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Health Insurance Coverage by Occupation Among Adults Aged 18–64 Years — 17 States, 2013–2014

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Lack of health insurance has been associated with poorer health status and with difficulties accessing preventive health services and obtaining medical care, especially for chronic diseases (*1*–*3*). Among workers, the prevalence of chronic conditions, risk behaviors, and having health insurance has been shown to vary by occupation (*4*,*5*). CDC used data from the 2013 and 2014 Behavioral Risk Factor Surveillance System (BRFSS) to estimate the prevalence of having no health care coverage (e.g., health insurance, prepaid plans such as health maintenance organizations, government plans such as Medicare, or Indian Health Service) by occupation. Among all workers aged 18–64 years, the prevalence of being uninsured declined significantly (21%) from 16.0% in 2013 to 12.7% in 2014. In both years there were large differences in the prevalence of being uninsured among occupational groups, ranging from 3.6% among the architecture and engineering occupations to 37.9% among the farming, fishing, and forestry occupations in 2013 and 2.7% among community and social services; and education, training, and library occupations to 37.0% among building and grounds cleaning and maintenance occupations in 2014 ($p<0.001$). In 2014, more than 25% of workers in four occupational groups reported having no health insurance (construction and extraction [29.1%]; farming, fishing, and forestry [34.6%]; food preparation and serving related [35.5%]; and building and grounds cleaning and maintenance [37.0%]). Identifying factors affecting differences in coverage by occupation might help to address health disparities among occupational groups.

BRFSS is an annual, state-based, random-digit–dialed landline and cell phone survey of noninstitutionalized adults aged ≥18 years residing in the United States.* Industry and occupation was first available as an optional module in BRFSS in 2013. In both 2013 and 2014, 17 states† asked all survey participants about their health care coverage§ and asked participants who were currently or recently employed at the time of their interview about their industry and occupation.¶

* https://www.cdc.gov/brfss/.

† Illinois, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oregon, Utah, and Washington.

§ Health care coverage was elicited by the question, "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, government plans such as Medicare, or Indian Health Service?" Possible responses were: yes, no, don't know/not sure, refused.

¶ Occupation was elicited by the question, "What kind of work do you do—for example, registered nurse, janitor, cashier, auto mechanic?"

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Participants' responses were coded to the 2002 version of U.S. Census Bureau occupation numeric codes. Census occupation codes were then grouped for analysis into major groups using the 2000 Standard Occupational Classification System. During 2014, 12 of the 17 states elected to expand Medicaid eligibility to persons with an income ≤138% of the federal poverty level,** and five did not (*6*).

The subpopulation of interest included respondents aged 18–64 years and currently employed for wages or self-employed in the 17 states. It excluded those on active military duty or whose occupation was missing or could not be coded. Respondents aged ≥65 years were excluded because they were presumed to be eligible for Medicare (*7*).

Data were weighted and analyzed to account for the complex BRFSS sampling design. The prevalence of being uninsured was estimated by occupational group and sociodemographic characteristics, stratified by year. Unadjusted prevalences by occupational group were calculated to present the magnitude of noncoverage for each occupational group. To control for effects of the potential confounders age, sex, race/ethnicity, language in which the survey was conducted, education, annual household income, marital status, employment status (currently employed for wages or self-employed), county urbanization, and state Medicaid expansion in 2014, and to provide estimates specifically reflecting the association between occupation and being uninsured, adjusted prevalences were estimated using logistic regression. The initial model included occupational group, year, the interaction between occupational group and year, confounders, and the two-way interaction term between each confounder and year. County urbanization and each confounder interaction term except for age by year and income by year were dropped from the final model because they were not statistically significant.

Among the 17 states, the survey response rates ranged from 31.1% to 59.2% in 2013†† and 33.0% to 57.6% in 2014.§§ In 2013 and 2014, the subpopulation of interest comprised 138,407 workers. Among these, 18,140 (13%) were excluded because occupation was missing or could not be coded, leaving 59,718 respondents in 2013 and 60,549 in 2014.

The overall prevalence of being uninsured among workers in 2013 (16.0%) declined 21% (p<0.001) (3.3 percentage points [p<0.001]) to 12.7% in 2014 (Table 1). The prevalence of being uninsured declined in all demographic groups in 2014; both the percentage point difference and the percentage change were statistically significant for all groups except persons aged 25–34 years, persons who took the survey in Spanish, those with household incomes ≥$50,000, and those who resided in urban and rural counties. The decline was statistically significant among workers who lived in the most populous counties, metropolitan (Table 1). The prevalence of being uninsured

** Patient Protection and Affordability Act, Pub L. No. 111–148, 124 Stat. 271, (March 2010).

†† https://www.cdc.gov/brfss/annual_data/2013/pdf/2013_dqr.pdf.
§§ https://www.cdc.gov/brfss/annual_data/2014/pdf/2014_dqr.pdf.

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TABLE 1. Prevalence* of not having health insurance among currently employed workers, by selected characteristics and year — Behavioral Risk Factor Surveillance System, 17 states, 2013–2014

Characteristic	2013		2014		2013 to 2014	
	No. in sample	Uninsured % (95% CI)	No. in sample	Uninsured % (95% CI)	Percentage point difference % (95% CI)	Percent change† %
Age group (yrs)						
18–24	3,566	26.6 (23.7–29.8)	3,774	18.6 (16.0–21.7)	-8.0 (-12.2 to -3.8)	-30§
25–34	9,276	20.8 (19.1–22.6)	9,226	19.6 (17.7–21.7)	-1.2 (-3.9 to 1.5)	-6
35–44	12,395	16.6 (15.0–18.3)	12,297	12.8 (11.5–14.3)	-3.8 (-6.0 to -1.6)	-23§
45–54	17,256	11.5 (10.5–12.7)	17,057	8.1 (7.1–9.2)	-3.5 (-5.0 to -1.9)	-30§
55–64	17,225	9.4 (8.5–10.5)	18,195	6.8 (5.9–7.8)	-2.6 (-4.0 to -1.3)	-28§
Sex						
Men	27,835	18.7 (17.6–19.9)	28,766	15.5 (14.4–16.7)	-3.2 (-4.8 to -1.6)	-17§
Women	31,883	12.8 (11.9–13.6)	31,783	9.5 (8.7–10.3)	-3.3 (-4.5 to -2.1)	-26§
Race/Ethnicity						
White, non-Hispanic	48,198	11.1 (10.5–11.7)	48,557	8.6 (7.9–9.3)	-2.5 (-3.4 to -1.6)	-23§
Black, non-Hispanic	3,746	20.3 (17.9–22.9)	3,878	15.5 (13.7–17.5)	-4.8 (-8.0 to -1.6)	-24§
Other, non-Hispanic	3,166	17.6 (14.1–21.8)	3,237	12.4 (9.6–15.9)	-5.2 (-10.2 to -0.2)	-29§
Hispanic	4,026	38.3 (35.1–41.6)	4,176	33.3 (30.1–36.8)	-5.0 (-9.6 to -0.3)	-13§
Survey language						
English	58,591	13.7 (13.1–14.4)	59,433	10.4 (9.8–11.1)	-3.3 (-4.3 to -2.4)	-24§
Spanish	1,047	60.7 (54.9–66.1)	1,099	58.4 (52.8–63.8)	-2.3 (-10.2 to 5.6)	-4
Other	44	¶	2	¶	—	—
Education						
Less than high school	2,271	48.2 (44.0–52.5)	2,334	41.4 (37.3–45.7)	-6.8 (-12.7 to -0.8)	-14§
High school graduate	13,521	20.8 (19.4–22.3)	13,806	17.0 (15.4–18.7)	-3.8 (-6.0 to -1.6)	-18§
Some college or technical school	16,847	14.1 (13.0–15.3)	16,937	11.0 (9.9–12.2)	-3.1 (-4.7 to -1.5)	-22§
College graduate or more	27,023	5.5 (5.0–6.2)	27,399	3.4 (3.0–3.9)	-2.1 (-2.9 to -1.3)	-38§
Annual household income						
$0–$14,999	2,153	49.3 (44.5–54.1)	2,110	37.8 (32.7–43.1)	-11.5 (-18.6 to -4.4)	-23§
$15,000–$24,999	5,753	43.0 (40.1–46.0)	5,549	31.8 (29.0–34.7)	-11.2 (-15.3 to -7.1)	-26§
$25,000–$34,999	4,911	27.2 (24.5–29.9)	4,679	22.4 (19.3–25.8)	-4.8 (-9.0 to -0.6)	-18§
$35,000–$49,999	7,739	17.2 (15.0–19.7)	7,448	12.8 (11.1–14.7)	-4.4 (-7.3 to -1.4)	-25§
$50,000–$74,999	10,676	7.6 (6.4–8.9)	10,323	6.8 (5.4–8.6)	-0.7 (-2.8 to 1.3)	-10
≥$75,000	24,327	3.2 (2.7–3.8)	25,492	3.0 (2.4–3.9)	-0.2 (-1.1 to 0.7)	-5
Marital status						
Married	36,250	9.5 (8.7–10.4)	37,602	6.8 (6.2–7.6)	-2.7 (-3.8 to -1.6)	-28§
Divorced, widowed, or separated	10,385	22.8 (20.9–24.7)	9,832	17.8 (16.1–19.7)	-4.9 (-7.5 to -2.3)	-22§
Never married or a member of an unmarried couple	12,868	24.9 (23.3–26.6)	12,893	21.3 (19.5–23.1)	-3.6 (-6.1 to -1.2)	-15§
Employment status						
Employed for wages	50,776	13.8 (13.1–14.5)	51,382	11.2 (10.5–11.9)	-2.6 (-3.6 to -1.6)	-19§
Self-employed	8,942	29.5 (27.1–32.0)	9,167	22.4 (19.9–25.1)	-7.1 (-10.7 to -3.5)	-24§
Metropolitan/Urban/Rural county of residence**						
Metropolitan	41,803	15.6 (14.8–16.4)	42,527	12.2 (11.4–13.0)	-3.4 (-4.5 to -2.2)	-22§
Urban	14,360	18.0 (16.6–19.6)	14,403	15.9 (14.1–18.0)	-2.1 (-4.5 to 0.4)	-11
Rural	3,555	18.4 (15.8–21.3)	3,619	15.0 (12.2–18.3)	-3.4 (-7.5 to 0.7)	-18
State Medicaid expansion in 2014						
State did expand††	42,670	15.3 (14.5–16.1)	41,085	11.8 (11.0–12.6)	-3.5 (-4.6 to -2.3)	-23§
State did not expand§§	17,048	20.1 (18.8–21.4)	19,464	18.3 (17.3–19.4)	-1.7 (-3.4 to -0.1)	-9§
Total	**59,718**	**16.0 (15.3–16.7)**	**60,549**	**12.7 (12.0–13.4)**	**-3.3 (-4.3 to -2.4)§**	**-21§**

Abbreviation: CI = confidence interval.

