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Influenza vaccination coverage of Vaccine for Children (VFC)-entitled versus privately insured children, United States, 2011–2013[☆]

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Abstract

Background—The Vaccines for Children (VFC) program provides vaccines at no cost to children who are Medicaid-eligible, uninsured, American Indian or Alaska Native (AI/AN), or underinsured and vaccinated at Federally Qualified Health Centers or Rural Health Clinics. The objective of this study was to compare influenza vaccination coverage of VFC-entitled to privately insured children in the United States, nationally, by state, and by selected socio-demographic variables.

Methods—Data from the National Immunization Survey-Flu (NIS-Flu) surveys were analyzed for the 2011–2012 and 2012–2013 influenza seasons for households with children 6 months–17 years. VFC-entitlement and private insurance status were defined based upon questions asked of the parent during the telephone interview. Influenza vaccination coverage estimates of children VFC-entitled versus privately insured were compared by *t*-tests, both nationally and within state, and within selected socio-demographic variables.

Results—For both seasons studied, influenza coverage for VFC-entitled children did not significantly differ from coverage for privately insured children (2011–2012: 52.0% ± 1.9% versus 50.7% ± 1.2%; 2012–2013: 56.0% ± 1.6% versus 57.2% ± 1.2%). Among VFC-entitled children, uninsured children had lower coverage (2011–2012: 38.9% ± 4.7%; 2012–2013: 44.8% ± 3.5%) than Medicaid-eligible (2011–2012: 55.2% ± 2.1%; 2012–2013: 58.6% ± 1.9%) and AI/AN children (2011–2012: 54.4% ± 11.3%; 2012–2013: 54.6% ± 7.0%). Significant differences in vaccination coverage among VFC-entitled and privately insured children were observed within

[☆]The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of CDC.

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Author's contribution

AS conceived the study and wrote the first draft of the manuscript. He had access to all data and takes the responsibility for their integrity. YZ performed the statistical analyses. TAS, KEK, PJS and JAS participated in data interpretation and writing of the manuscript. TAS and JAS also contributed to the conception of the study and data analysis. All authors have reviewed and approved the submitted version of the manuscript.

Conflict of interest statement

We declare that we do not have conflicts of interest relating to this study.

some subgroups of race/ethnicity, income, age, region, and living in a metropolitan statistical area principle city.

Conclusions—Although finding few differences in influenza vaccination coverage among VFC-entitled versus privately insured children was encouraging, nearly half of all children were not vaccinated for influenza and coverage was particularly low among uninsured children. Additional public health interventions are needed to ensure that more children are vaccinated such as a strong recommendation from health care providers, utilization of immunization information systems, provider reminders, standing orders, and community-based interventions such as educational activities and expanded access to vaccination services.

Keywords

Influenza; Vaccination coverage; VFC; Children; Private insurance; NIS-Flu

1. Introduction

Seasonal influenza vaccination coverage among children 6 months–17 years has been increasing, from 43.7% in the 2009–2010 influenza season to 56.6% in the 2012–2013 season [1–4]. Despite these increases, influenza vaccination coverage among children is still below the *Healthy People 2020* (HP2020) revised target of 70% [5,6]. The Vaccines for Children (VFC) program has reduced racial/ethnic disparities in childhood vaccination coverage, improved vaccination rates among children, and fostered discontinuance of referring children to health department clinics by allowing children to be vaccinated in their medical home [7–9]. The VFC program was created by the Omnibus Budget Reconciliation Act of 1993 and first implemented in 1994, and is a federal entitlement program that provides vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay [10,11]. Children 18 years are entitled to receive VFC vaccines if they are Medicaid-eligible, uninsured, American Indian or Alaska Native (AI/AN), or underinsured and vaccinated at Federally Qualified Health Centers (FQHC) or Rural Health Clinics (RHC) [11]. Studies of the association between insurance status and vaccination coverage among children for recommended vaccines other than influenza have shown that children with health insurance have higher vaccination coverage than uninsured children [12–18].

Differences in influenza vaccination coverage between VFC-entitled and privately insured children 6 months–17 years have not been evaluated with a national sample, nor have such differences in coverage been evaluated among socio-demographic subgroups of children. Identifying and quantifying any differences in childhood influenza vaccination coverage by insurance status could help guide public health action to increase influenza vaccination coverage for all children. This study was undertaken to compare influenza vaccination coverage of VFC-entitled versus privately insured children 6 months–17 years in the United States, nationally and by state, and to assess for any difference within select socio-demographic subgroups.

2. Methods

2.1. Survey description

We analyzed data from the National Immunization Survey-Flu (NIS-Flu) surveys for two influenza seasons: 2011–2012 and 2012–2013 [1–3]. The NIS-Flu survey is an ongoing, national list-assisted random-digit-dial survey of households with either landline telephone or cellular telephone numbers, and has a target population of non-institutionalized children 6 months–17 years [1]. The survey includes three components: the NIS-Child for children 19–35 months, the NIS-Teen for children 13–17 years, and a short child influenza module for children 6–18 months and 3–12 years [1,19,20]. The Council of American Survey and Research Organizations (CASRO) response rates for the 2011–2012 and 2012–2013 influenza seasons ranged from 51.8% to 63.2% for the landline sample and 18.1% to 30.9% for the cellular telephone sample [21]. Data on child, maternal, and household socio-demographic characteristics were collected during the telephone interviews.

