 2008–2014 (Table 2) from 24 (5.4%) stillbirths in 2008 to 25 (5.5%) in 2014, and from three (0.7%) infant deaths within 30 days of delivery in 2008 to eight (1.7%) in 2014. No vital status was recorded for five infants with CS (1.1%) in 2014.

Among 428 CS patients born alive in 2014, 28 (6.5%) had one or more clinical sign or symptom of CS infection (Table 3). The most commonly reported signs were syphilitic rash ($n = 8$), jaundice ($n = 8$), and hepatosplenomegaly ($n = 5$). An additional 49 (11.4%) had other evidence of CS infection, including long bone x-ray findings consistent with CS, a reactive cerebrospinal fluid (CSF) venereal disease research laboratory test, or an elevated CSF white blood cell count or protein level in the absence of another etiology. Forty-two infants (9.8%) did not have treatment recorded at the time the case was reported to CDC.[§]

Among 458 mothers of infants with CS in 2014, 100 (21.8%) received no prenatal care, and no information about prenatal care was available for 44 mothers (9.6%) (Table 3). Among the 314 mothers with one or more prenatal visit, 135 (43.0%) received no treatment for syphilis during the course of their pregnancy and 94 (30.0%) received inadequate treatment. The 135 mothers who received no treatment include 21 mothers who were never tested for syphilis during pregnancy and 52 mothers who tested negative for syphilis in early pregnancy and subsequently acquired syphilis before delivery. The remaining 62 mothers tested positive, but were not treated. Benzathine penicillin G is the only known effective treatment for preventing CS (3). Maternal treatment was considered inadequate if it was initiated too late (<30 days

before delivery), if a nonpenicillin therapy was administered, or if the dose of penicillin administered was inadequate for the mother's stage of syphilis.

Discussion

The rate of CS in the United States reached a low of 8.4 cases per 100,000 live births in 2012, after 4 years of steady decline. However, during 2012–2014, the national CS rate increased 38%. This rapid increase in the CS rate coincided with a 22% national increase in the rate of P&S syphilis among women during the same period.

In the United States, a case of CS is a sentinel event reflecting numerous missed opportunities for prevention within public health and health care systems (7). There are two major opportunities to prevent CS: primary prevention of syphilis among women of reproductive age and men who have sex with women, and prevention of mother-to-infant transmission among pregnant women already infected with syphilis.

Preventing syphilis among women and their male partners requires that sexually transmitted diseases (STD) prevention programs quickly identify and respond to increases in syphilis cases among women and men who have sex with women in their jurisdictions. CS cases and cases of syphilis among women should be reported to the local health department within 24 hours of diagnosis, and STD programs should review local syphilis case data each week to detect increases in CS cases or cases of syphilis among women. In addition, CS cases should be reported to CDC within 1 month of diagnosis. STD programs should prioritize cases of infectious syphilis among women of reproductive age and their male sex partners for case investigation and partner services to reduce transmission and infection in these populations. STD programs might also consider enhancing surveillance efforts by determining pregnancy status on all reported syphilis cases in women and by monitoring the screening and treatment practices among prenatal care providers in communities at highest risk for delivering an infant with CS.

Mother-to-infant transmission of syphilis can be prevented or mother-to-infant transmission that has already occurred can

[§] Newborn treatment for congenital syphilis might include either a 10-day course of aqueous crystalline or procaine penicillin G or one intramuscular dose of benzathine penicillin G, depending upon various factors related to 1) identification of syphilis in the mother; 2) adequacy of maternal treatment; 3) presence of clinical, laboratory, or radiographic evidence of syphilis in the neonate; and 4) comparison of maternal (at delivery) and neonatal serologic titers. Full guidance is available at <http://www.cdc.gov/std/tg2015/congenital.htm>.

TABLE 2. Number and percentage* of congenital syphilis cases by vital status of infant — United States, 2008–2014

Vital status of infant	2008	2009	2010	2011	2012	2013	2014
	No. (%)						
Alive	419 (94.0)	402 (93.3)	357 (92.3)	338 (94.7)	314 (94.0)	332 (92.5)	420 (91.7)
Born alive, then died [†]	3 (0.7)	1 (0.2)	7 (1.8)	4 (1.1)	3 (0.9)	4 (1.1)	8 (1.7)
Stillborn	24 (5.4)	27 (6.3)	23 (5.9)	13 (3.6)	15 (4.5)	22 (6.1)	25 (5.5)
Unknown	0 (0)	1 (0.2)	0 (0)	3 (0.8)	2 (0.6)	1 (0.3)	5 (1.1)
Total	446 (100.0)	431 (100.0)	387 (100.0)	358 (100.0)	334 (100.0)	359 (100.0)	458 (100.0)

* Percentages might not add to 100% because of rounding.

[†] "Born alive, then died" includes live births that died <30 days after birth where death occurred before case investigation and case report were completed.

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

The rate of congenital syphilis (CS) in the United States decreased during 1991–2005 but increased slightly during 2005–2008.

What is added by this report?

Although the rate of CS steadily decreased during 2008–2012 (10.5 cases to 8.4 cases per 100,000 live births), the rate increased during 2012–2014 (11.6 cases per 100,000 live births in 2014), reflecting an increase in the national rate of primary and secondary syphilis among women. The 2014 CS rate is higher than seen in over a decade.

What are the implications for public health practice?

CS and its complications can be prevented by rapidly responding to syphilis increases among women of reproductive age and men who have sex with women, and by quality prenatal care, which includes screening and treatment for syphilis.

be treated when maternal syphilis is detected, and benzathine penicillin G appropriate for the mother's stage of infection[¶] is initiated ≥ 30 days before delivery (3). CDC recommends that all pregnant women be screened for syphilis at their first prenatal visit (3). Women at increased risk for syphilis and women living in high-morbidity geographic areas should also be screened at the beginning of their third trimester and again at delivery.** When access to prenatal care is not optimal, rapid plasma reagin screening should be performed at the time that a pregnancy is confirmed (performed onsite by using a rapid plasma reagin card test, if possible, and the woman treated as necessary). Newborn infants should not be discharged from the hospital unless the syphilis serologic status of the mother has been determined at least one time during pregnancy and preferably again at delivery if the mother is determined to be at increased risk. Any woman who delivers a stillborn infant should be tested for syphilis.

A substantial percentage of CS cases are attributable to a lack of prenatal care; even among those receiving some prenatal care, the detection and treatment of maternal syphilis often occurs too late to prevent CS. Health departments, in partnership with prenatal care providers and other local organizations, should work together to address barriers to obtaining early

TABLE 3. Characteristics of infants with congenital syphilis (CS) and their mothers — United States, 2008–2014

Characteristic	2014
	(N = 458)
	No. (%*)
Infant	
Symptom status of infants born alive	
Total born alive	428 (100.0)
Signs or symptoms of CS [†]	28 (6.5)
Asymptomatic	343 (80.1)
Unknown	57 (13.3)
Treatment regimen of infants born alive	
Total born alive	428 (100.0)
Aqueous or procaine penicillin (10 days)	301 (70.3)
Benzathine penicillin (1 dose)	50 (11.6)
Other	33 (7.7)
No treatment	42 (9.8)
Unknown	2 (0.5)
Mother	
Mother received prenatal care	
Yes	314 (68.6)
No	100 (21.8)
Unknown	44 (9.6)
Treatment status among mothers who received prenatal care	
Total receiving prenatal care	314 (100.0)
Adequate treatment [§]	43 (13.7)
Inadequate treatment: <30 days before delivery	78 (24.8)
Inadequate treatment: Nonpenicillin therapy	3 (1.0)
Inadequate treatment: Not enough penicillin for mother's stage of infection	13 (4.1)
No treatment	135 (43.0)
Unknown	42 (13.4)

* Percentages might not sum to 100% because of rounding.

