

National, State, and Local Area Vaccination Coverage among Adolescents Aged 13–17 Years — United States, 2009

The Advisory Committee for Immunization Practices (ACIP) recommends that adolescents routinely receive the following vaccines: meningococcal conjugate (MenACWY, 1 dose); tetanus, diphtheria, acellular pertussis (Tdap, 1 dose); and (for females) human papillomavirus (HPV, 3 doses) (1). Adolescents also should receive the following recommended vaccinations they missed during childhood: measles, mumps, rubella (MMR, 2 doses); hepatitis B (HepB, 3 doses); and varicella (VAR, 2 doses) (1). Since 2006, CDC has conducted the National Immunization Survey–Teen (NIS-Teen) to estimate vaccination coverage among adolescents aged 13–17 years. This report summarizes results from 2009 NIS-Teen and updates data from 2008 NIS-Teen (2). Comparing 2009 with 2008, vaccination coverage among adolescents for the three routinely administered adolescent vaccines increased for Tdap (from 40.8% to 55.6%), MenACWY (from 41.8% to 53.6%), ≥ 1 dose of HPV (from 37.2% to 44.3%), and ≥ 3 doses of HPV (from 17.9% to 26.7%). Vaccination coverage varied widely among states; four states (Connecticut, Massachusetts, New Hampshire, and Rhode Island) had coverage of $>60\%$ for all three of the routinely administered adolescent vaccines (Tdap, MenACWY, and HPV). Nationally, *Healthy People 2010* vaccination objectives of 90% coverage among adolescents aged 13–15 years were met for ≥ 3 doses of HepB and ≥ 1 dose of VAR. Coverage with routine adolescent vaccines is increasing; however, more effort, including identification and dissemination of successful state-based practices, is needed to continue to increase the number of adolescents vaccinated according to ACIP recommendations.

NIS-Teen collects vaccination information regarding adolescents aged 13–17 years* in the 50 states and selected local areas† using a random-digit-dialed sample of telephone numbers of households. In 2009, the NIS-Teen was expanded to include adolescents

living in the U.S. Virgin Islands (including St. Croix, St. Thomas, St. John, and Water Island). After parent/guardian respondents grant permission, surveys are mailed to the adolescents' vaccination providers to obtain vaccination histories. In 2009, the household response rate[§] was 58.0%; a total of 20,399 adolescents with provider-verified vaccination records are included in this report, representing 57.2% of all adolescents with completed household interviews. A total of 20,066 adolescents (10,445 males and 9,621 females) are included in the national estimates.[¶] NIS-Teen methodology, including the weighting procedure, has been described previously.** Statistical differences in vaccination coverage were evaluated using t-tests and were considered statistically significant at $p \leq 0.05$.

Vaccination coverage among adolescents increased substantially from 2008 to 2009. Among adolescents aged 13–17 years, administration of ≥ 1 dose of tetanus and diphtheria (Td) or Tdap vaccine after age 10 years increased from 72.2% to 76.2% (Table 1). Coverage with ≥ 1 dose of Tdap increased from 40.8% to 55.6%, and coverage with ≥ 1 dose of MenACWY increased from 41.8% to 53.6%. Among adolescent females, coverage with ≥ 1 dose of HPV increased from 37.2% to 44.3% and with ≥ 3 doses of HPV increased from 17.9% to 26.7%. At least 24 weeks between the first and third doses of the HPV vaccine are needed to complete the series (1). Among those who initiated the HPV series, 90.1% had received their first dose at least 24 weeks before the interview date and had the minimum period needed to complete the series before the interview. Of these, 67.5% (95% confidence interval [CI] = 64.4–70.5) received ≥ 3 doses. Among males, 49.6% (CI = 47.8–51.4) received both ≥ 1 dose of Td/Tdap and ≥ 1 dose of MenACWY;

* Eligible participants were born during January 1991–February 1997.

† Eleven local areas that received federal immunization grants were sampled separately: District of Columbia; Los Angeles County, California; Chicago, Illinois; Lake County, Indiana; Marion County, Indiana; New York, New York; Philadelphia County, Pennsylvania; Bexar County, Texas; Houston, Texas; Dallas County, Texas; El Paso County, Texas.