2.2. VFC-entitled and private insurance group definitions

Data from the NIS-Flu surveys were used to evaluate whether the children were (i) on Medicaid, (ii) not covered by health insurance (uninsured), (iii) AI/AN, or (iv) privately insured. These evaluations were based upon insurance questions asked of the parent during the telephone interview. While the NIS-Child and NIS-Teen components of the NIS-Flu had a long series of questions to determine insurance status of the child, there were only two insurance questions included on the influenza module for children 6–18 months and 3–12 years. The two questions were as follows: “Does [child] have any kind of health care coverage, including health insurance, prepaid plans such as Health Maintenance Organizations, or government plans such as Medicaid?” and “Is that coverage Medicaid, the State Children’s Health Insurance Program, or some other type of insurance?” Precise VFC-entitlement status could not be determined because of the inability to identify the underinsured and vaccinated at FQHC/RHC group with the NIS-Flu survey questions. Thus, for this study, the VFC-entitled group consisted of children who were reported as uninsured, Medicaid-eligible, or AI/AN, categories which are not mutually exclusive. The privately insured group consisted of children reported as having private health insurance.

2.3. Influenza vaccination coverage assessment

Influenza vaccination status was assessed by asking the parent if the survey-selected child(ren) in the household had received an influenza vaccination since July 1 and, if so, in which month and year. The parental responses about whether a child had received influenza vaccine were not validated with medical records. For the 2011–2012 season, interview data collected during September 2011 through June 2012 were included in the analyses, and children reported to have received influenza vaccination July 2011 through May 2012 were considered vaccinated. For the 2012–2013 season, interview data collected during October 2012 through June 2013 were included in the analyses, and children reported to have received influenza vaccination July 2012 through May 2013 were considered vaccinated. For children who were reported to have been vaccinated but had a missing month and year of vaccination (6.1% for the 2011–2012 season and 6.0% for the 2012–2013 season), month and year of vaccination was imputed from donor pools matched for week of interview, age

group, state of residence, and race/ethnicity [2,3]. Estimation of influenza vaccination coverage was based on the Kaplan–Meier survival analysis procedure that has been used to calculate season-specific estimates starting with the 2009–2010 influenza season [1,3,22,23]. Influenza vaccination coverage estimates were calculated by private health insurance and VFC-entitlement status at the national level. Influenza vaccination coverage by private health insurance and VFC-entitlement status was also calculated by state and within select socio-demographic sub-groups.

2.4. Statistical methods

Comparisons of influenza vaccination coverage estimates between VFC-entitled and privately insured children and between the 2011–2012 and 2012–2013 seasons were performed with *t*-tests assuming large degrees of freedom. All analyses were weighted to the United States population of non-institutionalized children 6 months–17 years. The weights used to calculate the routine parental-reported influenza vaccination coverage estimates for children that are published on CDC’s FluVaxView website could not be used for this study [24] because, for the NIS-Child and NIS-Teen components of the NIS-Flu, the insurance questions are asked only after the parent grants permission to contact the child’s vaccination provider to obtain vaccination records; insurance status is therefore missing for children whose parents did not grant permission for the NIS to contact their providers. Thus, a new set of weights was derived so that the sample of children with insurance information is representative of the population of non-institutionalized children 6 months–17 years in the United States. To quantify the possible extent of differences due to the reweighting, we compared the reweighted estimates for the subset of data analyzed for this study to the published final estimates that used all the data for both seasons studied. We found that for the 2011–2012 season, the differences between this study estimates and the published final estimates ranged from –1.6% to 0.5%. Similarly, for the 2012–2013 season, the differences ranged from –0.2% to 1.3%.

The analyses for this study included 83,411 children for the 2011–2012 season and 87,661 children for the 2012–2013 season. All estimates, along with 95% confidence intervals (CIs), were calculated using SAS (SAS Institute, Inc., Cary, NC, version 9.3) and SUDAAN (Research Triangle Institute, Research Triangle Park, NC, version 10.01) to account for the complex survey design. All tests were two-sided and all comparisons noted as differences were statistically significant at alpha equal to 0.05 while comparisons noted as similar or the same were not statistically different at the $p < 0.05$ level.

2.5. Ethical approval

Institutional Review Board (IRB) approval for conducting the NIS-Flu was obtained through the National Center for Health Statistics Research Ethics Review Board and through the IRB of NORC at the University of Chicago.

3. Results

Nationally, 34.2% of children 6 months–17 years old were VFC-entitled during the 2011–2012 season based on the proxy variable that excluded underinsured and vaccinated at

FQHC/RHC children, and 65.8% had private insurance (Table 1). In this season, 26.4% were enrolled in Medicaid, 6.6% were uninsured, and 2.2% were AI/AN. In the 2012–2013 season, 37.0% of children were considered VFC-entitled with 28.6% enrolled in Medicaid, 6.8% uninsured, and 3.1% AI/AN; 63.0% of children were privately insured. The distribution of socio-demographic characteristics of the sample surveyed is included in Table 1.

