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National Vaccination Coverage Among Adolescents Aged 13–17 Years — National Immunization Survey-Teen, United States, 2023

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Abstract

Based on safety and efficacy data, vaccinations are the best defense to protect persons and communities from serious vaccine-preventable diseases. The Advisory Committee on Immunization Practices recommends routine vaccination of adolescents aged 11–12 years with three vaccines including tetanus, diphtheria, and acellular pertussis vaccine; quadrivalent meningococcal conjugate vaccine; and human papillomavirus vaccine. CDC analyzed data from the 2023 National Immunization Survey-Teen for 16,658 adolescents aged 13–17 years (born during January 2005–December 2010) to assess vaccination coverage in 2023, recent trends in coverage by birth year, and trends in coverage by eligibility for the Vaccines for Children (VFC) program and birth year. In 2023, coverage with all routine vaccines recommended for adolescents was similar to coverage in 2022. Vaccination coverage among VFC-eligible adolescents was generally stable during the COVID-19 pandemic, except for a decrease in the percentage of VFC-eligible adolescents who were up to date with HPV vaccination by age 13 years among those born in 2010 compared with those born in 2007. Whereas coverage differences were found between VFC-eligible and non–VFC-eligible adolescents before the COVID-19 pandemic, coverage was similar among the most recent birth years in the survey. Providers should make strong recommendations for all routine vaccines and review adolescent vaccination records to verify if adolescents are up to date with all recommended vaccines.

Introduction

Based on safety and efficacy data, vaccinations are the best defense to protect persons and communities from serious vaccine-preventable diseases. 2024 marks the 30th anniversary of the Vaccines for Children (VFC) program, which provides recommended vaccines at no cost to eligible children and adolescents (*1*). The Advisory Committee on Immunization Practices (ACIP) recommends routine vaccination of children aged 11–12 years with tetanus, diphtheria, and acellular pertussis vaccine (Tdap); quadrivalent meningococcal conjugate vaccine (MenACWY); and human papillomavirus (HPV) vaccine (which may begin at age 9 years). At age 16 years, adolescents should receive a booster dose of MenACWY. In addition, persons aged 16–23 years may receive serogroup B meningococcal vaccine (MenB) on the basis of shared clinical decision-making. Adolescents should also catch up on missed childhood vaccines, stay current with COVID-19 vaccinations,* and receive an annual influenza vaccine† (*2*). A recent publication used National Immunization Survey-Child data to assess trends

* COVID-19 vaccination is recommended for all persons aged ≥6 months (https://www.cdc.gov/covid/vaccines/stay-up-to-date.html). Estimates of COVID-19 vaccination coverage are available at https://www.cdc.gov/vaccines/imz-managers/coverage/covidvaxview/interactive/children.html.

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in vaccination coverage among VFC-eligible children aged 19–35 months (*3*). This new report includes the first assessment of vaccination coverage trends by birth year among adolescents eligible for the VFC program. This report uses 2015–2023 National Immunization Survey-Teen (NIS-Teen) data to assess 1) trends in coverage by eligibility for the VFC program[§] and birth year, 2) vaccination coverage in 2023 among adolescents aged 13–17 years, and 3) recent trends in coverage by birth year.

Methods

NIS-Teen is a random–digit-dialed mobile telephone survey[¶] conducted in the United States to monitor vaccination coverage among adolescents aged 13–17 years.[**] A household survey is administered to parents or guardians of eligible adolescents to collect information about the adolescent and the household, and to obtain consent to contact the adolescent's vaccination providers. Once consent is received, a mailed survey is sent to all vaccination providers identified by the parent or guardian to compile the adolescent's complete vaccination record.

The 2023 NIS-Teen vaccination coverage estimates were derived from provider-reported data for 16,658 adolescents aged 13–17 years[††] who were born during January 2005–December 2010.[§§] The household response rate[¶¶] was 24.4%, and 39.5% of adolescents with completed interviews

[†] Influenza vaccination is recommended for all persons aged ≥6 months. Influenza vaccination coverage estimates are available at https://www.cdc.gov/flu/fluvaxview/index.htm.

[§] VFC-eligible adolescents were defined as meeting one of the following criteria: 1) enrolled in Medicaid or Indian Health Service; 2) uninsured; 3) American Indian or Alaska Native; 4) ever received a vaccination at Indian Health Service–operated centers, Tribal health centers, or urban Indian health care facilities.

[¶] Persons living in all identified households with mobile telephones were eligible for interview. Sampling weights were adjusted for survey nonresponse, adolescent multiplicity (number of chances for selection), and noncoverage of the survey sampling frame, and were calibrated to known population totals. During 2015–2017, NIS-Teen sampled from a landline frame in addition to a mobile telephone frame; therefore, sampling weights were also adjusted for overlapping samples of mixed telephone users. A description of NIS-Teen single-frame survey methodology and its effect on reported vaccination estimates is available at https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/pubs-presentations/dual-to-single-frame-teen.html.

[**] Local areas that received federal immunization funds under Section 317 of the Public Health Service Act were sampled separately. Those areas included Chicago, Illinois; New York, New York; Philadelphia County, Pennsylvania; Bexar County, Texas; and Houston, Texas. Three territories were sampled separately in 2023: Guam, Puerto Rico, and U.S. Virgin Islands.

[††] The 2023 NIS-Teen sample included 7,857 females and 8,711 males. Adolescents from Guam (131), Puerto Rico (453), and U.S. Virgin Islands (89) were excluded from the national estimates.

[§§] Estimates in this report include persons who might have received vaccinations on time or as catch-up. Influenza vaccination coverage data are not included in this report but are available at https://www.cdc.gov/flu/fluvaxview/index.htm.

[¶¶] The Council of American Survey Research Organizations household response rate is the product of three other rates: 1) the resolution rate (the proportion of telephone numbers that can be identified as either business or residence), 2) the screening rate (the proportion of qualified households that complete the screening process), and 3) the cooperation rate (the proportion of contacted eligible households for which a completed interview is obtained).

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had adequate provider data.*** Cross-sectional analysis was used to estimate vaccination coverage among adolescents aged 13–17 years in the 2023 survey year compared with the 2022 survey year. Using methodology established in 2021 and 2022 NIS-Teen reports (*4*,*5*), vaccination coverage by birth year was assessed using combined 2015–2023 NIS-Teen data. To assess coverage trends before and after the COVID-19 pandemic began, the 2007–2010 birth years were compared by age using the 2007 birth year as the reference group, because this was the last birth year that consisted of adolescents whose routine vaccinations were not affected by health care disruptions during the pandemic. To assess coverage trends by VFC eligibility, the 2002–2010 birth years were evaluated. Kaplan-Meier techniques were used to account for censoring of vaccination status at age ≥13 years.††† Z-tests were used to compare differences in vaccination coverage by survey year, birth year, and eligibility for the VFC program; differences with p<0.05 were considered statistically significant. Data were weighted§§§ and analyses were conducted using SAS-callable SUDAAN (version 11; RTI International). This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.¶¶¶

Results

Recent Trends in Vaccination Coverage by Age 13 Years and by Eligibility for the VFC Program

Coverage with ≥1 Tdap dose, ≥1 MenACWY dose, and ≥1 HPV vaccine dose by age 13 years among adolescents born during 2008–2010 and eligible for the VFC program was similar to coverage among VFC-eligible adolescents born in 2007. However, the percentage of VFC-eligible adolescents who were up to date with HPV vaccination (HPV UTD)**** was 10.3 percentage points lower among adolescents born in 2010 compared with those born in 2007 (Figure) (Table 1).

Among adolescents born during 2003–2008, coverage with ≥1 Tdap and ≥1 MenACWY dose by age 13 years was lower among VFC-eligible adolescents than among non–VFC-eligible adolescents, whereas among those born in 2009 and 2010, coverage was similar among both VFC-eligible and non–VFC-eligible adolescents. Coverage with ≥1 HPV vaccine dose and percentage HPV UTD was higher among VFC-eligible adolescents than among non–VFC-eligible adolescents born during 2002–2005, whereas coverage was similar by VFC eligibility status among those born during 2006–2010 (Figure).

Routine Vaccination Coverage Among Adolescents Aged 13–17 Years, by Survey Year

In 2023, coverage with all routine vaccines recommended for adolescents was similar to coverage in 2022. Among adolescents aged 13–17 years included in the 2023 survey, 89.0% had received ≥1 Tdap dose,†††† 88.4% had received ≥1 MenACWY dose,§§§§ 76.8% had received ≥1 HPV vaccine dose,¶¶¶¶ and 61.4% were HPV UTD (Table 2) (Supplementary Figure 1, https://stacks.cdc.gov/view/cdc/159388). Among the other vaccines and catch-up vaccines recommended for adolescents, coverage with ≥1 MenB dose***** increased by 3.0 percentage points and coverage with ≥2 hepatitis A vaccine doses††††† increased by 1.9 percentage points in 2023 compared with coverages in 2022.

Recent Trends in Vaccination Coverage, by Birth Year

Among adolescents born in 2008 (i.e., due for routine adolescent vaccines during the pandemic), coverage by age 13 years with ≥1 Tdap dose was 2.3 percentage points lower, ≥1 MenACWY dose was 2.6 percentage points lower, and ≥1 HPV vaccine dose was 3.2 percentage points lower than

*** Adolescents who received ≥1 non–COVID-19 vaccine dose reported by a provider and those who had received no vaccinations were considered to have adequate provider data. "No vaccinations" indicates that the vaccination status is known because the parent or guardian indicated there were no vaccinations, and the provider returned no immunization history forms or returned them indicating that no vaccinations had been administered.

††† NIS-Teen data during 2015–2023 were combined, and Kaplan-Meier methods were used to calculate cumulative vaccination coverage estimates by age in days, stratified by annual birth year; sample sizes by birth year were 19,931 (2002), 20,085 (2003), 18,908 (2004), 18,242 (2005), 16,564 (2006), 12,633 (2007), 8,346 (2008), 4,990 (2009), and 1,692 (2010). Z-tests were used to compare differences in vaccination coverage by eligibility for the VFC program; differences with p<0.05 were considered statistically significant.

§§§ https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-TEEN-PUF22-DUG.pdf

¶¶¶ 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

**** HPV UTD includes adolescents who received ≥3 doses, and those who received 2 doses when the first HPV vaccine dose was initiated at age <15 years and there was ≥5 months minus 4 days between the first and second dose (https://www.cdc.gov/iis/cdsi/). This update to the HPV vaccination recommendation occurred in December 2016. Some adolescents might have received more than the 2 or 3 recommended HPV vaccine doses.

†††† Tdap vaccination coverage represents coverage with ≥1 Tdap dose at age ≥10 years.

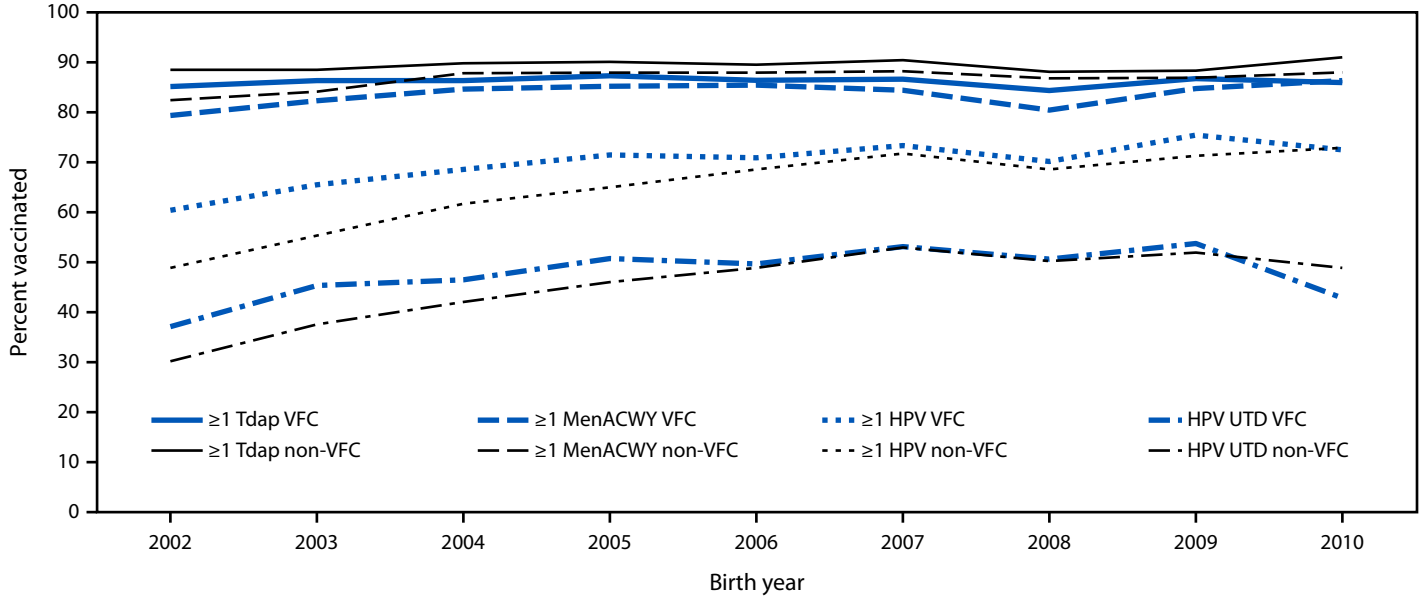
§§§§ Meningococcal conjugate vaccination coverage represents coverage with MenACWY or meningococcal-unknown type vaccine.

¶¶¶¶ HPV vaccination coverage includes receipt of any HPV vaccine and does not distinguish between nine-valent, quadrivalent, or bivalent vaccines. Some adolescents might have received more than the 2 or 3 recommended HPV vaccine doses.

***** MenB vaccination is not routinely recommended for all adolescents. Vaccines are administered to adolescents and young adults aged 16–23 years based on shared clinical decision-making. Coverage estimates for ≥1 and ≥2 MenB doses were calculated among adolescents who were aged 17 years at the time of interview; ≥2 doses of MenB required correct interval between the first and second dose and excluded those with unknown type of meningococcal vaccine.