* Unadjusted, weighted estimates.

† Percent change = [(prevalence in 2014 – prevalence in 2013)/prevalence in 2013] x 100.

§ p<0.05.

¶ Estimates have a relative standard error >50% and are not shown as they do not meet standards of reliability/precision.

** County of residence was classified as metropolitan (codes 1–3), urban (4–7), or rural (8–9), based on the U.S. Department of Agriculture's 2013 Rural-Urban Continuum Codes. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

†† Except as noted, expansion began January 1, 2014: Illinois, Maryland, Massachusetts, Michigan (April 1, 2014), Minnesota, New Hampshire (August 15, 2014), New Jersey, New Mexico, New York, North Dakota, Oregon, and Washington (n = 83,755; 69.6% of respondents).

§§ Louisiana, Mississippi, Montana, Nebraska, and Utah (n = 36,512; 30.4% of respondents).

exceeded 20% in 2014 (well above the average of 12.7%) among workers who took the survey in Spanish, who had less than a high school education, who had an annual household income <$35,000, were of Hispanic ethnicity, self-employed, and never married.

In both 2013 and 2014, a lower percentage of workers were uninsured in the 12 states that expanded Medicaid eligibility than were in the five states that did not, and the prevalence of being uninsured declined more (23%) in states that expanded Medicaid than in those that did not (9%; p = 0.013), although the percentage point difference between the two groups of states was not statistically significant (Table 1).

In both 2013 and 2014, there were statistically significant differences among occupation groups in the unadjusted prevalence of being uninsured (p<0.001). In 2013, the unadjusted prevalence of being uninsured ranged from 3.6% among the architecture and engineering occupations to 37.9% among the farming, fishing, and forestry occupations. In 2014, the unadjusted prevalence of being uninsured ranged from a high of 37.0% (building and grounds cleaning and maintenance) to 2.7% (community and social services; and education, training, and library) (Table 2). More than 25% of the workers in four occupations (construction and extraction [29.1%]; farming, fishing, and forestry [34.6%]; food preparation and serving related [35.5%]; and building and grounds cleaning and maintenance [37.0%]) reported not having health insurance in 2014.

There were also statistically significant differences in adjusted prevalence of being uninsured by occupation (p<0.001) in both 2013 and 2014. The 2014 adjusted prevalence of being uninsured ranged from 19.4% in the farming, fishing, and forestry occupations to 5.4% in the education, training, and library occupations. Half the occupational groups experienced significant decreases from 2013 to 2014 in the adjusted prevalence of being uninsured (Table 3). The same four occupational groups with the highest unadjusted prevalences of being uninsured in 2014 also had the highest prevalences in 2014 after adjustment for potential confounders (Table 3).

Discussion

Among currently employed workers aged 18–64 years in 17 U.S. states, the overall percentage who did not have health insurance decreased significantly (21% decline) from 2013 to 2014. This finding is consistent with the decline in being

TABLE 2. Prevalence* of not having health insurance among currently employed workers aged 18 to 64 years, by occupational group† and year, ranked from lowest to highest prevalence in 2014 — Behavioral Risk Factor Surveillance System, 17 states, 2013–2014

	2013		2014		2013 to 2014	
Occupational group	No. in sample	Uninsured % (95% CI)	No. in sample	Uninsured % (95% CI)	Percentage point difference % (95% CI)	Percent change§ %
Community and social services	1,426	6.6 (4.6–9.5)	1,391	2.7 (1.6–4.3)	-4.0 (-6.7 to -1.3)	-60¶
Education, training, and library	5,171	5.2 (3.9–6.8)	5,215	2.7 (1.8–4.0)	-2.5 (-4.3 to -0.7)	-48¶
Healthcare practitioners and technical	5,275	4.5 (3.5–5.8)	5,149	2.8 (2.1–3.7)	-1.7 (-3.1 to -0.3)	-38¶
Computer and mathematical	1,990	6.2 (3.3–11.5)**	2,211	3.3 (2.0–5.2)	-3.0 (-7.2 to 1.3)	-48
Life, physical, and social science	1,097	4.0 (2.2–7.2)**	1,139	3.4 (1.6–7.0)**	-0.6 (-4.1 to 2.8)	-16
Business and financial operations	2,778	3.7 (2.4–5.7)	2,530	3.9 (2.6–5.8)	0.2 (-2.1 to 2.4)	5
Architecture and engineering	1,726	3.6 (2.2–5.8)	1,735	4.4 (2.7–7.2)	0.9 (-1.9 to 3.6)	24
Protective service	1,169	9.9 (6.5–14.8)	1,185	5.4 (3.6–8.2)	-4.4 (-9.1 to 0.3)	-45¶
Legal	833	4.6 (2.8–7.7)	863	6.1 (2.4–14.6)**	1.5 (-4.5 to 7.5)	32
Management	6,914	9.7 (8.3–11.3)	7,450	6.8 (5.5–8.4)	-2.9 (-5.0 to -0.8)	-30¶
Office and administrative support	7,104	9.4 (7.8–11.3)	7,100	7.3 (5.9–9.1)	-2.1 (-4.5 to 0.3)	-22
Arts, design, entertainment, sports, and media	1,311	15.1 (11.7–19.3)	1,261	10.8 (7.2–16.0)	-4.3 (-10.1 to 1.4)	-29
Healthcare support	1,513	23.6 (18.6–29.4)	1,460	11.3 (8.7–14.6)	-12.2 (-18.4 to -6.1)	-52¶
Sales and related	5,198	19.3 (17.1–21.7)	5,286	12.6 (10.9–14.5)	-6.7 (-9.7 to -3.8)	-35¶
Installation, maintenance, and repair	1,826	18.5 (15.1–22.6)	1,909	16.2 (12.5–20.7)	-2.3 (-7.9 to 3.2)	-13
Production	2,661	18.1 (15.2–21.5)	2,530	16.4 (13.0–20.4)	-1.8 (-6.6 to 3.1)	-10
Personal care and service	1,910	23.8 (20.2–28.0)	1,974	16.7 (13.4–20.6)	-7.1 (-12.5 to -1.8)	-30¶
Transportation and material moving	2,604	26.7 (22.7–31.1)	2,656	21.7 (18.1–25.7)	-5.0 (-10.7 to 0.7)	-19
Construction and extraction	3,089	34.9 (31.1–38.9)	3,194	29.1 (25.3–33.3)	-5.8 (-11.4 to -0.2)	-17¶
Farming, fishing, and forestry	414	37.9 (28.6–48.1)	508	34.6 (23.7–47.5)	-3.3 (-18.9 to 12.3)	-9
Food preparation and serving related	1,789	37.4 (32.5–42.5)	1,804	35.5 (29.9–41.5)	-1.9 (-9.6 to 5.8)	-5
Building and grounds cleaning and maintenance	1,920	37.3 (32.2–42.7)	1,999	37.0 (31.6–42.8)	-0.3 (-8.0 to 7.4)	-1

Abbreviation: CI = confidence interval.
* Unadjusted, weighted estimates.
† From the 2000 Standard Occupational Classification System. https://www.bls.gov/soc/.
§ Percent change = [(prevalence in 2014 – prevalence in 2013) / prevalence in 2013] x 100.
¶ p<0.05.
** Estimates have a relative standard error >30% and ≤50% and should be used with caution as they do not meet standards of reliability/precision.

uninsured among all U.S. adults from 20.4% in 2013 to 16.3% in 2014 (*8*). The 1-year changes were significant for some occupations. During both years, the prevalence among workers of not having health insurance varied by occupation, and this variation persisted after adjustment for factors known to be associated with insurance coverage. Among the occupations with the highest worker prevalences of being uninsured were farming, fishing, and forestry and construction and extraction, two occupations that are also among the most hazardous (*9*).

During the study period, the requirement to obtain qualifying health insurance began in January 2014, and included, among others, an exemption if the minimum annual premiums exceeded 8% of household income[¶¶]; hence, some respondents might not have been able to afford coverage. There was no employer mandate to provide health insurance to employees in 2014,[***,†††] which might have affected some respondents' ability to obtain coverage. Workers who took the survey in Spanish had a particularly high prevalence of being uninsured, even in 2014, possibly because they did not qualify for Medicaid, could not afford coverage, or did not have employers who provided health insurance.

The findings in this report are subject to at least seven limitations. First, because they are not addressed by BRFSS, this study does not account for certain factors which might have affected workers' access to health insurance and which might have affected occupations differentially; including them would have narrowed the differences in adjusted prevalences by occupation within a year. These include the number of workers employed by the employer and whether the worker worked full- or part-time, had a temporary or permanent job, or was a contract worker. Second, 15.5% and 10.2% of currently employed, age-eligible workers had uncodable or missing occupation information in 2013 and 2014, respectively, and were excluded from the analyses. However, there was no significant difference in insurance status in either year between those with and without occupation information. Third, all BRFSS data are self-reported and could not be verified. Fourth, households without telephones are excluded

¶¶ https://www.irs.gov/affordable-care-act/the-individual-shared-responsibility-payment-an-overview.