Influenza vaccination coverage was higher in the 2012–2013 season compared to the 2011–2012 season for both VFC-entitled (56.0% versus 52.0%) and privately insured children (57.2% versus 50.7%; Table 1). This increase occurred in all subgroups of VFC-entitlement studied except the AI/AN children in which coverage remained similar. Influenza vaccination coverage by the socio-demographic characteristics of the sample is included in Table 1.

Nationally, VFC-entitled children had similar influenza vaccination coverage compared to privately insured children in both influenza seasons studied, with coverage being 52.0% versus 50.7%, respectively, in the 2011–2012 season and 56.0% versus 57.2%, respectively, in the 2012–2013 season (Fig. 1). Within the VFC-entitled group of children, uninsured children had lower influenza vaccination coverage than Medicaid insured children in both seasons studied, with coverage being 38.9% versus 55.2%, respectively, in the 2011–2012 season and 44.8% versus 58.6%, respectively, in the 2012–2013 season (Fig. 1).

By state, influenza vaccination coverage varied widely among VFC-entitled and privately insured children during both seasons (Table 2). During the 2011–2012 season, coverage among VFC-entitled children ranged from 34.2% in Arizona to 74.9% in Rhode Island, and coverage among privately insured children ranged from 34.7% in Alaska to 73.9% in Rhode Island. During the 2012–2013 season, coverage among VFC-entitled children ranged from 40.3% in Missouri to 87.1% in Rhode Island, and coverage among privately insured children ranged from 41.6% in Montana to 81.4% in Rhode Island. Coverage among VFC-entitled children exceeded 70% in three states and among privately insured children in one state during the 2011–2012 season. Coverage among VFC-entitled children exceeded 70% in eight states and among privately insured children in four states during the 2012–2013 season. In only nine states were there differences in coverage between VFC-entitled and privately insured children during the 2011–2012 season, and in two states during the 2012–2013 season. During the 2011–2012 season, three states had lower coverage among VFC-entitled children and six states had lower coverage among privately insured children. During the 2012–2013 season, one state had lower coverage among VFC-entitled children and one state had lower coverage among privately insured children. Comparing influenza vaccination coverage between seasons, VFC-entitled children had higher coverage in seven states and privately insured children had higher coverage in 16 states in the 2012–2013 season than in the 2011–2012 season.

In the 2011–2012 season, influenza vaccination coverage was similar among VFC-entitled and privately insured children for most socio-demographic groups studied (Table 3). For non-Hispanic white only children, coverage was higher among privately insured compared to VFC-entitled children. For four of the socio-demographic groups (age 13–17 years, MSA

principle city, Northeast, and Midwest), coverage was higher among VFC-entitled compared to privately insured children.

Again, for the 2012–2013 season, influenza vaccination coverage was similar among VFC-entitled and privately insured children for most socio-demographic groups studied, but a different pattern was evident (Table 3). For six of the socio-demographic groups (age 6–23 months, age 2–4 years, male, non-Hispanic white, non-Hispanic other/multiple race, and above poverty \$75,000), coverage was higher among privately insured compared to VFC-entitled children. Coverage was not higher among the VFC-entitled children for any of the socio-demographic groups in 2012–2013 season.

4. Discussion

The findings of this study indicate that in both influenza seasons studied, VFC-entitled children had similar influenza vaccination coverage to privately insured children overall, and that within the VFC-entitled group uninsured children had influenza vaccination coverage that was at least 10 percentage points lower than the other two VFC-entitled groups of Medicaid and AI/AN children. Two studies have shown that vaccination coverage of other routinely administered vaccines among children 13–17 years was lower for VFC-entitled children compared to privately insured children [12,16]. Another study of children 19–35 months showed differences in vaccination coverage based on insurance status [13]. A similar study showed that vaccination coverage for diphtheria–tetanus–acellular pertussis, polio, measles–mumps–rubella, Haemophilus influenza type b, varicella, heptavalent pneumococcal conjugate (PCV7), and influenza vaccination was lower among VFC-entitled children than for privately insured children [15]. One additional study had shown that, compared to those who were fully insured, children who were underinsured and received vaccinations at a health department clinic had significantly lower vaccination coverage for the varicella and PCV7 vaccines [17]. In our study we could not assess the underinsured group of VFC-eligible children.

As in previous reports of childhood influenza vaccination coverage for the United States, we found large variability in influenza vaccination coverage between states. While several states achieved or surpassed the *HP2020* target of 70% coverage, coverage remains low in many states. This variability was observed in both VFC-entitled and privately insured children. It is unknown to us why states vary widely in child influenza vaccination coverage, something that has been seen in the United States since the vaccine was first recommended for all children. The factors likely include varying degrees of programmatic and provider implementation of influenza recommendations, varying parental awareness, attitudes, and access to influenza vaccination services for their children, and other factors. Further study is needed to understand the variability in influenza vaccination coverage between states.

The findings of this study suggest that overall the influenza vaccination coverage among VFC-entitled children is similar to coverage among children who are privately insured; however, efforts are still needed to achieve the *HP2020* revised target of 70% coverage in children 6 months–17 years. A striking difference was observed in the uninsured group which had the lowest coverage among the groups compared. These children are eligible for

the Vaccines for Children program but may not be aware of the program and may not have a medical home. With the implementation of the Affordable Care Act (ACA), it is expected that fewer children will be uninsured. The ACA helps make health insurance more available in three primary ways: (1) sets up a Health Insurance Marketplace where consumers may go to compare available insurance plans and enroll in the one they choose, (2) promotes the expansion of Medicaid programs in the states, and (3) reforms insurance market rules (e.g., eliminates denial of coverage for pre-existing conditions)¹.

