

National and State Vaccination Coverage Among Adolescents Aged 13 Through 17 Years — United States, 2010

The Advisory Committee on Immunization Practices (ACIP) recommends that adolescents routinely receive meningococcal conjugate (MenACWY, 2 doses); tetanus, diphtheria, acellular pertussis (Tdap, 1 dose); and human papillomavirus (HPV, 3 doses) vaccines (influenza vaccine is recommended annually for all persons aged 6 months and older) (1). CDC tracks vaccination coverage among adolescents aged 13 through 17 years through the National Immunization Survey–Teen (NIS-Teen). To provide updated vaccination coverage estimates, CDC analyzed 2010 NIS-Teen data and compared results with 2009 NIS-Teen estimates (2). This report summarizes the results of that analysis, which found that coverage increased for all three of the routinely administered adolescent vaccines: Tdap from 55.6% to 68.7%, MenACWY from 53.6% to 62.7%, (among females) ≥ 1 dose of HPV from 44.3% to 48.7%, and ≥ 3 doses of HPV from 26.7% to 32.0%. Vaccination coverage varied widely among states; three states (Massachusetts, Rhode Island, and Washington) had coverage of $>65\%$ for ≥ 1 dose of all three vaccines (Tdap, MenACWY, and HPV). Continued evaluation of vaccination-promoting initiatives, including state vaccination-financing policies, is needed to understand their impact on adolescent vaccination and to promote effective practices.

Since 2006, NIS-Teen has collected vaccination and sociodemographic information from parents or guardians regarding adolescents aged 13 through 17 years* in the 50 states, the District of Columbia, selected local areas,[†] and the U.S. Virgin Islands, using a random-digit-dialed sample of telephone numbers of households. After securing permission to contact vaccination providers, survey staff members mail

questionnaires to obtain vaccination histories from the medical record. In 2010, the Council of American Survey Research Organizations (CASRO) response rate[§] for NIS-Teen was 58.0%. A total of 19,488 adolescents with provider-verified vaccination records were included in this analysis, representing 59.2% of all adolescents with completed household interviews. A total of 19,257 adolescents (10,037 males and 9,220 females) were included in the national estimates; 231 adolescents from the U.S. Virgin Islands were excluded. NIS-Teen methods, including weighting procedures, have been described previously.[¶] Differences in vaccination coverage were evaluated using t-tests and were considered statistically significant at $p \leq 0.05$.

Vaccination coverage among adolescents aged 13 through 17 years has increased since 2006, although the rate of increase

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

[¶]Information available at ftp://ftp.cdc.gov/pub/health_statistics/nchs/dataset_documentation/nis/nisteepuf09_dug.pdf.

* Eligible participants were born during January 1992–February 1998.

[†] Six local areas that received federal immunization grants were sampled separately: District of Columbia; Chicago, Illinois; New York, New York; Philadelphia County, Pennsylvania; Bexar County, Texas; and Houston, Texas. Two other local areas were chosen for oversampling: Dallas County, Texas; and El Paso County, Texas.

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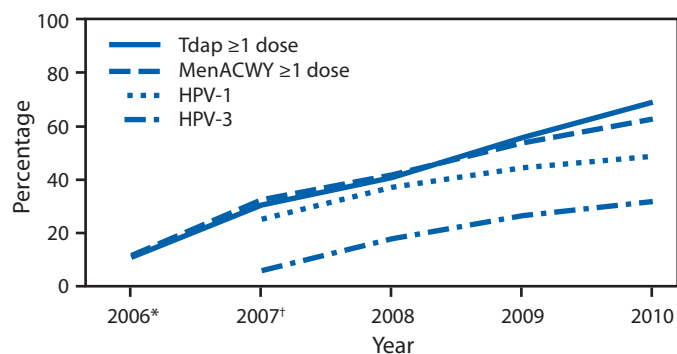


has differed among the three routinely administered vaccines. From 2007 to 2010, the average annual percentage-point increases for ≥ 1 dose of Tdap (12.8 points, 95% confidence interval [CI] = 12.1–13.4) and ≥ 1 dose of MenACWY (10.1 points, CI = 9.5–10.7) were significantly greater than that for ≥ 1 dose of HPV (7.9 points, CI = 7.0–8.7) ($p \leq 0.05$) (Figure).

From 2009 to 2010, vaccination coverage increased for all three vaccines. Tdap coverage increased from 55.6% to 68.7%, MenACWY from 53.6% to 62.7%, (among females) ≥ 1 dose of HPV from 44.3% to 48.7%, and ≥ 3 doses of HPV from 26.7% to 32.0% (Table 1). At least 24 weeks between the first and third doses of the HPV vaccine are needed to complete the series (1). Among females who initiated the HPV series, 94.3% met the minimum period needed to complete the series before the interview. Of these, 69.6% received ≥ 3 doses. Among adolescent males, 1.4% (CI = 1.1–1.8) received ≥ 1 dose of HPV. Aside from vaccination with HPV, no significant differences in vaccination coverage were observed between males and females. Among vaccines either administered during childhood or as catch-up vaccinations, coverage among adolescents aged 13 through 17 years with ≥ 2 doses of measles, mumps, and rubella; ≥ 3 doses of hepatitis B; and ≥ 2 doses of varicella vaccine (in persons with no history of disease) increased from 2009 to 2010.

By race/ethnicity, no differences were observed in coverage with ≥ 1 dose of Tdap; however, differences were observed by poverty status (Table 2). For ≥ 1 dose of MenACWY, coverage was higher among Hispanics than among whites; however, no

FIGURE. Estimated vaccination coverage among adolescents aged 13 through 17 years, National Immunization Survey–Teen (NIS-Teen), 2006–2010



Abbreviations: Tdap = tetanus, diphtheria, acellular pertussis vaccine; MenACWY = meningococcal conjugate vaccine; HPV-1 = human papillomavirus vaccine, ≥ 1 dose; HPV-3 = human papillomavirus, ≥ 3 doses.