[†] Signs and symptoms of CS in an infant or a child aged <2 years included condyloma lata, snuffles, syphilitic rash, hepatosplenomegaly, jaundice/hepatitis, pseudoparalysis, or edema (nephrotic syndrome, malnutrition, or both).

[§] Treatment is considered adequate if mothers are treated with a course of benzathine penicillin G appropriate for their stage of syphilis infection and treatment is initiated ≥ 30 days before delivery. Syphilis treatment guidelines are available at <http://www.cdc.gov/std/tg2015/syphilis.htm>.

and adequate prenatal care for the majority of vulnerable pregnant women. Women who are uninsured or underinsured and women with substance use issues have been found to be at increased risk for receiving inadequate or no prenatal care, placing them at increased risk for CS (8,9).

The findings in this report are subject to at least three limitations. First, shortcomings in screening practices (e.g., inconsistent syphilis testing of mothers with stillborn infants) or underreporting can lead to missed cases (10). Second, this analysis only stratified data at the regional and state levels; the observations reported here might not reflect more local (e.g., county- or city-level) epidemiology. Third, the use of 2013 natality data in the calculation of CS rates might overestimate the rate of CS by a limited amount; preliminary data indicate that births might have increased slightly in the United States during 2013–2014.

[¶] For mothers with primary, secondary, or early latent syphilis, a single intramuscular dose of 2.4 million units of benzathine penicillin G; for mothers with late latent syphilis, 7.2 million units of benzathine penicillin G, administered as 3 intramuscular doses of 2.4 million units each at one-week intervals.

** Information about the incidence of syphilis among women is available at the state- and county-level through the National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Atlas and is available at <http://gis.cdc.gov/grasp/nchhstpatlas/main.html?value=atlas>.

Although the United States experienced an overall decline in the rate of CS during 2008–2012, the rate increased substantially during 2012–2014, to the highest level since 2001. Racial and ethnic disparities persist, and CS prevention in the public health and health care sectors remains paramount. Addressing CS will depend upon health care providers and STD programs being aware of infectious syphilis among women of reproductive age and men who have sex with women in their jurisdictions; reporting cases of CS and cases of syphilis among women of reproductive age and men who have sex with women in a timely fashion; prioritizing STD partner services for syphilis cases among women of reproductive age and their sex partners; instituting more thorough prenatal screening practices when warranted; ensuring timely treatment of identified cases with benzathine penicillin G; and removing the barriers to timely and high quality prenatal care.

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Progress Toward Regional Measles Elimination — Worldwide, 2000–2014

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In 2000, the United Nations General Assembly adopted the Millennium Development Goals (MDG), with MDG4 being a two-thirds reduction in child mortality by 2015, and with measles vaccination coverage being one of the three indicators of progress toward this goal.* In 2010, the World Health Assembly established three milestones for measles control by 2015: 1) increase routine coverage with the first dose of measles-containing vaccine (MCV1) for children aged 1 year to $\geq 90\%$ nationally and $\geq 80\%$ in every district; 2) reduce global annual measles incidence to fewer than five cases per million population; and 3) reduce global measles mortality by 95% from the 2000 estimate (1).[†] In 2012, the World Health Assembly endorsed the Global Vaccine Action Plan[§] with the objective to eliminate measles in four World Health Organization (WHO) regions by 2015. WHO member states in all six WHO regions have adopted measles elimination goals. This report updates the 2000–2013 report (2) and describes progress toward global control and regional measles elimination during 2000–2014. During this period, annual reported measles incidence declined 73% worldwide, from 146 to 40 cases per million population, and annual estimated measles deaths declined 79%, from 546,800 to 114,900. However, progress toward the 2015 milestones and elimination goals has slowed markedly since 2010. To resume progress toward milestones and goals for measles elimination, a review of current strategies and challenges to improving program performance is needed, and countries and their partners need to raise the visibility of measles elimination, address barriers to measles vaccination, and make substantial and sustained additional investments in strengthening health systems.

* Additional information available at <http://www.unmillenniumproject.org/goals/gti.htm#goal4>.

[†] Whereas the coverage milestone is to be met by every country, the incidence and mortality reduction milestones are to be met globally.

[§] The Global Vaccine Action Plan is the implementation plan of the Decade of Vaccines, a collaboration between WHO, UNICEF, the Bill and Melinda Gates Foundation, Gavi, the Vaccine Alliance, the U.S. National Institute of Allergy and Infectious Diseases, the African Leaders Malaria Alliance, and others to extend the full benefit of immunization to all persons by 2020 and beyond. Additional information is available at http://www.who.int/immunization/global_vaccine_action_plan and at http://apps.who.int/gb/ebwha/pdf_files/wha65/a65_22-en.pdf.

Immunization Activities

To estimate coverage with MCV1 and the second dose of MCV (MCV2) through routine immunization services,[¶] WHO and the United Nations Children's Fund (UNICEF) use data from administrative records and surveys reported annually by the 194 WHO countries. From 2000 to 2010, estimated MCV1 coverage increased globally from 72% to 85%, and remained at 85% through 2014 (Tables 1 and 2). The number of countries with $\geq 90\%$ MCV1 coverage increased from 84 (44%) in 2000 to 131 (68%) in 2012, then decreased to 122 (63%) in 2014. Since 2003, countries also have reported the number of districts with $\geq 80\%$ MCV1 coverage. Among countries with $\geq 90\%$ MCV1 coverage nationally, the percentage having $\geq 80\%$ MCV1 coverage in all districts increased from 1% (1 of 103) in 2003 to 44% (57 of 131) in 2012, then declined to 40% (49 of 122) in 2014. Among the estimated 20.6 million infants who did not receive MCV1 through routine immunization services in 2014, approximately 11.6 million (56%) were in six countries: the Democratic Republic of the Congo (0.6 million), Ethiopia (0.9 million), India (4.2 million), Indonesia (1 million), Nigeria (3.3 million), and Pakistan (1.6 million).

During 2000–2014, the number of countries providing MCV2 nationally through routine immunization services increased from 97 (51%) to 154 (79%), with six countries (Burkina Faso, Morocco, Niger, Rwanda, Senegal, Tanzania) introducing MCV2 in 2014. Estimated global MCV2 coverage increased from 15% in 2000 to 56% in 2014. During 2014, approximately 221 million children received MCV during mass immunization campaigns known as supplementary immunization activities (SIAs)** conducted in 29 countries, with 23 countries (79%) providing one or more additional child health interventions during the SIA (Figure). Based on doses administered, SIA coverage was $\geq 95\%$ in 16 (55%) countries;

[¶] For MCV1, among children aged 1 year or, if MCV1 is given at age ≥ 1 year, among children aged 24 months. For MCV2, among children at the recommended age of administration of MCV2, as per the national immunization schedule. WHO/UNICEF estimates of national immunization coverage are available at http://www.who.int/immunization/monitoring_surveillance/data.

** Supplemental immunization activities (SIAs) generally are carried out using two target age ranges. An initial, nationwide catch-up SIA focuses on all children aged 9 months–14 years, with the goal of eliminating susceptibility to measles in the general population. Periodic follow-up SIAs then focus on all children born since the last SIA. Follow-up SIAs generally are conducted nationwide every 2–4 years and focus on children aged 9–59 months; their goal is to eliminate any measles susceptibility that has developed in recent birth cohorts and to protect children who did not respond to MCV1.

