

Brief report

Pneumococcal vaccination coverage among persons ≥ 65 years—United States, 2013



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ABSTRACT

Background: Invasive pneumococcal disease is a major cause of illness in the United States, and rates are higher among persons ≥ 65 years. Pneumococcal vaccination has been recommended to adults ≥ 65 years since 1997.

Methods: Data from the 2005–2013 Behavioral Risk Factor Surveillance System were analyzed. Weighted estimates of pneumococcal vaccination coverage were calculated by state and race/ethnicity and tests for linear trend were performed.

Results: In 2013, the median state vaccination coverage among adults ≥ 65 years was 69.5%, and coverage ranged from 61.9% in New Jersey to 75.6% in Oregon. Coverage overall among non-Hispanic whites (71.1%) was higher than coverage for non-Hispanic blacks (57.7%), Hispanics (51.9%), and non-Hispanic persons of other race (65.4%). Coverage increased from 2005 to 2013 overall and by racial/ethnic subgroups.

Conclusion: Although pneumococcal vaccination coverage has improved in the past several years, coverage remains below the Healthy People 2020 target of 90% and racial/ethnic disparities exist.

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1. Introduction

Invasive disease from *Streptococcus pneumoniae* (pneumococcus) is a major cause of serious illness in the United States [1]. Pneumococcal infection rates are higher for persons ≥ 65 years, and in 2013, there were an estimated 33,900 cases of invasive pneumococcal disease (IPD) and 3700 deaths with the highest rates of death occurring among those ≥ 65 years [1]. Since 1997, the Advisory Committee on Immunization Practices (ACIP) has recommended 23-valent pneumococcal polysaccharide vaccine (PPSV23) to all adults ≥ 65 years [2,3]. In 2014, ACIP recommended that 13-valent pneumococcal conjugate vaccine (PCV13) and PPSV23 be administered routinely in series to all adults aged ≥ 65 years [4]. Despite increases in pneumococcal vaccination coverage in recent years, coverage remains well below *Healthy People 2020* targets of 90% for adults ≥ 65 years [5]. The most recent overall national pneumococcal vaccination coverage estimate from the 2013 National Health Interview Survey (NHIS) was 59.7% [6]. Continued efforts are needed to increase the number of adults vaccinated against

pneumococcal disease. In light of these results, health care providers are encouraged to consider adoption of the ACIP recommendation to offer pneumococcal vaccine to all adults ≥ 65 years and take advantage of opportunities to vaccinate patients, such as visits for annual seasonal influenza vaccine. We used 2005–2013 Behavioral Risk Factor Surveillance System (BRFSS) data to examine national and state-specific influenza vaccination coverage among adults ≥ 65 years overall and by race/ethnicity in the most recent survey year and determine whether national coverage has improved in recent years.

2. Methods

Data from the 2005–2013 BRFSS were analyzed in 2014 and 2015. The BRFSS is a continuous, population-based telephone survey conducted by state health departments in collaboration with the Centers for Disease Control and Prevention (CDC) to collect uniform, state-specific data on self-reported preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases. Individuals are randomly selected using a multistage cluster design, and data are weighted by age, sex, and, in some states, race/ethnicity, to reflect each area's estimated adult population [7]. Beginning in 2011,

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Table 1
Percentage of adults ≥ 65 years who reported ever receiving pneumococcal vaccine, by state/area and racial/ethnic subgroups*—United States, Behavioral Risk Factor Surveillance System, 2013.