* Tdap and MenACWY vaccination recommendations were published in March and October 2006, respectively.

† HPV vaccination recommendations were published in March 2007.

differences were observed in coverage by poverty status. For HPV, patterns differed by racial/ethnic group and poverty status depending on the measure of HPV vaccination coverage used. HPV initiation among whites was lower than among Hispanics and American Indian/Alaskan Natives; receipt of ≥ 3 HPV doses among those who initiated the series was lower among blacks and Hispanics than among whites. A difference was not observed in coverage by poverty status for ≥ 1 dose of HPV; however, coverage with ≥ 3 doses of HPV was lower

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TABLE 1. Estimated vaccination coverage among adolescents aged 13 through 17 years,* by age at interview and selected vaccines and doses — National Immunization Survey—Teen (NIS-Teen), United States, 2010

Vaccine and dose	Age at interview (yrs)										Overall			
	13 (n = 3,914)		14 (n = 3,918)		15 (n = 3,942)		16 (n = 3,959)		17 (n = 3,524)		2010 (N = 19,257)		2009 (N = 20,066)	
	%	(95% CI) [†]	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Td or Tdap[§]														
≥1 dose Td or Tdap since age 10 yrs	78.0	(75.5–80.3)	82.5	(80.4–84.4) [¶]	82.2	(80.1–84.2) [¶]	82.2	(80.1–84.2) [¶]	81.0	(78.7–83.2)	81.2	(80.2–82.2) ^{**}	76.2	(75.1–77.2)
≥1 dose Tdap since age 10 yrs	73.7	(71.2–76.2)	77.2	(74.8–79.3) [¶]	72.0	(69.5–74.3)	65.4	(62.6–68.1) [¶]	54.6	(51.7–57.4) [¶]	68.7	(67.5–69.8) ^{**}	55.6	(54.3–56.8)
MenACWY^{††} ≥1 dose	63.8	(61.1–66.5)	66.6	(64.0–69.1)	64.0	(61.4–66.5)	61.8	(58.9–64.5)	57.1	(54.2–60.0) [¶]	62.7	(61.5–63.9) ^{**}	53.6	(52.4–54.9)
HPV^{§§}														
≥1 dose	38.9	(34.9–43.1)	48.5	(44.5–52.6) [¶]	51.1	(47.0–55.3) [¶]	51.7	(47.8–55.7) [¶]	53.1	(49.1–57.1) [¶]	48.7	(46.9–50.5) ^{**}	44.3	(42.4–46.1)
≥3 doses	23.2	(20.1–26.6)	30.5	(26.9–34.3) [¶]	31.9	(28.3–35.6) [¶]	36.9	(33.2–40.8) [¶]	37.5	(33.7–41.5) [¶]	32.0	(30.3–33.6) ^{**}	26.7	(25.2–28.3)
3-dose series completion ^{¶¶}	64.1	(55.9–71.5)	68.2	(61.7–74.0)	65.6	(59.4–71.3)	74.3	(69.4–78.7) [¶]	74.6	(68.8–79.6) [¶]	69.6	(66.8–72.2)	67.5	(64.4–70.5)
MMR^{***} ≥2 doses	93.2	(91.9–94.3)	91.0	(88.9–92.8)	90.3	(88.4–92.0) [¶]	89.2	(86.8–91.1) [¶]	88.6	(86.3–90.5) [¶]	90.5	(89.6–91.3) ^{**}	89.1	(88.3–89.9)
Hepatitis B ≥3 doses	94.8	(93.7–95.8)	93.0	(91.0–94.6)	91.6	(89.7–93.1) [¶]	90.1	(87.7–92.0) [¶]	88.6	(86.5–90.4) [¶]	91.6	(90.8–92.4) ^{**}	89.9	(89.2–90.6)
Varicella														
History of varicella disease ^{†††}	28.5	(25.9–31.2)	34.5	(31.9–37.3) [¶]	44.3	(41.6–47.1) [¶]	53.8	(50.8–56.9) [¶]	62.6	(59.7–65.4) [¶]	44.7	(43.5–46.0) ^{**}	52.7	(51.4–54.0)
≥1 dose vaccine if had no history of disease	96.4	(95.4–97.2)	93.2	(91.5–94.6) [¶]	90.0	(87.5–92.0) [¶]	85.0	(80.5–88.5) [¶]	82.2	(78.4–85.4) [¶]	90.5	(89.4–91.5) ^{**}	87.0	(85.7–88.3)
≥2 doses vaccine if had no history of disease	65.8	(62.8–68.8)	64.3	(61.0–67.5)	56.4	(52.8–59.9) [¶]	50.7	(45.8–55.6) [¶]	44.2	(39.5–49.0) [¶]	58.1	(56.4–59.8) ^{**}	48.6	(46.6–50.6)
History of disease or received ≥2 doses varicella vaccination	75.6	(73.2–77.8)	76.6	(74.3–78.8)	75.7	(73.3–78.0)	77.2	(74.4–79.8)	79.1	(76.4–81.7) [¶]	76.8	(75.7–77.9)	75.7	(74.6–76.8)

* Adolescents (N = 19,257) in 2010 NIS-Teen were born during January 1992–February 1998.

† Confidence interval. Estimates with confidence interval widths >20 might not be reliable.

§ Includes percentages receiving tetanus and diphtheria toxoid vaccine (Td) since age 10 years, or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap), or tetanus-unknown type vaccine since age 10 years.

¶ Statistically significant difference at $p \leq 0.05$ in estimated vaccination coverage. Reference group was age 13 years.

** Statistically significant difference compared with 2009 NIS-Teen overall estimates ($p \leq 0.05$).

†† Includes percentages receiving meningococcal conjugate vaccine (MenACWY) or meningococcal-unknown type vaccine.