TABLE 1. Estimates of coverage with the first dose of measles-containing vaccine administered through routine immunization services among children aged 1 year, reported measles cases and incidence, and estimated measles mortality,* by World Health Organization region — worldwide, 2000

WHO region	2000						
	Coverage with 1st dose (%) [†]	Countries with ≥90% coverage (%)	Coverage with 2nd dose (%)	Reported cases (No.) [§]	Incidence ^{¶,**}	Countries with incidence <5/million (%)	Estimated deaths (95% CI)
African	53	9	5	520,102	841	8	342,800 (225,400–574,200)
Americas	93	63	45	1,754	2.1	89	NA
Eastern Mediterranean	72	57	28	38,592	90	17	54,300 (32,200–91,100)
European	91	60	49	37,421	50	48	300 (100–2,200)
South-East Asia	63	30	3	78,558	51	0	138,500 (102,100–185,900)
South-East Asia (excluding India)	78	33	9	39,723	80	0	52,700 (32,700–81,300)
India	56	NA	0	38,835	37	0	85,800 (69,400–104,700)
Western Pacific	85	44	2	177,052	105	30	10,800 (5,400–53,600)
Total	72	44	15	853,479	146	38	546,800 (365,200–907,000)

Abbreviations: CI = confidence interval; NA = not applicable; WHO = World Health Organization.

* Mortality estimates for 2000 might be different from previous reports: when WHO and UNICEF rerun the model used to generate estimated measles deaths each year using the new WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) data, as well as updated surveillance data, adjusted results for each year, including the baseline year, are also produced and updated.

[†] Coverage data: WUENIC. Geneva, World Health Organization, 2014 (update of July 15, 2015). Available at http://www.who.int/immunization/monitoring_surveillance/data.

[§] Reported case data: measles cases from World Health Organization, 2014 (update of September 8, 2015); available at (http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidence measles.html). Americas data for 2014 from Immunization in the Americas, 2015 Summary; available at http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=31828&lang=en.

[¶] Cases per million population; population data from United Nations, Department of Economic and Social Affairs, Population Division (2013).

** Any country not reporting data on measles cases for that year was removed from both the numerator and denominator.

TABLE 2. Estimates of coverage with the first dose of measles-containing vaccine administered through routine immunization services among children aged 1 year, reported measles cases and incidence, and estimated measles mortality, by World Health Organization region — worldwide, 2014

WHO Region	2014										
	Coverage with 1st dose (%) [*]	Countries with ≥90% coverage (%)	Coverage with 2nd dose (%)	Reported cases (No.) [†]	Decline in cases from 2000 (%)	Incidence ^{§,¶}	Decline in incidence from 2000 (%)	Countries with incidence <5/ million (%)	Reported genotypes ^{**}	Estimated deaths (95% CI)	Mortality reduction 2000–2014 (%)
African	73	30	11	73,914	86	78	91	51	B3	48,000 (15,400–145,600)	86
Americas	92	77	51	1,817	NA	1.9	11	97	B3 D4 D8 D9 H1	NA	NA
Eastern Mediterranean	77	57	66	18,129	53	29	68	21	B3 D4 D8 H1	13,900 (9,500–38,400)	74
European	94	83	84	14,176	62	19	62	60	B3 D4 D8 H1	100 (0–1,800)	67
South-East Asia	84	45	59	28,403	64	18	64	56	B3 D4 D8	46,900 (27,900–80,800)	66
South-East Asia (excluding India)	85	50	78	3,426	91	12	85	63	B3 D4 D8	8,100 (2,700–25,400)	85
India	83	NA	51	24,977	36	20	47	0	B3	38,800 (25,300–55,400)	55
Western Pacific	97	74	93	131,043	26	71	33	35	B3 D4 D8 D9 G3 H1	6,100 (800–63,300)	44
Total	85	63	56	267,482	69	40	73	58		114,900 (53,700–330,000)	79

Abbreviations: CI = confidence interval; NA = not applicable; WHO = World Health Organization.

* Coverage data: WUENIC. Geneva, World Health Organization, 2014 (update of July 15, 2015). Available at http://www.who.int/immunization/monitoring_surveillance/data.

[†] Reported case data: measles cases from World Health Organization, 2014 (update of September 8, 2015); available at (http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidence measles.html). Americas data for 2014 from Immunization in the Americas, 2015 Summary; available at http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=31828&lang=en.

[§] Cases per million population; population data from United Nations, Department of Economic and Social Affairs, Population Division (2013).

[¶] Any country not reporting data on measles cases for that year was removed from both the numerator and denominator.

** Data as of September 25, 2015, as reported to the Measles Nucleotide Surveillance (MeaNS) database, available at http://www.who-measles.org/Public/Web_Front/main.php.

TABLE 3. Measles supplementary immunization activities* and the delivery of other child health interventions, by country and World Health Organization region — worldwide, 2014

WHO region/country	Age group targeted	Extent of SIA	Children reached No. (%) [†]	Other interventions delivered
African				
Angola	6 mos–9 yrs	National	9,169,335 (117)	Oral poliovirus vaccine, vitamin A
Benin	9 mos–9 yrs	National	2,621,634 (100)	
Burkina Faso	9 mos–14 yrs	National	8,481,625 (106)	Rubella vaccine
Chad	9 mos–9 yrs	National	4,886,532 (103)	
Cote d'Ivoire	6 mos–9 yrs	National	9,640,512 (92)	Vitamin A, deworming, medication
Democratic Republic of the Congo	6 mos–9 yrs	Rollover-national [§]	18,539,883 (101)	Oral poliovirus vaccine, vitamin A, deworming medication
Guinea	6 mos–9 yrs	Outbreak response	1,411,043 (99)	
Mauritania	9 mos–14 yrs	National	1,489,563 (105)	
South Sudan	6–59 mos; 6 mos–15 yrs	National	2,172,737 (91)	Oral poliovirus vaccine, vitamin A
Tanzania	9 mos–14 yrs	National	20,529,629 (97)	Oral poliovirus and rubella vaccines, vitamin A, deworming medication
Americas				
Argentina	1–4 yrs	National	2,347,019 (82)	Oral poliovirus, rubella, and mumps vaccines
Brazil	1–4 yrs	National	9,805,102 (89)	Oral poliovirus, rubella, and mumps vaccines
Paraguay	1–5 yrs	National	533,889 (72)	Oral poliovirus, rubella, and mumps vaccines
Venezuela	1–5 yrs	National	2,466,543 (99)	Oral poliovirus, rubella, and mumps vaccines
Eastern Mediterranean				
Afghanistan	9–59 mos; 6 mos–10 yrs	Subnational	842,134 (94)	
Iraq	9–36 mos	National	3,295,122 (96)	
Lebanon	9 mos–18 yrs	National	1,056,830 (72)	Rubella vaccine
Pakistan	9 mos–9 yrs	Rollover-national [§]	25,091,751 (103)	Oral poliovirus vaccine
Somalia	9–59 mos	Subnational child health days and SIAs in newly accessible areas	1,251,090 (67)	Oral poliovirus and tetanus toxoid vaccines, vitamin A, deworming medication
Syria	7 mos–5 yrs; ≥15 yrs in high-risk areas	Subnational	769,408 (74)	Rubella and mumps vaccines
Yemen	9 mos–14 yrs	National	11,368,968 (93)	Oral poliovirus and rubella vaccines
European				
Azerbaijan	10–14 yrs	National	164,560 (96)	Rubella and mumps vaccines
Georgia	≥14 yrs	National	28,718 (106)	Rubella and mumps vaccines
South-East Asia				
Bangladesh	9 mos–14 yrs	National	53,644,603 (102)	Oral poliovirus and rubella vaccines
Western Pacific				
Laos	9 mos–9 yrs	National	1,569,224 (101)	Oral poliovirus and rubella vaccines, deworming medication
Micronesia	12 mos–49 yrs; 12 mos–57 yrs	National	71,388 (87)	Rubella and mumps vaccines
Philippines	6–36 mos 9–59 mos	Outbreak response National	12,098,419 (89)	Oral poliovirus and rubella vaccines (only in national SIA)
Solomon Islands	6 mos–29 yrs	National	394,584 (105)	Rubella vaccine
Viet Nam	9 mos–10 yrs 1–14 yrs	Subnational National	15,147,961 (93)	Rubella vaccine (only in national SIA)
Total			220,889,806	

Abbreviations: SIA = supplementary immunization activity; WHO = World Health Organization.