††††† Vaccination for hepatitis A; hepatitis B; varicella; and measles, mumps, and rubella are considered childhood vaccinations and are recommended for adolescents who are not up to date with these vaccinations. Except as noted, coverage estimates for ≥1 and ≥2 varicella vaccine doses were obtained among adolescents with no history of varicella.

FIGURE. Vaccination coverage,* by age 13 years among adolescents born during 2002–2010,† by Vaccines for Children program eligibility§ — National Immunization Survey-Teen, United States, 2015–2023



Abbreviations: HPV = human papillomavirus; HPV UTD = up to date with HPV vaccination; MenACWY = quadrivalent meningococcal conjugate vaccine; Tdap = tetanus, diphtheria, and acellular pertussis vaccine; VFC = Vaccines for Children.

* At least 1 dose Tdap at age ≥10 years, ≥1 dose MenACWY or meningococcal-unknown type vaccine, and ≥1 dose HPV vaccine (nine-valent, quadrivalent, or bivalent). The routine Advisory Committee on Immunization Practices recommendation for HPV vaccination was made for females in 2006 and for males in 2011. Because HPV vaccination was recommended for males in 2011, coverage for all adolescents was not measured before that year. HPV UTD includes adolescents who received ≥3 doses, and those who received 2 doses when the first HPV vaccine dose was initiated at age <15 years and there was ≥5 months minus 4 days between the first and second dose.

† National Immunization Survey-Teen data during 2015–2023 were combined, and Kaplan-Meier methods were used to calculate cumulative vaccination coverage estimates by age in days, stratified by annual birth year; sample sizes by birth year were 19,931 (2002), 20,085 (2003), 18,908 (2004), 18,242 (2005), 16,564 (2006), 12,633 (2007), 8,346 (2008), 4,990 (2009), and 1,692 (2010).

§ VFC-eligible adolescents were defined as meeting one of the following criteria: 1) enrolled in Medicaid or Indian Health Service; 2) uninsured; 3) American Indian or Alaska Native; 4) ever received a vaccination at Indian Health Service–operated centers, Tribal health centers, or urban Indian health care facilities.

among those born in 2007 (i.e., due for routine adolescent vaccines before the pandemic began) (Table 1) (Supplementary Figure 2, https://stacks.cdc.gov/view/cdc/159389). Routine vaccination coverage by age 14 and 15 years among adolescents born in 2008 remained lower than coverage among adolescents born in 2007. Coverage attained by age 13 and 14 years among adolescents born in 2009 was similar to prepandemic coverage levels. Among those born in 2010, coverage by age 13 years was similar to prepandemic coverage levels, except that the percentage of adolescents who were HPV UTD was 7.1 percentage points lower than among those born in 2007.

Discussion

For three decades, the VFC program has been instrumental in maintaining and progressively improving vaccination coverage among children and adolescents. Approximately 40% of adolescents aged 13–17 years included in the 2023 NIS-Teen data were eligible for the VFC program, highlighting the program's critical role in achieving high vaccination coverage across the United States (CDC, unpublished data, 2023). The effectiveness of the VFC program in reaching vulnerable and under-resourced communities is demonstrated by the higher HPV vaccination coverage among VFC-eligible adolescents compared with non–VFC-eligible adolescents before the COVID-19 pandemic, and similar coverage by VFC eligibility since the pandemic. The decline in the percentage of VFC-eligible adolescents who are HPV UTD could signal a change in accessibility to vaccination through the VFC program, a change that needs further exploration. This possibility underscores the importance of ongoing efforts to ensure equitable access to vaccination services for all children and adolescents. Significant opportunities to improve vaccination coverage among VFC-eligible adolescents remain, highlighting the need for continued outreach and support to address barriers to vaccination among these populations.

In 2023, with the exception of small increases in vaccination coverage for ≥1 MenB dose and ≥2 hepatitis A doses, coverage with routine vaccines recommended for adolescents was similar to 2022 coverage estimates. For the second consecutive year,

TABLE 1. Vaccination coverage* among adolescents born during 2007–2010,† by age, and by Vaccines for Children program eligibility§ — National Immunization Survey-Teen, United States, 2015–2023

	Birth year, % (95% CI)¶								
	By age 13 yrs				By age 14 yrs			By age 15 yrs	
Vaccine	2007	2008	2009	2010	2007	2008	2009	2007	2008
Overall									
≥1 dose Tdap	88.7 (87.5–89.9)	86.4 (84.7–88.1)**	87.5 (85.4–89.5)	88.6 (85.1–91.5)	90.5 (89.4–91.5)	88.0 (86.2–89.6)**	88.6 (86.4–90.6)	91.0 (89.9–92.0)	88.5 (86.7–90.2)**
≥1 dose MenACWY	86.6 (85.2–87.9)	84.0 (82.1–85.9)**	85.8 (83.8–87.8)	87.2 (83.4–90.5)	88.9 (87.6–90.1)	86.5 (84.5–88.3)**	86.8 (84.7–88.8)	89.7 (88.4–90.8)	87.2 (85.2–89.0)**
≥1 dose HPV	72.4 (70.8–74.0)	69.2 (67.0–71.4)**	73.2 (70.7–75.5)	72.6 (68.1–76.9)	77.1 (75.5–78.7)	73.5 (71.3–75.8)**	75.6 (73.0–78.1)	79.3 (77.7–80.9)	75.9 (72.8–78.8)**
HPV UTD	52.9 (51.1–54.7)	50.3 (48.1–52.5)	52.6 (49.9–55.5)	45.8 (41.2–50.7)**	60.9 (59.0–62.8)	57.0 (54.6–59.4)**	58.5 (55.3–61.7)	65.2 (63.2–67.2)	60.3 (57.1–63.6)**
Non–VFC-eligible									
≥1 dose Tdap	90.4 (89.2–91.5)	88.1 (86.0–90.0)	88.3 (85.6–90.6)	91.0 (88.2–93.4)	91.2 (90.0–92.2)	89.3 (87.2–91.1)	89.0 (86.3–91.4)	91.4 (90.2–92.4)	NA
≥1 dose MenACWY	88.2 (86.6–89.8)	86.8 (84.5–88.9)	86.9 (84.3–89.2)	88.0 (83.9–91.5)	89.3 (87.6–90.8)	88.7 (86.5–90.7)	87.5 (84.9–89.9)	89.7 (88.0–91.2)	88.9 (86.7–90.9)
≥1 dose HPV	71.7 (69.7–73.7)	68.5 (65.7–71.3)	71.2 (68.0–74.3)	72.8 (66.9–78.4)	76.7 (74.7–78.7)	73.9 (71.0–76.8)	73.8 (70.3–77.2)	78.6 (76.5–80.5)	76.7 (72.2–81.0)
HPV UTD	52.8 (50.5–55.0)	50.1 (47.4–52.9)	51.8 (48.4–55.4)	48.7 (42.9–54.9)	61.8 (59.4–64.1)	56.7 (53.7–59.8)**	57.5 (53.6–61.6)	66.5 (64.0–69.0)	60.6 (56.0–65.2)**
VFC-eligible									
≥1 dose Tdap	86.6 (84.3–88.7)††	84.3 (81.2–87.1)††	86.7 (83.2–89.8)	85.9 (79.4–91.2)	89.6 (87.7–91.4)	86.3 (83.3–89.0)	88.1 (84.5–91.3)	90.5 (88.6–92.3)	87.5 (84.5–90.3)
≥1 dose MenACWY	84.4 (82.1–86.6)††	80.4 (76.9–83.6)††	84.7 (81.3–87.8)	86.3 (79.7–91.7)	88.3 (86.3–90.2)	83.6 (80.1–86.7)**,††	86.0 (82.5–89.2)	89.6 (87.6–91.4)	85.0 (81.5–88.1)**
≥1 dose HPV	73.3 (70.7–76.0)	70.1 (66.6–73.5)	75.4 (71.7–79.0)	72.4 (65.4–78.9)	77.6 (75.0–80.1)	72.9 (69.4–76.4)**	77.6 (73.6–81.3)	80.2 (77.6–82.7)	74.5 (70.8–78.1)**
HPV UTD	53.0 (50.1–56.0)	50.5 (46.9–54.2)	53.6 (49.2–58.1)	42.7 (35.6–50.7)**	59.9 (56.8–63.0)	57.4 (53.7–61.3)	59.5 (54.4–64.7)	63.6 (60.3–66.8)	59.8 (55.7–63.9)

Abbreviations: HPV = human papillomavirus; HPV UTD = up to date with HPV vaccination; MenACWY = quadrivalent meningococcal conjugate vaccine; NA = not available; Tdap = tetanus, diphtheria, and acellular pertussis vaccine; VFC = Vaccines for Children.

* At least 1 dose Tdap at age ≥10 years; ≥1 dose MenACWY or meningococcal-unknown type vaccine; and ≥1 dose HPV vaccine (nine-valent, quadrivalent, or bivalent). The routine Advisory Committee on Immunization Practices recommendation for HPV vaccination was made for females in 2006 and for males in 2011. Because HPV vaccination was recommended for males in 2011, coverage for all adolescents was not measured before that year. HPV UTD includes adolescents with ≥3 doses, and those with 2 doses when the first HPV vaccine dose was initiated at age <15 years and there was ≥5 months minus 4 days between the first and second dose.

† National Immunization Survey-Teen data during 2015–2023 were combined, and Kaplan-Meier methods were used to calculate cumulative vaccination coverage estimates by age in days, stratified by annual birth year; sample sizes by birth year were 12,633 (2007), 8,346 (2008), 4,990 (2009), and 1,692 (2010).

§ VFC-eligible adolescents were defined as meeting one of the following criteria: 1) enrolled in Medicaid or Indian Health Service; 2) uninsured; 3) American Indian or Alaska Native; 4) ever received a vaccination at Indian Health Service–operated centers, Tribal health centers, or urban Indian health care facilities.

¶ Estimates with 95% CI >20 might not be reliable. https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-TEEN-PUF22-DUG.pdf

** Statistically significant difference ($p<0.05$); referent group was the 2007 birth year.

†† Statistically significant difference ($p<0.05$) between non–VFC-eligible adolescents and VFC-eligible adolescents born in the same year; referent group was non–VFC-eligible adolescents.

HPV vaccination coverage has not increased among adolescents aged 13–17 years.

Lower vaccination coverage among adolescents born in 2008 compared with those born in 2007 was first identified with the 2021 NIS-Teen report (*4*) and has persisted, demonstrating the ongoing impact of disruptions to health care during the COVID-19 pandemic. However, coverage with ≥1 Tdap dose, ≥1 MenACWY dose, and ≥1 HPV vaccine dose among adolescents born in 2009 and 2010 returned to prepandemic levels. In 2021, approximately 25% of U.S. households reported that a child or adolescent had missed or delayed a health care visit because of the pandemic (*6*,*7*). Outreach to parents of adolescents who have yet to return to routine medical care since the pandemic will be critical to verifying that adolescents receive important primary care and vaccinations. In addition, compared with coverage among adolescents born in 2007, HPV UTD coverage among those born in 2010 decreased 7.1 percentage points overall and 10.3 percentage points among VFC-eligible adolescents. HPV vaccination is essential to prevent HPV-attributable cancers (*8*). Although HPV vaccine initiation by birth year has returned to prepandemic levels, further efforts are needed to increase HPV vaccination coverage.

TABLE 2. Estimated vaccination coverage with selected vaccines and doses among adolescents aged 13–17* years, by age at time of interview — National Immunization Survey-Teen, United States, 2023

Vaccine	% (95% CI)†						
	Age at interview, yrs					Total	
	13 n = 3,295	14 n = 3,376	15 n = 3,343	16 n = 3,382	17 n = 3,172	2023 n = 16,568	2022 n = 16,043
Tdap§ ≥1 dose	88.6 (86.1–90.7)	87.1 (84.2–89.5)	90.7 (88.6–92.4)	89.7 (87.5–91.5)	88.9 (86.0–91.2)	**89.0 (87.9–90.0)**	**89.9 (88.9–90.9)**
MenACWY¶							
≥1 dose	85.1 (82.2–87.6)	86.0 (82.9–88.6)	89.4 (87.2–91.3)**	90.3 (88.2–92.1)**	91.2 (89.0–93.0)**	**88.4 (87.3–89.4)**	**88.6 (87.6–89.6)**
≥2 doses††	NA	NA	NA	NA	59.7 (56.2–63.2)	**59.7 (56.2–63.2)**	**60.8 (57.5–63.9)**
MenB§§							
≥1 dose	NA	NA	NA	NA	32.4 (29.3–35.6)**	**32.4 (29.3–35.6)¶¶**	**29.4 (26.5–32.4)**
≥2 doses	NA	NA	NA	NA	12.8 (10.7–15.3)	**12.8 (10.7–15.3)**	**11.9 (10.0–14.1)**
HPV* vaccine**							
All adolescents							
≥1 dose	72.2 (69.1–75.2)	76.4 (73.2–79.3)	77.7 (74.5–80.6)**	79.6 (76.7–82.3)**	77.7 (74.4–80.7)**	**76.8 (75.4–78.1)**	**76.0 (74.7–77.3)**
HPV UTD†††	49.0 (45.5–52.5)	60.1 (56.7–63.4)**	62.3 (58.4–66.0)**	69.0 (65.7–72.1)**	66.1 (62.4–69.6)**	**61.4 (59.9–63.0)**	**62.6 (61.1–64.0)**
Females							
≥1 dose	74.3 (69.8–78.3)	79.0 (74.9–82.6)	77.0 (72.6–80.9)	81.6 (77.4–85.1)**	80.8 (77.1–84.1)**	**78.5 (76.7–80.2)**	**77.8 (75.8–79.6)**
HPV UTD	52.3 (47.2–57.4)	61.9 (57.1–66.5)**	65.2 (60.1–69.9)**	70.4 (65.4–74.9)**	70.1 (65.6–74.1)**	**64.0 (61.9–66.1)**	**64.6 (62.5–66.6)**
Males							
≥1 dose	70.2 (65.6–74.5)	73.9 (69.0–78.3)	78.3 (73.6–82.4)**	77.9 (73.6–81.6)**	74.7 (69.3–79.5)	**75.1 (73.0–77.1)**	**74.4 (72.5–76.1)**
HPV UTD	45.7 (41.1–50.4)	58.4 (53.5–63.1)**	59.6 (53.8–65.1)**	67.8 (63.4–71.8)**	62.3 (56.6–67.7)**	**59.0 (56.7–61.2)**	**60.6 (58.6–62.6)**
MMR ≥2 doses	93.3 (91.3–94.9)	90.5 (87.9–92.5)	91.5 (88.1–93.9)	90.6 (88.2–92.5)	90.7 (88.1–92.7)	**91.3 (90.2–92.3)**	**91.2 (90.2–92.1)**
Hepatitis A vaccine ≥2 doses§§§	88.6 (86.2–90.7)	87.9 (85.2–90.2)	86.6 (83.3–89.4)	85.5 (82.8–87.8)	85.8 (83.1–88.1)	86.9 (85.7–88.0)¶¶	85.0 (83.8–86.1)
Hepatitis B vaccine ≥3 doses	93.1 (91.4–94.6)	89.9 (87.1–92.1)**	90.6 (87.3–93.1)	89.8 (87.3–91.8)**	91.0 (88.6–92.9)	90.9 (89.8–91.9)	91.2 (90.2–92.1)
Varicella							
History of varicella disease¶¶¶	7.1 (5.0–9.9)	6.9 (5.2–9.0)	7.2 (5.6–9.2)	8.1 (6.2–10.4)	7.1 (5.2–9.6)	7.3 (6.4–8.2)	7.0 (6.3–7.8)
No history of varicella disease							
≥1 dose vaccine	96.3 (95.2–97.1)	94.1 (91.8–95.8)	94.9 (92.4–96.7)	92.9 (90.7–94.6)**	95.0 (93.3–96.3)	94.6 (93.8–95.4)	94.1 (93.2–94.8)
≥2 doses vaccine	93.2 (91.4–94.6)	89.7 (87.0–91.9)**	91.7 (89.0–93.8)	89.9 (87.6–91.9)**	89.6 (86.8–91.9)**	90.8 (89.8–91.8)	90.8 (89.8–91.8)
History of varicella disease or receipt of ≥2 varicella vaccine doses	93.7 (92.0–95.0)	90.4 (87.9–92.5)**	92.3 (89.8–94.3)	90.7 (88.6–92.5)**	90.4 (87.8–92.5)**	91.5 (90.5–92.4)	91.5 (90.5–92.4)