State/area	Unweighted sample size	Persons of all other racial/ethnic groups					
		All persons % (95% CI) [†]	Non-Hispanic white % (95% CI)	Total % (95% CI)	Non-Hispanic black % (95% CI)	Hispanic % (95% CI)	Non-Hispanic persons of other race % (95% CI)
All states combined [‡]	140,851	68.4 (±0.5)	71.1 (±0.5)	57.7 (±1.8) [§]	57.7 (±2.4) [§]	51.9 (±3.5) [§]	65.4 (±3.9) [§]
Alabama	2201	67.1 (±2.7)	69.1 (±2.8)	59.2 (±7.0) [§]	59.1 (±7.4) [§]	—	55.6 (±25.5)
Alaska	779	63.3 (±5.0)	65.2 (±5.0)	58.7 (±13.1)	—	—	61.4 (±14.9)
Arizona	1394	72.0 (±4.0)	73.7 (±4.2)	63.8 (±13.1)	—	56.7 (±17.9)	70.7 (±20.7)
Arkansas	1848	67.8 (±2.9)	69.5 (±2.9)	56.7 (±9.3) [§]	49.6 (±10.9) [§]	—	74.7 (±15.5)
California	2629	64.5 (±2.7)	69.4 (±2.6)	56.2 (±6.1) [§]	50.7 (±13.7) [§]	48.7 (±8.0) [§]	68.5 (±10.2)
Colorado	3458	73.9 (±1.8)	75.2 (±1.8)	67.4 (±6.9) [§]	74.6 (±14.7)	65.0 (±8.8) [§]	68.8 (±15.9)
Connecticut	2070	67.8 (±2.8)	70.0 (±3.0)	54.0 (±9.6) [§]	50.3 (±12.8) [§]	60.5 (±19.9)	58.6 (±18.6)
Delaware	1600	72.4 (±2.8)	75.6 (±2.8)	57.1 (±8.8) [§]	58.5 (±10.4) [§]	—	56.2 (±18.4) [§]
District of Columbia	1394	64.4 (±3.4)	69.3 (±4.3)	61.5 (±5.1) [§]	61.9 (±5.2) [§]	—	61.1 (±26.0)
Florida	12,618	66.2 (±2.0)	71.0 (±1.6)	49.7 (±6.6) [§]	49.1 (±8.8) [§]	47.4 (±9.9) [§]	65.3 (±11.0)
Georgia	1978	66.4 (±2.8)	70.6 (±2.9)	54.6 (±6.6) [§]	53.3 (±7.2) [§]	—	67.4 (±18.3)
Hawaii	1949	68.2 (±3.2)	67.7 (±5.0)	69.0 (±3.9)	—	61.0 (±17.4)	69.5 (±4.0)
Idaho	1738	68.7 (±3.0)	69.0 (±3.1)	73.7 (±13.5)	—	—	70.7 (±19.1)
Illinois	1712	64.6 (±3.4)	66.7 (±3.3)	56.1 (±10.5)	60.0 (±13.7)	—	52.7 (±23.2)
Indiana	3135	70.0 (±2.0)	70.9 (±2.0)	60.1 (±9.1) [§]	64.5 (±10.8)	—	55.1 (±17.6)
Iowa	2651	72.6 (±2.1)	73.2 (±2.1)	54.9 (±16.2) [§]	—	—	—
Kansas	7027	70.0 (±1.2)	70.5 (±1.3)	64.5 (±5.6) [§]	60.5 (±8.7) [§]	61.0 (±11.6)	73.6 (±7.8)
Kentucky	3074	67.7 (±2.6)	67.4 (±2.7)	69.9 (±10.0)	67.0 (±12.4)	—	78.4 (±16.8)
Louisiana	1742	68.1 (±3.0)	71.2 (±3.2)	59.4 (±6.9) [§]	59.6 (±7.5) [§]	—	56.9 (±19.2)
Maine	2571	73.8 (±2.2)	73.7 (±2.2)	76.3 (±14.3)	—	—	74.4 (±15.6)
Maryland	3893	69.3 (±2.2)	72.4 (±2.2)	62.8 (±5.0) [§]	63.1 (±5.7) [§]	49.2 (±19.4) [§]	67.8 (±12.0)
Massachusetts	3756	69.9 (±2.3)	71.4 (±2.4)	60.1 (±8.6) [§]	62.6 (±13.1)	53.9 (±13.5) [§]	61.4 (±16.0)
Michigan	3869	68.6 (±2.0)	70.6 (±2.0)	54.8 (±7.7) [§]	52.5 (±9.3) [§]	59.5 (±21.7)	61.8 (±14.1)
Minnesota	3633	72.3 (±3.5)	72.7 (±3.6)	65.8 (±15.1)	57.0 (±31.3)	—	73.1 (±16.9)