§§ ≥1 dose of human papillomavirus vaccine, either quadrivalent or bivalent. Percentage reported among females only (n = 9,220).

¶¶ Percentage of females who received 3 doses among those who had at least 1 HPV dose and at least 24 weeks between the first dose and the interview date.

*** ≥2 doses of measles, mumps, and rubella vaccine.

††† By parent/guardian report or provider records.

among those living below the poverty level than those living at or above the poverty level.

Coverage estimates varied by state and reporting area (Table 3), with rates ranging from 29.0% (Mississippi) to 87.9% (New Hampshire) for ≥1 dose of Tdap and from 26.0% (Mississippi) to 89.5% (District of Columbia) for ≥1 dose of MenACWY. Among females, coverage estimates ranged from 28.8% (Idaho) to 73.0% (Rhode Island) for ≥1 dose of HPV and from 17.6% (Idaho) to 55.1% (Rhode Island) for ≥3 doses of HPV. Three states (Massachusetts, Rhode Island, and Washington) had coverage of >65% for ≥1 dose of all three routinely administered adolescent vaccines (Tdap, MenACWY, and HPV). Coverage for the three adolescent vaccines was significantly lower among adolescents living in the southeastern United States compared with adolescents living in other regions.

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Editorial Note

In 2010, vaccination coverage among adolescents aged 13 through 17 years increased from coverage in 2009; however, the percentage-point increase in ≥1 dose of HPV among females (4.4 points) was less than half the increase observed for ≥1 dose of Tdap (13.1) and ≥1 dose of MenACWY (9.1). As in previous years, coverage with ≥1 dose of HPV was higher among older compared with younger adolescent females. Among females with adequate time to complete the series, 30.4% had not done so. HPV completion rates were lower among certain populations (i.e., blacks, Hispanics, and those living below poverty) known to have higher cervical cancer rates (3). Although HPV vaccination is only universally recommended for females aged 9 through 26 years, 2009 ACIP guidance states that HPV vaccination may be administered to males aged 9

TABLE 2. Estimated vaccination coverage among adolescents aged 13 through 17 years,* by race/ethnicity,† poverty status,§ and selected vaccines and doses — National Immunization Survey–Teen (NIS-Teen), United States, 2010

Vaccine	Race/Ethnicity										Poverty status					
	White, non-Hispanic (n = 13,223)		Black, non-Hispanic (n = 1,982)		Hispanic (n = 2,469)		American Indian/Alaska Native, non-Hispanic (n = 253)		Asian, non-Hispanic (n = 516)		Other (n = 814)		Below poverty level (n = 2,723)		At or above poverty level (n = 15,731)	
	%	(95% CI) [¶]	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Td or Tdap**																
≥1 dose Td or Tdap since age 10 yrs	80.9	(79.8–81.9)	80.5	(77.8–83.0)	82.4	(79.4–85.1)	82.7	(74.9–88.4)	85.8	(77.9–91.2)	79.4	(73.8–84.1)	76.8	(73.7–79.6) ^{††}	82.2	(81.2–83.2)
≥1 dose Tdap since age 10 yrs	68.6	(67.3–69.9)	66.9	(63.5–70.2)	69.6	(66.1–73.0)	68.4	(58.4–76.9)	74.4	(66.2–81.2)	66.8	(61.0–72.1)	64.7	(61.3–68.0) ^{††}	69.5	(68.3–70.7)
MenACWY 1 dose^{§§}	61.2	(59.8–62.5)	63.4	(59.8–66.8)	66.1	(62.5–69.6) ^{††}	62.4	(52.1–71.6)	71.6	(62.2–79.4)	58.8	(52.9–64.4)	62.0	(58.5–65.2)	62.9	(61.6–64.2)
HPV^{¶¶}																
≥1 dose	45.8	(43.8–47.9)	48.9	(43.8–54.1)	56.2	(50.6–61.6) ^{††}	64.8	(46.6–79.5) ^{††}	50.1	(38.2–61.9)	52.3	(44.0–60.5)	51.8	(46.8–56.8)	47.7	(45.7–49.6)
≥3 doses	32.4	(30.6–34.2)	30.2	(25.5–35.4)	29.5	(25.0–34.4)	40.5	(26.7–56.0)	39.8	(28.3–52.5)	37.3	(29.9–45.3)	28.2	(24.2–32.4) ^{††}	32.9	(31.1–34.7)
3-dose series completion ^{***}	74.7	(71.6–77.5)	65.4	(57.5–72.5) ^{††}	56.1	(48.5–63.5) ^{††}	64.0	(45.6–79.1)	86.0	(75.4–92.5) ^{††}	75.4	(62.7–84.8)	57.3	(50.1–64.2) ^{††}	73.2	(70.3–76.0)
≥2 MMR ^{†††}	91.6	(90.7–92.4)	90.8	(88.7–92.6)	86.2	(82.9–88.9) ^{††}	92.1	(86.2–95.6)	93.8	(90.8–95.9)	89.9	(85.2–93.2)	87.8	(84.9–90.1) ^{††}	91.1	(90.3–92.0)
Hepatitis B ≥3 doses	92.7	(91.8–93.4)	90.9	(88.8–92.6)	88.9	(85.8–91.3) ^{††}	92.8	(87.2–96.1)	93.6	(90.2–95.8)	90.0	(85.3–93.3)	89.0	(86.2–91.3) ^{††}	92.4	(91.6–93.1)
Varicella																
History of varicella disease ^{§§§}	47.0	(45.6–48.3)	40.0	(36.4–43.7) ^{††}	42.9	(39.2–46.7) ^{††}	51.3	(40.8–61.6)	35.9	(27.8–44.9) ^{††}	43.3	(37.7–49.0)	43.9	(40.4–47.5)	45.1	(43.7–46.4)
Among adolescents without history of disease:																
≥1 dose vaccine	91.2	(90.1–92.1)	89.2	(85.8–91.9)	90.6	(86.7–93.4)	88.0	(75.2–94.6)	89.7	(81.4–94.5)	85.9	(76.8–91.8)	86.7	(82.7–89.9) ^{††}	91.2	(90.2–92.2)
≥2 dose vaccine	59.2	(57.3–61.0)	55.3	(50.2–60.3)	56.2	(51.0–61.2)	58.7	(43.9–72.1)	62.9	(52.7–72.2)	59.2	(51.4–66.6)	53.8	(48.7–58.7)	58.9	(57.1–60.7)
History of disease or received ≥2 dose varicella vaccination	78.3	(77.2–79.4)	73.2	(69.8–76.4) ^{††}	75.0	(71.4–78.2)	79.9	(69.5–87.3)	76.3	(68.3–82.7)	76.9	(71.4–81.6)	74.1	(70.8–77.1) ^{††}	77.4	(76.3–78.5)