4.1. Strengths and limitations

The findings of this study are subject to several limitations. First, influenza vaccination status was based on parental report, not validated with medical records, and, thus, is subject to recall bias. A validity study has shown that parental report (for children) overestimates influenza vaccination coverage and may be more accurate for children who are privately or publicly insured as compared to parent report for uninsured children [25]. Second, NIS-Flu is a telephone survey that excludes households with no telephone service. Non-coverage and non-response bias may remain even after weighting adjustments. Third, we assessed influenza vaccination coverage with at least one dose of vaccination, but children younger than nine years often need two doses to be fully protected against influenza disease [26]. Fourth, our measure of VFC-entitlement included only three of the four VFC-entitlement criteria (Medicaid-eligible, uninsured, and AI/AN), as information was not available to identify underinsured children (likely less than 1%) [11,14] which would lead to a slight underestimation of the percentage of children who are eligible for the VFC program. Lastly, in the NIS-Flu VFC and insurance status for children 6–18 months and 3–12 years (62.5% of the study sample in 2011–2012, 62.6% in 2012–2013) were based upon parental report to a smaller set of questions than what was used for children 19–35 months (NIS-Child) and 13–17 years (NIS-Teen) and, thus, may be subject to misclassification error. To quantify the possible extent of this error, we compared the NIS-Flu insurance variables to unpublished VFC administrative data. The 2013 VFC administrative data was collected using the child age groups <1 year, 1–2 years, 3–6 years, and 7–18 years. For these age groups, respectively, and based on the administrative data, 50.2%, 43.6%, 42.6%, and 32.1% of children in the United States were Medicaid insured in 2013 and 9.2%, 9.2%, 9.2%, and 9.1% were uninsured. An analysis of the NIS-Flu data for the 2012–2013 season by these same age groups (except 6–11 months instead of <1 year) indicated that 32.0%, 38.6%, 28.5%, and 26.9% were Medicaid insured and 5.9%, 4.8%, 6.3% and 7.3% were uninsured. Thus the differences between the NIS-Flu and the administrative data were: 18.2%, 5.0%, 14.1%, and 5.2% for Medicaid and 3.3%, 4.4%, 2.9%, and 1.8% for uninsured. This indicates that the largest amount of underestimation by the NIS-Flu insurance proxy variables occurred for Medicaid insured children <1 year (by 18 percentage points) and 3–6 years (by 14 percentage points), and there was a 5 percentage point or less underestimation for the other age groups for Medicaid and for all age groups for uninsured children based on the NIS-Flu as compared to administrative data. This misclassification of Medicaid status is expected to dilute observed differences in vaccination coverage between VFC-entitled and privately

¹<https://www.healthcare.gov/health-care-law-protections/#part8=undefined/part=8/>.

insured children, because some Medicaid-enrolled children will be misclassified as having private health insurance.

5. Conclusions

This study showed no national differences in influenza vaccination coverage by VFC-entitlement status for the two influenza seasons studied. However, children who were uninsured had low vaccination coverage, and large state variability and some variability between demographic variables exists. Although the results are encouraging, influenza vaccination coverage was below the **HP2020** target of 70% for almost every socio-demographic group, indicating that improvement of coverage is needed to protect all children from influenza. Increased efforts are needed to implement evidence-based strategies proven to increase vaccination coverage such as a strong recommendation from health care providers, utilization of immunization information systems, provider reminders, standing orders, and community-based interventions such as educational activities and expanded access to vaccination services [27].

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Abbreviations

HP2020	Healthy People 2020
VFC	Vaccines for Children
AI/AN	American Indian or Alaska Native
FQHC	Federally Qualified Health Centers
RHC	Rural Health Clinics
NIS-Flu	National Immunization Survey-Flu
CASRO	Council of American Survey and Research Organizations
MSA	Metropolitan Statistical Area
CI	confidence interval
PCV7	Heptavalent Pneumococcal Conjugate Vaccine
ACA	Affordable Care Act

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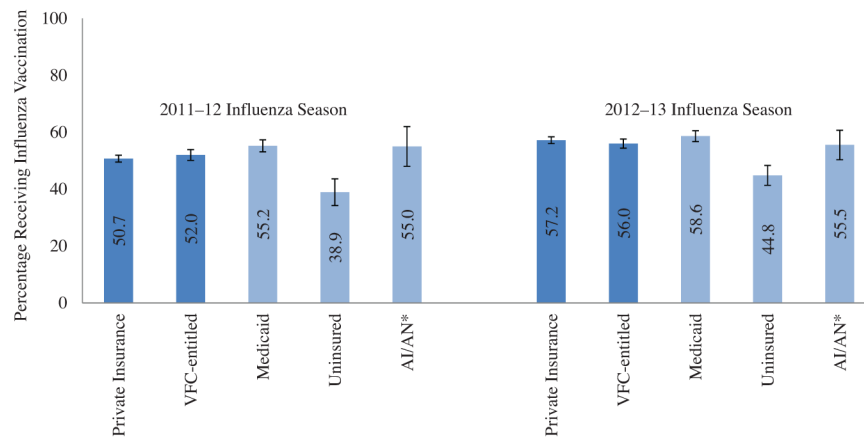