Mississippi	2469	66.2 (±2.7)	72.1 (±2.9)	49.4 (±6.4) [§]	48.1 (±6.6) [§]	—	65.7 (±21.6)
Missouri	2436	71.0 (±2.7)	72.5 (±2.9)	59.6 (±9.4) [§]	54.7 (±11.1) [§]	—	72.9 (±15.3)
Montana	2914	69.9 (±2.4)	70.5 (±2.4)	57.4 (±11.7) [§]	—	—	69.9 (±11.9)
Nebraska	5478	71.7 (±1.8)	71.9 (±1.9)	65.4 (±9.9)	77.2 (±13.7)	44.9 (±18.6) [§]	70.2 (±15.4)
Nevada	1441	66.8 (±4.4)	67.5 (±4.4)	64.6 (±12.4)	57.6 (±22.4)	74.3 (±17.8)	61.8 (±21.5)
New Hampshire	1895	73.4 (±2.4)	73.9 (±2.4)	67.3 (±14.2)	—	—	67.6 (±14.7)
New Jersey	2952	61.9 (±2.8)	65.6 (±2.7)	51.3 (±7.3) [§]	50.3 (±9.5) [§]	45.2 (±12.7) [§]	59.4 (±16.0)
New Mexico	2480	68.7 (±2.6)	72.3 (±2.9)	68.5 (±5.1) [§]	62.5 (±19.6)	62.0 (±5.8) [§]	63.0 (±11.3)
New York	2162	65.1 (±2.7)	70.0 (±2.6)	53.2 (±7.0) [§]	54.3 (±10.6) [§]	53.2 (±11.3) [§]	51.0 (±16.2)
North Carolina	2670	71.8 (±2.3)	73.8 (±2.4)	63.9 (±6.3) [§]	63.4 (±7.2) [§]	—	67.9 (±13.1)
North Dakota	2212	70.4 (±2.5)	70.5 (±2.5)	72.4 (±18.2)	—	—	77.5 (±19.5)
Ohio	3356	71.2 (±2.3)	71.2 (±2.4)	72.3 (±7.0)	72.4 (±8.6)	—	63.4 (±16.5)
Oklahoma	2707	74.4 (±2.0)	75.2 (±2.1)	69.5 (±6.0)	56.3 (±12.1) [§]	56.3 (±18.4)	81.1 (±5.5)
Oregon	1752	75.6 (±2.4)	75.5 (±2.4)	77.6 (±12.8)	—	—	81.7 (±10.7)
Pennsylvania	3299	68.8 (±2.1)	69.4 (±2.2)	61.2 (±7.9)	59.9 (±9.2) [§]	—	69.8 (±17.8)
Rhode Island	1788	72.4 (±2.7)	73.2 (±2.9)	65.2 (±10.3)	—	55.2 (±21.4)	71.0 (±13.3)
South Carolina	3483	70.7 (±2.2)	73.2 (±2.5)	63.2 (±4.9) [§]	61.5 (±5.3) [§]	—	78.3 (±13.4)
South Dakota	1976	65.4 (±3.8)	65.5 (±3.8)	60.8 (±24.3)	—	—	74.6 (±19.2)
Tennessee	1637	69.7 (±3.1)	71.6 (±3.1)	58.2 (±10.5) [§]	54.3 (±11.5) [§]	—	72.5 (±20.1)
Texas	3036	67.9 (±2.9)	72.5 (±3.1)	57.2 (±6.4) [§]	66.0 (±12.1)	52.9 (±7.9) [§]	54.9 (±20.2)
Utah	2905	69.4 (±2.2)	69.7 (±2.2)	67.9 (±11.5)	—	57.6 (±16.6)	75.8 (±14.6)
Vermont	1860	73.5 (±2.4)	73.5 (±2.5)	73.2 (±14.3)	—	—	70.4 (±17.0)
Virginia	2141	70.9 (±2.5)	73.4 (±2.5)	58.9 (±7.0) [§]	57.8 (±7.9) [§]	—	65.3 (±17.6)
Washington	3442	73.4 (±2.1)	74.8 (±1.9)	61.9 (±9.5) [§]	61.8 (±17.8)	—	74.7 (±9.4)
West Virginia	1704	69.5 (±2.6)	69.7 (±2.6)	67.2 (±14.4)	—	—	63.6 (±18.7)
Wisconsin	1697	73.1 (±3.6)	74.4 (±3.4)	62.2 (±18.9)	55.9 (±21.5)	—	69.6 (±29.5)
Wyoming	2240	68.9 (±2.4)	69.5 (±2.4)	59.5 (±12.4)	—	—	78.7 (±15.1)
Guam	171	36.8 (±9.1)	—	36.8 (±9.9)	—	—	39.0 (±10.6)
Puerto Rico	1805	26.4 (±2.6)	—	26.4 (±2.6)	—	26.4 (±2.6)	—
Median [†]		69.5	71.2	61.5	58.8	55.8	68.5
Range [†]		61.9–75.6	65.2–75.6	49.4–77.6	48.1–77.2	44.9–74.3	51.0–81.7