* Adolescents (N = 19,257) in the 2010 NIS-Teen were born during January 1992–February 1998.

† Respondents who self-identified as Hispanic were of any race. Respondents who self-identified as white, black, Asian, or American Indian/Alaska Native were all considered non-Hispanic. Native Hawaiian, other Pacific Islanders and persons of multiple races were categorized as Other.

§ Adolescents were classified as below poverty level if their total family income was less than the federal poverty level specified for the applicable family size and number of children aged <18 years. All others were classified as at or above the poverty level. Additional information available at <http://www.census.gov/hhes/www/poverty.html>. Poverty status was unknown for 792 adolescents.

¶ Confidence interval. Estimates with confidence interval widths >20 might not be reliable.

** Includes ≥1 dose of tetanus toxoid-diphtheria vaccine (Td) since age 10 years, or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) since age 10 years.

†† Statistically significant difference at $p \leq 0.05$ in estimated vaccination coverage. For race/ethnicity, referent group was white, non-Hispanic adolescents; for poverty status, referent group was at or above poverty level.

§§ Includes percentages receiving meningococcal conjugate vaccine (MenACWY) and meningococcal-unknown type vaccine.

¶¶ ≥1 dose of human papillomavirus vaccine, either quadrivalent or bivalent. Percentage reported among females only (n = 9,220).

*** Percentage of females who received 3 doses among those who had at least 1 HPV dose and at least 24 weeks between the first dose and the interview date.

††† Includes ≥2 doses of measles, mumps, rubella vaccine.

§§§ By parent/guardian report or provider records.

through 26 years. Only 1.4% of males aged 13 through 17 years received the vaccine in 2010.

As in previous years, adolescent vaccination coverage varied widely among states and other reporting areas, which could reflect differing vaccination-promotion initiatives among local health agencies and communities. Common initiatives among the three states with the highest vaccination coverage (Massachusetts, Rhode Island, and Washington) included strong working relationships and communication between state immunization programs and vaccination providers, local professional organizations, and schools; school vaccination requirements; and promotion of the use of reminder/recall systems (CDC, unpublished data, 2011). Additional factors that might play an important role in vaccination coverage

include vaccine financing, health-care infrastructure, local outbreaks, and communication efforts leading to increased consumer demand.

Analysis of 2009 NIS-Teen data found that middle school vaccination requirements for Tdap or MenACWY were associated with higher coverage for these vaccines; however, adolescents living in states with a middle school vaccination requirement for at least one adolescent vaccine did not have significantly higher coverage with all three recommended adolescent vaccines compared with adolescents living in states with no vaccination requirements (4). The number of states with middle school requirements increased from the 2009–10 to the 2010–11 school year (i.e., 37 required a tetanus

TABLE 3. Estimated vaccination coverage among adolescents aged 13 through 17 years,* by state and selected area and selected vaccines and doses — National Immunization Survey—Teen (NIS-Teen), United States, 2010