Abbreviations: HPV = human papillomavirus; HPV UTD = up to date with HPV vaccination; MenACWY = quadrivalent meningococcal conjugate vaccine; MenB = serogroup B meningococcal vaccine; MMR = measles, mumps, and rubella vaccine; NA = not applicable; NIS-Teen = National Immunization Survey-Teen; Tdap = tetanus, diphtheria, and acellular pertussis vaccine.

* Adolescents (16,658) in the 2023 NIS-Teen were born during January 2005–December 2010.

† Estimates with 95% CI >20 might not be reliable. https://www.cdc.gov/vaccines/imz-managers/nis/downloads/NIS-TEEN-PUF22-DUG.pdf

§ Includes percentages of persons receiving Tdap vaccine at age ≥10 years.

¶ Includes percentages of adolescents receiving MenACWY or an unknown type of meningococcal vaccine.

** Statistically significant difference (p<0.05) in estimated vaccination coverage by age; referent group was adolescents aged 13 years.

†† At least 2 doses of MenACWY or unknown type of meningococcal vaccine among adolescents aged 17 years at time of interview and does not include adolescents who received first dose of MenACWY vaccine at age ≥16 years.

§§ Calculated only among adolescents who were aged 17 years at time of interview with vaccine administered based on individual clinical decision; ≥2 doses of MenB required correct interval between first and second dose and excluded those with unknown type of meningococcal vaccine.

¶¶ Statistically significant difference (p<0.05) compared with 2022 NIS-Teen estimates.

*** HPV vaccine, nine-valent, quadrivalent, or bivalent. For ≥1 dose and HPV UTD measures, percentages are reported among females and males combined (16,568) and for females only (7,857) and males only (8,711).

††† HPV UTD includes adolescents who received ≥3 doses, and those who received 2 doses when the first HPV vaccine dose was initiated at age <15 years and there was ≥5 months minus 4 days between the first and second dose (https://www.cdc.gov/iis/cdsi/). This update to the HPV vaccine recommendation occurred in December 2016.

§§§ In July 2020, the Advisory Committee on Immunization Practices revised recommendations for hepatitis A vaccination to include catch-up vaccination for children and adolescents aged 2–18 years who have not previously received hepatitis A vaccine at any age.

¶¶¶ By parent or guardian report or provider records.

Summary

What is already known about this topic?

Vaccinations are the best defense to protect persons and communities from serious vaccine-preventable diseases. Three vaccines are routinely recommended for adolescents. The Vaccines for Children (VFC) program provides recommended vaccines at no cost to eligible children and adolescents.

What is added by this report?

Overall, vaccination coverage among VFC-eligible adolescents remained stable across recent birth years, except for a decline in human papillomavirus vaccine up-to-date coverage by age 13 years among those born in 2010 compared with those born in 2007.

What are the implications for public health practice?

Health care providers should make strong recommendations for all routine vaccines and verify if adolescents, particularly those eligible for the VFC program, are up to date with all recommended vaccines.

Limitations

The findings in this report are subject to at least three limitations. First, the household response rate was low, which could introduce selection bias if respondents differed systematically from nonrespondents. Second, coverage estimates stratified by birth year were derived from unequal sample sizes. Sample sizes among younger adolescents, such as those born in 2010, were smaller because those persons have had less time for eligibility for inclusion in the NIS-Teen survey. The wider 95% CIs for the more recent birth years should be considered when interpreting and comparing vaccination coverage across different birth years. Finally, a total survey error assessment indicated that NIS-Teen coverage estimates were significantly lower in the 2023 sample compared with the 2022 sample among birth years common to both survey years (*9*,*10*). This analysis might not be able to accurately detect actual changes in survey year coverage from 2022 to 2023 that are within a range of 1–3 percentage points. Possible reasons for the decline in bridging birth year estimates include an early close of the provider record check period in 2023, a change in provider lookup software used by NIS, or a change in reporting by providers. Although data are weighted to account for nonresponse and households without telephones, some bias might remain. Recent total survey error assessments indicated that NIS-Teen estimates might underestimate actual coverage, with the largest underestimation occurring for HPV UTD (–5.2 percentage points) (*10*).

Implications for Public Health Practice

Health care providers should strongly recommend all routine vaccines and confirm adolescents are fully vaccinated. The VFC program plays a substantial role in this effort by facilitating access to vaccines for eligible families, without financial barriers and by promoting equity in health care access. Parents of adolescents should schedule a well-child visit as the school year begins to verify that adolescents receive all recommended vaccines, such as the HPV vaccine, which prevents 92% of HPV-attributable cancers (*8*). Vaccinations can also be administered through school-based clinics, pharmacies, and back-to-school health events, which can provide expanded opportunities for adolescents to receive recommended vaccines.

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Human Papillomavirus Vaccination Coverage Among Adolescent Girls Aged 13–17 Years — U.S.-Affiliated Pacific Islands, 2013–2023

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Abstract

Worldwide, cervical cancer is the fourth most common cancer among women, and the World Health Organization (WHO) Western Pacific Region, where the U.S.-affiliated Pacific Islands (USAPI) are located, accounts for one quarter of all estimated cases. Human papillomavirus (HPV) vaccines are recommended at age 11–12 years to prevent most cervical cancers. HPV vaccines were introduced across USAPI during 2007–2016, predominantly provided through school-located vaccination programs. Retrospective analysis using data from jurisdictional immunization information systems was used to estimate vaccination coverage among adolescent girls as of the last day of each calendar year during 2013–2023. This analysis measured progress toward the WHO 2030 vaccination coverage goal of ≥90% completion of the HPV vaccination series among girls by age 15 years. As of December 2023, initiation of the HPV vaccination series among adolescent girls aged 13–17 years ranged from 58.0% in Palau to 97.2% in the Northern Mariana Islands, and HPV vaccination series completion coverage ranged from 43.4% in Palau to 91.8% in the Northern Mariana Islands. HPV vaccination series completion coverage is >90% in the Northern Mariana Islands and is on track to meet WHO goals by 2030 in American Samoa. Assessment of adolescent vaccination coverage can help immunization programs monitor progress toward regional goals and identify populations and areas with low coverage. Implementing evidence-based strategies to increase vaccine access and coverage would benefit jurisdictions with lagging coverage.

Introduction

Worldwide, cervical cancer is the fourth most common cancer among women, and the World Health Organization (WHO) Western Pacific region* accounts for one quarter of all estimated cases (*1*); the age-standardized rate of cervical cancer in the Marshall Islands (74 per 100,000 women) is the highest in the world (*2*). Nearly all cervical cancers are caused by human papillomaviruses (HPV). HPV vaccines, which have been licensed for use since 2006, are estimated to have the potential to prevent approximately 75% of all cervical cancers (*3*). CDC recommends HPV vaccination for both boys and girls at age 11–12 years.† However, to assess progress toward reaching vaccination goals in the 2020 WHO Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem,§ this report focuses on HPV vaccination coverage among adolescent girls. The WHO strategy recommends that HPV vaccines be included in all national immunization programs; the goal is for ≥90% of girls to complete the HPV vaccination series by age 15 years, by 2030 (*4*).

HPV vaccines were introduced across the U.S.-affiliated Pacific Islands (USAPI)¶ during 2007–2016,** predominantly provided through school-located vaccination programs.†† Assessment of vaccination coverage among adolescent girls can help immunization programs monitor progress toward regional goals and identify populations and areas with low coverage. These data can be used to guide evidence-based interventions, adapted to the local context, to improve vaccination coverage. This report describes annual HPV vaccination coverage among adolescent girls in five of the six USAPI§§ jurisdictions during 2013–2023.

* WHO member countries are grouped into six regions: Africa, Americas, Eastern Mediterranean, Europe, South-East Asia, and Western Pacific. The Western Pacific Region consists of 37 countries and areas, including the six U.S.-affiliated Pacific Islands. https://www.who.int/westernpacific/about/where-we-work

† https://www.cdc.gov/vaccines/imz-schedules/adolescent-easyread.html

§ Three of the six USAPI jurisdictions offer the vaccine to girls (American Samoa, Guam, and the Northern Mariana Islands), and three offer the vaccine to both boys and girls (Federated States of Micronesia, Marshall Islands, and Palau). Coverage among adolescent girls is included in this report for consistency across jurisdictions and to assess progress toward WHO goals, which include vaccination goals only for girls. https://www.cdc.gov/vaccines/hcp/imz-schedules/child-adolescent-notes.html#note-hpv

¶ USAPI comprise three U.S. territories (American Samoa, Guam, and the Northern Mariana Islands) and three freely associated nations (Federated States of Micronesia, Marshall Islands, and Palau). All jurisdictions receive Section 317 Immunization Program funding, which is a discretionary program funded by the U.S. Congress to purchase vaccines and support immunization infrastructure. The U.S. territories (American Samoa and Northern Mariana Islands) also receive Vaccines for Children (VFC) funding; VFC is an entitlement program for children aged ≤18 years that provides vaccines at no cost to VFC program–eligible children through public and private health care providers that are enrolled in the VFC program.

** Implementation of the HPV vaccine program varied by jurisdiction. Northern Mariana Islands implemented the program in 2007, Palau in 2008, Marshall Islands in 2009, and American Samoa in 2011. Federated States of Micronesia implemented the program in three states (Kosrae, Pohnpei, and Yap) in 2009, and the fourth state (Chuuk) in 2016.

†† American Samoa provided a mixed clinic- and school-located HPV program during 2011–2018. The school-located program ended in 2018.

§§ Jurisdictions in this report include American Samoa, Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and Palau. Vaccination coverage among adolescents in Guam has been assessed via the National Immunization Survey since 2013; immunization Information system (IIS)–based coverage assessment was not conducted for Guam. Information on adolescent vaccination coverage in Guam is available at https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/index.html.

Methods

Data Sources and Inclusion and Exclusion Criteria

Patient-level data from jurisdictional immunization information systems (IISs) were aggregated at the jurisdiction level for this retrospective analysis. Persons were included in the denominator for annual analyses if they 1) were adolescent girls aged 13–17 years as of January 1 of the assessment year, 2) had an active patient status[¶¶] in the IIS through the end of the assessment year, and 3) had received any vaccine within the most recent 5 years. Exclusion criteria consistent with the Modeling of Immunization Registry Operations Work Group managing active patient status guidance was retrospectively applied to mitigate IIS denominator inflation (*5*). Patients were excluded from all analyses if they had zero vaccine doses recorded in the IIS or if the last vaccination date recorded in the IIS was before January 1, 2006.

Estimation of HPV Vaccination Coverage

Retrospective point-in-time analysis (i.e., coverage as of a specific date) was used to estimate vaccination coverage as of December 31 of each year during 2013–2023. All HPV vaccine doses received as of the end of the assessment year were included in coverage estimates. Vaccination coverage indicators included receipt of ≥1 HPV vaccine dose and HPV vaccination series completion status.[***] Completion of the HPV vaccination series is defined as receipt of ≥3 HPV vaccine doses, or receipt of 2 doses if the series was initiated at age <15 years, and if ≥5 months minus 4 days have elapsed between receipt of the first and second dose.