* Race/ethnicity is based on self report. Persons categorized as white, black, or other were identified as non-Hispanic. Persons identified as Hispanic might be of any race. The other race category includes Asian, American Indian/Alaska Native (AI/AN), and multiple races.

[†] Confidence interval.

[‡] Excludes U.S. territories.

[§] $p < 0.05$ by t test comparing non-Hispanic whites and persons of all other racial/ethnic groups.

^{||} Estimate may not be reliable due to relative standard error > 0.3 or sample size < 30 .

surveys included landline and cellular telephone households and used a new method for weighting [7]. Respondents are asked, “Have you ever had a pneumonia shot?” and we calculated the weighted proportion of respondents who reported ever receiving a

pneumonia shot. In the 2013 BRFSS, the median state/area American Association of Public Opinion Research response rate was 46.4% [8]. T -tests were performed to test significant differences among racial/ethnic groups and linear trend tests were performed to test

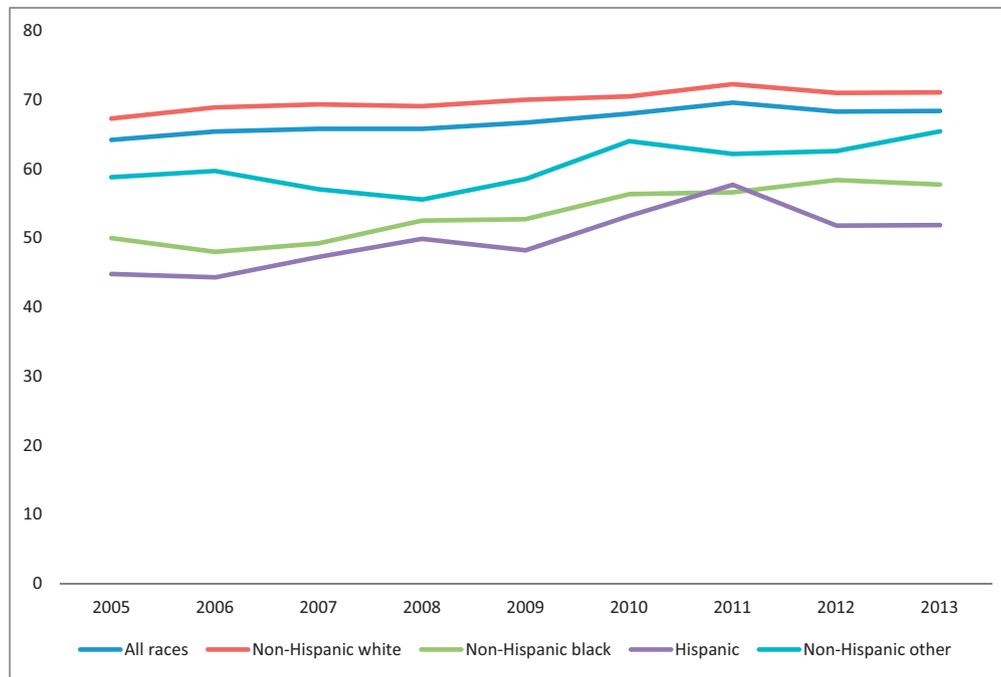


Fig. 1. Pneumococcal vaccination coverage among adults ≥ 65 years, by race/ethnicity - United States, BRFSS 2005–2013.

whether coverage has significantly increased over time with a significance level set at $\alpha = 0.05$.

3. Results

In the 2013 BRFSS, the median state vaccination coverage among adults ≥ 65 years was 69.5%, and coverage ranged from 61.9% in New Jersey to 75.6% in Oregon. Coverage overall among non-Hispanic whites (71.1%) was higher than coverage for non-Hispanic blacks (57.7%), Hispanics (51.9%), and non-Hispanic persons of other race (65.4%). Among non-Hispanic whites, coverage ranged from 65.2% in Alaska to 75.6% in Delaware with a median of 71.2%. Among non-white persons of all other racial/ethnic groups combined (including non-Hispanic blacks, Hispanics, and all other non-Hispanic persons of other race), coverage ranged from 49.4% in Mississippi to 77.6% in Oregon with a median of 61.5%. In 28 states/areas, coverage was higher among non-Hispanic whites compared with that for persons of all other racial/ethnic groups combined, while in the remaining states/areas, coverage across racial and ethnic groups was similar (Table 1).