* SIAs typically are carried out using two approaches: 1) An initial, nationwide catch-up SIA targets all children aged 9 months–14 years, with the goal of eliminating susceptibility to measles in the general population and periodic follow-up SIAs then target all children born since the last SIA. 2) Follow-up SIAs are typically conducted nationwide every 2–4 years and typically target children aged 9–59 months; their goal is to eliminate any measles susceptibility that has developed in recent birth cohorts and to protect children who did not respond to the first measles vaccination. The exact age range for follow-up SIAs depends on the age-specific incidence of measles, coverage with 1 dose of measles-containing vaccine, and the time since the last SIA.

[†] When coverage >100% the intervention reached more persons than the estimated target population.

[§] Rollover national campaigns started the previous year or will continue into the next year.

however, of the five countries conducting post-SIA coverage surveys, only one estimated SIA coverage at $\geq 95\%$.

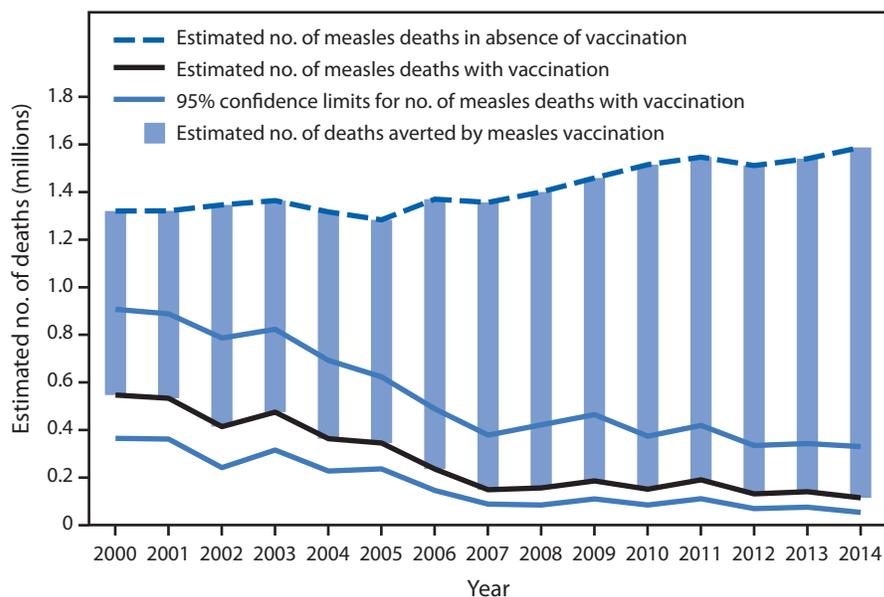
Disease Incidence

Countries report the number of measles cases from either case-based or aggregate surveillance systems^{††} to WHO and UNICEF each year. Effective measles surveillance includes case-based surveillance with laboratory testing to confirm cases. In 2014, 187 (96%)^{§§} countries used case-based surveillance, and 191 (98%)^{¶¶} had access to standardized quality-controlled testing through the WHO Global Measles and Rubella Laboratory Network.

During 2000–2014, the number of annually reported measles cases worldwide decreased 69%, from 853,479 to 267,482, and measles incidence decreased 73%, from 146 to 40 cases per million population (Tables 1 and 2). The results for 2014 represent little change from those reported in 2013 (280,795 cases and 40 cases per million population), although fewer countries reported in 2014 (169) compared with 2013 (175).^{***} The percentage of reporting countries with < 5 cases per million decreased from 65% (113 of 175) in 2013 to 58% (98 of 169) in 2014. During 2000–2014, the Region of the Americas (AMR) maintained measles incidence at fewer than 5 cases per million.

Measles incidence decreased in four of six WHO regions from 2013 to 2014 (Table 2). In the African Region (AFR), reported cases decreased 57%, from 171,178 cases in 2013 to 73,914 in 2014, largely because of decreases in the Democratic Republic of the Congo (from 88,381 to 33,711) and Nigeria (from 52,852 to 6,855). However, in 2014, outbreaks occurred in Angola (11,699) and Ethiopia (12,739 cases). In the Eastern Mediterranean Region (EMR), the European Region (EUR), and the South-East Asia Region (SEAR), reported cases also

FIGURE. Estimated number of measles deaths and number of deaths averted by measles vaccination — worldwide, 2000–2014



decreased in 2014, although large outbreaks were reported in India (24,977), Somalia (10,278 cases), and Russia (4,711) in 2014. Increased numbers of cases were reported in 2014 from AMR, largely because of outbreaks in Brazil (727 cases) and the United States (667); and from the Western Pacific Region (WPR), because of large outbreaks reported in China (52,628), the Philippines (58,848 cases), and Vietnam (15,033).

Genotypes of viruses isolated from measles cases were reported to WHO by 69 (41%) of the 169 countries reporting measles cases in 2014. Of the 24 recognized measles virus genotypes, 11 were detected during 2005–2008 and eight during 2009–2014, excluding those from vaccine reactions and cases of subacute sclerosing panencephalitis (3). In 2014, among 7,155 reported sequences,^{†††} 1,328 (50 countries) were genotype B3, 38 (eight countries) were D4, 1,083 (45 countries) were D8, 92 (12 countries) were D9, four (four countries) were G3, and 4,610 (18 countries) were H1 (Table 2).

Mortality Estimates

WHO has developed a model to estimate measles mortality in countries using numbers and age distribution of reported cases, routine and SIA MCV coverage, and age- and country-specific case-fatality ratios (4,5). New measles vaccination coverage and case data for all countries during 2000–2014

^{††} Available at http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidence measles.html.

^{§§} Countries without case-based measles surveillance in 2014 were Djibouti, India, Mauritius, Sao Tome and Principe, Seychelles, Somalia, and South Sudan.

^{¶¶} Countries without access to standardized quality-controlled testing by the WHO Measles and Rubella Laboratory Network in 2014 were Cape Verde, Sao Tome and Principe, and Seychelles.

^{***} Countries not reporting in 2013 were Cuba (AMR); Bahrain, Libya, and the United Arab Emirates (EMR); Austria, Bosnia and Herzegovina, Italy, Malta, Monaco, San Marino, and Ukraine (EUR); and Brunei Darussalam, Cook Islands, Fiji, the Marshall Islands, Nauru, Samoa, Singapore, and Tuvalu (WPR). In 2014, countries not reporting were Djibouti and Oman (EMR); Albania, Andorra, Croatia, Finland, Italy, Luxembourg, Monaco, Montenegro, Poland, San Marino, and Ukraine (EUR); Indonesia and Thailand (SEAR); and Cook Islands, Fiji, Marshall Islands, Nauru, Niue, Singapore, Solomon Islands, Tonga, Tuvalu, and Western Samoa (WPR).

^{†††} Sequences were for the 450 nucleotide carboxy-terminal of the nucleocapsid gene in the measles virus genome. Genotypes isolated from three cases of subacute sclerosing panencephalitis (D3, D6, and D7) were excluded from the total. Data (as of October 7, 2015) available from the Measles Nucleotide Surveillance (MeaNS) database, available at http://www.who-measles.org/Public/Web_Front/main.php.

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

During 2000–2010, global vaccination coverage with the 1st dose of measles-containing vaccine (MCV1) increased from 72% to 85%, and annual measles incidence decreased from 146 reported cases per million population in 2000 to 50 cases per million in 2010. During 2010–2013, MCV1 coverage and measles incidence did not significantly change.

What is added by this report?

During 2000–2014, an estimated 17.1 million deaths were prevented by measles vaccination, and measles incidence decreased 73%, from 146 to 40 cases per million population. The number of countries providing the 2nd dose of measles-containing vaccine (MCV2) nationally through routine immunization services increased to 154 (79%) in 2014, and global MCV2 coverage was 56%. During 2014, a total of 221 million children were vaccinated against measles during supplementary immunization activities.