*** https://www.irs.gov/affordable-care-act/employers/employer-shared-responsibility-provisions.

††† 79 Fed. Reg. 8543 (February 12, 2014). https://www.federalregister.gov/documents/2014/02/12/2014-03082/shared-responsibility-for-employers-regarding-health-coverage.

TABLE 3. Adjusted prevalence* of not having health insurance among currently employed workers aged 18 to 64 years by occupational group† and year, ranked from lowest to highest prevalence in 2014 — Behavioral Risk Factor Surveillance System, 17 states, 2013–2014

	2013		2014		2013 to 2014	
Occupational group	No. in sample	Uninsured % (95% CI)	No. in sample	Uninsured % (95% CI)	Percentage point difference % (95% CI)	Percent change§ %
Education, training, and library	4,822	13.4 (10.6–16.7)	4,809	5.4 (4.1–7.0)	-8.0 (-11.3 to -4.7)	-60¶
Community and social services	1,358	11.3 (7.9–16.0)	1,295	5.9 (3.8–9.0)	-5.5 (-10.2 to -0.7)	-48¶
Protective service	1,100	11.6 (8.8–15.2)	1,107	6.4 (4.1–10.1)	-5.2 (-9.5 to -0.9)	-45¶
Computer and mathematical	1,846	14.8 (9.4–22.5)	2,030	6.7 (4.3–10.4)	-8.1 (-15.1 to -1.0)	-55¶
Healthcare practitioners and technical	4,924	12.2 (9.9–14.9)	4,760	6.9 (5.1–9.1)	-5.3 (-8.4 to -2.2)	-44¶
Life, physical, and social science	1,038	9.5 (5.9–14.9)	1,059	7.8 (4.3–13.7)	-1.6 (-7.9 to 4.6)	-17
Healthcare support	1,378	18.5 (14.3–23.5)	1,306	8.4 (6.0–11.5)	-10.1 (-15.3 to -4.8)	-55¶
Office and administrative support	6,471	11.7 (10.1–13.5)	6,427	8.6 (6.9–10.7)	-3.1 (-5.5 to -0.6)	-26¶
Business and financial operations	2,624	9.1 (6.7–12.1)	2,356	9.4 (6.8–13.0)	0.4 (-3.6 to 4.4)	4
Arts, design, entertainment, sports, and media	1,208	16.3 (12.8–20.4)	1,124	9.5 (6.4–13.8)	-6.8 (-12.0 to -1.6)	-42¶
Architecture and engineering	1,596	8.8 (4.5–16.4)**	1,604	9.9 (6.5–14.9)	1.2 (-5.9 to 8.2)	13
Personal care and service	1,700	15.6 (12.9–18.7)	1,761	10.3 (8.1–13.0)	-5.3 (-9.1 to -1.6)	-34¶
Management	6,453	15.1 (13.0–17.4)	6,848	10.7 (8.7–13.1)	-4.4 (-7.5 to -1.3)	-29¶
Sales and related	4,718	17.4 (15.4–19.6)	4,665	11.3 (9.8–13.1)	-6.1 (-8.7 to -3.5)	-35¶
Production	2,414	12.7 (10.9–14.8)	2,273	12.0 (9.6–14.7)	-0.7 (-3.9 to 2.4)	-6
Installation, maintenance, and repair	1,696	15.0 (12.6–17.9)	1,731	12.8 (9.5–17.1)	-2.2 (-6.8 to 2.4)	-15
Transportation and material moving	2,351	16.7 (14.1–19.6)	2,356	13.8 (11.1–17.2)	-2.8 (-6.9 to 1.3)	-17
Legal	778	13.7 (9.3–19.8)	800	14.9 (7.3–28.1)**	1.2 (-10.2 to 12.7)	9
Building and grounds cleaning and maintenance	1,690	16.9 (13.9–20.4)	1,749	16.7 (13.8–20.0)	-0.2 (-4.6 to 4.2)	-1
Construction and extraction	2,845	21.5 (19.1–24.2)	2,876	18.6 (15.9–21.6)	-2.9 (-6.6 to 0.7)	-14
Food preparation and serving related	1,534	19.7 (16.8–22.9)	1,511	19.3 (15.5–23.8)	-0.3 (-5.4 to 4.8)	-2
Farming, fishing, and forestry	375	15.8 (10.4–23.3)	429	19.4 (12.5–28.9)	3.6 (-6.7 to 13.9)	23

Abbreviation: CI = confidence interval.

* Weighted estimates adjusted by age group, sex, race/ethnicity, language in which the survey was administered (English, Spanish, other), education, annual household income, marital status, employment status (currently employed for wages or self-employed), and state Medicaid expansion.

† From the 2000 Standard Occupational Classification System. https://www.bls.gov/soc/.

§ Percent change = [(prevalence in 2014 – prevalence in 2013) / prevalence in 2013] x 100.

¶ $p<0.05$.

** Estimates have a relative standard error >30% and ≤50% and should be used with caution as they do not meet standards of reliability/precision.

Summary

What is already known about this topic?

Lack of health insurance has been associated with poorer health status and with difficulties accessing preventive health services and obtaining medical care, especially for chronic diseases.

What is added by this report?

During 2014, 12.7% of workers aged 18–64 years were uninsured (21% decline from 2013); declines occurred in all demographic groups. By occupational group, the 2014 prevalence of not having health insurance ranged from 37.0% (building and grounds cleaning and maintenance) to 2.7% (community and social services; and education, training, and library).

What are the implications for public health practice?

Identifying factors affecting differences in insurance rates by occupation might help to target interventions to reduce health disparities among U.S. workers.

from BRFSS, and the prevalence of being uninsured varies by household telephone status.[§§§,¶¶¶] However, this should have little impact on the findings because only an estimated 2.3% of households do not have telephones.[****] Fifth, because of the overall low survey response rates among the 17 states in 2013 and 2014, nonresponse bias is possible. Sixth, because only 17 states used the industry and occupation module in both years, the findings might not be nationally representative. Finally, causality for the changes observed from 2013 to 2014 is beyond the scope of this study.

Because some workplace conditions (*10*) and health outcomes (*4*,*5*) vary by industry or occupation, workers might rely on health insurance for treatment of work-related injuries or illnesses, and health insurance coverage can influence health status (*1*,*2*) as well as the ability to remain employed, identifying factors affecting differences in insurance rates by occupation might help to target interventions to reduce health disparities among U.S. workers. Given the changes in health insurance coverage from 2013 to 2014 and the wide variability in coverage by occupation, BRFSS data could be used to monitor changes in insurance among workers over time by occupation (such as the effect of changes in Medicaid policy on workers' health care coverage) and to assess associations between health outcomes and differences in coverage among occupations.

[§§§] https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201312.pdf.
[¶¶¶] https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201412.pdf.
[****] https://www.cdc.gov/brfss/annual_data/2014/pdf/overview_2014.pdf.

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Conflict of Interest

No conflicts of interest were reported.

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Tobacco Product Use Among Youths With and Without Lifetime Asthma — Florida, 2016

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The increasing availability of diverse tobacco products has led to complex tobacco product use patterns among youths (*1*). Use by youths of products containing nicotine in any form is unsafe (*2*); among young persons with asthma, use of combustible tobacco products, particularly cigarettes, is associated with worsening symptoms, poor asthma control, and an increased need for medical management (*3*,*4*). Studies suggest that youths with asthma adopt health risk behaviors, including tobacco product use, at rates similar to or higher than those of youths without asthma (*3*–*7*); however, these studies are often limited to a partial list of tobacco product types among high school students. To assess current use (≥1 days during the past 30 days) of one or more of five tobacco product types (cigarettes, electronic cigarettes [defined as e-cigarettes, e-cigars, vape pipes, vaping pens, e-hookah, and hookah pens], hookah, smokeless tobacco, or cigars) among Florida middle school (grades 6–8) and high school (grades 9–12) students with or without a previous medical diagnosis of asthma, the Florida Department of Health analyzed data from the 2016 Florida Youth Tobacco Survey (FYTS). In 2016, 11.1% of middle school and 27.9% of high school students with asthma, and 7.9% of middle school and 24.2% of high school students without asthma, reported any current tobacco product use. Current use of each tobacco product type was considerably higher among students with asthma than among those without asthma. E-cigarettes were the most commonly used tobacco product type reported by middle and high school students with asthma (7.9% and 19.6%, respectively) and without asthma (5.8% and 17.2%, respectively). Statewide tobacco prevention strategies could help reduce all forms of tobacco product use among youths, particularly among those with asthma.

FYTS is a cross-sectional, school-based, pencil-and-paper questionnaire administered to Florida public middle school and high school students.* The consent process for the FYTS is dependent upon the school district administering the survey. Several districts use an active permission form; however, most districts obtain parental consent through passive permission forms that instruct parents to sign the form only if they wish to opt their child out of participation. Student participation is voluntary. Information is collected on indicators of tobacco product use, perceptions of harm, and exposure to secondhand smoke to monitor and guide tobacco prevention and control policies and strategies in Florida. A two-stage cluster probability sampling procedure was used to generate a statewide representative sample of Florida students attending public schools in grades 6–12. Data were self-reported, and no identifying information was collected from participating students. In 2016, a total of 36,082 middle and 33,558 high school students participated in the surveys; combined student and school response rates were 78.0% and 71.0%, respectively (*8*).

Lifetime asthma status was assessed with the question "Has a doctor or nurse ever told you that you have asthma?" Response options were "yes," "no," and "not sure." Students who responded "yes" were categorized as having asthma; all other responses were categorized as not having asthma. Students who did not answer the question (9.8%) were excluded from analyses. Current use of tobacco products, defined as use on ≥1 days during the past 30 days, was measured for cigarettes, e-cigarettes,† hookah (water pipes),§ smokeless tobacco products (chewing tobacco, snuff, or dip), and cigars (cigars, cigarillos, or little cigars).¶ "Any tobacco product use" was defined as current use of ≥1 tobacco products, and "multiple tobacco product use" was defined as current use of ≥2 products.