Fig. 1. Influenza vaccination coverage among children 6 months–17 years by insurance status and Vaccines for Children (VFC) entitlement status, National Immunization Survey-Flu (NIS-Flu), 2011–2012 and 2012–2013 influenza seasons. * AI/AN: Alaska Indian/Alaska Native. The VFC-entitled group does not include underinsured children. Uninsured children had lower influenza vaccination coverage than Medicaid insured children in both seasons (both $p < 0.05$); the uninsured children had lower coverage compared to the AI/AN group in both seasons (both $p < 0.05$), and the coverage of Medicaid insured children did not differ from coverage of AI/AN children.

Table 1
Socio-demographic distribution and influenza vaccination coverage estimates, children 6 months–17 years, National Immunization Survey-Flu (NIS-Flu), 2011–2012 and 2012–2013 influenza seasons.

Socio-demographic characteristics	2011–2012 influenza season			2012–2013 influenza season		
	n	% ± 95% CI ^a	Vaccinated % ± 95% CI	n	% ± 95% CI	Vaccinated % ± 95% CI
VFC ^b /Insurance status						
VFC-entitled	25,382	34.2 ± 0.9	52.0 ± 1.9	29,015	37.0 ± 0.8 ^c	56.0 ± 1.6 ^c
Uninsured	4675	6.6 ± 0.5	38.9 ± 4.7	5707	6.8 ± 0.4	44.8 ± 3.5 ^c
Medicaid	19,146	26.4 ± 0.8	55.2 ± 2.1	21,608	28.6 ± 0.7 ^c	58.6 ± 1.9 ^c
American Indian/Alaska Native	3021	2.2 ± 0.2	55.0 ± 7.0	3493	3.1 ± 0.3 ^c	55.5 ± 5.2
Privately insured	58,029	65.8 ± 0.9	50.7 ± 1.2	58,646	63.0 ± 0.8 ^c	57.2 ± 1.2 ^c
Age						
6–23 months	9013	10.4 ± 0.5	74.2 ± 3.0	10,288	9.6 ± 0.4 ^c	78.2 ± 2.6 ^c
2–4 years	14,286	16.2 ± 0.6	63.8 ± 2.3	15,491	15.6 ± 0.5	65.6 ± 2.0
5–12 years	40,690	44.6 ± 0.8	54.4 ± 1.4	47,391	45.2 ± 0.7	58.5 ± 1.3 ^c
13–17 years	19,422	28.8 ± 0.8	32.1 ± 2.0	14,491	29.6 ± 0.7	43.3 ± 1.9 ^c
Gender						
Male	42,964	51.2 ± 0.9	51.6 ± 1.4	45,423	51.2 ± 0.7	56.4 ± 1.3 ^c
Female	40,447	48.8 ± 0.9	50.6 ± 1.5	42,238	48.8 ± 0.7	57.2 ± 1.4 ^c
Race/ethnicity						
Non-Hispanic, white only	52,384	57.1 ± 0.9	47.2 ± 1.2	53,432	53.4 ± 0.8 ^c	54.1 ± 1.1 ^c
Non-Hispanic, black only	8838	14.9 ± 0.7	53.1 ± 3.1	8820	14.0 ± 0.6	57.3 ± 3.0
Hispanic	13,600	22.2 ± 0.8	59.3 ± 2.8	15,448	23.4 ± 0.8 ^c	60.8 ± 2.5
Non-Hispanic other/multiple races	8589	5.8 ± 0.3	53.2 ± 3.2	9961	9.2 ± 0.4 ^c	61.4 ± 3.0 ^c
Metropolitan statistical area (MSA)						
MSA, principle city	26,841	32.6 ± 0.9	55.1 ± 2.0	29,451	32.9 ± 0.8	59.6 ± 1.7 ^c
MSA, not principle city	38,017	51.8 ± 0.9	50.3 ± 1.5	38,147	49.9 ± 0.8 ^c	56.5 ± 1.5 ^c
Non-MSA	18,553	15.7 ± 0.5	45.4 ± 2.0	20,063	17.2 ± 0.5 ^c	52.2 ± 1.8 ^c
Annual income/poverty level ^d						
Above poverty, \$75,000	32,791	34.9 ± 0.8	50.7 ± 1.5	33,336	33.5 ± 0.7 ^c	59.6 ± 1.5 ^c
Above poverty, <\$75,000	31,311	36.0 ± 0.9	46.8 ± 1.7	32,067	35.1 ± 0.8	52.3 ± 1.6 ^c
At or below poverty level	13,709	22.5 ± 0.8	57.2 ± 2.7	15,444	24.1 ± 0.8 ^c	59.6 ± 2.2
Unknown	5600	6.5 ± 0.4	56.0 ± 3.6	6814	7.3 ± 0.4 ^c	56.9 ± 3.3