What are the implications for public health practice?

Although measles vaccination has saved millions of lives since 2000, progress has slowed since 2010. Reaching measles control and elimination goals will require addressing policy and practice gaps that prevent reaching larger numbers of children with measles vaccination, increasing visibility of measles elimination efforts, and ensuring adequate resources for strengthening health systems.

led to a new series of mortality estimates. During this period, estimated measles deaths decreased 79%, from 546,800 to 114,900, and all regions had substantial reductions in estimated measles mortality (Tables 1 and 2). Compared with no measles vaccination, measles vaccination prevented an estimated 17.1 million deaths during 2000–2014 (Figure).

Regional Verification of Measles Elimination

Since the last report, the AMR regional verification committee determined that AMR cannot be declared measles free, because Brazil has had sustained transmission of a single measles virus strain for >1 year. The WPR regional verification committee verified absence of endemic measles in two member states and one area, bringing the total to seven in WPR (6); the EUR regional verification committee verified measles elimination in 22 member states (7).

Discussion

During 2000–2014, increased coverage worldwide with both (1st and 2nd) routine doses of MCV, combined with SIAs in countries that lack high coverage with 2 doses of MCV, contributed to a 73% decrease in reported measles incidence

and a 79% reduction in estimated measles mortality. During this period, measles vaccination prevented an estimated 17.1 million deaths. However, on the basis of current trends in measles vaccination coverage and incidence, the WHO Strategic Advisory Group of Experts on Immunization concluded that the 2015 global milestones and measles elimination goals will not be achieved (8).

Measles can serve as an indicator of the strength and reach of the health system, as measles outbreaks reveal populations poorly served by health services. In high-burden, low-coverage countries, outbreak investigations have also found low MCV1 coverage where long-standing policies and practices prevent vaccination of children aged ≥ 12 months, discourage opening a 10-dose vial when few children are present, and limit measles vaccination to only one session per month (Global Immunization Division, Center for Global Health, CDC, unpublished data, 2015). Addressing these gaps, maximizing how SIA planning and implementation can improve routine services, and conducting high-quality SIAs should increase coverage and equity for all vaccines and further reduce the number of measles cases and deaths. As coverage improves, establishing a visit during the second year of life integrating MCV2 and other child health interventions should help to further reduce measles burden.

The findings in this report are subject to at least three limitations. First, MCV coverage estimates are affected by inclusion of SIA doses administered to children outside the target group, inaccurate estimates of the target population size, and inaccurate reports of the number of doses delivered. Second, underascertainment of measles cases through surveillance systems can occur, because not all patients with measles seek care and not all cases are reported. Third, some countries report aggregate numbers of unconfirmed cases rather than case-based data.

The decrease in measles mortality is among three main contributors (along with decreases in pneumonia and diarrhea) to the decline in overall child mortality and progress toward MDG4 (9). To assess the reasons for the slowing of progress since 2010 and to modify current strategies as needed, the Measles & Rubella Initiative^{§§§} partners have commissioned a midterm strategy review. Countries and their partners need to raise the visibility of measles elimination, and secure the resources needed to implement strategies required to reach measles control and elimination goals, taking into account the results and recommendations from the review.

^{§§§} The Measles & Rubella Initiative is a partnership established in 2001 as the Measles Initiative, led by the American Red Cross, CDC, the United Nations Foundation, UNICEF, and WHO. Additional information is available at <http://www.measlesrubellainitiative.org>.

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Global Routine Vaccination Coverage, 2014

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The year 2014 marked the 40th anniversary of the World Health Organization's (WHO) Expanded Program on Immunization, which was established to ensure equitable access to routine immunization services (1). Since 1974, global coverage with the four core vaccines (Bacille Calmette-Guérin vaccine [BCG; for protection against tuberculosis], diphtheria-tetanus-pertussis [DTP] vaccine, poliovirus vaccine, and measles vaccine) has increased from <5% to ≥85%, and additional vaccines have been added to the recommended schedule. Coverage with the 3rd dose of DTP vaccine (DTP3) by age 12 months is an indicator of immunization program performance because it reflects completion of the basic infant immunization schedule; coverage with other vaccines, including the 3rd dose of poliovirus vaccine (polio3); the 1st dose of measles-containing vaccine (MCV1) is also assessed. Estimated global DTP3 coverage has remained at 84%–86% since 2009, with estimated 2014 coverage at 86%. Estimated global coverage for the 2nd routine dose of measles-containing vaccine (MCV2) was 38% by age 24 months and 56% when older age groups were included, similar to levels reported in 2013 (36% and 55%, respectively). To reach and sustain high immunization coverage in all countries, adequate vaccine stock management and additional opportunities for immunization, such as through routine visits in the second year of life, are integral components to strengthening immunization programs and reducing morbidity and mortality from vaccine preventable diseases.

Vaccination coverage represents the percentage of persons in a target age group that received a vaccine dose. Administrative coverage is calculated by dividing the number of vaccine doses administered to those in a specified target age group by the estimated target population. Countries report administrative coverage annually to WHO and the United Nations Children's Fund (UNICEF) through the Joint Reporting Form (JRF).^{*} Vaccine stock management information, including availability and supply, is also reported through the JRF. Vaccination coverage surveys estimate vaccination coverage by visiting a representative sample of households with children in a specified target age group to obtain information on vaccination status. WHO and UNICEF derive national coverage estimates through an annual country-by-country review of all available data, including administrative and survey-based coverage. As

new data are incorporated, revisions of past coverage estimates (2,3) and updates are published on the WHO and UNICEF websites (4,5). The WHO/UNICEF estimates of national immunization coverage, on which this report is based, are revised annually and include retrospective changes in estimates if new data become available.

In 2014, estimated DTP3 coverage was 86% worldwide among infants aged ≤12 months, ranging from 77% in the WHO African Region to 96% in the Western Pacific Region, and representing 115.2 million vaccinated children (Table 1). Approximately 18.7 million eligible children did not complete the 3-dose series; among whom 11.5 million (61%) did not receive the 1st DTP dose, and 7.2 million (39%) started, but did not complete the 3-dose series. Estimated global coverage with BCG, polio3, and MCV1 was 91%, 86%, and 85%, respectively. During 2014, a total of 129 (66%) of 194 WHO countries achieved ≥90% national DTP3 coverage; and 57 (29%) achieved ≥80% DTP3 coverage in every district. National DTP3 coverage was 80%–89% in 30 countries, 70%–79% in 20 countries, and <70% in 15 countries. Among the 18.7 million children who did not receive 3 DTP doses during the first year of life, 9.3 million (50%) lived in five countries (India [22%], Nigeria [12%], Pakistan [6%], Indonesia [5%] and Ethiopia [4%]); 11.4 million (61%) lived in 10 countries (Figure).

Additional vaccines are increasingly being introduced into national immunization schedules. By the end of 2014, hepatitis B vaccine was included in the routine immunization schedule in 184 (95%) countries, 96 (49%) of which included a dose administered within 24 hours of birth to prevent perinatal hepatitis B virus transmission. Worldwide (including countries that have not introduced the vaccine) coverage with 3 doses of hepatitis B vaccine in 2014 was 82%, and hepatitis B vaccine birth-dose coverage was 38% (Table 1). Rubella vaccine has been introduced into the routine immunization schedule in 140 (72%) countries, with an estimated coverage of 46% globally. Coverage with 3 doses of *Haemophilus influenzae* type b vaccine, which had been introduced in 192 (99%) countries[†] by 2014, was 56%. By 2014, rotavirus vaccine had been introduced in 74 (38%) countries, and pneumococcal conjugate vaccine (PCV) in 117 (60%) countries. Coverage with the completed rotavirus vaccination series (2 or 3 doses, depending on the vaccine used) was 19% globally, and coverage with 3 doses of PCV was 31%. MCV2 was included in the

[†] Includes parts of Belarus, India and Russian Federation.