Data were statistically weighted to yield representative estimates of Florida middle and high school students attending public schools. Prevalence estimates and corresponding population counts were calculated for current tobacco product use overall and by school level (middle or high) among students with or without asthma. Rao-Scott modified chi-square tests were performed to assess statistically significant differences between students with or without asthma; p values of <0.05 were considered statistically significant.

* FYTS is administered annually at the beginning of each calendar year. In even-numbered years, samples are drawn at the county level. http://www.floridahealth.gov/statistics-and-data/survey-data/florida-youth-survey/florida-youth-tobacco-survey/index.html.

† Electronic cigarettes are battery-operated devices that usually contain a nicotine-based liquid that is vaporized and inhaled. Questions about electronic cigarettes on FYTS were preceded by an introductory paragraph. This paragraph read "The next questions include e-cigarettes, e-cigars, vape pipes, vaping pens, e-hookah, and hookah pens made by companies such as Blu, NJOY, and Starbuzz."

§ Hookah was defined by FYTS as a single-stemmed water pipe used for smoking tobacco.

¶ Current cigarette use was defined as having smoked cigarettes on ≥1 days during the past 30 days; current electronic cigarette use was defined as having used an e-cigarette, e-cigar, vape pipe, vaping pen, e-hookah, or hookah pen on ≥1 days during the past 30 days; current hookah use was defined as having smoked tobacco from a hookah or water pipe on ≥1 days during the past 30 days; current smokeless tobacco use was defined as having used chewing tobacco, snuff, or dip on ≥1 days during the past 30 days; current cigar use was defined as having smoked cigars, cigarillos, or little cigars on ≥1 days during the past 30 days.

In 2016, 19.5% of middle and 20.6% of high school students in Florida reported lifetime asthma (Table 1). Approximately 190,000 middle and high school students in Florida (8.5% and 24.9%, respectively) reported current use of any tobacco product in 2016, with approximately 86,000 (3.1% and 9.0%, respectively) reporting multiple tobacco product use.

Current use of each tobacco product type was higher among middle and high school students with asthma than among those without asthma (p<0.05) (Table 2). Among students with asthma, 11.1% of middle (approximately 10,000) and 27.9% of high school (34,000) students reported current use of any tobacco product. Conversely, 7.9% of middle (30,000) and 24.2% of high school (116,000) students without asthma reported current use of any tobacco product. Among current users with asthma, 4.2% of middle (4,400) and 10.9% of high school (17,000) students reported multiple tobacco product use, compared with 2.8% of middle (12,000) and 8.6% of high school (52,000) students without asthma. During 2016, e-cigarettes were the most commonly used tobacco product type among middle (7.9%) and high school (19.6%) students with asthma, followed by hookah (3.8% and 9.7%), cigars (2.3% and 7.3%), cigarettes (2.2% and 5.7%), and smokeless tobacco (2.1% and 4.3%).

TABLE 1. Prevalence of self-reported diagnosed asthma* among Florida middle and high school students, by school level — Florida Youth Tobacco Survey, 2016

School level	Prevalence of asthma	
	%† (95% CI)	Weighted no.†
Total	**20.1 (19.7–20.6)**	**261,786**
Middle school	19.5 (18.9–20.1)	157,468
High school	20.6 (20.0–21.2)	104,318

Abbreviation: CI = confidence interval.
* Asthma was defined as a "yes" response to the question "Has a doctor or nurse ever told you that you have asthma?"
† Weighted to yield representative estimates of Florida middle and high school students attending public schools.

Discussion

In 2016, Florida middle and high school students with asthma reported higher current use of each tobacco product type, including use of multiple tobacco products, than did students without asthma. The higher use of each tobacco product type among students with asthma, most notably combustible products (e.g., cigarettes), is concerning because health risks associated with tobacco product use are higher for this population (*3*,*4*).

Among middle and high school students with asthma who reported current use of tobacco products, e-cigarettes were the most commonly reported tobacco product type used, followed

TABLE 2. Percentage of Florida middle and high school students who reported current tobacco product use,* by tobacco product, school level, and asthma status — Florida Youth Tobacco Survey, 2016

Tobacco product	With asthma†,§		Without asthma		Total	
	%¶ (95% CI)	Weighted no. of users¶	%¶ (95% CI)	Weighted no. of users¶	%¶ (95% CI)	Weighted no. of users¶
Middle school students						
Cigarettes	2.2 (1.8–2.7)	2,273	1.4 (1.2–1.6)	5,845	**1.5 (1.4–1.7)**	**8,118**
Electronic cigarettes	7.9 (6.8–8.9)	7,202	5.8 (5.4–6.2)	22,554	**6.2 (5.8–6.6)**	**29,756**
Hookah	3.8 (3.1–4.5)	3,840	2.4 (2.1–2.6)	9,910	**2.7 (2.4–2.9)**	**13,750**
Smokeless tobacco	2.1 (1.6–2.5)	2,102	1.2 (1.0–1.3)	4,925	**1.3 (1.2–1.5)**	**7,028**
Cigars	2.3 (1.8–2.8)	2,385	1.3 (1.1–1.5)	5,654	**1.5 (1.3–1.7)**	**8,039**
Any tobacco product**	11.1 (9.3–12.3)	9,986	7.9 (7.4–8.4)	29,660	**8.5 (8.0–9.0)**	**39,646**
≥2 tobacco products††	4.2 (3.6–4.9)	4,426	2.8 (2.5–3.1)	12,146	**3.1 (2.8–3.4)**	**16,572**
High school students						
Cigarettes	5.7 (5.0–6.4)	8,663	4.6 (4.3–5.0)	27,520	**4.8 (4.5–5.2)**	**36,183**
Electronic cigarettes	19.6 (18.1–21.2)	22,979	17.2 (16.4–18.0)	80,412	**17.7 (17.0–18.4)**	**103,391**
Hookah	9.7 (8.6–10.7)	14,886	6.8 (6.3–7.2)	40,342	**7.4 (6.9–7.8)**	**55,227**
Smokeless tobacco	4.3 (3.7–4.9)	6,580	3.3 (3.0–3.6)	19,387	**3.5 (3.2–3.8)**	**25,967**
Cigars	7.3 (6.5–8.2)	11,187	5.5 (5.1–5.9)	32,874	**5.9 (5.5–6.3)**	**44,061**
Any tobacco product**	27.9 (26.2–29.6)	34,358	24.2 (23.3–25.1)	116,070	**24.9 (24.1–25.8)**	**150,428**
≥2 tobacco products††	10.9 (9.8–11.9)	17,114	8.6 (8.1–9.1)	52,057	**9.0 (8.6–9.5)**	**69,171**

Abbreviation: CI = confidence interval.
* Current cigarette use was defined as having smoked cigarettes on ≥1 days during the past 30 days; current electronic cigarette use was defined as having used an electronic cigarette on ≥1 days during the past 30 days; current hookah use was defined as having smoked tobacco from a hookah or water pipe on ≥1 days during the past 30 days; current smokeless tobacco use was defined as having used chewing tobacco, snuff, or dip on ≥1 days during the past 30 days; current cigar use was defined as having smoked cigars, cigarillos, or little cigars on ≥1 days during the past 30 days.
† Having asthma was defined as a "yes" response to the question "Has a doctor or nurse ever told you that you have asthma?"
§ Use of each tobacco product type significantly differed by asthma status: Rao-Scott chi-square test; p value <0.05.
¶ Weighted to yield representative estimates of Florida middle and high school students attending public schools.
** Any tobacco product use was defined as having used cigarettes, electronic cigarettes, hookah, smokeless tobacco, or cigars on ≥1 days during the past 30 days.
†† ≥2 tobacco product use was defined as having used two or more tobacco products (cigarettes, electronic cigarettes, hookah, smokeless tobacco, or cigars) on ≥1 days during the past 30 days.

Summary

What is already known about this topic?

Among young persons with asthma, use of combustible tobacco products, particularly cigarettes, worsens symptoms and increases need for medical management.

What is added by this report?

Current use of all tobacco product types and multiple tobacco products was significantly higher among students with asthma than among those without asthma. E-cigarettes were the most commonly reported tobacco product type used by middle and high school students with asthma (7.9% and 19.6%, respectively) and without asthma (5.8% and 17.2%, respectively).

What are the implications for public health practice?

Statewide tobacco prevention strategies could help reduce all forms of tobacco product use among youths, particularly among those with asthma.

by hookah, cigars, cigarettes, and smokeless tobacco. Higher current use of all tobacco product types among youths with asthma might be explained by some of the same factors associated with cigarette smoking in this population, including exposure to tobacco product use in the social environment and use as a coping mechanism for psychosocial distress (*9*,*10*). Youths with asthma who are nonadherent to their asthma medication regimen also report being more rebellious and risk-taking, making them more likely to engage in health-compromising behaviors (*10*). Finally, high prevalence of e-cigarette and hookah use might reflect perceptions among youths that these products are more socially acceptable or less harmful than cigarettes, cigars, and smokeless tobacco (*6*,*7*). However, the use of products containing nicotine in any form among youths, including e-cigarettes, is unsafe (*2*).

The findings in this report are subject to at least four limitations. First, FYTS data are only collected from middle and high school students who attend public schools and are therefore not representative of all students or youths in Florida. Second, FYTS data are self-reported and therefore subject to recall and response bias. Third, past-30-day use of tobacco products might not reflect regular or daily use. Finally, because of questionnaire wording, it was not possible to ascertain the proportion of e-cigarette users who were vaporizing liquids containing nicotine versus other substances.

Statewide tobacco prevention strategies, particularly among youths with asthma, coupled with other proven interventions, are important to reducing all forms of tobacco product use among youths. As the diversity of tobacco products increases, measures to educate youths about the health risks for all tobacco product types are warranted, particularly among those with asthma.

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Conflict of Interest

No conflicts of interest were reported.