Socio-demographic characteristics	2011–2012 influenza season				2012–2013 influenza season			
	<i>n</i>	% ± 95% CI ^a	Vaccinated % ± 95% CI	% ± 95% CI	<i>n</i>	% ± 95% CI	Vaccinated % ± 95% CI	% ± 95% CI
Region ^e								
Northeast	15,364	16.7 ± 0.5	58.3 ± 2.0	16.4 ± 0.4	17,311	16.4 ± 0.4	66.1 ± 1.9 ^c	16.4 ± 0.4
Midwest	17,083	21.5 ± 0.5	47.5 ± 1.7	21.6 ± 0.5	18,083	21.6 ± 0.5	54.0 ± 1.6 ^c	21.6 ± 0.5
South	32,305	37.6 ± 0.8	50.8 ± 1.7	37.8 ± 0.7	31,773	37.8 ± 0.7	55.5 ± 1.6 ^c	37.8 ± 0.7
West	18,659	24.2 ± 0.8	49.8 ± 2.8	24.2 ± 0.7	20,494	24.2 ± 0.7	54.7 ± 2.5 ^c	24.2 ± 0.7

n is unweighted sample size.

^aConfidence interval.

^bVaccines for Children program. The VFC-entitled group consisted of children who were either uninsured, Medicaid eligible, or an American Indian or Alaska Native. Children may fall into more than one of these categories; therefore, the numbers and proportions of children in each of the VFC-entitled subgroups sum to more than the overall number and proportion of VFC-entitled children in the sample.

^cStatistically significant difference compared to the 2011–2012 influenza season estimates.

^dPoverty level was defined based on the reported number of people living in the household and annual household income, and the U.S. Census poverty thresholds.

^eClassification was based on the U.S. Census Bureau's census region definition.

Table 2

Influenza vaccination coverage by Vaccines for Children (VFC) entitlement status and by state, children 6 months–17 years, National Immunization Survey-Flu (NIS-Flu), 2011–2012 and 2012–2013 influenza seasons.

State	2011–2012 influenza season				2012–2013 influenza season			
	VFC-entitled		Privately insured		VFC-entitled		Privately insured	
	n	Vaccinated % ± 95% CI ^a	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI
Overall	25,382	52.0 ± 1.9	58,029	50.7 ± 1.2	29,015	56.0 ± 1.6 ^b	58,646	57.2 ± 1.2 ^b
Alabama	513	50.3 ± 9.9	1009	47.7 ± 6.1	495	56.0 ± 9.6	849	50.1 ± 7.4
Alaska	607	42.6 ± 8.4	738	34.7 ± 6.4	749	48.3 ± 7.0	849	45.5 ± 6.5 ^b
Arizona	384	34.2 ± 10.3^c	1105	52.8 ± 7.8^d	458	48.9 ± 8.1 ^b	1217	48.5 ± 5.2
Arkansas	350	54.4 ± 12.7 ^c	1219	65.4 ± 6.0	434	60.1 ± 9.5	1039	64.5 ± 6.3
California	335	48.7 ± 10.8 ^c	1236	52.7 ± 5.4	429	53.8 ± 8.0	1414	56.7 ± 5.5
Colorado	393	46.9 ± 9.8	1222	52.1 ± 5.9	463	62.7 ± 7.6 ^b	1238	58.1 ± 4.9
Connecticut	417	66.5 ± 9.3	1138	59.5 ± 5.9	503	67.6 ± 7.9	1189	65.8 ± 5.4
Delaware	357	61.5 ± 11.2 ^c	1061	52.6 ± 8.4	550	73.3 ± 7.1	1086	62.0 ± 9.8
D.C.	504	55.6 ± 9.9	842	68.3 ± 9.4	530	77.5 ± 9.3 ^b	893	70.2 ± 9.4
Florida	509	50.1 ± 9.0	839	43.6 ± 11.0 ^c	640	51.0 ± 10.3 ^c	813	45.2 ± 6.6
Georgia	374	45.9 ± 12.3 ^c	1130	42.0 ± 5.5	386	45.8 ± 9.5	978	53.1 ± 5.8 ^b
Hawaii	490	71.4 ± 20.8 ^c	994	68.6 ± 6.5	547	71.6 ± 14.2 ^c	1054	72.7 ± 7.5
Idaho	434	41.9 ± 8.7	870	42.4 ± 6.7	500	47.3 ± 8.7	834	41.9 ± 5.9
Illinois	1164	49.4 ± 7.1	1702	39.8 ± 4.8^d	1287	54.6 ± 6.3	1684	51.4 ± 5.3 ^b
Indiana	573	50.7 ± 8.2	971	43.3 ± 5.5	556	55.8 ± 7.2	831	52.8 ± 5.8 ^b
Iowa	345	55.8 ± 9.5	1052	48.9 ± 4.9	357	51.0 ± 9.0	973	57.7 ± 5.3 ^b
Kansas	418	40.8 ± 9.5	1061	49.0 ± 5.4	477	44.7 ± 7.6	834	46.3 ± 5.2
Kentucky	382	38.2 ± 9.4	967	54.6 ± 6.0^d	419	55.7 ± 10.3 ^{b,c}	984	58.2 ± 6.1
Louisiana	735	57.0 ± 8.4	907	48.4 ± 6.1	869	55.4 ± 7.5	912	57.6 ± 6.3 ^b
Maine	537	61.2 ± 7.4	797	59.6 ± 6.2	568	60.0 ± 7.8	824	61.9 ± 6.6
Maryland	385	74.1 ± 18.3 ^c	1781	61.0 ± 8.3	277	63.8 ± 14.6 ^c	1379	66.5 ± 7.3