^{*} Administrative data reported to WHO and UNICEF annually are available at http://www.who.int/immunization/monitoring_surveillance/data/administrative_coverage.xls.

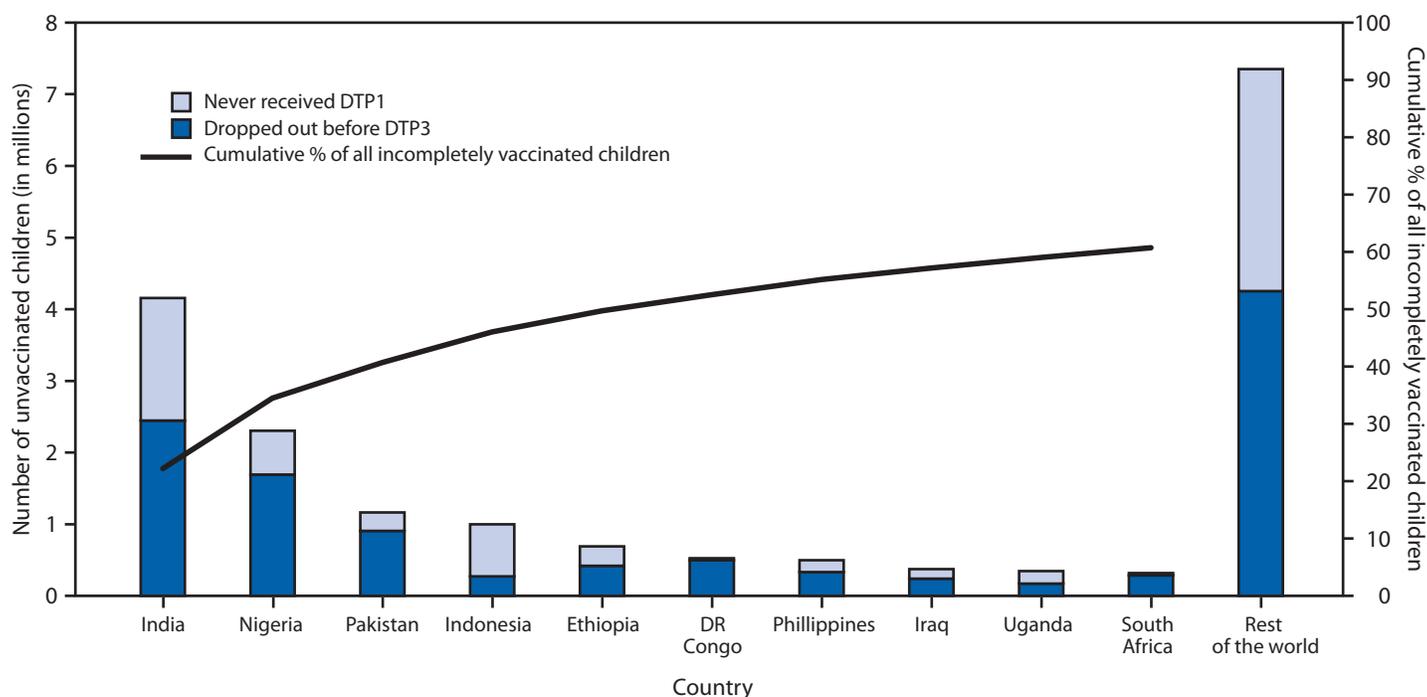
TABLE 1. Vaccination coverage by vaccine and World Health Organization (WHO) region — worldwide, 2014*

WHO region	Vaccination coverage (%)										
	BCG	HepB BD	HepB3	DTP3	Hib3	Polio3	Rota last	PCV3	Rubella	MCV1	MCV2
Total (worldwide)	91	38	82	86	56	86	19	31	46	85	56
African	84	10	77	77	77	77	30	50	10	73	11
Americas	95	69	88	90	90	90	71	83	92	92	51
Eastern Mediterranean	89	24	83	82	72	82	22	45	42	77	66
European	94	39	82	95	85	95	7	44	94	94	84
South-East Asia	92	29	75	84	30	83	0	0	12	84	59
Western Pacific	97	80	92	96	21	97	1	2	91	97	93

Abbreviations: BCG = Bacille Calmette-Guérin; HepB BD = birth dose of hepatitis B vaccine; HepB3 = 3 doses of hepatitis B vaccine; DTP3 = 3 doses of diphtheria-tetanus-pertussis vaccine; Hib3 = 3 doses of *Haemophilus influenzae* type b vaccine; Polio3 = 3 doses of poliovirus vaccine; Rota last = last dose of rotavirus series; PCV3 = 3 doses of pneumococcal conjugate vaccine; MCV1 = 1st dose of measles-containing vaccine; MCV2 = 2nd dose of measles-containing vaccine.

* Weighted regional average.

FIGURE. Estimated number of children who did not receive 3 doses of diphtheria-tetanus-pertussis vaccine (DTP3) during the first year of life among 10 countries with the largest number of incompletely vaccinated children and cumulative percentage of all incompletely vaccinated children worldwide accounted for by these 10 countries, 2014



Abbreviations: DTP1 = 1st dose of diphtheria-tetanus-pertussis vaccine; DTP3 = 3 doses of diphtheria-tetanus-pertussis vaccine; DR Congo = Democratic Republic of the Congo.

routine immunization schedule in 154 (79%) countries, with global coverage reaching 56% in 2014. In general, coverage for all vaccines varied greatly by WHO region.

MCV2 and booster doses for DTP and poliovirus vaccine are administered after the first year of life in 163 countries. A total of 159 (82%) countries now have at least one routinely scheduled vaccination during the second year of life. The most common vaccines administered during the second year of life are MCV2 (66 countries), rubella-containing vaccine (69 countries), diphtheria-tetanus-containing boosters (107 countries), and poliovirus vaccine boosters (100 countries) (Table 2).

During 2014, a total of 50 (26%) of the 194 WHO countries reported experiencing a national level stockout, or shortage of supply, of at least one vaccine lasting at least 1 month. Overall 110 national stockout events were reported in 2014, with a mean of 2.2 events per country and a maximum of six events per country. DTP-containing vaccine shortages represented 40% of the reported stockout events, followed by BCG (25%), and MCV (14%). At the subnational level, 88% of countries with a national level stockout experienced a district level stockout. In 38 (86%) countries with a district level stockout, the primary cause identified was a national level stockout.

TABLE 2. Number and percentage of countries with ≥ 1 vaccination recommended during the second year of life, by vaccine and World Health Organization (WHO) region — worldwide, 2014

WHO region	Total no. countries	≥ 1 vaccination during second year*	No. of countries (%)						
			Measles-containing vaccine [†]		Rubella-containing vaccine [†]	DT-containing vaccine [†]	Polio-containing vaccine ^{†,§}	PCV	Other [¶]
			1st dose	2nd dose					
Total (worldwide)	194	159 (82)	32 (16)	66 (34)	69 (36)	107 (55)	100 (52)	28 (14)	49 (25)
African	47	22 (47)	1 (2)	17 (36)	3 (6)	11 (23)	11 (23)	0 (0)	0 (0)
Americas	35	34 (97)	3 (9)	6 (26)	9 (26)	33 (94)	29 (83)	7 (20)	17 (49)
Eastern Mediterranean	21	21 (100)	0 (0)	16 (76)	11 (52)	16 (76)	17 (81)	4 (19)	4 (19)
European	53	50 (94)	24 (45)	8 (15)	29 (55)	35 (66)	35 (66)	11 (21)	20 (38)
South-East Asia	11	9 (82)	0 (0)	7 (64)	2 (18)	4 (36)	3 (27)	0 (0)	0 (0)
Western Pacific	27	23 (85)	4 (15)	12 (44)	15 (56)	8 (22)	5 (19)	6 (22)	8 (30)

Abbreviations: DT = diphtheria-tetanus; PCV = pneumococcal conjugate vaccine.