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Progress Toward Rubella and Congenital Rubella Syndrome Control — South-East Asia Region, 2000–2016

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In 2013, the 66th session of the Regional Committee of the World Health Organization (WHO) South-East Asia Region (SEAR)* adopted the goal of elimination of measles and control† of rubella and congenital rubella syndrome (CRS) by 2020 (*1*). Rubella is the leading vaccine-preventable cause of birth defects. Although rubella typically causes a mild fever and rash in children and adults, rubella virus infection during pregnancy, especially during the first trimester, can result in miscarriage, fetal death, or a constellation of congenital malformations known as CRS, commonly including visual, auditory, and/or cardiac defects, and developmental delay (*2*). Rubella and CRS control capitalizes on the momentum created by pursuing measles elimination because the efforts are programmatically linked. Rubella-containing vaccine (RCV) is administered as a combined measles and rubella vaccine, and rubella cases are detected through case-based surveillance for measles or fever and rash illness (*3*). This report summarizes progress toward rubella and CRS control in SEAR during 2000–2016. Estimated coverage with a first RCV dose (RCV1) increased from 3% of the birth cohort in 2000 to 15% in 2016 because of RCV introduction in six countries. RCV1 coverage is expected to increase rapidly with the phased introduction of RCV in India and Indonesia beginning in 2017; these countries are home to 83% of the SEAR birth cohort. During 2000–2016, approximately 83 million persons were vaccinated through 13 supplemental immunization activities (SIAs) conducted in eight countries. During 2010–2016, reported rubella incidence decreased by 37%, from 8.6 to 5.4 cases per 1 million population, and four countries (Bangladesh, Maldives, Sri Lanka, and Thailand) reported a decrease in incidence of ≥95% since 2010. To achieve rubella and CRS control in SEAR, sustained investment to increase routine RCV coverage, periodic high-quality SIAs to close immunity gaps, and strengthened rubella and CRS surveillance are needed.

Immunization Activities

Before 2000, only two of the 11 SEAR countries (Sri Lanka and Thailand) included RCV in the routine infant immunization schedule. By the end of 2016, eight (73%) countries had introduced RCV (Table 1). India, Indonesia, and North Korea, three countries that include 84% of infants living in the region, had not yet introduced RCV, but India and Indonesia plan to introduce RCV in the immunization schedule in phases during 2017–2019. The age of administration is at age 9–9.5 months for RCV1 and 15–36 months for the second RCV dose (Table 1). WHO and the United Nations Children's Fund (UNICEF) use reported administrative coverage of RCV1 (i.e., the number of doses administered divided by the estimated target population) along with survey data to estimate national RCV1 coverage (*4*,*5*). Estimated regional RCV1 coverage of the birth cohort in the region increased from 3% in 2000 to 15% in 2016 (Figure). Six of eight countries that had introduced RCV1 by 2016 reported ≥90% coverage nationwide (Table 1). During 2000–2016, eight SEAR countries conducted SIAs and vaccinated 83.1 million children, adolescents, and young adults (Table 2).

Surveillance Activities

Rubella cases and outbreaks were reported by three countries (Bhutan, Sri Lanka, and Thailand) in 2000, by nine countries (all but India and Timor-Leste) in 2010, and by all 11 countries in 2013. By 2016, case-based measles-rubella surveillance had been initiated in all SEAR countries and included rubella immunoglobulin M (IgM) antibody testing for all suspected measles cases§ that tested negative for measles IgM antibody. Countries reported measles-rubella case-based surveillance data indicators¶ to the WHO SEAR office (*6*,*7*). A SEAR measles-rubella laboratory network with eight participating laboratories was established in 2003 as part of the WHO Global Measles and Rubella Laboratory Network. By 2016, the network had

*The WHO South-East Asia Region consists of 11 countries: Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, North Korea, Sri Lanka, Thailand, and Timor-Leste.

†Rubella and CRS control is defined as a 95% reduction of rubella and CRS cases compared with the 2010 baseline nationally and regionally.

§A suspected measles case was defined as any case of fever and maculopapular rash in Bhutan, Maldives, Myanmar, and Timor-Leste. The remaining countries used a suspected measles case definition that included fever, maculopapular rash, and any of the following: cough, coryza, or conjunctivitis.

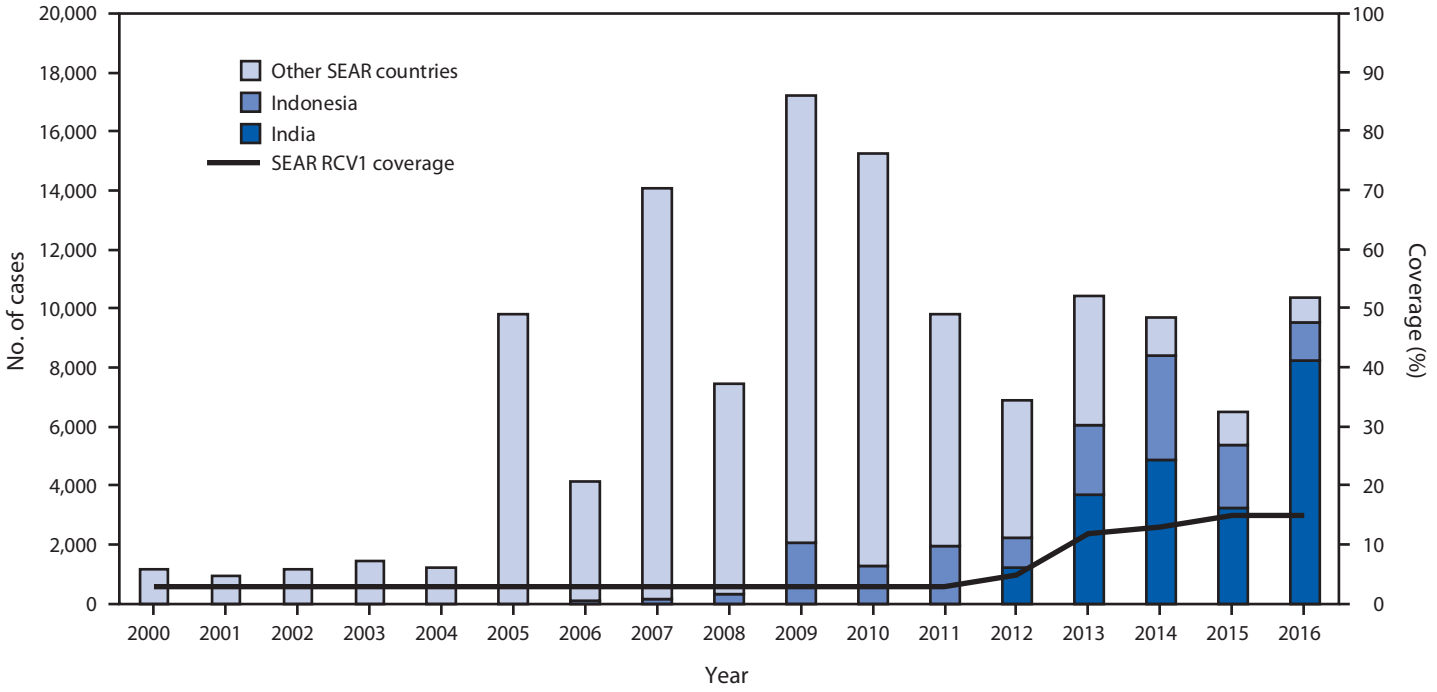
¶Surveillance indicators include 1) an annualized incidence rate of two discarded nonmeasles nonrubella cases per 100,000 population at the national level; 2) ≥80% of subnational administrative units reporting ≥2 discarded nonmeasles nonrubella cases per 100,000 population per year; 3) ≥80% of suspected cases tested for measles and rubella IgM antibodies; 4) ≥80% of laboratory-confirmed chains of transmission have adequate samples collected for detecting rubella virus and tested in an accredited laboratory; and 5) ≥80% of suspected cases have an adequate investigation conducted within 48 hours of notification.

TABLE 1. Estimated coverage* with rubella-containing vaccine (RCV), age at vaccination, number of confirmed rubella and congenital rubella syndrome (CRS) cases, and rubella incidence, by country — World Health Organization South-East Asia Region, 2010 and 2016

Country (year RCV introduced)	2010					2016					% change in rubella incidence 2010 to 2016
	% RCV1 coverage	RCV schedule	No. of confirmed CRS cases	No. of confirmed rubella cases	Rubella incidence†	% RCV1 coverage	RCV schedule	No. of confirmed CRS cases	No. of confirmed rubella cases	Rubella incidence†	
Bangladesh (2012)	NA§	NA	NR¶	12,963	87.4	94	9.5m, 15m	87	165	1.0	-99
Bhutan (2006)	95	9m, 24m	NR	9	12.9	97	9m, 24m	0	3	4.0	-69
India (N/A)	NA	NA	NR	NR	NR	NA	NA	25	8,274	6.4	—
Indonesia (N/A)	NA	NA	NR	1,323	5.6	NA	NA	174	1,238	4.8	-15
Maldives (2007)	96	9m, 18m	NR	4	12.5	99	18m	0	0	0.0	-100
Myanmar (2015)	NA	NA	NR	11	0.2	91	9m	0	10	0.2	0
Nepal (2013)	NA	NA	NR	510	18.5	83	9m, 15m	33	656	22.9	+24
North Korea (N/A)	NA	NA	NR	0	0.0	NA	NA	0	0	0.0	0
Sri Lanka (1996)	99	3y, 13y	8	68	3.3	99	9m, 3y	0	0	0.0	-100
Thailand (1993)	98	9m, p1	NR	387	6.1	99	9m, 2.5y	0	7	0.1	-98
Timor-Leste (2016)	NA	NA	NR	NR	NR	78	9m, 18m	0	8	6.5	—
South-East Asia Region	**3**	**—**	**8**	**15,275**	**8.6**	**15**	**—**	**319**	**10,361**	**5.4**	**-37**

Source: http://www.who.int/immunization/monitoring_surveillance/data/en.
Abbreviations: m = months; NA = not applicable; NR = not reported; p = primary grade of school; RCV1 = first dose of RCV; y = years.
* Data are from World Health Organization and United Nations Children's Fund (UNICEF) estimates, 2016 revision (as of July 2017).
† Cases per 1 million population.
§ Dose was not included in the vaccination schedule for that year.
¶ Country did not report cases in the year specified.