HPV vaccination series dropout was measured as the proportion of adolescents who had not completed the HPV vaccination series by the end of the assessment year, among those who received the first dose. SAS software (version 9.4; SAS Institute) was used to conduct all analyses. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[†††]

[¶¶] Patient active or inactive status in the IIS establishes a classification of individual patients within a health care organization. Health care providers are responsible for vaccinating patients with an "active" status within their clinic population or geographic catchment area. Patient status is changed to "inactive" when the patient changes providers, moves, or is lost to follow-up or "deceased" if patient death is confirmed through manual review or system linkage with vital statistics or other health records. https://repository.immregistries.org/files/resources/5835adc2dad8d/mirow_pais_mini-guide.pdf

[***] In 2016, the HPV vaccine recommendations changed from a 3-dose series for all to a 2-dose series among children and adolescents who initiate the vaccination series before age 15 years. Completion of the HPV vaccination series is defined as receipt of ≥3 HPV vaccine doses or receipt of 2 doses if the series is initiated at age <15 years, and ≥5 months minus 4 days have elapsed between the first and second dose. This measure was applied retrospectively for all years 2013–2023. https://www.cdc.gov/vaccines/hcp/imz-schedules/child-adolescent-notes.html#note-hpv

[†††] 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

Results

Jurisdictional HPV Vaccination Coverage Among Adolescent Girls Aged 13–17 Years

Coverage with ≥1 HPV vaccine dose and HPV vaccination series completion status varied by jurisdiction (Table). As of December 2023, coverage with ≥1 HPV dose among adolescent girls aged 13–17 years ranged from 58.0% in Palau to 97.2% in the Northern Mariana Islands. HPV vaccination series completion coverage ranged from 43.4% in Palau to 91.8% in the Northern Mariana Islands. As of 2023, the Northern Mariana Islands is the only jurisdiction to have already met the WHO 2030 HPV 90% vaccination coverage goal.

Trends in HPV Vaccination Coverage Among Adolescent Girls, 2013–2023

During 2013–2023, coverage with ≥1 HPV vaccine dose increased by 35.2–72.8 percentage points across jurisdictions (Figure 1), and HPV vaccination series completion coverage increased by 35.3–72.9 percentage points (Figure 2). The percentage of adolescent girls who had received ≥1 HPV vaccine dose and who completed the vaccination series increased each year from 2013 to 2023 in all jurisdictions except Palau, where ≥1-dose coverage and HPV vaccination series completion coverage peaked in 2020 at 71.6% and 59.0%, respectively, and have since declined to 58.0% and 43.4%, respectively, in 2023 (Table). In American Samoa, HPV vaccination series completion coverage increased from 78.0% to 82.8% (4.8 percentage points) from 2022 to 2023. If coverage continues to increase at the same rate, American Samoa will meet the WHO 2030 ≥90% HPV vaccination series completion coverage goal by 2025.

HPV vaccination series dropout varied across jurisdictions and years; during 2013–2023, dropout decreased in all jurisdictions except in Palau, where it increased from a low of 17.2% in 2021 to a high of 25.2% in 2023 (Table). Dropout was lowest in the Northern Mariana Islands, where only 5.6% of adolescent girls aged 13–17 years who initiated the HPV vaccination series had not completed it in 2023.

Discussion

HPV vaccines are a critical public health tool to prevent most cervical cancers. HPV vaccination coverage has increased markedly in USAPI since the vaccination programs commenced, and HPV vaccination series completion coverage in the Northern Mariana Islands currently exceeds the ≥90% WHO 2030 goal. If the current coverage trends continue, American Samoa will also be on track to meet the WHO 2030 coverage goal. The 2023 rates of initiation of the HPV vaccination series among adolescent girls aged 13–17 years in American Samoa

TABLE. Human papillomavirus vaccination coverage among adolescent girls aged 13–17 years, by jurisdiction — U.S.-affiliated Pacific Islands,* 2013–2023

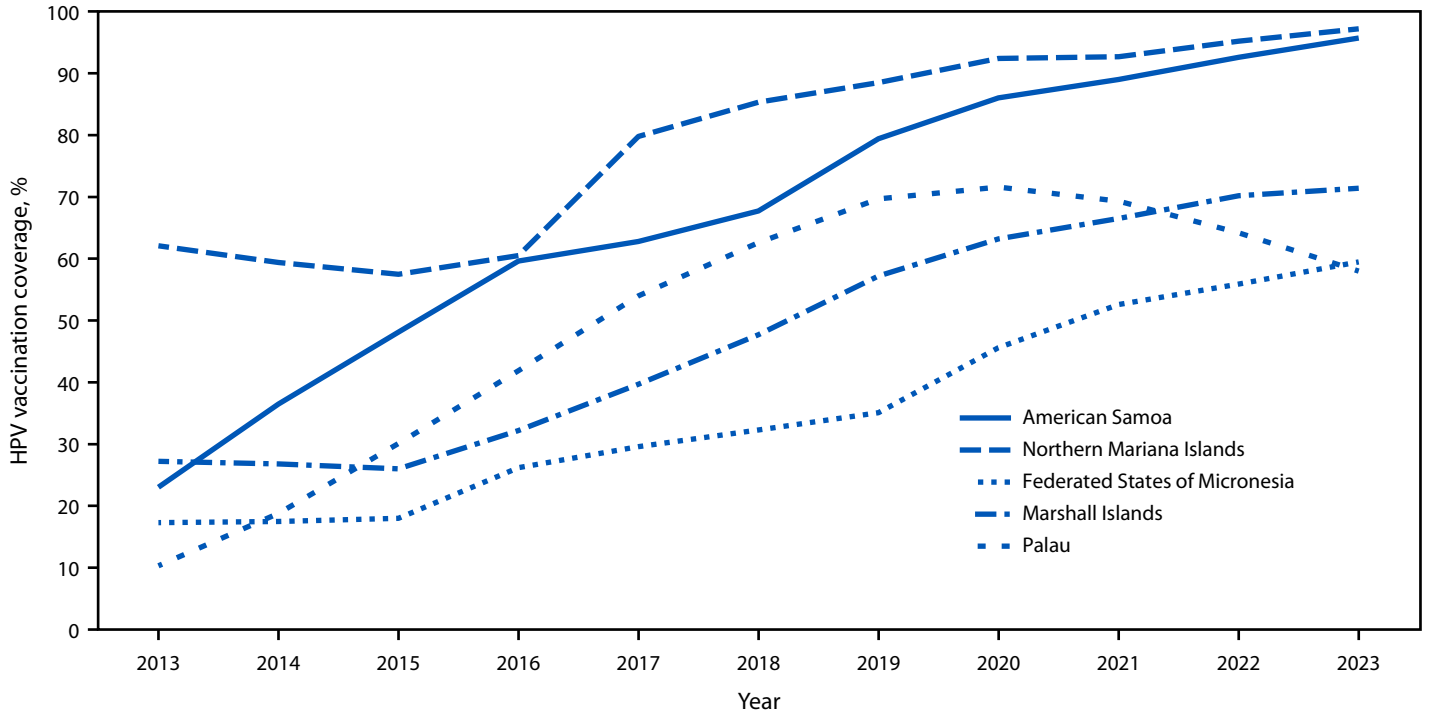
Jurisdiction/Year	Population,† no.	Coverage, %		
		Received ≥1 HPV vaccine dose	HPV vaccination series completion§	HPV vaccination series dropout¶
American Samoa				
2013	3,785	23.0	4.9	78.8
2014	3,888	36.5	12.9	64.7
2015	3,937	48.1	25.2	47.6
2016	3,608	59.6	34.6	42.0
2017	3,580	62.8	36.0	42.7
2018	3,578	67.7	39.1	42.2
2019	3,492	79.4	50.0	37.1
2020	3,291	86.0	61.0	29.0
2021	3,194	89.0	67.6	24.0
2022	3,027	92.6	78.0	15.8
2023	2,921	95.7	82.8	13.4
Northern Mariana Islands				
2013	3,142	62.1	44.2	28.8
2014	3,155	59.4	43.0	27.5
2015	3,053	57.5	40.6	29.3
2016	2,904	60.5	44.2	26.8
2017	2,733	79.8	56.1	29.7
2018	2,673	85.3	72.1	15.5
2019	2,591	88.5	79.7	9.9
2020	2,476	92.4	87.0	5.9
2021	2,511	92.7	87.6	5.5
2022	2,314	95.2	90.2	5.3
2023	2,289	97.2	91.8	5.6
Federated States of Micronesia				
2013	6,807	17.3	9.4	45.8
2014	6,914	17.5	9.7	44.2
2015	6,854	18.0	10.2	43.1
2016	6,853	26.2	12.6	52.1
2017	6,769	29.6	16.0	45.9
2018	6,800	32.3	19.5	39.7
2019	6,789	35.1	23.6	32.8
2020	5,956	45.6	33.9	25.5
2021	5,766	52.6	40.9	22.2
2022	5,539	55.9	45.6	18.5
2023	5,507	59.5	48.4	18.5
Marshall Islands				
2013	3,358	27.2	13.6	49.8
2014	3,400	26.8	13.8	48.4
2015	3,373	26.0	13.0	50.2
2016	3,368	32.2	16.4	49.0
2017	3,402	39.7	22.3	43.9
2018	3,475	47.7	30.7	35.6
2019	3,528	57.2	39.7	30.6
2020	3,518	63.2	45.3	28.3
2021	3,476	66.5	48.1	27.7
2022	3,231	70.2	52.2	25.6
2023	2,981	71.4	53.6	24.9
Palau				
2013	893	10.3	8.1	21.7
2014	786	18.8	12.2	35.1
2015	721	30.1	19.6	35.0
2016	673	41.9	27.8	33.7
2017	683	54.0	35.4	34.4
2018	650	62.6	45.8	26.8
2019	647	69.7	54.7	21.5
2020	630	71.6	59.0	17.5
2021	639	69.3	57.4	17.2
2022	623	64.2	52.2	18.8
2023	629	58.0	43.4	25.2

See table footnotes on the next page.

TABLE. (*Continued*) Human papillomavirus vaccination coverage among adolescent girls aged 13–17 years, by jurisdiction — U.S.-affiliated Pacific Islands,* 2013–2023

Abbreviations: HPV = human papillomavirus; IIS = immunization information system.
* Jurisdictions in this report include American Samoa, Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and Palau. Vaccination coverage among adolescents in Guam has been assessed via the National Immunization Survey since 2013; IIS-based coverage assessment was not conducted for Guam. Information on adolescent vaccination coverage in Guam is available at https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/index.html.
† Total number of adolescent girls aged 13–17 years with an active patient status in the IIS, ≥1 dose of any vaccine ever recorded in the IIS, and ≥1 dose of any vaccine recorded in the IIS within 5 years of the assessment year.
§ In December 2016, the HPV vaccination recommendations changed from a 3-dose series for all to a 2-dose series among children and adolescents who initiate the vaccination series before age 15 years. Completion of the HPV vaccination series is defined as receipt of ≥3 HPV vaccine doses, or receipt of 2 doses if the series is initiated at age <15 years, and ≥5 months minus 4 days have elapsed between the first and second dose. This measure was applied retrospectively for all years 2013–2023. https://www.cdc.gov/vaccines/hcp/imz-schedules/child-adolescent-notes.html#note-hpv
¶ The percentage of adolescents who started the HPV vaccination series but did not complete it as of the end of the assessment year.

FIGURE 1. Trends in ≥1-dose human papillomavirus vaccination coverage among adolescent girls aged 13–17 years, by jurisdiction — U.S.-affiliated Pacific Islands,* 2013–2023



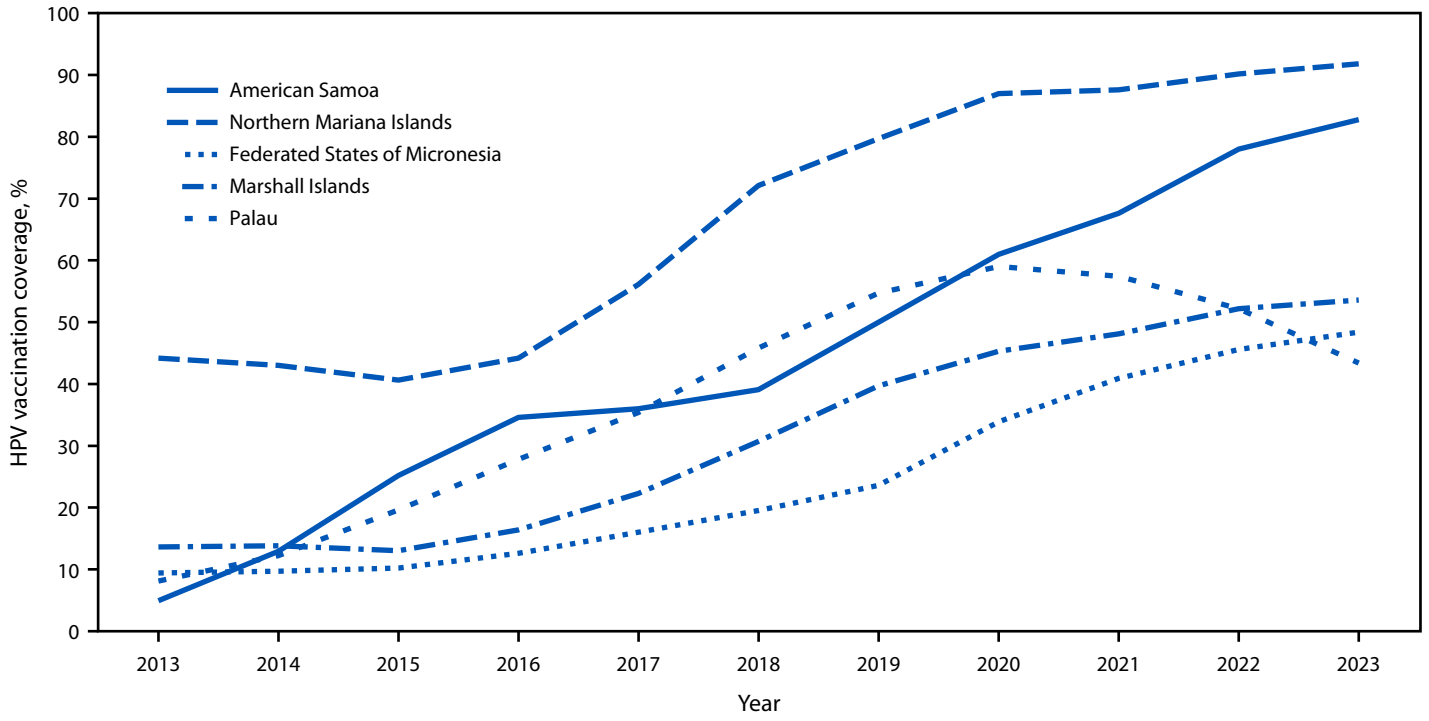
Abbreviation: HPV = human papillomavirus.
* Jurisdictions include American Samoa, Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and Palau. Vaccination coverage among adolescents in Guam has been assessed via the National Immunization Survey since 2013; immunization information system–based coverage assessment was not conducted for Guam. https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/index.html

(95.7%) and the Northern Mariana Islands (97.2%) are higher than those in the three freely associated USAPI jurisdictions (Federated States of Micronesia, Marshall Islands, and Palau) (range = 58.0%–71.4%).