* Excludes Vitamin A supplementation.

[†] These vaccines might contain more than 1 antigen; thus these columns are not mutually exclusive.

[§] Including diphtheria-tetanus-pertussis-containing combinations.

[¶] Hepatitis A, *Haemophilus influenzae* type b, varicella, meningococcal, yellow fever, pneumococcal polysaccharide, and Japanese encephalitis.

Discussion

The Global Vaccine Action Plan, 2011–2020 (GVAP), endorsed by the World Health Assembly in 2012, is a framework to provide more equitable access to vaccines. The plan calls on all countries to reach a target of 90% national coverage for all vaccines and 80% coverage in all districts by 2015, with sustained coverage levels for 3 years by 2020 (6). The number of children who had not received a 3rd dose of DTP vaccine reached an all-time low of 18.7 million in 2014. However, global DTP3 coverage has remained unchanged at 86% since 2013, with 65 (34%) countries having not yet met the GVAP target of 90% national coverage. In 18% of countries, national DTP3 coverage is <80%. The same six countries (India, Nigeria, Pakistan, Indonesia, Ethiopia, and the Democratic Republic of the Congo) have been home to more than half the world's population of unvaccinated children for the past 19 years. GVAP highlights the need to identify barriers to vaccine delivery and to ensure accountability through annual reporting of actions taken to improve immunization programs for countries experiencing stagnation in coverage.

One key element to addressing the progress toward achieving global vaccination coverage goals is improving vaccine stock management, which is a critical component to ensuring vaccine access. The large proportion of countries experiencing district level stockouts as a result of a national level stockout provides evidence that shortage of vaccines at the national level can affect the supply chain and interrupt immunization services. Improved and timely demand forecasts to the vaccine industry are integral to help secure sufficient supplies of vaccines.

Delivering vaccination services during the second year of life provides an opportunity to fully protect children by providing booster doses, as well as vaccinating children who were missed

Summary

What is already known on this topic?

In 1974, the World Health Organization established the Expanded Program on Immunization to ensure that all children have access to routinely recommended vaccines. Since then, global coverage with vaccines to prevent tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, and measles has increased from <5% to $\geq 85\%$, and additional vaccines have been added to the recommended schedule. Coverage with the 3rd dose of diphtheria-tetanus-pertussis vaccine by age 12 months is an indicator of immunization program performance.

What is added by this report?

The number of countries offering vaccination in the second year of life is increasing. However, substantial barriers to improving coverage still remain, including national vaccine stockouts, or shortage of supplies.

What are the implications for public health practice?

Administering vaccines during the second year of life is a critical opportunity to provide catch up vaccinations and allows countries to progress toward a life course immunization strategy. Establishing a routine visit for administering vaccines during the second year of life requires appropriate training of health care workers to implement new policies, ongoing support to ensure adequate reporting practices, and careful communication and social mobilization efforts to inform caregivers of the need for additional vaccines beyond infancy.

during the first year of life. These missed opportunities leave children insufficiently protected against vaccine-preventable diseases such as diphtheria, tetanus, pertussis, and measles into adolescence and adulthood. Establishing a routine visit for administering vaccines during the second year of life requires appropriate training of health care workers to implement new policies, ongoing support to ensure adequate reporting

practices, and careful communication and social mobilization efforts to inform caregivers of the need for additional vaccines beyond infancy. Countries that already have an established health intervention visit during the second year of life might be better poised to introduce or add vaccines because of the opportunity to synergize between programs while minimizing the burden on health care workers and systems (7).

Strategies that promote vaccination beyond infancy can help create a safety net to improve coverage after service interruptions. Additionally, countries with established health care visits in the second year of life have an opportunity to work more broadly toward a life course vaccination strategy, whereby all persons are protected through routine immunization visits from infancy through adulthood, and important vaccine and health messages are reinforced at each visit.

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Notes from the Field

Meningococcal Disease Among Men Who Have Sex with Men — United States, January 2012–June 2015

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Since 2012, three clusters of serogroup C meningococcal disease among men who have sex with men (MSM) have been reported in the United States. During 2012, 13 cases of meningococcal disease among MSM were reported by the New York City Department of Health and Mental Hygiene (1); over a 5-month period during 2012–2013, the Los Angeles County Department of Public Health reported four cases among MSM; and during May–June 2015, the Chicago Department of Public Health reported seven cases of meningococcal disease among MSM in the greater Chicago area. MSM have not previously been considered at increased risk for meningococcal disease. Determining outbreak thresholds* for special populations of unknown size (such as MSM) can be difficult. The New York City health department declared an outbreak based on an estimated increased risk for meningococcal infection in 2012 among MSM and human immunodeficiency virus (HIV)–infected MSM compared with city residents who were not MSM or for whom MSM status was unknown (1). The Chicago Department of Public Health also declared an outbreak based on an increase in case counts and thresholds calculated using population estimates of MSM and HIV-infected MSM. Local public health response included increasing awareness among MSM, conducting contact tracing and providing chemoprophylaxis to close contacts, and offering vaccination to the population at risk (1–3). To better understand the epidemiology and burden of meningococcal disease in MSM populations in the United States and to inform recommendations, CDC analyzed data from a retrospective review of reported cases from January 2012 through June 2015.

In May 2013 and again in August 2015, CDC requested that health departments review all cases of probable or confirmed meningococcal disease caused by any serogroup and reported among males during January 2012–June 2015 to the National

Notifiable Disease Surveillance System and, if possible, determine MSM status. The requests were made through Epi-X, a secure communications network for public health officials, and follow-up with each state health department occurred through individual e-mail correspondence. All 50 state health departments and the health departments of New York City, Los Angeles County, Chicago, and the District of Columbia responded to CDC's request for information. Analysis of the data was restricted to cases occurring among MSM aged 18–64 years.

During the case review period, 527 meningococcal disease cases among males aged 18–64 years were reported. Although MSM status is not routinely collected as part of national meningococcal case reporting and might be underreported, 74 cases were identified among MSM: 23 from New York City, 14 from Los Angeles County, 11 from Chicago, and 26 sporadic cases occurring in states or geographic areas where fewer than three cases of the same meningococcal serogroup were reported among MSM during a 3-month period (4) (Table). MSM status could not be verified for the other 453 meningococcal disease cases among men aged 18–64 years using available data, nor could CDC distinguish between health departments reporting zero cases in MSM and those that had no data on MSM status.

Among the 74 reported cases among MSM aged 18–64 years, the median age was 31 years (range = 20–59 years). Thirty-seven (52%) of 71 patients with known race were white, 29 (41%) were black, two (3%) were Asian, and three (4%) were other race. *Neisseria meningitidis* serogroup C accounted for 62 (84%) cases; serogroups B, W, and Y accounted for five, two, and three cases, respectively; and the serogroup for two patients was unknown. Overall, 24 (32%) cases were fatal, including six of the New York City cases (26%), five (36%) of the Los Angeles County cases, three (27%) of the Chicago cases, and 10 (38%) of the sporadic cases. Among 63 patients for whom HIV status was reported, 37 (59%) were HIV-positive; among these, 11 (30%) died. Meningococcal vaccination status was known for 41 patients; among these, six (15%) were vaccinated with a quadrivalent meningococcal vaccine. Five of the six vaccinated patients had serogroup C meningococcal disease, and two of the five died. Further analysis of meningococcal disease rates, risk factors, and pulsed-field gel electrophoresis data from all cases identified among MSM is ongoing.

*Occurrence of three or more confirmed or probable cases during a period of ≤ 3 months among persons who are not close contacts of each other and who do not share a common affiliation, with a primary attack rate of at least 10 cases per 100,000 population.