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State	2011–2012 influenza season				2012–2013 influenza season			
	VFC-entitled		Privately insured		VFC-entitled		Privately insured	
	n	Vaccinated % ± 95% CI ^a	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI
Massachusetts	150	62.2 ± 15.7 ^c	1132	62.7 ± 5.3	218	79.5 ± 7.4	1334	76.0 ± 4.4 ^b
Michigan	400	37.1 ± 9.2	1129	47.9 ± 5.0^d	421	49.5 ± 8.0 ^b	1078	53.1 ± 5.8
Minnesota	272	58.8 ± 10.8 ^c	918	46.7 ± 6.0	317	61.0 ± 10.7 ^c	955	63.4 ± 5.7 ^b
Mississippi	569	38.5 ± 8.7	831	48.3 ± 7.3	611	48.1 ± 8.4	819	49.6 ± 6.8
Missouri	414	45.1 ± 10.2 ^c	882	44.8 ± 6.3	475	40.3 ± 9.5	917	54.2 ± 5.4^{b,d}
Montana	456	42.6 ± 9.7	1134	43.1 ± 5.4	472	46.5 ± 8.8	1185	41.6 ± 5.6
Nebraska	314	57.8 ± 11.0 ^c	741	49.1 ± 6.9	401	57.7 ± 9.0	881	57.7 ± 6.4
Nevada	501	45.1 ± 10.9 ^c	1001	45.8 ± 8.3	607	56.0 ± 8.3	1134	51.2 ± 5.5
New Hampshire	164	48.7 ± 14.1 ^c	1284	52.4 ± 6.3	314	65.0 ± 11.0 ^c	1358	60.3 ± 6.3
New Jersey	383	65.6 ± 8.8	1030	62.8 ± 5.5	466	76.5 ± 8.5	1172	67.2 ± 5.3
New Mexico	873	64.3 ± 7.2	791	53.8 ± 8.0	867	70.4 ± 6.5	676	64.5 ± 7.1 ^b
New York	973	64.1 ± 6.7	1512	51.8 ± 4.9^d	1277	63.0 ± 5.0	1853	59.5 ± 4.2 ^b
North Carolina	438	65.3 ± 13.9^c	986	49.8 ± 6.7^d	603	58.7 ± 7.2	1094	57.7 ± 5.8
North Dakota	244	63.1 ± 11.2^c	757	49.6 ± 6.6^d	417	59.7 ± 10.6 ^c	1169	61.5 ± 6.7 ^b
Ohio	414	54.9 ± 9.9	906	46.4 ± 5.7	540	50.1 ± 7.8	1112	57.1 ± 6.3 ^b
Oklahoma	742	59.3 ± 7.9	565	45.1 ± 7.3^d	872	54.4 ± 7.4	580	44.3 ± 8.5
Oregon	262	37.2 ± 10.9 ^c	1229	43.2 ± 5.7	354	45.0 ± 9.7	1450	48.1 ± 4.4
Pennsylvania	782	53.3 ± 8.4	2221	53.4 ± 4.9	792	57.5 ± 9.3	2346	67.2 ± 5.8 ^b
Rhode Island	471	74.9 ± 10.3 ^c	1090	73.9 ± 6.1	496	87.1 ± 6.9	912	81.4 ± 6.2
South Carolina	627	56.4 ± 9.7	809	42.9 ± 7.1^d	763	54.6 ± 7.2	873	51.1 ± 6.8
South Dakota	365	59.3 ± 9.1	716	58.1 ± 6.2	373	80.5 ± 11.2^{b,c}	749	66.5 ± 6.7^d
Tennessee	304	40.8 ± 11.7 ^c	1266	51.1 ± 5.8	341	58.7 ± 10.4 ^{b,c}	1137	56.7 ± 5.5
Texas	2921	51.5 ± 4.9	5257	54.2 ± 3.5	2951	56.6 ± 5.5	4656	56.1 ± 4.4
Utah	196	46.1 ± 14.1 ^c	901	49.8 ± 6.8	304	47.7 ± 10.6 ^c	976	49.9 ± 5.6
Vermont	227	54.7 ± 12.1 ^c	1056	57.5 ± 6.3	405	53.6 ± 13.1 ^c	1284	62.6 ± 5.8

State	2011–2012 influenza season				2012–2013 influenza season			
	VFC-entitled		Privately insured		VFC-entitled		Privately insured	
	<i>n</i>	Vaccinated % ± 95% CI ^a	<i>n</i>	Vaccinated % ± 95% CI	<i>n</i>	Vaccinated % ± 95% CI	<i>n</i>	Vaccinated % ± 95% CI
Virginia	290	40.7 ± 14.7 ^c	1419	52.2 ± 6.4	274	59.6 ± 13.0 ^c	1268	63.9 ± 6.5 ^b
Washington	276	54.2 ± 12.1 ^c	986	43.2 ± 5.7	325	57.1 ± 11.8 ^c	1006	56.6 ± 6.1 ^b
West Virginia	467	43.1 ± 10.4 ^c	950	52.6 ± 7.3	463	55.4 ± 8.8	935	55.8 ± 6.5
Wisconsin	393	54.8 ± 8.4	932	49.6 ± 5.7	414	54.4 ± 8.7	865	55.5 ± 5.6
Wyoming	288	52.9 ± 16.0 ^c	957	42.4 ± 7.7	388	49.3 ± 11.4 ^c	998	46.3 ± 7.2

n is unweighted sample size.