The differences in coverage among the USAPI jurisdictions might be attributed, at least in part, to differences in access to the vaccine. Both American Samoa and the Northern Mariana Islands have offered the vaccine through a mix of school-located vaccination programs as well as in public health clinics. These two jurisdictions receive vaccination program funding and vaccine supply through the Section 317 Immunization Program and the U.S. Vaccines for Children (VFC) program. The three freely associated jurisdictions are not eligible to receive VFC funding and thus have a more limited vaccine supply; therefore, these jurisdictions have not consistently been able to offer HPV vaccine in clinics or other locations outside the school setting.

The school-located HPV vaccination program is an evidence-based intervention to increase HPV vaccination coverage, particularly in low- and middle-income settings; however,

FIGURE 2. Trends in human papillomavirus vaccination series completion* coverage among adolescent girls aged 13–17 years, by jurisdiction† — U.S.-affiliated Pacific Islands, 2013–2023



Abbreviation: HPV = human papillomavirus.

* In December 2016, the HPV vaccination recommendations changed from a 3-dose series for all to a 2-dose series among children and adolescents who initiate the vaccination series before age 15 years. Completion of the HPV vaccination series is defined as receipt of ≥3 HPV vaccine doses, or receipt of 2 doses if the series is initiated at age <15 years, and ≥5 months minus 4 days have elapsed between the first and second dose. This measure was applied retrospectively for all years 2013–2023. https://www.cdc.gov/vaccines/hcp/imz-schedules/child-adolescent-notes.html#note-hpv

† Jurisdictions include American Samoa, Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and Palau. Vaccination coverage among adolescents in Guam has been assessed via the National Immunization Survey since 2013; immunization information system–based coverage assessment was not conducted for Guam. https://www.cdc.gov/vaccines/imz-managers/coverage/teenvaxview/data-reports/index.html

jurisdiction-level coverage is constrained when the vaccine is only available in the school setting (*6*). For example, secondary school enrollment[§§§] among girls is approximately 66% in Federated States of Micronesia, 83% in Marshall Islands, and 80% in Palau, compared with approximately 97% in American Samoa and the Northern Mariana Islands (*7–9*). Strategies to reach out-of-school adolescent girls are needed to improve vaccination coverage in these settings. Providing vaccine access to girls who are not enrolled in school is also an important health equity consideration. Some research suggests that girls who drop out of school are more likely to contract sexually transmitted infections, such as HPV, than are those who remain in school (*10*).

In addition to challenges associated with accessing adolescent girls who are not in school, school-based HPV vaccination programs in some areas might have been suspended while schools were closed during the COVID-19 pandemic. The decline in coverage after 2020 in Palau might be evidence of the pandemic's impact because coverage was trending up among girls who reached the target vaccination age of 11–12 years before 2020, compared with girls who reached age 11–12 years in 2020 and later. More research is needed to assess the underlying reasons for the lower coverage in the freely associated USAPI and to design and implement evidence-based interventions to improve vaccination outcomes adapted to the local context. Specific strategies might be needed to increase vaccination coverage among populations that have recently experienced larger declines in coverage, including those who would have been within the recommended age for vaccination during the pandemic.

Limitations

The findings in this report are subject to at least three limitations. First, accuracy of coverage estimates in this assessment is

§§§ Gross enrollment ratio, measured as the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Data for American Samoa and the Northern Mariana Islands are available from the U.S. Census Bureau. https://data.census.gov/table?q=school%20enrollment%20and%20sex%20american%20samoa; https://data.census.gov/table?q=school%20enrollment%20and%20sex%20commonwealth%20of%20the%20northern%20mariana%20islands

Summary

What is already known about this topic?

Cervical cancer is the fourth most common cancer among women worldwide, and the World Health Organization Western Pacific Region, where the U.S.-affiliated Pacific Islands (USAPI) are located, accounts for one quarter of all estimated cases. Human papillomavirus (HPV) vaccines prevent most cervical cancers and are recommended for girls at age 11–12 years.

What is added by this report?

This is the first comprehensive report of trends in HPV vaccination coverage among adolescent girls since the vaccines were introduced in USAPI jurisdictions. Coverage with HPV vaccine is on track to meet 2030 goals in two jurisdictions, but disparities need to be addressed.

What are the implications for public health practice?

Adolescent vaccination coverage assessment identifies progress toward regional goals. To target increased vaccine access and coverage, this assessment identifies populations and areas with low coverage.

dependent upon completeness and accuracy of jurisdictional IIS data. Working with the jurisdictions, CDC has found high levels of completeness and accuracy of vaccination data (i.e., consistency in recorded dose dates and product types between paper and IIS records) across the five USAPI IISs included in this assessment through evaluations conducted since 2016. However, IIS data completeness before 2016 has not been evaluated. Second, the active patient population size could be inflated in IISs compared with census estimates because of difficulties tracking out-migration and deaths, which can lead to an underestimation of vaccination coverage. However, recent U.S. Census Bureau data were not available for denominator estimation for all jurisdictions included in this assessment. For this reason, exclusion criteria consistent with the Modeling of Immunization Registry Operations Work Group managing active patient status guidance were applied to retrospectively classify likely active patient status to patients in the IIS for each assessment year. Finally, vaccination coverage for Guam is assessed via the National Immunization Survey and was not included in this analysis. Differences in vaccination coverage estimation methods might mean that results are not directly comparable with IIS-based estimates for the other USAPI presented in this report.

Implications for Public Health Practice

Only two of the five USAPI have met or are on track to meet the WHO 2030 goal of ≥90% completion of the HPV vaccination series among girls by age 15 years. Identifying and implementing evidence-based strategies to increase vaccine access and coverage would benefit jurisdictions with lagging coverage. The USAPI immunization programs partner with various international governmental, nongovernmental, and academic organizations on immunization and comprehensive cancer control initiatives. Vaccination coverage data can support development of their activities by providing performance indicators and data for modeling health outcomes related to HPV vaccination, promoting health equity, and attaining the WHO 2030 goal of 90% HPV vaccination series completion coverage.

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Vital Signs: Trends and Disparities in Childhood Vaccination Coverage by Vaccines for Children Program Eligibility — National Immunization Survey-Child, United States, 2012–2022

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Abstract

Introduction: The Vaccines for Children (VFC) program was established in 1994 to provide recommended vaccines at no cost to eligible children and help ensure that all U.S. children are protected from life-threatening vaccine-preventable diseases.

Methods: CDC analyzed data from the 2012–2022 National Immunization Survey-Child (NIS-Child) to assess trends in vaccination coverage with ≥1 dose of measles, mumps, and rubella vaccine (MMR), 2–3 doses of rotavirus vaccine, and a combined 7-vaccine series, by VFC program eligibility status, and to examine differences in coverage among VFC-eligible children by sociodemographic characteristics. VFC eligibility was defined as meeting at least one of the following criteria: 1) American Indian or Alaska Native; 2) insured by Medicaid, Indian Health Service (IHS), or uninsured; or 3) ever received at least one vaccination at an IHS-operated center, Tribal health center, or urban Indian health care facility.

Results: Overall, approximately 52.2% of U.S. children were VFC eligible. Among VFC-eligible children born during 2011–2020, coverage by age 24 months was stable for ≥1 MMR dose (88.0%–89.9%) and the combined 7-vaccine series (61.4%–65.3%). Rotavirus vaccination coverage by age 8 months was 64.8%–71.1%, increasing by an average of 0.7 percentage points annually. Among all children born in 2020, coverage was 3.8 (≥1 MMR dose), 11.5 (2–3 doses of rotavirus vaccine), and 13.8 (combined 7-vaccine series) percentage points lower among VFC-eligible than among non–VFC-eligible children.

Conclusions and implications for public health practice: Although the VFC program has played a vital role in increasing and maintaining high levels of childhood vaccination coverage for 30 years, gaps remain. Enhanced efforts must ensure that parents and guardians of VFC-eligible children are aware of, have confidence in, and are able to obtain all recommended vaccines for their children.

Introduction

Congress established the Vaccines for Children (VFC) program in 1994 to provide routine vaccines at no cost to eligible children. Since introduction of the VFC program, vaccination of children born during 1994–2023 will have prevented approximately 508 million illnesses and 1,129,000 deaths, saving nearly $2.7 trillion in societal costs (*1*). In 2023, VFC distributed approximately 74 million pediatric vaccine doses to participating health care provider locations (CDC, unpublished data, 2024). The VFC program is one of the nation's primary health platforms created to promote health equity and improve the health of children.

VFC funds are allocated by the Centers for Medicare & Medicaid Services to CDC, and Medicaid providers can receive payment from Medicaid for vaccine administration services provided to Medicaid-eligible children.* CDC provides funding to 61 state, local, and territorial immunization programs to implement and oversee the VFC program (*2*). Persons aged ≤18 years who are Medicaid-eligible, uninsured, underinsured,† or American Indian or Alaska Native (AI/AN)§ are eligible to receive vaccines from VFC program providers at no cost. This report 1) describes characteristics of children eligible for the VFC program; 2) examines trends in routine vaccination coverage among VFC-eligible children; and 3) identifies gaps in vaccination coverage among VFC-eligible children compared with children who are not VFC-eligible.

* https://www.ssa.gov/OP_Home/ssact/title19/1928.htm

† Children categorized as underinsured because their health insurance plans do not include coverage for recommended vaccinations are eligible to receive VFC vaccines only at Federally Qualified Health Centers (FQHCs), Rural Health Clinics (RHCs), or under an approved deputization provider location agreement. https://www.cdc.gov/vaccines-for-children/vfc-information-for-parents/index.html

§ As defined by the Indian Health Care Improvement Act.

Methods

Data Collection

NIS-Child is a nationally representative household survey that monitors coverage with Advisory Committee on Immunization Practices (ACIP)–recommended vaccines among children aged 19–35 months in the 50 states, the District of Columbia, and some U.S. territories[¶] using a random-digit–dial telephone sampling frame.[**] Parents and guardians (parents) of eligible children are interviewed to obtain child, maternal, and household information and to obtain consent to contact the child's vaccine providers. With consent, parent-identified providers receive mailed immunization history questionnaires and are asked to provide information on vaccination types, doses, and dates administered and administrative data.

The overall household response rates[††] for 2012–2022 NIS-Child surveys ranged from 21.1% to 42.5%. Adequate provider data[§§] were available for 49.4% to 63.9% of children aged 19–35 months with a completed household interview, resulting in a sample size of 152,915 children.

Data Analysis

VFC-eligible children were defined as meeting one of these criteria: 1) AI/AN; 2) enrolled in Medicaid or the Indian Health Service (IHS) or uninsured[¶¶]; or 3) ever received at least one vaccination at an IHS-operated center, Tribal health center, or urban Indian health care facility. Birth cohorts were constructed to assess coverage with ≥1 dose of MMR, 2–3 doses of rotavirus vaccine,[***] the combined 7-vaccine series,[†††] and other routinely recommended vaccines[§§§] among children born during 2011–2020. Kaplan-Meier techniques were used to estimate vaccination coverage with all vaccines by age 24 months, with a few exceptions.[¶¶¶] Percentage point differences in vaccination coverage between VFC-eligible and non–VFC-eligible children (i.e., coverage among VFC-eligible children minus coverage among non–VFC-eligible children) were analyzed using Z-tests to assess the gap in coverage by VFC program eligibility status. Weighted linear regression models assessed the average annual percentage point change (AAPPC) in vaccination coverage among children born during 2011–2020. Estimates of vaccination coverage with ≥1 dose MMR, rotavirus, and the combined 7-vaccine series were stratified by the child's race and ethnicity, health insurance status, urbanicity,[****] and household income. Analyses were conducted using SAS-callable SUDAAN (version 11.0.3, RTI International) with $p<0.05$ considered statistically significant. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.[††††]

Results

Characteristics of Children Eligible for the VFC Program

Among children aged 19–35 months who were born during 2011–2020, 52.2% were VFC eligible (Table 1). Among VFC-eligible children born in 2020, 93.4% were Medicaid-insured, 7.4% were AI/AN, 43.7% lived in households with income below the federal poverty level, and 48.1% lived in a metropolitan statistical area (MSA) principal city. The proportion of VFC-eligible children who were uninsured decreased from 8.1% of those born in 2011 to 3.1% of those born in 2020.

[¶] Certain local areas that receive federal immunization funds under Section 317 of the Public Health Service Act are sampled separately in NIS. Those areas include Chicago, Illinois; New York, New York; Philadelphia County, Pennsylvania; Bexar County, Texas; and Houston, Texas. Two territories were sampled separately in 2022: Guam and Puerto Rico. National estimates in this report exclude U.S. territories.

[**] NIS-Child surveys from 2011–2017 were conducted using a dual-frame design with both mobile and landline sampling frames. NIS-Child surveys from 2018–2022 were conducted using a single-frame mobile telephone design.

[††] The Council of American Survey Research Organizations response rate is the product of three other rates: 1) the resolution rate (the proportion of telephone numbers that can be identified as either for business or residence), 2) the screening rate (the proportion of qualified households that complete the screening process), and 3) the cooperation rate (the proportion of contacted eligible households for which a completed interview is obtained).