Coverage data by more specific race/ethnicity were available for only some states due to small sample sizes. Data for non-Hispanic blacks was available for all but 18 states/areas, and among those, median state coverage was 58.8% and coverage ranged from 48.1% in Mississippi to 77.2% in Nebraska. Data for Hispanics was available in only 20 states/areas, and among those, median state coverage was 55.8%, and coverage ranged from 44.9% in Nebraska to 74.3% in Nevada. Data for non-Hispanic persons of other race was available for all but 2 states/areas. Median state coverage was 68.5% and coverage ranged from 51.0% in New York to 81.7% in Oregon. Compared to non-Hispanic whites, coverage was lower among non-Hispanic blacks in 22 states, lower among Hispanics in 10 states, and lower among persons of other race in 1 state (Table 1).

Since 2005, pneumococcal vaccination coverage among persons ≥ 65 years has significantly increased (test for linear trend, $p < 0.05$). In 2005, coverage was 64.2%, and coverage reached its highest point in 2011 at 69.6% (Fig. 1). Coverage also significantly increased for all race/ethnic groups (test for linear trend, $p < 0.05$), and in each year

since 2005, coverage among non-Hispanic whites has been higher than all other racial/ethnic groups (Fig. 1).

4. Discussion

While use of pneumococcal conjugate vaccines in children has resulted in a reduction of vaccine-type invasive infections in older adults in the United States, significant morbidity and mortality from pneumococcal disease still exists, and vaccinating adults ≥ 65 years with PPSV23 and PCV13 can reduce the burden of illness [9]. In 2013, 38% of IPD among adults in this age group was caused by serotypes unique to PPSV23, while 20–25% of IPD cases and 10% of community-acquired pneumonia cases were caused by PCV13 serotypes [10]. The current *Healthy People 2020* goal of 90% for pneumococcal vaccination in adults ≥ 65 years is based on baseline rates and the need to prevent pneumococcal disease which still lingers in this population [5].