State/Area	Vaccine doses routinely recommended for adolescents									Vaccine doses routinely recommended during childhood (adolescent catch-up vaccines)										
	≥1 Td or Tdap since age 10 years [†]		≥1 Tdap since age 10 years		≥1 MenACWY [§]		≥1 HPV [¶]		≥3 HPV ^{**}		3-dose series completion ^{††}		≥2 MMR ^{§§}		≥3 HepB ^{¶¶}		≥1 VAR ^{***}		≥2 VAR ^{†††}	
	% (95% CI) ^{§§§}	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
United States	81.2 (±1.0)	68.7 (±1.2)	62.7 (±1.2)	48.7 (±1.8)	32.0 (±1.6)	69.6 (±2.7)	90.5 (±0.8)	91.6 (±0.8)	90.5 (±1.1)	58.1 (±1.7)										
Alabama	79.4 (±5.1)	68.4 (±6.2)	47.7 (±6.5)	45.8 (±9.2)	20.0 (±7.0)	47.4 (±13.6)	93.5 (±3.3)	89.3 (±4.1)	88.7 (±5.9)	43.5 (±8.7)										
Alaska	76.2 (±5.4)	63.9 (±6.2)	40.9 (±6.4)	40.8 (±9.2)	25.0 (±8.1)	63.4 (±13.5)	87.8 (±4.5)	89.0 (±4.2)	76.6 (±8.1)	44.7 (±9.2)										
Arizona	88.1 (±4.1)	76.5 (±5.7)	78.9 (±5.3)	52.8 (±9.4)	33.1 (±9.1)	67.0 (±12.4)	84.5 (±4.6)	85.4 (±5.0)	91.0 (±5.3)	64.5 (±8.3)										
Arkansas	55.0 (±6.5)	43.0 (±6.6)	30.9 (±6.2)	37.9 (±10.0)	19.6 (±7.5)	63.4 (±20.7)	89.2 (±3.8)	90.6 (±3.7)	89.3 (±4.9)	27.4 (±7.4)										
California	81.2 (±4.9)	71.2 (±5.7)	66.7 (±6.0)	56.1 (±9.1)	32.0 (±8.1)	61.0 (±12.3)	87.9 (±4.8)	89.0 (±4.6)	90.8 (±5.2)	57.3 (±8.4)										
Colorado	89.6 (±3.7)	85.7 (±4.3)	59.6 (±6.4)	52.5 (±9.0)	40.9 (±8.8)	81.6 (±9.9)	92.6 (±3.3)	93.1 (±2.9)	94.8 (±3.2)	65.3 (±7.8)										
Connecticut	91.1 (±3.7)	76.2 (±5.0)	72.0 (±5.4)	57.9 (±8.3)	45.5 (±8.5)	83.2 (±9.6)	97.6 (±2.0)	97.1 (±2.4)	98.1 (±1.8)	79.5 (±6.7)										
Delaware	81.6 (±4.9)	65.5 (±5.9)	71.2 (±5.9)	63.9 (±8.7)	40.4 (±9.1)	68.6 (±12.3)	94.1 (±3.1)	92.1 (±3.6)	88.2 (±6.2)	67.8 (±7.7)										
District of Columbia	89.7 (±3.6)	71.6 (±5.6)	89.5 (±3.8)	57.5 (±8.8)	33.8 (±8.2)	62.7 (±11.4)	98.4 (±1.2)	98.5 (±1.2)	97.5 (±1.8)	84.9 (±5.3)										
Florida	89.8 (±4.2)	61.9 (±6.4)	55.1 (±6.6)	41.1 (±10.1)	24.9 (±9.1)	62.0 (±15.6)	94.2 (±3.5)	96.8 (±2.3)	89.4 (±6.9)	44.5 (±8.7)										
Georgia	78.8 (±4.7)	62.2 (±5.9)	63.5 (±5.8)	43.5 (±7.9)	22.8 (±6.0)	62.0 (±12.7)	94.8 (±2.4)	95.1 (±2.4)	93.9 (±4.1)	75.0 (±7.1)										
Hawaii	78.6 (±5.4)	58.1 (±6.2)	64.5 (±5.9)	62.7 (±9.5)	39.9 (±9.2)	70.9 (±10.9)	93.7 (±2.9)	93.9 (±2.9)	95.6 (±3.1)	65.2 (±7.3)										
Idaho	58.0 (±6.1)	49.2 (±6.2)	40.8 (±6.0)	28.8 (±7.9)	17.6 (±6.8)	66.1 (±15.5)	84.2 (±4.6)	90.0 (±3.7)	76.6 (±8.5)	42.8 (±10.1)										
Illinois	78.4 (±4.1)	66.2 (±4.7)	56.6 (±4.9)	39.7 (±6.6)	26.0 (±5.8)	72.2 (±9.1)	93.7 (±2.2)	95.3 (±1.8)	87.2 (±4.7)	52.5 (±6.8)										
City of Chicago	76.6 (±5.7)	69.5 (±6.0)	63.8 (±6.2)	50.6 (±9.2)	28.4 (±8.8)	62.0 (±13.9)	88.8 (±4.1)	89.0 (±4.1)	86.4 (±5.7)	62.4 (±8.1)										
Rest of state	78.9 (±5.0)	65.4 (±5.7)	54.7 (±5.9)	36.8 (±7.8)	25.3 (±7.0)	75.8 (±11.2)	95.0 (±2.6)	97.0 (±1.9)	87.4 (±5.7)	49.8 (±8.4)										
Indiana	79.8 (±5.1)	72.3 (±5.8)	70.6 (±5.9)	37.0 (±8.2)	24.8 (±7.2)	77.6 (±12.5)	92.6 (±3.2)	93.9 (±3.0)	85.8 (±6.7)	58.1 (±9.9)										
Iowa	70.8 (±6.1)	64.2 (±6.4)	53.7 (±6.6)	48.2 (±9.5)	36.2 (±8.9)	79.4 (±11.0)	83.0 (±5.2)	87.4 (±4.4)	84.2 (±7.9)	38.5 (±10.0)										
Kansas	81.9 (±4.4)	76.8 (±4.7)	50.2 (±5.7)	40.2 (±8.5)	25.1 (±7.2)	62.9 (±14.5)	91.3 (±3.2)	88.2 (±3.7)	88.4 (±5.1)	65.6 (±7.9)										
Kentucky	86.1 (±4.3)	53.1 (±6.3)	44.8 (±6.2)	40.1 (±9.2)	27.3 (±7.9)	75.5 (±14.1)	93.0 (±3.3)	94.4 (±3.1)	86.1 (±6.1)	40.7 (±8.7)										
Louisiana	84.9 (±4.2)	69.3 (±5.6)	78.6 (±5.0)	54.2 (±9.2)	39.3 (±9.1)	74.4 (±10.9)	92.6 (±3.5)	94.1 (±3.0)	84.4 (±6.8)	63.9 (±8.5)										
Maine	78.4 (±5.6)	63.2 (±6.3)	56.4 (±6.4)	54.6 (±9.5)	32.9 (±8.8)	65.2 (±12.5)	93.7 (±3.3)	89.3 (±4.3)	91.7 (±5.5)	58.0 (±8.6)										
Maryland	79.0 (±5.5)	61.2 (±6.4)	68.9 (±6.1)	41.6 (±9.4)	30.8 (±8.6)	76.5 (±12.3)	95.1 (±2.5)	96.9 (±1.9)	97.6 (±1.8)	59.4 (±7.8)										
Massachusetts	95.8 (±2.8)	82.4 (±5.2)	82.9 (±5.3)	65.9 (±8.9)	46.8 (±10.0)	71.1 (±13.0)	93.7 (±4.5)	95.7 (±2.8)	98.6 (±1.4)	74.7 (±7.4)										
Michigan	81.6 (±5.0)	66.2 (±6.3)	70.9 (±6.0)	49.4 (±10.0)	25.2 (±7.9)	52.7 (±14.5)	93.6 (±3.7)	94.6 (±3.3)	97.4 (±2.5)	64.3 (±8.4)										
Minnesota	93.2 (±3.2)	70.3 (±5.9)	57.0 (±6.3)	51.3 (±9.4)	37.8 (±9.0)	80.1 (±11.8)	93.5 (±3.5)	92.8 (±3.5)	92.7 (±4.0)	68.0 (±8.0)										
Mississippi	34.6 (±5.7)	29.0 (±5.5)	26.0 (±5.4)	34.0 (±8.3)	20.0 (±7.2)	62.8 (±15.1)	87.8 (±4.5)	83.2 (±4.7)	69.4 (±8.2)	24.7 (±7.8)										
Missouri	76.3 (±5.3)	66.0 (±5.8)	49.2 (±5.9)	41.4 (±8.2)	25.5 (±6.9)	66.0 (±13.7)	88.1 (±3.9)	90.9 (±3.3)	76.9 (±6.9)	44.3 (±7.8)										
Montana	84.5 (±4.2)	76.1 (±5.1)	40.2 (±5.9)	45.5 (±8.9)	33.2 (±8.7)	77.3 (±10.7)	88.8 (±4.0)	84.4 (±4.6)	82.9 (±6.9)	41.4 (±9.0)										
Nebraska	82.7 (±5.0)	70.3 (±5.9)	65.7 (±6.2)	52.3 (±9.5)	42.5 (±9.5)	84.0 (±8.8)	92.8 (±3.2)	92.8 (±3.3)	92.5 (±4.8)	59.8 (±9.6)										
Nevada	80.6 (±4.8)	68.3 (±5.9)	54.2 (±6.2)	47.4 (±8.7)	25.9 (±7.6)	60.2 (±13.5)	88.8 (±4.2)	92.2 (±3.0)	86.0 (±5.9)	53.6 (±8.3)										
New Hampshire	95.9 (±2.2)	87.9 (±3.9)	73.8 (±5.4)	49.6 (±8.2)	42.2 (±8.1)	87.1 (±7.8)	97.2 (±1.9)	96.9 (±2.0)	97.5 (±2.6)	76.8 (±7.0)										
New Jersey	85.3 (±4.6)	68.9 (±6.0)	81.7 (±5.2)	35.4 (±9.0)	25.4 (±7.5)	76.2 (±16.6)	92.6 (±3.5)	95.4 (±3.2)	91.0 (±5.4)	62.2 (±8.1)										
New Mexico	88.8 (±4.0)	71.8 (±5.7)	52.9 (±6.2)	48.4 (±8.4)	31.1 (±7.9)	67.6 (±12.7)	85.8 (±4.8)	86.4 (±4.7)	83.6 (±7.0)	55.7 (±8.6)										
New York	90.9 (±2.7)	82.9 (±3.5)	71.2 (±4.5)	56.2 (±6.6)	39.7 (±6.6)	76.9 (±9.1)	94.4 (±2.6)	94.9 (±2.2)	94.8 (±2.9)	61.6 (±5.8)										
City of New York	92.9 (±2.7)	82.0 (±4.6)	75.5 (±5.4)	62.7 (±8.1)	42.4 (±8.7)	72.7 (±11.1)	94.5 (±3.0)	93.8 (±3.1)	95.0 (±3.2)	66.7 (±7.3)										
Rest of state	89.6 (±4.2)	83.6 (±4.8)	68.4 (±6.5)	52.0 (±9.6)	37.9 (±9.3)	80.4 (±13.8)	94.4 (±3.8)	95.6 (±3.0)	94.6 (±4.5)	58.0 (±8.5)										
North Carolina	77.8 (±5.1)	67.7 (±5.7)	52.4 (±6.0)	51.9 (±9.1)	39.3 (±9.1)	80.2 (±10.6)	85.7 (±4.3)	89.2 (±3.6)	80.0 (±6.1)	52.1 (±8.0)										
North Dakota	88.4 (±4.0)	83.1 (±4.7)	76.8 (±5.1)	41.7 (±8.4)	26.3 (±7.2)	67.4 (±13.2)	94.2 (±2.9)	96.6 (±1.9)	90.7 (±5.3)	63.6 (±9.1)										