^aConfidence interval.

^bStatistically significant difference compared to the 2011–2012 influenza season estimates.

^cEstimate might be unreliable because CI half-width is >10.

^dStatistically significant difference compared to the VFC-entitled group in the same influenza season (also bolded).

Table 3

Influenza vaccination coverage by select population characteristics, children 6 months–17 years, National Immunization Survey-Flu (NIS-Flu), 2011–2012 and 2012–2013 influenza seasons.

Population characteristics	2011–2012 influenza season				2012–2013 influenza season			
	VFC ^a -entitled		Privately insured		VFC-entitled		Privately insured	
	n	Vaccinated % ± 95% CI ^b	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI	n	Vaccinated % ± 95% CI
Age								
6–23 months	3365	71.0 ± 5.1	5648	76.4 ± 3.5	3949	73.9 ± 4.5	6339	80.9 ± 3.0^c
2–4 years	4917	64.9 ± 4.1	9369	63.2 ± 2.8	5727	62.0 ± 3.3	9764	68.0 ± 2.6^{c,d}
5–12 years	10,930	53.4 ± 2.9	29,760	54.7 ± 1.6	14,511	56.9 ± 2.1	32,880	59.4 ± 1.6 ^d
13–17 years	6170	35.4 ± 3.4	13,252	30.3 ± 2.5^c	4828	45.0 ± 3.5 ^d	9663	42.4 ± 2.3 ^d
Gender								
Male	12,960	52.8 ± 2.6	30,004	51.0 ± 1.7	14,893	54.3 ± 2.2	30,530	57.6 ± 1.6^{c,d}
Female	12,422	51.2 ± 2.8	28,025	50.3 ± 1.8	14,122	57.7 ± 2.4 ^d	28,116	56.9 ± 1.7 ^d
Race/Ethnicity								
Non-Hispanic, white only	10,136	43.6 ± 2.6	42,248	48.2 ± 1.3^c	11,426	48.5 ± 2.2^d	42,006	55.7 ± 1.3^{c,d}
Non-Hispanic, black only	4244	55.6 ± 4.2	4594	50.2 ± 4.3	4359	56.2 ± 4.0	4461	58.7 ± 4.4 ^d
Hispanic	7009	58.5 ± 3.8	6591	60.1 ± 4.1	8517	62.1 ± 3.1	6931	59.0 ± 3.9
Non-Hispanic other/multiple races	3993	50.8 ± 4.8	4596	54.9 ± 4.2	4713	57.5 ± 4.0^d	5248	64.5 ± 4.2^{c,d}
Metropolitan statistical areas (MSA)								
MSA, principle city	9390	57.9 ± 3.2	17,451	53.3 ± 2.5^c	10,645	58.7 ± 2.6	18,806	60.1 ± 2.2 ^d
MSA, non-principle city	9130	49.3 ± 3.1	28,887	50.8 ± 1.6	10,686	55.5 ± 2.8 ^d	27,461	56.9 ± 1.7 ^d
Non-MSA	6862	46.4 ± 3.2	11,691	44.7 ± 2.4	7684	52.0 ± 2.9 ^d	12,379	52.4 ± 2.4 ^d
Annual income/Poverty level ^e								
Above poverty, \$75,000	2442	46.0 ± 5.6	30,349	51.0 ± 1.6	2878	51.9 ± 5.0	30,458	60.2 ± 1.6^{c,d}
Above poverty, <\$75,000	10,535	46.6 ± 2.9	20,776	46.9 ± 2.0	11,578	53.7 ± 2.6 ^d	20,489	51.4 ± 2.0 ^d
At or below poverty level	10,336	55.9 ± 2.9	3373	60.7 ± 5.6	11,749	58.6 ± 2.4	3695	63.3 ± 5.1
Unknown	2069	58.0 ± 6.6	3531	54.5 ± 4.2	2810	54.5 ± 5.2	4004	58.8 ± 4.2
Region ^f								
Northeast	4104	62.5 ± 4.0	11,260	56.5 ± 2.3^c	5039	66.1 ± 3.3	12,272	65.9 ± 2.3 ^d
Midwest	5316	50.3 ± 3.3	11,767	46.0 ± 1.9^c	6035	52.3 ± 2.7	12,048	55.0 ± 2.0 ^d
South	10,467	51.3 ± 2.9	21,838	50.6 ± 2.0	11,478	54.9 ± 2.7	20,295	56.0 ± 1.9 ^d
West	5495	47.8 ± 5.6	13,164	50.6 ± 3.1	6463	54.5 ± 4.2	14,031	54.8 ± 3.1

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n is unweighted sample size.

^a Vaccines for Children program.

^b Confidence interval.

^c Statistically significant difference compared to the VFC-entitled group in the same influenza season (**also bolded**).

^d Statistically significant difference compared to the 2011–2012 influenza season estimates.

^e Poverty level was defined based on the reported number of people living in the household and annual household income, and the U.S. Census poverty thresholds.

^f Classification was based on the U.S. Census Bureau's census region definition.