[§§] Beginning with the 2012 NIS-Child, all children with any provider-reported vaccination data were considered to have adequate provider data. https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NIS/NISPUF14_DUG.PDF

[¶¶] Children not covered by any kind of health insurance are classified as uninsured. https://www.cdc.gov/vaccines-for-children/downloads/operations-guide-508.pdf

[***] Includes ≥2 doses of Rotarix monovalent rotavirus vaccine or ≥3 doses of RotaTeq pentavalent rotavirus vaccine. If any dose in the series is either RotaTeq or unknown, it was assumed a 3-dose series was needed. The maximum age for the final rotavirus dose is 8 months, 0 days.

[†††] The combined 7-vaccine series (4:3:1:3*:3:1:4) includes ≥4 doses of diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP); ≥3 doses of poliovirus vaccine; ≥1 dose of measles-containing vaccine; ≥3 or ≥4 doses of *Haemophilus influenzae* type b conjugate vaccine (Hib) (depending upon product type); ≥3 doses of hepatitis B vaccine (HepB); ≥1 dose of varicella vaccine; and ≥4 doses of pneumococcal conjugate vaccine (PCV).

[§§§] Coverage was also assessed for ≥4 doses of DTaP; ≥3 doses of poliovirus vaccine; ≥3 or ≥4 doses of Hib (depending upon product type); the HepB birth dose; ≥3 doses of HepB; ≥1 dose of varicella vaccine; ≥4 doses of PCV; ≥1 dose of hepatitis A vaccine (HepA); and ≥2 doses of influenza vaccine.

[¶¶¶] Exceptions include coverage with the HepB birth dose, which was measured as the proportion of children who received a dose of HepB by age 3 days and rotavirus vaccine, assessed at age 8 months, 0 days.

[****] MSA status was determined based on household-reported city and county of residence and was grouped into three categories: MSA principal city, MSA nonprincipal city, and non-MSA. MSAs and principal cities were as defined by the U.S. Census Bureau (https://www.census.gov/programs-surveys/metro-micro.html). Non-MSA areas include urban populations not located within an MSA and completely rural areas.

[††††] 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

TABLE 1. Characteristics of children aged 19–35 months born during 2011–2020, overall and by Vaccines for Children program eligibility* — National Immunization Survey-Child, United States, 2012–2022

	Children born during 2011–2020				VFC-eligible children	
	Total		VFC-eligible	Non–VFC-eligible	Born in 2011	Born in 2020
Characteristic	No.	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Overall	**152,915**	**100.0 (—)**	**52.2 (51.7–52.7)**	**47.8 (47.3–48.3)**	**53.4 (51.8–55.0)**	**52.6 (50.7–54.4)**
Health insurance status among VFC-eligible children						
Any Medicaid insurance	**56,077**	**91.2 (90.8–91.6)**	91.2 (90.8–91.6)	NA	88.9 (87.3–90.3)	93.4 (92.0–94.6)
Indian Health Service	**1,199**	**1.0 (0.9–1.1)**	1.0 (0.9–1.1)	NA	1.0 (0.7–1.5)	0.8 (0.6–1.1)
No insurance	**4,083**	**5.7 (5.4–6.0)**	5.7 (5.4–6.0)	NA	8.1 (6.9–9.6)	3.1 (2.2–4.2)
Other insurance†	**1,926**	**2.1 (2.0–2.3)**	2.1 (2.0–2.3)	NA	1.9 (1.4–2.7)	2.7 (2.0–3.6)
Health insurance status among non–VFC-eligible children						
Private insurance only	**79,009**	**86.4 (85.9–86.8)**	NA	86.4 (85.9–86.8)	NA	NA
Other insurance§	**10,621**	**13.6 (13.2–14.1)**	NA	13.6 (13.2–14.1)	NA	NA
Poverty status						
At or above poverty level	**116,008**	**70.0 (69.5–70.5)**	46.5 (45.7–47.3)	94.5 (94.1–94.8)	37.8 (35.4–40.2)	56.3 (53.3–59.3)
Below poverty level	**31,612**	**30.0 (29.5–30.5)**	53.5 (52.7–54.3)	5.5 (5.2–5.9)	62.2 (59.8–64.6)	43.7 (40.7–46.7)
Race and ethnicity¶						
AI/AN, alone or combined with another race or ethnicity	**6,375**	**3.8 (3.6–4.0)**	7.3 (6.9–7.7)	NA	6.8 (5.8–8.1)	7.4 (6.2–8.7)
AI/AN only	**2,031**	**1.0 (0.9–1.1)**	1.9 (1.8–2.1)	NA	1.8 (1.4–2.2)	2.0 (1.6–2.6)
Asian only	**7,100**	**5.5 (5.2–5.7)**	3.9 (3.6–4.3)	7.2 (6.8–7.6)	3.4 (2.7–4.4)	4.1 (3.0–5.6)
Black or African American only	**12,230**	**13.0 (12.7–13.4)**	17.7 (17.2–18.3)	7.9 (7.5–8.3)	19.2 (17.4–21.2)	17.3 (15.5–19.3)
NH/OPI only	**689**	**0.3 (0.2–0.3)**	0.3 (0.2–0.4)	0.2 (0.2–0.3)	NA**	NA**
White only	**88,677**	**46.1 (45.6–46.6)**	30.8 (30.2–31.5)	62.7 (62.1–63.4)	30.5 (28.6–32.5)	31.6 (29.1–34.3)
Hispanic or Latino	**30,460**	**27.1 (26.6–27.6)**	37.6 (36.8–38.4)	15.7 (15.1–16.3)	37.4 (34.9–40.0)	36.7 (33.8–39.7)
Multiple races	**11,728**	**7.0 (6.8–7.3)**	7.7 (7.3–8.1)	6.3 (6.0–6.6)	7.2 (6.2–8.4)	7.9 (6.6–9.4)
Urbanicity						
MSA, principal city	**66,789**	**45.8 (45.3–46.3)**	47.8 (47.0–48.5)	43.7 (43.0–44.4)	47.7 (45.3–50.2)	48.1 (45.2–51.0)
MSA, nonprincipal city	**58,477**	**42.6 (42.1–43.1)**	37.9 (37.1–38.7)	47.7 (47.0–48.4)	36.2 (33.8–38.7)	37.5 (34.7–40.3)
Non-MSA	**27,649**	**11.6 (11.4–11.9)**	14.4 (13.9–14.8)	8.6 (8.3–8.9)	16.1 (14.7–17.5)	14.5 (12.7–16.4)

Abbreviations: AI/AN = American Indian or Alaska Native; CHIP = Children's Health Insurance Program; MSA = metropolitan statistical area; NA = not applicable; NH/OPI = Native Hawaiian or other Pacific Islander; VFC = Vaccines for Children.

* Child identified as AI/AN; insured by Medicaid or Indian Health Service; uninsured; or received at least one vaccine at an Indian Health Service–operated center, Tribal health facility, or urban Indian health care facility.

† Includes children identified as AI/AN with private insurance, CHIP, military, or another form of insurance, alone or in combination with another plan.

§ Includes children with CHIP, military, or other insurance, alone or in combination with private insurance.

¶ The child's race and ethnicity was reported by their parent or guardian. Children identified as AI/AN, Asian, Black or African American, NH/OPI, White, or multiple races were reported by the parent or guardian as non-Hispanic. Children identified as having multiple races had more than one race category selected. Children identified as Hispanic or Latino might be of any race. Children identified as AI/AN, alone or in combination with another race or ethnicity, might not be mutually exclusive from other racial and ethnic groups shown.

** Estimate suppressed because it did not meet standards for data reliability (95% CI >20, relative SE >30, or sample size <30).

Overall Vaccination Coverage Among Children Eligible for the VFC Program

Among VFC-eligible children born during 2011–2020, coverage by age 24 months with ≥1 dose of MMR and the combined 7-vaccine series was stable (88.0%–89.9% and 61.4%–65.3%, respectively) (Figure) (Table 2). Rotavirus vaccination coverage by age 8 months was 64.8%–71.1%, increasing on average by 0.7 percentage points annually. Among VFC-eligible children born in 2020, coverage with ≥1 dose of MMR, rotavirus vaccine, and the combined 7-vaccine series was 89.6%, 71.0%, and 61.4%, respectively.

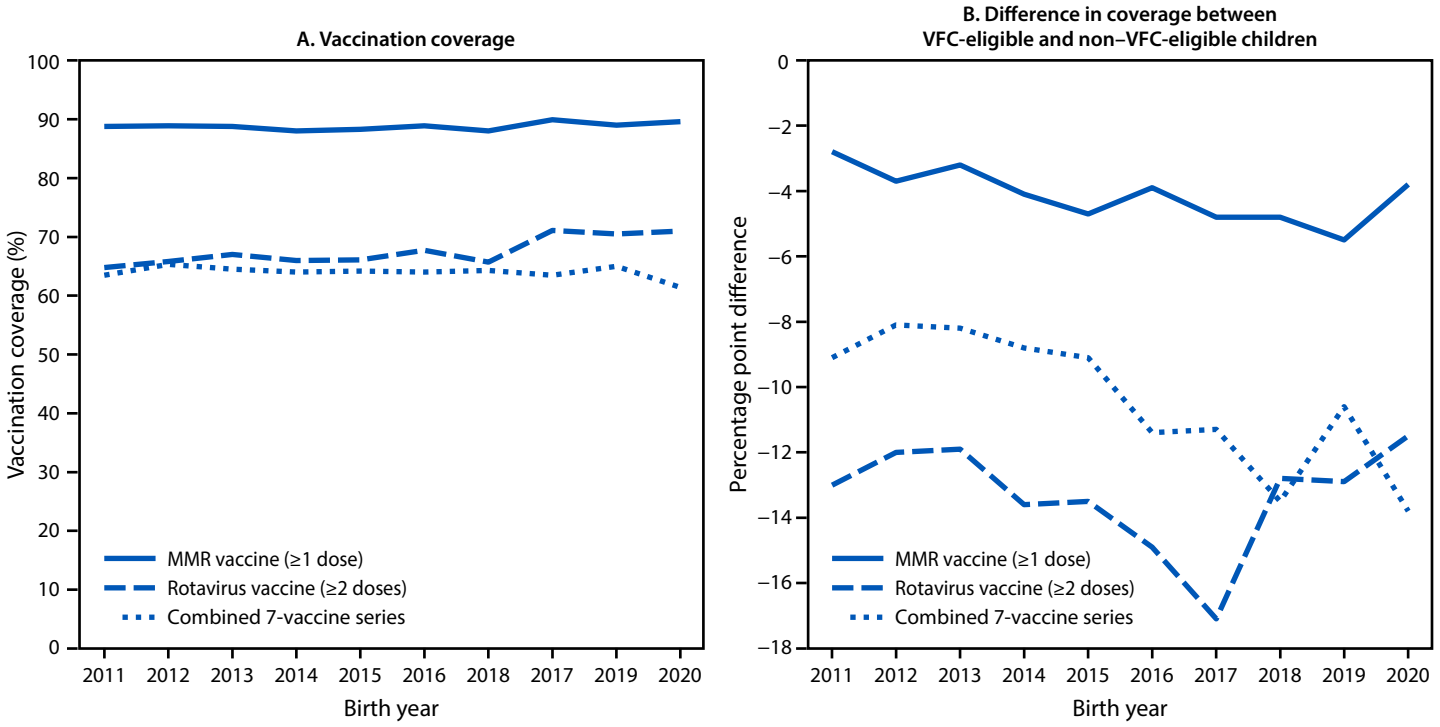
Among the vaccines included in the combined 7-vaccine series, coverage among VFC-eligible children born in 2020 was approximately 90% for first doses of vaccines (≥1 dose of varicella vaccine and ≥1 dose of MMR[§§§§]) and for series administered earlier in life (≥3 doses of poliovirus vaccine and ≥3 doses of hepatitis B vaccine) (Supplementary Table, https://stacks.cdc.gov/view/cdc/159296). Coverage was 73.6%–76.7% with series requiring multiple doses by age 24 months, with some doses recommended after age 12 months (i.e., ≥4 doses of diphtheria, tetanus toxoids, and acellular pertussis vaccine; ≥4 doses pneumococcal conjugate vaccine; and the full series of *Haemophilus influenzae* type b conjugate vaccine).

Vaccination Coverage Among VFC-Eligible Children Born in 2020 by Selected Characteristics

Among VFC-eligible children born in 2020, coverage with ≥1 dose of MMR, rotavirus vaccine, and the combined 7-vaccine series among those who were uninsured was 18.9–34.7 percentage points lower than that among Medicaid-insured children (Table 3). Compared with coverage among children living at or above the poverty level, coverage with rotavirus

[§§§§] MMR and varicella vaccines are 2-dose vaccination series, with first doses administered at age 12–15 months, and second doses administered at age 4–6 years.

FIGURE. Coverage* with ≥1 dose of measles, mumps, and rubella vaccine,† rotavirus vaccine,§ and the 7-vaccine series¶ among children eligible for the Vaccines for Children program (A) and difference in vaccination coverage between program-eligible and nonprogram-eligible children†† born during 2011–2020 (B) — National Immunization Survey-Child, United States, 2012–2022**



Abbreviations: AI/AN = American Indian or Alaska Native; MMR = measles, mumps, and rubella vaccine; VFC = Vaccines for Children.

* Coverage with ≥1 dose of MMR and the combined 7-vaccine series assessed before the day the child turns 24 months. Rotavirus vaccination coverage assessed by age 8 months, 0 days. The Kaplan-Meier method was used to estimate vaccination coverage to account for children whose vaccination history was ascertained before age 24 months.

† Includes children who might have received measles, mumps, rubella, and varicella combination vaccine.

§ At least two doses of Rotarix monovalent rotavirus vaccine, or ≥3 doses of RotaTeq pentavalent rotavirus vaccine. If any dose in the series is either RotaTeq or unknown, it was assumed a 3-dose series was needed. Maximum age for receipt of the final dose is age 8 mos, 0 days.