FIGURE. Number of reported rubella cases,* by country, and estimated first dose rubella-containing vaccine (RCV1)† coverage — World Health Organization (WHO) South-East Asia Region (SEAR),§ 2000–2016



Source: http://www.who.int/immunization/monitoring_surveillance/data/en.
Abbreviation: RCV = rubella-containing vaccine in routine immunization.
* Cases of rubella reported to WHO and the United Nations Children's Fund (UNICEF) through the Joint Reporting Form to the Regional Office for the South-East Asia Region.
† Data are from WHO and UNICEF estimates for SEAR.
§ Other countries in the region include Bangladesh, Bhutan, Maldives, Myanmar, Nepal, North Korea, Sri Lanka, Thailand, and Timor-Leste.

TABLE 2. Characteristics of rubella supplementary immunization activities (SIAs),* by country and year — World Health Organization (WHO) South-East Asia Region, 2000–2016

Country	Year	Rubella-containing vaccine used	SIA type	SIA extent	Target age group	Population reached in targeted age group	% administrative coverage
Bangladesh	2014	MR	Catch-up	National	9m–15y	53,644,603	>100†
	2016	MR	Follow-up	Subnational	9m–5y	100,863	>100†
Bhutan	2006	MR	Catch-up	National	9m–14y; 15y–44y F	332,041	98
Maldives	2005	MR	Catch-up	National	6y–25y M; 6y–35y F	118,877	82
	2006	MR	Catch-up	National	6y–25y M; 6y–35y F	123,642	85
	2007	MMR	Follow-up	National	4y–6y	16,462	56
Myanmar	2015	MR	Catch-up	National	9m–15y	13,160,764	94
Nepal	2012	MR	Catch-up	National	9m–15y	8,524,991	89
	2015	MR	Follow-up	Subnational	6m–15y	453,665	91
	2016	MR	Follow-up	Subnational	9m–5y	2,528,539	>100†
Sri Lanka	2004	MR	Catch-up	National	16y–20y	1,362,108	72
Thailand	2015	MR	Follow-up	National	2.5y–7y	2,244,906	88
Timor-Leste	2015	MR	Catch-up	National	6m–15y	484,850	97
South-East Asia Region						**83,096,311**	**98**

Source: http://www.who.int/immunization/monitoring_surveillance/data/en.
Abbreviations: F = females; M = males; MMR = measles, mumps, and rubella vaccine; MR = measles and rubella vaccine; m = months; y = years.
* Rubella SIAs generally are carried out along with measles SIAs using two target age ranges. An initial, nationwide catch-up SIA targets all children aged 9 months–15 years, with the goal of eliminating susceptibility to rubella virus in the general population. Periodic follow-up SIAs then target all children born since the last SIA. Follow-up SIAs generally are conducted nationwide every 2–4 years and target children aged 9–59 months; their goal is to eliminate any rubella virus susceptibility that has developed in recent birth cohorts and to protect children who did not respond to the first rubella vaccination.
† Values >100% indicate that the intervention reached more persons than the estimated target population. The numerator was the total children vaccinated, and the denominator was the estimated target calculated for vaccination.

expanded to include one regional reference laboratory in Thailand and 39 proficient** national or subnational laboratories (13 in India, four in Indonesia, 14 in Thailand, and one in each of the other eight countries).

The number of SEAR countries reporting CRS cases through the WHO-UNICEF Joint Reporting Form (JRF)†† increased from two in 2002 to 10 in 2016. North Korea, Sri Lanka, and Thailand report CRS cases as part of the national integrated disease surveillance programs. Eight countries identify CRS cases through sentinel site surveillance (Bangladesh, since 2012; Indonesia and Nepal, 2014; Maldives, 2015; Bhutan, India, Myanmar and Timor-Leste, 2016). Bangladesh also has population-based CRS surveillance, for which all vaccine-preventable disease surveillance reporting sites also report CRS cases.

Rubella Incidence and Rubella Virus Genotypes

From 2010 to 2016, reported annual rubella incidence in SEAR decreased 37%, from 8.6 to 5.4 cases per 1 million population. Five countries reported <1 rubella case per 1 million population in 2016, including four (Bangladesh, Maldives, Sri Lanka, and Thailand) that reported a decrease in incidence of ≥95% since 2010 (Table 1). In 2016, SEAR countries reported 10,361 laboratory confirmed and epidemiologically linked rubella cases, including 1,720 sporadic cases and 8,641 cases that occurred in 263 laboratory-confirmed rubella outbreaks and 68 mixed measles and rubella outbreaks. Only five of the 8,641 confirmed outbreak-associated rubella cases occurred in countries that had introduced RCV. Among the confirmed outbreak-associated cases, 698 (8%) patients were aged <1 year; 2,682 (31%), 1–4 years; 3,297 (38%), 5–9 years; 1,207 (14%), 10–14 years; and 757 (9%), ≥15 years. Overall, 7,884 (91%) of the outbreak-associated cases in 2016 occurred in children aged <15 years. Among all reported rubella cases in 2016, a total of 9,512 (92%) occurred in India and Indonesia (Figure). Reported CRS cases increased from 26 in 2002 to 319 in 2016, reflecting an increase in countries reporting CRS cases from two in 2002 to 10 in 2016 (Table 1). During 2000–2016, 84 rubella viruses (all genotypes 1E or 2B) were reported from the region to the Rubella Nucleotide Sequence Database (RubeNS).§§

** A proficient laboratory is one that has been defined as having met defined criteria as outlined in the report, "Framework for verifying elimination of measles and rubella." http://www.who.int/wer/2013/wer8809.pdf.
†† The JRF is used yearly by countries to report information on immunization schedules, vaccination campaigns, number of vaccine doses administered through routine immunization services, and other monitoring data to WHO and UNICEF. Surveillance data, including number of cases of rubella and CRS, are also reported to WHO and UNICEF through the JRF using standard case definitions.

§§ RubeNS and the Measles Nucleotide Surveillance Database (MeaNS) are components of laboratory surveillance for measles and rubella; all laboratories in the Global Measles Rubella Laboratory Network are requested to submit nucleotide sequences for viruses identified.

Summary

What is already known about this topic?

Before 2000, only two World Health Organization South-East Asia Regional (SEAR) countries had introduced rubella-containing vaccine (RCV) into routine immunization programs.

What is added by this report?

During 2000–2016, six additional SEAR countries introduced RCV, and first dose RCV (RCV1) coverage increased from 3% (2000) to 15% (2016). During 2010–2016, reported rubella incidence decreased 37%, from 8.6 to 5.4 cases per 1 million population. Bangladesh, Maldives, Sri Lanka, and Thailand likely have controlled rubella and congenital rubella syndrome (CRS).

What are the implications for public health practice?

Rubella and CRS elimination in the region might be considered with investment in high routine RCV coverage, periodic high-quality supplementary immunization activities, and improved rubella and CRS surveillance. With the introduction of RCV in India and Indonesia beginning in 2017, regional RCV1 coverage is expected to increase rapidly.

Discussion

Substantial progress was made toward rubella and CRS control in SEAR during 2000–2016, with a 37% decline in reported rubella incidence. Momentum for rubella and CRS control was accelerated by the Regional Committee with the establishment of a regional goal in 2013 to achieve measles elimination and rubella and CRS control by 2020 (*1*). After this goal was established, countries rapidly introduced RCV, and eight of 11 countries now include RCV in the routine immunization schedule. In four countries (Bangladesh, Maldives, Sri Lanka, and Thailand) rubella and CRS likely have been controlled. Fifteen percent of the SEAR birth cohort received RCV through routine immunization services in 2016; with the introduction of RCV in India and Indonesia beginning in 2017, regional RCV1 coverage is expected to increase rapidly.

In the SEAR countries, rubella cases occurred mostly among children aged <15 years; catch-up SIAs conducted in Bangladesh, Bhutan, Myanmar, Nepal, and Timor-Leste during 2000–2016 targeted this age group and achieved overall decreases in rubella incidence. Therefore, rubella incidence is expected to decrease significantly when the populous countries of India and Indonesia conduct catch-up SIAs as part of RCV introduction into the immunization programs. Periodic high-quality SIAs will be needed to close immunity gaps until high measles and rubella vaccination coverage is achieved through routine immunization services by all countries in the region. Sustained investments to achieve or maintain high routine RCV coverage are needed.

Optimal surveillance for rubella and CRS is essential to monitor the impact of rubella vaccine introduction to ensure that there is no epidemiologic age shift in incidence (from children to women of childbearing age) and to verify progress toward rubella and CRS control goals. As countries progress toward elimination of endemic rubella virus transmission, elimination-standard surveillance will be required (*8*). Efforts needed to achieve this include modifying the case definition to include all cases of rash and fever from both public and private sector clinical sites and enhancing laboratory capacity to support surveillance, including the ability to process an increased number of specimens following the change to a more sensitive case definition.

The findings in this report are subject to at least two limitations. First, 30%–50% of rubella virus infections are typically asymptomatic or mild; thus many rubella cases are likely not to be detected and reported (*2*). CRS surveillance complements rubella surveillance data and improves monitoring of rubella disease burden in the population. Second, the quality of surveillance varies among countries, and the definition used for suspected rubella cases varies from country to country, which limits comparisons of surveillance data among countries.

The midterm review of the Strategic Plan for Measles Elimination and Rubella/CRS Control for WHO South-East Asia Region 2014–2020 found evidence that four countries (Bangladesh, Maldives, Sri Lanka, and Thailand) had achieved ≥95% reduction in rubella cases since 2010 (*9*). The regional goal of rubella and CRS control by 2020 appears to be achievable; with continued investment in high routine RCV coverage, periodic high-quality SIAs, and improved rubella and CRS surveillance, a regional rubella elimination goal might be considered in the near future.