Pneumococcal vaccination coverage has increased since 1993, when median state coverage was 27.4%, and coverage ranged from 18.5% in Louisiana to 40.0% in Colorado [11]. However, in recent years, improvements have been modest. Between 2004 and 2005, median state coverage increased from 64.6% to 65.7%, and only 3 states had a significant increase in coverage [12]. In 2012 and 2013, median state coverage was 68.8% and 69.5%, respectively [13].

Variation in state coverage could be due to differing medical care delivery infrastructure, population norms, and effectiveness of state and local immunization programs among states [14]. Numerous factors play a role in racial/ethnic differences in coverage among adults, including differences in attitudes toward vaccination, the propensity to seek and accept vaccination, and differences in quality of care received by racial/ethnic populations [15–19].

Similar trends and gaps in coverage have been observed in other surveillance systems, like the NHIS, a national, cross-sectional household survey of the civilian, noninstitutionalized population in the United States. In the 2013 NHIS, national pneumococcal vaccination coverage among adults ≥ 65 years was 59.7%, which was not statistically different than the previous year's coverage estimate [6]. Non-Hispanic whites had higher coverage (63.6%) than

non-Hispanic blacks (48.7%), Hispanics (39.2%), and non-Hispanic Asians (45.3%), but persons of other race had coverage (54.6%) similar to that for non-Hispanic whites [6]. Overall coverage in the 2013 BRFSS was 9.8 percentage points higher than coverage in the 2013 NHIS. Factors that may contribute to the differences in estimated coverage between the NHIS and BRFSS include a more representative sample frame and higher response rates for the NHIS, survey mode (in person for the NHIS, telephone for BRFSS), and differences in survey operations and weighting procedures.

Data from this report indicate that while pneumococcal vaccination coverage has improved, it still remains well below vaccination targets. Also, opportunities for pneumococcal vaccination are missed during contacts with health care providers. In 2008, among persons ≥ 65 years who reported never receiving PPSV23, 89% had one or more physician visits in the past year, 14% were hospitalized in the past year, 19% visited an emergency room, and 39% had received a flu vaccination [20]. Annual influenza vaccination provides an opportunity for people ≥ 65 years to receive pneumococcal vaccination. Standing orders for vaccinations, reminder/recall systems, and regular assessment of vaccination coverage in health care settings have been shown to improve vaccination coverage among adults [21]. Since coverage is lower among minorities nationally and in most states, specific strategies are needed to improve coverage among these groups, such as developing culturally and linguistically appropriate messages, working with healthcare providers who care for elderly minority patients to better implement effective interventions, conducting vaccination clinics in underserved neighborhoods, and developing new partnerships to reach populations that have not been targeted [22]. Finally, pneumococcal vaccination coverage is higher in states that offer pharmacists full immunization privileges compared to states with limited or no authorization for pharmacists to provide vaccination services [23].

The findings in this report are subject to at least four limitations. First, pneumococcal vaccination status was based on self-report and subject to recall bias. However, self-reported pneumococcal vaccination status has been shown to be sensitive and specific [24]. Second, the median BRFSS response rate was low, and nonresponse bias may remain even after weighting adjustments. Finally, adults in this sample could have been vaccinated using PPSV23 or PCV13, but BRFSS did not ascertain pneumococcal vaccination by type.

5. Conclusion

Improvement in pneumococcal vaccination coverage is needed to reach the Healthy People 2020 target. Health-care providers are encouraged to consider following the National Vaccine Advisory Committee Standards for Adult Immunization Practice and routinely assess vaccination needs, strongly recommend vaccination to their patients, administer needed vaccines or refer to vaccinating providers, and document vaccines administered or received by patients.

Disclaimer

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of CDC.

Conflict of interest statement

All authors report no conflicts of interest.

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