TABLE. Number of reported cases of meningococcal disease among men who have sex with men, by serogroup and reporting jurisdiction — United States, January 2012–June 2015

Jurisdiction	Total	Serogroup					HIV-positive*	Died†
		C	B	W	Y	Unknown		
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
New York City	23	22 (96)	1 (4)	0 —	0 —	0 —	15 (65)	6 (26)
Los Angeles County	14	10 (71)	3 (21)	0 —	1 (7)	0 —	5 (42)	5 (36)
Chicago	11	11 (100)	0 —	0 —	0 —	0 —	5 (50)	3 (27)
Other [§]	26	19 (73)	1 (4)	2 (8)	2 (8)	2 (8)	12 (67)	10 (38)
Total	74	62 (84)	5 (1)	2 (3)	3 (4)	2 (3)	37 (59)	24 (32)

Abbreviation: HIV = human immunodeficiency virus.

* Among 63 patients with known HIV status.

† 11 of the patients who died were HIV-positive.

§ Other jurisdictions reporting at least one sporadic case were Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Illinois, Maryland, Massachusetts, New Jersey, New Mexico, Pennsylvania, South Carolina, Tennessee, Texas, and Utah.

Information on MSM and HIV status of men reported with meningococcal disease is not currently noted on most meningococcal case report forms. However, representative and complete data on MSM and HIV status are needed to better understand the epidemiology of and potential risk factors for meningococcal disease among MSM in the United States and to inform prevention and control recommendations.

Health departments are encouraged to attempt to determine MSM and HIV status during investigations of meningococcal disease cases caused by any serogroup occurring among males aged ≥ 16 years. If permitted by state law, state health departments are asked to complete a supplemental case report form (available at <http://www.cdc.gov/meningococcal/surveillance/index.html>) for all cases of meningococcal disease occurring among MSM and submit the forms to CDC via e-mail (meningnet@cdc.gov) or via fax (404-315-4681).

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Announcements

Get Smart About Antibiotics Week — November 16–22, 2015

Every year, more than 2 million persons in the United States are infected with antibiotic-resistant bacteria and approximately 23,000 persons die as a result of these infections (1). The rise of antibiotic resistance continues to represent a serious threat to human and animal health, national security, and economies worldwide. November 16–22, 2015, is Get Smart About Antibiotics Week, an annual observance to raise awareness of the threat of antibiotic resistance and the importance of appropriate antibiotic prescribing and use.

The use of antibiotics is the single most important factor leading to antibiotic resistance around the world. Earlier this year, the White House released the *National Action Plan to Combat Antibiotic-Resistant Bacteria*, a roadmap to guide activities like stewardship programs. In addition, stakeholders joined a White House Forum on Antibiotic Stewardship to raise awareness and encourage partners to commit to focusing on stewardship activities in the coming years. The commitments made by those invested in this issue will set the course to help the nation make measurable progress on this important public health threat.

Get Smart About Antibiotics Week is a key component of CDC's efforts to improve antibiotic stewardship in communities, health care facilities, nursing homes, and on farms in collaboration with state-based programs and nonprofit and for-profit partners. Get Smart About Antibiotics Week coincides with the World Health Organization's first World Antibiotic Awareness Week and many other global antibiotic resistance observances, including those in Europe, Australia, and Canada. Information on scheduled activities and how to get involved in combating antibiotic resistance is available at <http://www.cdc.gov/getsmart/week/index.html>.

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World Day of Remembrance for Road Traffic Victims — November 15, 2015

In October 2005, the United Nations (UN) General Assembly adopted a resolution (1) calling for governments and nongovernmental organizations to mark the third Sunday in November each year as World Day of Remembrance for Road Traffic Victims. The theme of this year's World Day of Remembrance is "From Global Remembrance to Global Action Across the Decade."

Road traffic crashes kill approximately 3,500 persons each day and injure or disable approximately 20 million each year around the world (2). Road traffic crashes are the leading cause of death among persons aged 10–24 years worldwide, and the leading cause of death to those in the first 3 decades of life in the United States.

CDC has declared motor vehicle injuries a "winnable battle" and supports UN and World Health Organization (WHO) efforts to dedicate 2011–2020 as the Decade of Action for Road Safety (3). The Decade of Action was launched in May 2011 in more than 100 countries with the goal of preventing five million road traffic deaths globally by 2020. The UN General Assembly is also committed to efforts to halve the number of global road traffic deaths and injuries by 2020 as part of the UN's Sustainable Development Goals (4).

World Remembrance Day is dedicated to remembering the many millions killed or injured in road crashes as well as their families and communities, and also pays tribute to the dedicated emergency crews, police and medical professionals who deal with the traumatic aftermath of road death and injury. Ancillary materials are available to provide organizations with action strategies to support victims and survivors (5). Additional information about the World Day of Remembrance is available at <http://www.worlddayofremembrance.org>. Additional information about CDC's motor vehicle injury prevention activities is available at <http://www.cdc.gov/motorvehiclesafety>.

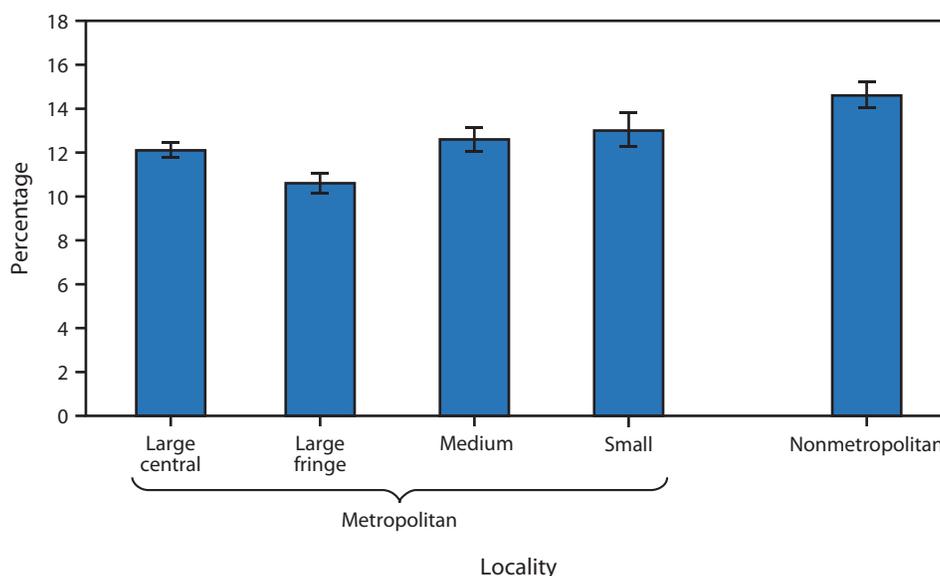
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QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged 18–64 Years Who Did Not Get or Delayed Medical Care in the Past Year Because of Cost,[†] by Type of Locality[§] — National Health Interview Survey, 2012–2014[¶]



* With 95% confidence interval.

[†] Based on family member's responses to the question "During the past 12 months, was there any time when a person needed medical care, but did not get it because the person couldn't afford it?" and to a question asking if, during the past 12 months, the person delayed seeking or obtaining medical care because of worry about the cost.

[§] Counties were classified into urbanization levels based on a classification scheme developed by NCHS that considers metropolitan/nonmetropolitan status, population, and other factors.

[¶] Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population, and are derived from the National Health Interview Survey family core questionnaire.

During 2012–2014, the percentage of adults aged 18–64 years who did not get or who delayed medical care during the last 12 months because of cost was higher in nonmetropolitan counties (14.6%) compared with metropolitan counties (10.6%–13.0%). Among adults residing in metropolitan counties, those in large fringe metropolitan counties were less likely to report not getting or delaying medical care (10.6%) compared to those in large central metropolitan counties (12.1%), medium metropolitan counties (12.6%), and small metropolitan counties (13.0%).

Sources: National Health Interview Survey. Available at <http://www.cdc.gov/nchs/nhis.htm>. NCHS urban-rural classification scheme for counties. Available at http://www.cdc.gov/nchs/data/series/sr_02/sr02_154.pdf.

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