See table footnotes on page 1122.

booster, 31 specified Tdap, and 10 required MenACWY) and likely contributed to increases in Tdap and MenACWY coverage (5). The District of Columbia and Virginia are the only reporting areas with middle school HPV vaccination requirements (4), which might have contributed to the increase in HPV vaccination in those areas over the past 2 years. Missed vaccination opportunities occur when adolescents receive middle school–required vaccines but not other ACIP-recommended vaccines. Further study is needed to understand and address barriers to providing all recommended vaccines during the same visit.

The findings in this report are subject to at least four limitations. First, NIS-Teen is a landline telephone survey,

although studies have shown no evidence of bias after adjusting sampling weights for noncoverage of households without landline telephones (6). During the fourth quarter of 2010, NIS-Teen sampled telephone numbers from a cellular-telephone sampling frame.** Differences between landline only and dual-frame coverage estimates ranged from -0.6 to 0.6 percentage points. Second, the household response rate was 58.0%, and only 59.2% of those with completed household interviews also

** Participants were eligible for interview from the cellular-telephone sampling frame if their household was cellular-telephone-only (i.e., household with access to a cellular telephone but not a landline telephone) or cellular-telephone-mainly (i.e., household containing both a cellular telephone and a landline telephone, but not at all likely or somewhat unlikely to answer the landline telephone if it rang).