Conflict of Interest

No conflicts of interest were reported.

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Notes from the Field

Outbreak of Severe Illness Linked to the Vitamin K Antagonist Brodifacoum and Use of Synthetic Cannabinoids — Illinois, March–April 2018

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Synthetic cannabinoids, also known as K2 and spice, are heterogeneous psychoactive compounds identified as substances of abuse (*1*,*2*). On March 22, 2018, the Illinois Department of Public Health was notified by the Illinois Poison Center of four patients seen in emergency departments (EDs) during the preceding 2 weeks with unexplained bleeding and high international normalized ratios (INRs; range from 5 to >20 [normal <1.1]), indicating a clotting disorder, and reported synthetic cannabinoid use during the previous 3 days. None reported taking prescription anticoagulants or exposure to anticoagulant rodenticides. An investigation by the Illinois Department of Public Health, the Illinois Poison Center, CDC, local health departments, and law enforcement agencies was initiated to identify additional cases, ascertain epidemiologic links among patients, and implement control measures.

Requests for information regarding patients with serious bleeding and an elevated INR without a definitive etiology identified on or after February 1, 2018, were issued to Illinois EDs, emergency medical services, health care providers, local health departments, and coroners through Epi-X,* state and local health alert systems, and electronic distribution lists. Syndromic surveillance queries were developed by the Illinois Department of Public Health and implemented to identify patients evaluated at EDs and urgent care centers. Seven press releases encouraged anyone with a serious reaction after using synthetic cannabinoids to seek immediate medical attention.

Based on clinical signs and symptoms (unexplained bleeding, prolonged high INR values, and response to fresh frozen plasma and high doses of vitamin K), exposure to a long-acting vitamin K antagonist was suspected. Case definitions were developed based on signs and symptoms, synthetic cannabinoid exposure, and laboratory findings (Box). Data concerning signs and symptoms; synthetic cannabinoid use, brand, and

BOX. Case definitions for unexplained bleeding after use of synthetic cannabinoids — Illinois, 2018

Clinical criteria

Bruising, nosebleeds, bleeding gums, bleeding disproportionate to injury, vomiting blood, coughing up blood, blood in urine or stool, or excessively heavy menstrual bleeding.

Laboratory criteria

- Elevated international normalized ratios (INRs; ≥2.0) or abnormal coagulation profile (e.g., prothrombin time in absence of INR values) for which there is no other clinical explanation, or
- Detection of a long-acting anticoagulant (e.g., brodifacoum) in blood, serum, plasma, or urine, as determined by reference laboratory testing.

Case classification

Suspected case

One or more of the clinical criteria listed above in a patient, without an alternative explanation, and with reported use of synthetic cannabinoids or unknown drugs, or with some suspicion of previous or current drug use or exposure.

Probable case

- One or more of the clinical criteria listed above in a patient with reported use of synthetic cannabinoids in the 3 months preceding illness onset (by patient, proxy, medical record, or health care provider), and laboratory evidence of coagulopathy as measured by meeting the first laboratory criterion listed above, or
- One or more of the clinical criteria listed above, and meeting both laboratory criteria listed above, with no other explanation of results.

Confirmed case

One or more of the clinical criteria listed above in a patient, with reported use of synthetic cannabinoids in the 3 months preceding illness onset (by patient, proxy, medical record, or health care provider), and meeting the second laboratory criterion listed above.

* https://www.cdc.gov/mmwr/epix/epix.html.

location of purchase; and exposure to rodenticides, prescription anticoagulants, and illicit drugs were collected through patient interviews, medical chart abstraction, and Illinois Poison Center consultations. Blood samples were tested for presence of anticoagulants by high-performance liquid chromatography–tandem mass spectrometry (NMS Laboratories, Willow Grove, Pennsylvania).

As of April 25, 2018, a total of 155 cases (76 confirmed and 79 probable) had been identified; four (2.6%) patients died from major bleeding events. Median patient age was 32 years (range = 18–65 years), 115 (74%) were male, 81 (52%) were non-Hispanic white, 147 (95%) were hospitalized, and eight (5%) were treated in an ED only. The most frequently reported sign was hematuria (125; 81%); all patients reported bleeding from at least one site. INRs were elevated in all patients. All 81 (52%) analyzed clinical specimens from patients with a confirmed or probable case were positive for brodifacoum, a long-acting vitamin K antagonist used in rodenticides. Although cases clustered in two geographic areas (the Chicago area and seven neighboring counties in central Illinois), no single product source has been identified. Law enforcement is investigating the synthetic cannabinoid distribution network. Thirty-eight patients have been identified in eight other states, and CDC is conducting a multistate investigation (*3*). Product testing is ongoing in Illinois; some products in other states have tested positive for brodifacoum (*4*). Currently, the reason why brodifacoum was present in the synthetic cannabinoids is not known.

In 2017, 26 synthetic cannabinoids were listed as Schedule I substances under the Controlled Substances Act (*5*). However, they are often marketed as alternatives to marijuana or labeled as not for human consumption (*5*,*6*). They remain available for purchase, are relatively inexpensive, and are sometimes favored over marijuana because they are not detected in routine drug testing (*2*,*6*). The synthetic cannabinoid supply chain is unregulated, resulting in variable product compositions (*2*). Given the various compounds and unclear provenance, use of these products can result in unpredictable health effects (*1*). Stronger public messaging is needed and should target persons at risk. Engaging substance abuse services and community coalitions might improve outreach. Health care providers should consider vitamin K-dependent coagulopathy in patients with unexplained bleeding and reported or suspected synthetic cannabinoid use.

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Conflict of Interest

No conflicts of interest were reported.

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Notes from the Field

Cyclosporiasis Cases Associated with Dining at a Mediterranean-Style Restaurant Chain — Texas, 2017

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During July 21–August 8, 2017, the Texas Department of State Health Services (DSHS) was notified of 20 cases of cyclosporiasis among persons who dined at a Mediterranean-style restaurant chain (chain A) in the Houston area. On August 10, 2017, DSHS requested assistance from CDC to support ongoing investigations by the City of Houston Health Department, Harris County Public Health, Fort Bend County Health and Human Services, and Brazoria County Health Department. The objectives of this investigation were to determine the source of the illnesses in the Houston area and to generate hypotheses about the source of the national increase in cyclosporiasis in 2017.

Chain A has four locations in the Houston area and a central kitchen where many dishes are prepared. A case-control study was performed using a menu-specific questionnaire focusing on items containing fresh produce. A confirmed case was defined as laboratory-confirmed *Cyclospora* infection and clinically compatible illness in a person who ate at any location of chain A during May 28–July 15, 2017. A probable case was defined as diarrhea and at least one additional sign or symptom compatible with cyclosporiasis (e.g., anorexia, abdominal cramping, bloating, myalgia, fatigue, vomiting, or low-grade fever) in a person within 2 weeks after dining at chain A during May 28–July 15, 2017. Controls were identified as either dining companions of case-patients who had no illness or patrons who dined at the same chain A location within 2 days of a case-patient visit and who had no illness. For controls identified by the latter method, contact information was obtained using commercially available databases used by local health agencies in Texas. Three controls per case-patient were recruited.

A total of 22 case-patients (16 confirmed and six probable) and 66 controls were enrolled in the study. Case-patients had a median age of 52 years (range = 29–79 years); 50% were female. Analysis compared menu items consumed by case-patients and controls, followed by ingredient-level analysis. The following ingredients were identified as being significantly associated with illness: green onions (matched odds ratio = 11.3; 95% confidence interval = 2.55–104.68), tomatoes (5.5; 1.2–51.7), red onions (4.7; 1.3–21.0), and cabbage (4.0; 1.1–15.9). When analysis was limited to the 16 confirmed case-patients and their corresponding 48 controls, only green onions remained significantly associated with illness (17.6; 2.5–775.7). Restaurant invoices from chain A were collected for all items identified during the epidemiologic investigation, but efforts to trace any food item to its source were inconclusive. Although the current study identified potential foods associated with illness in Texas, investigators were not able to identify the illness source or confirm whether the patients within the chain A subcluster had consumed a product reported by other ill persons in the United States.

Cyclosporiasis is an intestinal illness caused by the parasite *Cyclospora cayetanensis*. Since 2013, the United States has experienced annual increases in the incidence of cyclosporiasis incidence during the summer months, with some illnesses linked to imported produce (*1*–*3*). Molecular subtyping of *Cyclospora* is not currently available; therefore, identification of an ingredient associated with a particular illness subcluster might provide information about a source contributing to other cyclosporiasis illnesses. Previous U.S. outbreaks of cyclosporiasis have been linked to fresh produce, such as prepackaged salad mix, raspberries, and cilantro (*3*,*4*). Identification of a vehicle for *Cyclospora* is complicated by the short shelf life of fresh produce as well as the use of potential vehicles such as garnishes or mixtures with other items that could also harbor the parasite. Ingredient-level analysis within restaurant clusters and subclusters therefore remains critical in *Cyclospora* outbreak investigations.

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Conflict of Interest

No conflicts of interest were reported.