¶ The combined 7-vaccine series (4:3:1:3*:3:1:4) includes ≥4 doses of diphtheria and tetanus toxoids and acellular pertussis vaccine, ≥3 doses of poliovirus vaccine, ≥1 dose of measles-containing vaccine, the full series of *Haemophilus influenzae* type b conjugate vaccine (≥3 or ≥4 doses, depending on product type), ≥3 doses of hepatitis B vaccine, ≥1 dose of varicella vaccine, and ≥4 doses of pneumococcal conjugate vaccine.

** Child is identified as AI/AN; insured by Medicaid or Indian Health Service; uninsured; or received any vaccines at an Indian Health Service–operated center, Tribal health facility, or urban Indian health care facility.

†† Defined as coverage among VFC-eligible children – coverage among non–VFC-eligible children.

vaccine and the combined 7-vaccine series among those living below the poverty level was 9.3–9.9 percentage points lower. By race and ethnicity, rotavirus vaccination coverage among AI/AN and Hispanic or Latino children was 6.9–8.9 percentage points higher than that among non-Hispanic White (White) children.

Comparison of Vaccination Coverage Among VFC-Eligible and Non–VFC-Eligible Children

Among all children born during 2011–2020, coverage with ≥1 dose of MMR, rotavirus vaccine, and the combined 7-vaccine series was lower among VFC-eligible children than among non–VFC-eligible children (Figure) (Table 2). During this period, the gap in coverage between VFC-eligible and non–VFC-eligible children increased for ≥1 dose of MMR (AAPPC = −0.2) and the combined 7-vaccine series (AAPPC = −0.6). Among children born in 2020, coverage with ≥1 dose of MMR, rotavirus vaccine, and the combined 7-vaccine series was 3.8, 11.5, and 13.8 percentage points, respectively, lower among VFC-eligible than among non–VFC-eligible children.

Among children born in 2020, all three vaccination coverage measures were lower among VFC-eligible children than among non–VFC-eligible children who were 1) White (−17.9 to −6.2 percentage points), 2) living at or above the poverty level (−11.2 to −4.6 percentage points), and 3) living in MSA principal cities (−12.8 to −3.3 percentage points) and MSA nonprincipal cities (−15.4 to −4.1 percentage points) (Table 3). Statistically significant gaps in coverage by sociodemographic characteristics were narrower for ≥1 dose of MMR (−6.2 to −3.3 percentage points) and wider for rotavirus vaccine (−17.9 to −7.7 percentage points) and the combined 7-vaccine series (−17.1 to −9.7 percentage points).

TABLE 2. Trends in vaccination coverage* with ≥1 dose measles, mumps, and rubella vaccine,† rotavirus vaccine,§ and the combined 7-vaccine series¶ among children eligible for the Vaccines for Children program and difference in coverage between program-eligible and nonprogram-eligible children born during 2011–2020 — National Immunization Survey-Child, United States, 2012–2022**

	Vaccine measure					
	MMR† (≥1 dose)		Rotavirus§ (received by age 8 mos, 0 days)		Combined 7-vaccine series¶	
Birth year	Coverage % (95% CI)	Percentage point difference (95% CI)	Coverage % (95% CI)	Percentage point difference (95% CI)	Coverage % (95% CI)	Percentage point difference (95% CI)
2011	88.8 (87.1 to 90.4)	−2.8 (−4.9 to −0.7)††	64.8 (62.3 to 67.1)	−13.0 (−16.0 to −10.0)††	63.5 (61.1 to 65.9)	−9.1 (−12.2 to −5.9)††
2012	88.9 (87.4 to 90.2)	−3.7 (−5.4 to −2.0)††	65.8 (63.5 to 67.9)	−12.0 (−15.0 to −9.1)††	65.3 (63.0 to 67.5)	−8.1 (−11.1 to −5.0)††
2013	88.8 (87.3 to 90.2)	−3.2 (−5.1 to −1.2)††	67.0 (64.8 to 69.2)	−11.9 (−14.6 to −9.1)††	64.5 (62.2 to 66.7)	−8.2 (−11.2 to −5.3)††
2014	88.0 (86.2 to 89.7)	−4.1 (−6.3 to −1.8)††	66.0 (63.5 to 68.4)	−13.6 (−16.8 to −10.4)††	64.0 (61.6 to 66.4)	−8.8 (−12.2 to −5.4)††
2015	88.3 (86.8 to 89.8)	−4.7 (−6.5 to −2.9)††	66.1 (63.6 to 68.6)	−13.5 (−16.7 to −10.3)††	64.2 (61.7 to 66.7)	−9.1 (−12.3 to −5.8)††
2016	88.9 (87.2 to 90.4)	−3.9 (−5.8 to −2.0)††	67.7 (65.1 to 70.2)	−14.9 (−17.9 to −11.9)††	64.0 (61.4 to 66.7)	−11.4 (−14.7 to −8.1)††
2017	88.0 (86.5 to 89.5)	−4.8 (−6.8 to −2.7)††	65.7 (63.5 to 67.8)	−17.1 (−19.7 to −14.4)††	64.3 (62.1 to 66.6)	−11.3 (−14.2 to −8.4)††
2018	89.9 (88.5 to 91.2)	−4.8 (−6.4 to −3.3)††	71.1 (69.1 to 73.0)	−12.8 (−15.2 to −10.4)††	63.5 (61.4 to 65.6)	−13.5 (−16.2 to −10.9)††
2019	89.0 (87.6 to 90.4)	−5.5 (−7.2 to −3.9)††	70.5 (68.5 to 72.5)	−12.9 (−15.4 to −10.5)††	65.0 (62.8 to 67.2)	−10.6 (−13.3 to −7.8)††
2020§§	89.6 (87.7 to 91.3)	−3.8 (−6.0 to −1.6)††	71.0 (68.3 to 73.5)	−11.5 (−14.8 to −8.3)††	61.4 (58.4 to 64.4)	−13.8 (−17.6 to −10.0)††
AAPPC¶¶	0.1 (−0.1 to 0.2)	−0.2 (−0.4 to −0.1)***	0.7 (0.3 to 1.1)***	−0.1 (−0.5 to 0.4)	−0.1 (−0.3 to 0.1)	−0.6 (−0.9 to −0.3)***

Abbreviations: AAPPC = average annual percentage point change in coverage; AI/AN = American Indian or Alaska Native; MMR = measles, mumps, and rubella vaccine; VFC = Vaccines for Children.

* Coverage with ≥1 dose MMR and the combined 7-vaccine series were assessed by age 24 months (before the day the child turns 24 months). Rotavirus vaccine series was assessed by age 8 months, 0 days. The Kaplan-Meier method was used to estimate vaccination coverage to account for children whose vaccination history was ascertained before age 24 months.

† Includes children who might have received measles, mumps, rubella, and varicella combination vaccine.

§ Two or more doses of Rotarix monovalent rotavirus vaccine, or ≥3 doses of RotaTeq pentavalent rotavirus vaccine. (If any dose in the series is either RotaTeq or unknown, it was assumed a 3-dose series was needed. The maximum age for receipt of the final rotavirus vaccine dose is 8 months, 0 days.

¶ The combined 7-vaccine series (4:3:1:3*:3:1:4) includes ≥4 doses of diphtheria and tetanus toxoids and acellular pertussis vaccine, ≥3 doses of poliovirus vaccine, ≥1 dose of measles-containing vaccine, the full series of *Haemophilus influenzae* type b conjugate vaccine (≥3 or ≥4 doses, depending on product type), ≥3 doses of hepatitis B vaccine, ≥1 dose of varicella vaccine, and ≥4 doses of pneumococcal conjugate vaccine.

** Child is identified as AI/AN; insured by Medicaid or Indian Health Service; uninsured; or received at least one vaccine at an Indian Health Service–operated center, Tribal health facility, or urban Indian health care facility.

†† Statistically significant (p<0.05) percentage point difference in coverage (VFC-eligible − non–VFC-eligible).

§§ Data for the 2020 birth year are considered preliminary and are from survey years 2021 and 2022. Data from survey year 2023 were not available in time to include in this report.

¶¶ Slope of line created by fitting a linear regression model to the coverage estimates from birth years 2011–2020.

*** AAPPC is statistically significantly different from zero (p<0.05).

Discussion

More than one half of U.S. children (52.6%) born in 2020 were eligible for the VFC program, underscoring the vast scope of this program 30 years after it was enacted into law. Coverage among VFC-eligible children born during 2011–2020 with ≥1 dose of MMR remained high and stable, indicating that efforts to achieve and maintain measles elimination status in the United States have been supported through the VFC program. No differences in ≥1-dose MMR coverage among VFC-eligible children born in 2020 were found by race and ethnicity, poverty status, and urban-rural residency, demonstrating continued success in providing equitable access to vaccination through the VFC program (*3*). Increased coverage with rotavirus vaccine among VFC-eligible children born during 2011–2020 signals progress toward achieving high coverage with all routinely recommended immunizations.

Children born during 2018–2020 might have experienced health care disruptions resulting from the COVID-19 pandemic. However, previous analyses¶¶¶¶ found no differences in overall vaccination coverage by age 24 months among children who were due for vaccination before the pandemic compared with those who were due for vaccination during the COVID-19 pandemic, including among children who were Medicaid-insured, uninsured, or AI/AN (*4,5*).

Coverage with the combined 7-vaccine series was 61.4% among VFC-eligible children born in 2020, highlighting room for improvement. By individual vaccine measures, coverage with first doses of vaccines and series administered earlier in life was high but was lower for multidose series vaccines, with additional doses administered at age >12 months. These patterns suggest potential barriers associated with receiving multidose series and for vaccinating VFC-eligible children during the second year of life. Provider reminder-recall systems and simultaneous administration of childhood vaccines at well-child visits have been established as effective strategies that can reduce missed vaccination opportunities and increase coverage (*6,7*).

Additional opportunities to improve coverage were identified among certain sociodemographic groups. Coverage was lower among uninsured children than among Medicaid-insured

¶¶¶¶ https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/pubs-presentations/nis-child-pandemic-effects-2018-2021.html

TABLE 3. Vaccination coverage* among children born in 2020† and eligible§ for the Vaccines for Children program, by sociodemographic characteristics, and difference in coverage compared with children not eligible for the Vaccines for Children program — National Immunization Survey-Child, United States, 2021–2022

Characteristic	Vaccine measure					
	MMR¶ (≥1 dose)		Rotavirus (received by age 8 mos, 0 days)**		Combined 7-vaccine series††	
	VFC-eligible children coverage % (95% CI)	PP difference§§ (95% CI)	VFC-eligible children coverage % (95% CI)	PP difference§§ (95% CI)	VFC-eligible children coverage % (95% CI)	PP difference§§ (95% CI)
Overall vaccination coverage	**89.6 (87.7 to 91.3)**	**–3.8 (–6.0 to –1.6)¶¶**	**71.0 (68.3 to 73.5)**	**–11.5 (–14.8 to –8.3)¶¶**	**61.4 (58.4 to 64.4)**	**–13.8 (–17.6 to –10.0)¶¶**
Health insurance status						
Any Medicaid insurance (Ref)	90.1 (88.2 to 91.9)	NA	71.8 (69.0 to 74.4)	NA	61.8 (58.6 to 64.9)	NA
Indian Health Service	92.6 (81.2 to 98.3)	NA	78.5 (62.5 to 88.9)***	NA	71.6 (57.8 to 84.1)***	NA
No insurance	71.2 (56.5 to 84.5)***,†††	NA	37.1 (24.6 to 51.6)***,†††	NA	39.3 (25.5 to 57.1)***,†††	NA
Other insurance§§§	89.1 (80.1 to 95.2)	NA	78.1 (64.2 to 87.6)***	NA	69.6 (56.7 to 81.6)***	NA
Poverty status						
At or above poverty level (Ref)	88.9 (86.0 to 91.4)	–4.6 (–7.6 to –1.6)¶¶	76.1 (72.7 to 79.1)	–7.7 (–11.5 to –4.0)¶¶	65.3 (61.5 to 69.2)	–11.2 (–15.7 to –6.8)¶¶
Below poverty level	89.5 (86.7 to 92.0)	0 (–8.0 to 7.9)	66.2 (61.6 to 70.4)†††	6.0 (–10.0 to 21.9)***	56.0 (51.1 to 61.0)†††	–2.6 (–20.1 to 14.9)***
Race and ethnicity¶¶¶						
AI/AN, alone or combined with another race or ethnicity****	92.0 (87.6 to 95.2)	NA	75.5 (68.5 to 81.4)†††	NA	67.7 (59.4 to 75.8)	NA
AI/AN only	89.1 (81.3 to 94.6)	NA	69.0 (56.8 to 79.0)***	NA	56.7 (44.6 to 69.5)***	NA
Asian only	90.3 (77.8 to 97.4)	–2.8 (–14.2 to 8.5)***	79.3 (64.3 to 89.1)***	–4.7 (–18.9 to 9.5)***	62.7 (46.8 to 78.7)***	–15.7 (–33.8 to 2.4)***
Black or African American only	88.9 (84.2 to 92.7)	0.8 (–6.0 to 7.5)	71.7 (66.3 to 76.5)	–7.6 (–15.9 to 0.7)	61.8 (55.9 to 67.8)	–4.2 (–14.9 to 6.6)
White only (Ref)	88.3 (85.1 to 91.1)	–6.2 (–9.4 to –3.0)¶¶	66.6 (61.9 to 71.1)	–17.9 (–22.9 to –12.9)¶¶	60.3 (55.6 to 65.0)	–17.1 (–22.4 to –11.8)¶¶
Hispanic or Latino	91.7 (88.8 to 94.1)	–1.2 (–6.2 to 3.8)	73.5 (68.5 to 78.0)†††	–6.1 (–14.2 to 2.0)	62.0 (56.1 to 67.9)	–9.7 (–18.9 to –0.5)¶¶
Multiple races	86.6 (75.2 to 94.5)	–6.6 (–17.4 to 4.2)***	71.3 (61.4 to 79.5)	–5.5 (–17.5 to 6.6)***	63.0 (53.0 to 73.0)	–11.0 (–24.1 to 2.0)***
Urbanicity						
MSA, principal city (Ref)	89.4 (86.7 to 91.7)	–3.3 (–6.4 to –0.3)¶¶	72.2 (68.4 to 75.8)	–12.4 (–16.9 to –8.0)¶¶	62.2 (58.0 to 66.5)	–12.8 (–18.3 to –7.3)¶¶
MSA, nonprincipal city	90.4 (87.6 to 92.9)	–4.1 (–7.2 to –1.0)¶¶	69.9 (65.3 to 74.2)	–11.6 (–16.9 to –6.3)¶¶	61.4 (56.1 to 66.7)	–15.4 (–21.6 to –9.3)¶¶
Non-MSA	88.4 (82.2 to 93.2)	–0.7 (–10.1 to 8.6)	69.4 (62.2 to 75.8)	–6.6 (–17.1 to 3.9) ***	59.1 (52.2 to 66.1)	–6.0 (–16.5 to 4.6)***

See table footnotes on the next page.

children, consistent with findings on vaccination coverage among uninsured adolescents and adults (*8,9*). Uninsured children are more likely to live in households with incomes below the poverty level, to have had no provider health care visits in the past year, and to be less likely to complete multidose vaccination series (*8,10,11*). The proportion of uninsured children was small and decreased from approximately 8.1% in 2011 to 3.1% in 2020. Efforts to further reduce the proportion of uninsured children, including increasing access to Medicaid, can facilitate connection to the health care system (*12*) and subsequently increase vaccination coverage (*13*).