TABLE 3. (Continued) Estimated vaccination coverage among adolescents aged 13 through 17 years,* by state and selected area and selected vaccines and doses — National Immunization Survey–Teen (NIS-Teen), United States, 2010

State/Area	Vaccine doses routinely recommended for adolescents								Vaccine doses routinely recommended during childhood (adolescent catch-up vaccines)											
	≥1 Td or Tdap since age 10 years†		≥1 Tdap since age 10 years		≥1 MenACWY§		≥1 HPV¶		≥3 HPV**		3 dose series completion††		≥2 MMR§§		≥3 HepB¶¶		≥1 VAR***		≥2 VAR†††	
	%	(95% CI)§§§	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Ohio	69.3	(±5.8)	60.3	(±6.2)	61.6	(±6.1)	44.0	(±9.0)	31.1	(±8.1)	72.0	(±13.9)	90.7	(±3.6)	90.3	(±3.8)	92.4	(±4.3)	48.0	(±8.6)
Oklahoma	66.4	(±6.1)	54.8	(±6.5)	42.6	(±6.4)	47.4	(±8.8)	31.1	(±8.3)	68.7	(±12.8)	87.9	(±4.1)	91.7	(±3.4)	95.4	(±3.3)	42.9	(±8.8)
Oregon	75.9	(±5.6)	66.6	(±6.1)	52.4	(±6.4)	54.1	(±9.6)	38.2	(±9.5)	74.3	(±12.8)	88.6	(±4.4)	88.0	(±4.5)	87.8	(±5.9)	60.1	(±8.3)
Pennsylvania	84.7	(±4.3)	74.0	(±4.9)	79.8	(±4.5)	52.3	(±7.6)	41.7	(±7.5)	82.8	(±7.5)	96.2	(±1.6)	93.7	(±3.1)	96.0	(±2.8)	80.5	(±5.0)
Philadelphia County	86.1	(±4.1)	70.4	(±5.4)	84.5	(±4.4)	60.2	(±8.2)	38.5	(±8.3)	66.9	(±10.6)	90.9	(±3.4)	93.2	(±3.0)	96.4	(±2.3)	77.3	(±6.2)
Rest of state	84.5	(±4.9)	74.5	(±5.6)	79.1	(±5.1)	51.1	(±8.6)	42.2	(±8.5)	85.6	(±8.6)	97.0	(±1.8)	93.8	(±3.5)	95.9	(±3.2)	81.0	(±5.7)
Rhode Island	96.6	(±2.0)	79.5	(±5.0)	83.5	(±4.7)	73.0	(±7.7)	55.1	(±9.0)	79.6	(±9.3)	97.0	(±2.4)	93.6	(±3.4)	99.7	(±0.5)	85.3	(±5.3)
South Carolina	60.1	(±6.5)	48.1	(±6.6)	44.7	(±6.5)	41.5	(±9.3)	29.5	(±8.8)	74.6	(±12.7)	89.4	(±3.8)	95.3	(±2.4)	81.9	(±7.5)	32.3	(±7.9)
South Dakota	60.8	(±6.2)	52.5	(±6.3)	30.9	(±5.9)	68.8	(±7.8)	54.5	(±8.9)	85.5	(±7.9)	84.6	(±5.3)	78.3	(±5.8)	74.0	(±9.3)	19.7	(±8.7)
Tennessee	66.6	(±6.1)	58.7	(±6.2)	50.6	(±6.2)	33.1	(±7.9)	26.3	(±7.3)	83.1	(±10.7)	91.6	(±3.5)	94.6	(±2.9)	86.1	(±5.8)	54.7	(±8.2)
Texas	83.2	(±3.6)	71.9	(±4.3)	65.4	(±4.8)	47.5	(±7.1)	27.0	(±6.2)	62.3	(±10.8)	84.3	(±3.5)	87.2	(±3.3)	92.2	(±3.4)	60.2	(±6.3)
Bexar County	86.1	(±4.2)	72.1	(±5.3)	72.0	(±5.4)	44.2	(±8.0)	26.7	(±6.8)	65.7	(±12.4)	85.6	(±4.1)	88.7	(±3.7)	93.3	(±3.4)	57.2	(±7.9)
City of Houston	82.1	(±4.9)	71.3	(±5.8)	75.9	(±5.5)	55.1	(±8.9)	31.9	(±8.4)	59.9	(±12.8)	82.3	(±5.0)	83.4	(±5.0)	91.2	(±5.1)	68.4	(±7.6)
Dallas County	80.6	(±6.4)	72.5	(±6.8)	72.9	(±6.9)	34.4	(±10.7)	18.6	(±7.8)	65.1	(±17.1)	81.4	(±6.5)	83.2	(±6.3)	93.7	(±3.7)	58.8	(±8.7)
El Paso County	87.9	(±3.9)	79.5	(±4.8)	80.8	(±4.6)	67.4	(±8.1)	39.4	(±8.7)	60.7	(±11.3)	87.5	(±4.2)	91.1	(±3.4)	94.4	(±3.6)	65.2	(±7.8)
Rest of state	83.1	(±4.8)	71.5	(±5.9)	61.9	(±6.5)	47.7	(±9.6)	27.0	(±8.4)	62.3	(±14.6)	84.6	(±4.7)	87.8	(±4.4)	91.8	(±4.8)	59.4	(±8.9)
Utah	77.3	(±5.6)	68.8	(±6.1)	48.8	(±6.3)	39.2	(±8.6)	22.2	(±7.4)	59.1	(±13.7)	86.7	(±4.1)	87.5	(±4.1)	87.2	(±7.0)	50.3	(±9.5)
Vermont	89.6	(±4.4)	82.7	(±5.1)	54.1	(±6.5)	49.6	(±9.3)	38.6	(±8.8)	82.6	(±13.1)	96.8	(±2.0)	95.8	(±2.5)	93.8	(±4.0)	81.2	(±7.6)
Virginia	82.9	(±5.4)	72.0	(±6.3)	54.5	(±6.8)	54.0	(±9.7)	41.5	(±9.8)	78.2	(±10.0)	86.0	(±5.1)	89.6	(±4.7)	87.7	(±5.5)	43.1	(±8.5)
Washington	82.8	(±4.5)	70.6	(±5.4)	67.6	(±5.5)	69.3	(±7.4)	45.5	(±8.4)	66.5	(±10.1)	85.2	(±4.3)	86.1	(±4.1)	84.8	(±7.0)	64.3	(±8.5)
West Virginia	56.3	(±6.0)	49.9	(±6.1)	45.7	(±6.1)	42.4	(±8.5)	25.3	(±7.0)	63.9	(±13.8)	79.7	(±5.0)	77.4	(±5.2)	74.2	(±8.1)	40.2	(±8.8)
Wisconsin	91.6	(±3.5)	81.3	(±5.5)	69.4	(±6.4)	54.4	(±9.8)	44.1	(±9.7)	85.8	(±9.5)	90.3	(±4.0)	89.9	(±4.2)	93.8	(±4.9)	78.1	(±7.5)
Wyoming	88.6	(±4.0)	65.0	(±6.3)	51.5	(±6.5)	53.2	(±9.1)	40.3	(±8.8)	81.0	(±10.6)	90.0	(±3.8)	92.9	(±3.0)	85.4	(±6.5)	47.6	(±9.7)
U.S. Virgin Islands¶¶¶	78.7	(±6.4)	62.8	(±7.3)	31.9	(±7.4)	22.5	(±9.3)	NA****	NA****	NA	NA	90.9	(±4.2)	92.9	(±3.9)	92.9	(±4.4)	61.3	(±7.8)