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Notes from the Field

Verona Integron-Encoded Metallo-Beta-Lactamase–Producing *Pseudomonas aeruginosa* Outbreak in a Long-Term Acute Care Hospital — Orange County, Florida, 2017

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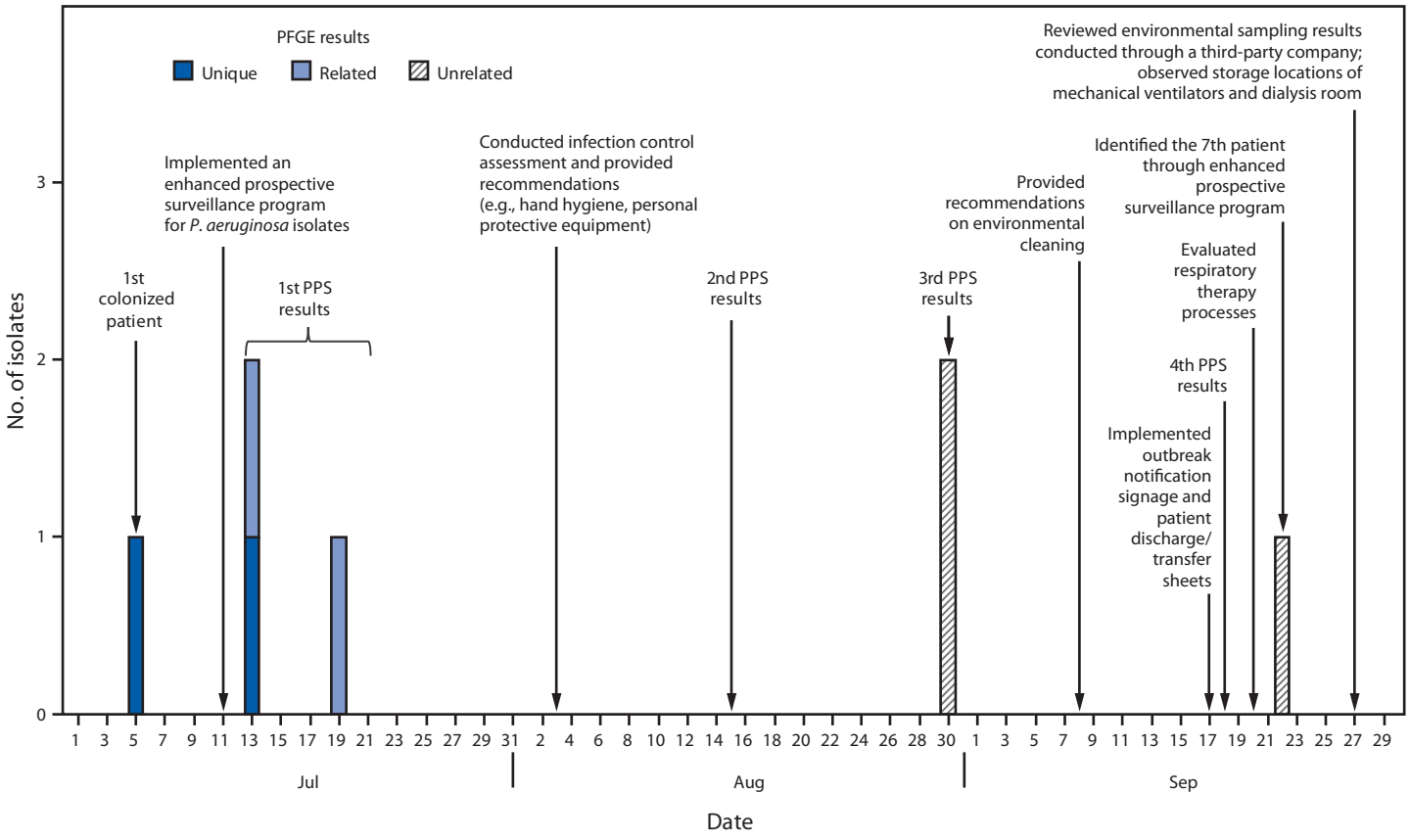
On July 5, 2017, one case of colonization with Verona integron-encoded metallo-beta-lactamase (VIM)–producing *Pseudomonas aeruginosa* was identified at a long-term acute care hospital (LTACH) in Orange County, Florida. VIM genes are capable of transferring among bacterial species (*1*); however, the mechanisms and frequency of resistance exchange is poorly understood (*2*). Thus, identification of colonization with VIM-resistant organisms is a sentinel event that warrants investigation and careful patient management. In response, the patient was placed on contact precautions and a facilitywide point prevalence survey was conducted (*3*). To detect colonization of VIM-producing *P. aeruginosa,* rectal swabs were collected from patients at the LTACH. The Florida Department of Health collaborated with the Tennessee Department of Health, the Southeast Regional Antibiotic Resistance Laboratory Network in Tennesee, and CDC to conduct antimicrobial resistance testing and genotyping.

During July 13–September 22, 2017, six additional patients at the LTACH screened positive for VIM-producing *P. aeruginosa* during three biweekly point prevalence surveys and an enhanced prospective surveillance system (Figure). The median length of stay at the LTACH among the seven colonized patients was 40.5 days (range = 13–150 days), and their median age was 60 years (range = 40–68 years); 57% were men. No patients reported hospitalizations or medical procedures outside the United States. Among the seven colonized patients, six had tracheostomy tubes (including three

FIGURE. Colonization of patients at a long-term acute care hospital with Verona integron-encoded metallo-beta-lactamase–producing *Pseudomonas aeruginosa*, timing of point prevalence surveys and implementation of infection control, and isolate pulsed-field gel electrophoresis (PFGE) results — Orange County, Florida, July–September, 2017



Abbreviation: PPS = point prevalence survey.

with current diagnoses of ventilator-dependent respiratory failure), six had decubitus ulcers, and four were receiving hemodialysis. Five patients had received antibiotic therapy before specimen collection, and one patient died approximately 1 month after colonization was detected. No cases of infection or complications associated with VIM-producing *P. aeruginosa* colonization have been reported at the LTACH. Pulsed field gel electrophoresis was conducted on four of the seven isolates; two had closely related (>90% similarity) patterns.

This investigation documents the first identification of VIM-producing *P. aeruginosa* in Florida. VIM-producing *P. aeruginosa* was first reported in Marseilles, France, in 1996 and has since been documented in health care–associated infections in several countries (*4*,*5*). Transmission can occur horizontally via hand carriage by health care personnel, through shared medical equipment, and through fomites (e.g., bedside tables, intravenous poles, bedside commodes, and sink drains) (*4*). Control measures include enhancing and reinforcing infection control processes and environmental disinfection. Measures taken in response to this outbreak investigation include 1) implementing an enhanced prospective surveillance program for *P. aeruginosa* isolates, 2) conducting infection control and response assessments (e.g., hand hygiene, personal protective equipment), 3) observing and reinforcing environmental cleaning practices, 4) implementing outbreak notification signage and patient discharge/transfer sheets, and 5) evaluating respiratory therapy processes.

Although carbapenem-resistant *P. aeruginosa* can be identified through routine culture and susceptibility testing, testing for mechanisms of resistance are not readily accessible. To detect the VIM-producing gene, additional antimicrobial resistance mechanism testing by polymerase chain reaction (PCR) must be conducted. Such testing is not routinely conducted at most clinical laboratories but is available now in all 50 states via CDC's Antimicrobial Resistance Laboratory Network (ARLN).

Routine surveillance or PCR testing for antibiotic resistance mechanisms among *P. aeruginosa* is not practiced widely or uniformly; thus, the true incidence and prevalence of VIM-producing *P. aeruginosa* in the community and the risk for transmission among patients in health care facilities is unknown (*6*). Testing for common carbapenemases via the ARLN has the potential to better define the epidemiology of carbapenem-resistant *P. aeruginosa* resistance mechanisms as well as inform the response to control transmission. Reporting of organisms with high-priority antibiotic resistance mechanisms to public health authorities can inform regional infection control and containment practices.

Conflict of Interest

No conflicts of interest were reported.

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Erratum

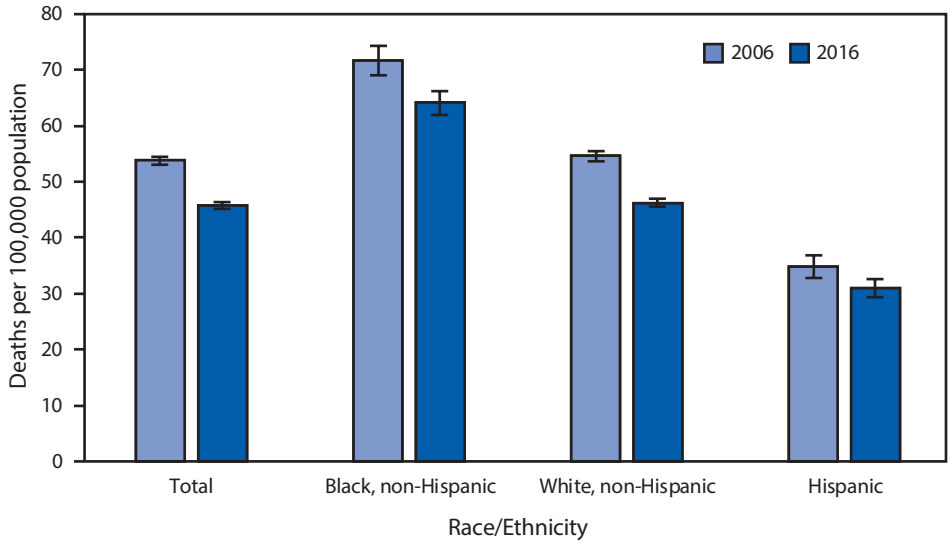
Vol. 67, No. 16

In the report "Fatal Falls Overboard in Commercial Fishing — United States, 2000–2016" on page 469, in Figure 2, the number of falls "Witnessed, Recovery attempted within 1 hour, Recovery unsuccessful" should have been **34** and not 5 as reported.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Breast Cancer Death Rates* Among Women Aged 50–74 Years, by Race/Ethnicity — National Vital Statistics System, United States, 2006 and 2016



* Breast cancer deaths were those with *International Classification of Diseases, Tenth Revision* underlying cause of death code C50.

The death rate from breast cancer among all women aged 50–74 years decreased 15.1%, from 53.8 per 100,000 in 2006 to 45.7 in 2016. In both 2006 and 2016, the death rate was higher among non-Hispanic black women compared with non-Hispanic white women and Hispanic women. From 2006 to 2016, the death rate from breast cancer decreased for non-Hispanic white women from 54.6 per 100,000 to 46.2, for Hispanic women from 34.8 to 31.0, and for non-Hispanic black women from 71.7 to 64.1.

Source: National Vital Statistics System, 2006 and 2016. https://wonder.cdc.gov/ucd-icd10.html.

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