Lower coverage with rotavirus vaccine and the combined 7-vaccine series was found among VFC-eligible children living below the poverty level compared with coverage among VFC-eligible children living at or above poverty. Although the VFC program provides vaccine at no cost, office visit fees or fees for nonvaccine services received during the visit (*2*) beyond vaccination cost might present potential barriers for low-income households, in addition to other barriers involving health care providers, parents, and the health care delivery system (*14,15*). Establishment of a place to receive ongoing routine care has been associated with increased likelihood of children in low-income households and VFC-eligible children being up to date with recommended vaccines (*14,16*).

Compared with coverage among non–VFC-eligible children, coverage overall was lower among VFC-eligible children,

TABLE 3. (*Continued*) Vaccination coverage* among children born in 2020† and eligible§ for the Vaccines for Children program, by sociodemographic characteristics, and difference in coverage compared with children not eligible for the Vaccines for Children program — National Immunization Survey-Child, United States, 2021–2022

Abbreviations: AI/AN = American Indian or Alaska Native; CHIP = Children's Health Insurance Program; MMR = measles, mumps, and rubella vaccine; MSA = metropolitan statistical area; NA = not applicable; PP = percentage point; Ref = referent group; VFC = Vaccines for Children.

* Coverage with ≥1 dose MMR and the combined 7-vaccine series were assessed by age 24 months (before the day the child turns 24 months). Rotavirus vaccine series was assessed by age 8 months 0 days. The Kaplan-Meier method was used to estimate vaccination coverage to account for children whose vaccination history was ascertained before age 24 months.

† Data for the 2020 birth year are considered preliminary and are from survey years 2021 and 2022. Data from survey year 2023 were not available in time to include in this report.

§ Child is identified as AI/AN; insured by Medicaid or Indian Health Service; uninsured; or received at least one vaccine at an Indian Health Service–operated center, Tribal health facility, or urban Indian health care facility.

¶ Includes children who might have received measles, mumps, rubella, and varicella combination vaccine.

** Includes ≥2 doses of Rotarix monovalent rotavirus vaccine, or ≥3 doses of RotaTeq pentavalent rotavirus vaccine. If any dose in the series is either RotaTeq or unknown, it was assumed a 3-dose series was needed. The maximum age for the final rotavirus dose is 8 months, 0 days.

†† The combined 7-vaccine series (4:3:1:3*:3:1:4) includes ≥4 doses of diphtheria and tetanus toxoids and acellular pertussis vaccine, ≥3 doses of poliovirus vaccine, ≥1 dose of measles-containing vaccine, the full series of *Haemophilus influenzae* type b conjugate vaccine (≥3 or ≥4 doses, depending on product type), ≥3 doses of hepatitis B vaccine, ≥1 dose of varicella vaccine, and ≥4 doses of pneumococcal conjugate vaccine.

§§ PP difference in coverage = coverage among VFC-eligible children − coverage among non–VFC-eligible children.

¶¶ PP difference in coverage is statistically significant ($p<0.05$).

*** Estimates with 95% CIs >20 might not be reliable.

††† Statistically significant difference in coverage ($p<0.05$) compared with Ref.

§§§ Includes children identified as AI/AN with private insurance, CHIP, military, or another form of insurance, alone or in combination with another plan.

¶¶¶ The child's race and ethnicity was reported by their parent or guardian. Children identified as AI/AN, Asian, Black or African American, Native Hawaiian or other Pacific Islander, White, or multiple races were reported by the parent or guardian as non-Hispanic. Children identified as having multiple races had more than one race category selected. Children identified as Hispanic or Latino might be of any race. Children identified as AI/AN, alone or in combination with another race or ethnicity, might not be mutually exclusive from other racial and ethnic groups shown. Estimates for Native Hawaiian or other Pacific Islander children were suppressed because of small sample size.

**** Comparisons by race and ethnicity for AI/AN children, in combination with another race or ethnicity, and White children were possible as these racial and ethnic groups were mutually exclusive among children born in 2020.

consistent with an earlier analysis of vaccination coverage among VFC-eligible children (*17*). High, yet lower ≥1-dose MMR coverage among VFC-eligible children compared with non–VFC-eligible children is concerning, because small pockets of low coverage have resulted in measles outbreaks (*18*,*19*). Despite improvements in rotavirus vaccination coverage among VFC-eligible children, coverage in this group was significantly lower than coverage among non–VFC-eligible children. Increased efforts are needed to ensure that parents of VFC-eligible children are aware of, have confidence in, and are able to obtain all recommended vaccines for their children.

Limitations

The findings in this report are subject to at least six limitations. First, overall household response rates for NIS-Child were low (range = 21.1%–42.5%), and 49.4%–63.9% of children with completed household interviews had provider-reported vaccination records. Selection bias resulting from low household response rates might have occurred if the characteristics of participants and nonparticipants differed systematically. Data were weighted to account for nonresponse and households without telephones, but some bias might remain, which could affect the generalizability of results. Second, total survey error assessments***** indicate that NIS-Child data might underestimate actual coverage with some vaccines; thus, actual vaccination coverage might be higher than reported. Third, the definition of VFC eligibility status used for this study might have resulted in underestimation of the actual VFC-eligible population because the operationalized definition includes Medicaid-enrolled but not Medicaid-eligible children. If Medicaid-eligible children differ from those who are Medicaid-enrolled, comparisons by VFC eligibility status could be higher or lower. Fourth, underinsured children who received vaccines at a federally qualified health center, a rural health center, or a deputized provider††††† were excluded from the VFC-eligible group because of difficulty ascertaining information on the underinsured through NIS. This exclusion could result in potential misclassification of underinsured children as non–VFC-eligible. Fifth, health insurance status was determined at time of interview and might have varied during the child's vaccination history, which could result in misclassification of VFC eligibility status. Sixth, this study was cross-sectional; therefore, underlying causes of observed differences in coverage over time or by VFC eligibility status could not be determined.

***** https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/pubs-presentations/downloads/Error-Profile-for-the-2022-NIS-Child_2023-10-04.pdf

††††† Deputization is the formal extension of VFC authority to provide VFC vaccines to eligible underinsured children from a participating FQHC or RHC to another VFC-enrolled provider. Under this arrangement, the deputizing FQHC or RHC retains its full scope of authority as a VFC provider while extending the authority to deputized VFC providers to immunize underinsured children with VFC vaccines.

Summary

What is already known about this topic?

The Vaccines for Children (VFC) program covers the cost of vaccines for eligible children to help ensure that all U.S. children are protected from life-threatening vaccine-preventable diseases.

What is added by this report?

Among VFC-eligible children, coverage with measles, mumps, and rubella vaccine was high and stable during 2012 through 2022, but there is room for improvement to increase coverage with other routinely recommended vaccines. Among children born in 2020, vaccination coverage was 4–14 percentage points lower among children who were eligible versus non-eligible for the VFC program.

What are the implications for public health practice?

The VFC program plays a vital role in increasing and sustaining vaccination coverage. Increased efforts must promote awareness of, confidence in, and receipt of all recommended vaccines among those eligible for the VFC program.

Implications for Public Health Practice

The VFC program has supported high and increasing childhood vaccination coverage for 30 years and is one of public health's primary platforms for equity and ensuring that all children can access vaccines. Despite successes, the need to increase coverage with all routine vaccines and to reach children living in lower-income households and who lack insurance continues. Health care provider interventions to improve coverage include encouraging providers to make strong vaccine recommendations for their patients, strengthening family-provider relationships, providing parental education about vaccine benefits, using reminder-recall systems, reducing missed opportunities for vaccination, offering simultaneous administration of childhood vaccines, and administering catch-up vaccinations to all inadequately vaccinated children (*6*,*7*).

Enactment of the VFC program 30 years ago was a historic step in improving children's lives and advancing public health. The data presented in this report demonstrate long-term program results for multiple birth cohorts of children. As new vaccines are added and immunization schedules become increasingly complex, maintenance and evolution of the VFC program could help sustain and further increase vaccination coverage. Realizing this will require efforts to promote participation in the VFC program by providers serving VFC-eligible children. CDC encourages providers to assess vaccination needs for all children at every health care visit and strongly recommend needed vaccines, and address patient barriers and promote confidence in vaccination.

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Notes from the Field

Tularemia Associated with Harbor Seal Necropsy — Kitsap County, Washington, October 2023

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Summary

What is already known about this topic?

Tularemia is a zoonotic disease caused by *Francisella tularensis*, a bacterium found in several animal species, most frequently occurring in rabbits and rodents.

What is added by this report?

In 2023, tularemia occurred in a wildlife volunteer after exposure to a deceased, infected harbor seal, the first known report of tularemia acquired through contact with a marine mammal, and the first detection of *F. tularensis* in a marine mammal.

What are the implications for public health practice?

Health care providers, public health investigators, and persons working with marine wildlife need to be aware of the potential risk for tularemia and other zoonotic diseases associated with harbor seal contact and adhere to established safety protocols.

Tularemia is a zoonotic disease caused by the bacterium *Francisella tularensis*, which has been detected in a wide range of animal reservoirs, most frequently lagomorphs (i.e., rabbits and hares) and rodents (*1*,*2*). Infection can occur through multiple routes, including contact with infected animals, bites from infected insects, ingestion of contaminated water, and inhalation of aerosolized bacteria (*1*). Tularemia can exhibit several distinct clinical manifestations, generally corresponding to the route of exposure. With antibiotic therapy, most patients recover completely. In Washington, fewer than 10 human cases are reported annually (*3*).

Investigation and Outcomes

On October 20, 2023, a previously healthy woman aged 32 years who lived in Kitsap County, Washington was evaluated by a primary care provider for a painful swelling on the left hand. The patient worked as a wildlife biologist for a nonprofit organization and reported nicking a finger with a scalpel on October 3, while performing a necropsy on a harbor seal (*Phoca vitulina*) that had been found deceased along South Puget Sound.* The patient wore personal protective equipment including a surgical gown, laboratory goggles, an N-95 respirator, and surgical gloves during the necropsy; the cut occurred through the glove. Although the wound initially appeared to heal, it became inflamed and painful 2 weeks after the scalpel cut. Around this time, the patient experienced onset of subjective fever and ipsilateral axial lymph node swelling, as well as cough and congestion. The patient was prescribed doxycycline and topical mupirocin on October 20, and fully recovered. Although tularemia was not suspected by the provider at that time, the wound exudate was collected and submitted to a local clinical laboratory where it was cultured and identified as suspected *Francisella* species. On November 3, 2023, the Washington State Public Health Laboratory received the isolate, where it tested positive for *F. tularensis* by bacterial culture, direct fluorescent antibody, and polymerase chain reaction (PCR).

The seal necropsy report documented signs of possible infection of unspecified etiology in thoracic and abdominal organs without substantial wounds or other signs of trauma. Public health authorities partnered with the Washington Department of Fish and Wildlife to submit animal specimens† to the Washington Animal Disease Diagnostic Laboratory for histopathology and *F. tularensis* PCR testing; six specimens§ tested positive by PCR, and three¶ were forwarded to CDC's Division of Vector-Borne Diseases for confirmation. Molecular sequencing (six housekeeping genes; 4,107 base pairs) of the lung specimen performed by CDC identified *F. tularensis* type B (ssp. *holarctica*), phylogenetically similar to type B strains previously found in the western United States (*4*). The clinical isolate from the human case was destroyed in accordance with the Tier 1 select agent handling protocol,** with no sequence generated, prohibiting comparison with the sequence obtained from the seal specimen. This finding is the first known detection of *F. tularensis* in a marine mammal.

Public health authorities identified one other wildlife volunteer present during the necropsy. Contact identification and symptom monitoring of this volunteer and of laboratory workers handling the clinical specimen was conducted by the respective local health jurisdictions. No ill persons or additional cases were identified. This activity was reviewed by CDC, deemed not research, and was conducted consistent with applicable federal law and CDC policy.††

* The patient's organization routinely performs necropsies on harbor seals found deceased in the Puget Sound region to determine whether human interaction potentially contributed to wildlife death.

† Animal specimens included lung, mediastinal mass, trachea, kidney, liver, heart, stomach, small intestine, spleen, brain swab, and lymph nodes.

§ Lung, heart, liver, kidney, brain swab, and lymph node specimens.

¶ Lung, lymph node, and brain swab specimens.

** https://www.selectagents.gov/compliance/guidance/inventory/docs/Inventory_Guidance.pdf

†† 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

Preliminary Conclusions and Actions

Although most tularemia cases acquired in the northwestern United States are associated with environmental exposure or contact with rodents or lagomorphs, marine mammals should be considered as a potential source of infection. Health care providers, public health investigators, and persons working with marine wildlife need to be aware of the potential risk for tularemia and other zoonotic diseases associated with harbor seal contact and should wear appropriate personal protective equipment and adhere to established safety protocols (*5*).

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