* Adolescents (N = 19,257) in the 2010 NIS-Teen were born during January 1992–February 1998.

† Tetanus and diphtheria toxoids vaccine (Td), or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap), or tetanus-unknown vaccine since age 10 years.

§ ≥1 dose of meningococcal conjugate vaccine or meningococcal-unknown type vaccine.

¶ ≥1 dose of human papillomavirus vaccine, either quadrivalent or bivalent. Percentage reported among females only (n = 9,220).

** ≥3 doses of human papillomavirus vaccine, either quadrivalent or bivalent. Percentage reported among females only.

†† Percentage of females who received 3 doses among those who had at least 1 HPV dose and at least 24 weeks between the first dose and the interview date.

§§ ≥2 doses of measles, mumps, and rubella vaccine.

¶¶ ≥3 doses of hepatitis B vaccine.

*** ≥1 dose of varicella vaccine among adolescents without a reported history of varicella disease.

††† ≥2 doses of varicella vaccine among adolescents without a reported history of varicella disease.

§§§ Confidence interval. Estimates with confidence interval half-widths >10 might not be reliable.

¶¶¶ St. Croix, St. Thomas, St. John, and Water Island.

**** Estimate not reported because unweighted sample size for the denominator was <30 or CI half-width/Estimate greater than 0.588.

had adequate provider data. Noncoverage and nonresponse bias might remain after weighting adjustments, leading to underestimation or overestimation of coverage rates. Third, underestimates of vaccination coverage might have resulted from the exclusive use of provider-verified vaccination histories because the completeness of these records is unknown. Finally, estimates for particular states and reporting areas and for racial/ethnic populations should be interpreted with caution because of smaller sample sizes and wider confidence intervals.

Healthy People 2020 targets for adolescents aged 13 through 15 years are as follows: 80% coverage for ≥1 dose of Tdap, ≥1 dose of MenACWY, and ≥3 doses of HPV (among females) and 90% coverage for ≥2 doses of varicella vaccine (among adolescents without a reported history of varicella disease); no target has been set for HepB (7). Although adolescent

vaccination is increasing, additional strategies are needed to meet *Healthy People 2020* vaccination objectives for adolescents, particularly for HPV vaccination, because the increase in HPV coverage significantly lags behind other adolescent vaccines. A new 2012 Healthcare Effectiveness Data and Information Set (HEDIS) measure requiring health plans to track the number of females who receive 3 HPV doses by age 13 years is expected to lead to increased HPV vaccination rates (8). Evaluation of vaccination policies and practices associated with higher coverage in certain states and areas can help characterize effective methods. Promoting provider recommendations and parental awareness of adolescent vaccines, urging consideration of every health visit as an opportunity for vaccination, reducing out-of-pocket costs, and using immunization information systems and reminder/recall systems can increase vaccination

References

What is already known on this topic?

Since 2006, U.S. coverage with routinely recommended vaccinations among adolescents aged 13 through 17 years has increased, but adolescent coverage still remains low.

What is added by this report?

From 2009 to 2010, vaccination coverage among adolescents in the United States increased for ≥ 1 dose of tetanus, diphtheria, acellular pertussis (Tdap) vaccine; ≥ 1 dose of meningococcal conjugate vaccine (MenACWY); and for ≥ 1 dose and ≥ 3 doses of human papillomavirus vaccine (HPV) (females only). The increase in HPV 1-dose coverage was significantly lower than the increases in Tdap and MenACWY vaccination.

What are the implications for public health practice?

Coverage with routine adolescent vaccines is increasing, although the increase in HPV coverage among adolescent females is lagging, with only one third having received the full 3-dose series. Stronger provider recommendations for HPV vaccination, implementing reminder-recall systems, eliminating missed opportunities, and educating parents of adolescents regarding the risk for HPV infection and the benefits of vaccination, are needed to effectively protect adolescent girls against cervical cancer.

among adolescents (9,10). Providing additional and convenient access to adolescent vaccination services through pharmacies or school-associated programs might increase coverage in some communities. Finally, state and local immunization programs should make adolescent vaccination a priority to protect adolescents from vaccine-preventable diseases.

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