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

¶ Adolescents from the U.S. Virgin Islands (333: 175 females and 158 males) are excluded from the national estimates.

** Information available at ftp://ftp.cdc.gov/pub/health_statistics/nchs/dataset_documentation/nis/nisteenpuf08_dug.pdf.

TABLE 1. Estimated vaccination coverage among adolescents aged 13–17 years in 2009,* by age at interview and selected vaccines and doses — National Immunization Survey (NIS)–Teen, United States, 2009

Vaccines and doses	Age at interview (yrs)										Overall			
	13 (n = 3,915)		14 (n = 4,203)		15 (n = 4,162)		16 (n = 4,084)		17 (n = 3,702)		2009 (N = 20,066)		2008 (N = 17,835)	
	% [†]	(95% CI) [†]	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
MMR[§] ≥2 doses	91.2	(89.5–92.6)	89.3	(87.6–90.8)	86.9	(84.6–88.9) [¶]	90.9	(89.2–92.3)	87.6	(85.3–89.6) [¶]	89.1	(88.3–89.9)	89.3	(88.4–90.2)
Hepatitis B ≥3 doses	93.4	(92.1–94.5)	90.6	(88.9–92.1) [¶]	89.9	(88.0–91.5) [¶]	90.0	(88.1–91.6) [¶]	85.6	(83.7–87.3) [¶]	89.9	(89.2–90.6)**	87.9	(86.9–88.8)
Varicella														
History of varicella disease ^{††}	33.7	(31.2–36.3)	42.0	(39.3–44.7) [¶]	55.3	(52.4–58.1) [¶]	62.8	(59.8–65.7) [¶]	69.6	(66.7–72.3) [¶]	52.7	(51.4–54.0)**	59.8	(58.4–61.3)
≥1 dose vaccine if had no history of disease	93.6	(92.0–94.9)	89.8	(87.4–91.8) [¶]	87.2	(83.8–89.9) [¶]	80.4	(76.2–84.0) [¶]	75.3	(70.1–79.9) [¶]	87.0	(85.7–88.3)**	81.9	(80.2–83.5)
≥2 doses vaccine if had no history of disease	54.3	(50.8–57.8)	50.2	(46.2–54.2)	49.6	(45.2–54.0)	44.1	(38.5–49.7) [¶]	37.1	(31.9–42.6) [¶]	48.6	(46.6–50.6)**	34.1	(31.8–36.6)
History of disease or received ≥2 doses varicella vaccination ^{§§}	69.7	(67.0–72.3)	71.1	(68.5–73.5)	77.5	(75.0–79.8) [¶]	79.2	(76.8–81.4) [¶]	80.9	(78.3–83.2) [¶]	75.7	(74.6–76.8)	73.5	(72.2–74.8)
Td or Tdap since age 10 years														
≥1 dose Td or Tdap ^{¶¶}	70.5	(67.9–73.0)	74.8	(72.4–77.1) [¶]	78.2	(75.9–80.3) [¶]	78.4	(75.9–80.8) [¶]	78.5	(76.0–80.8) [¶]	76.2	(75.1–77.2)**	72.2	(70.8–73.4)
≥1 dose Tdap	65.2	(62.5–67.8)	63.5	(60.8–66.2)	58.3	(55.5–61.0) [¶]	46.8	(44.0–49.6) [¶]	43.6	(40.7–46.5) [¶]	55.6	(54.3–56.8)**	40.8	(39.3–42.3)
MenACWY^{***} ≥1 dose	53.8	(51.0–56.5)	56.1	(53.3–58.9)	54.6	(51.8–57.3)	54.4	(51.5–57.3)	48.8	(45.9–51.7) [¶]	53.6	(52.4–54.9)**	41.8	(40.3–43.2)
HPV^{†††}														
≥1 dose	37.1	(33.5–40.9)	40.6	(36.8–44.6)	46.0	(42.1–50.0) [¶]	49.9	(45.4–54.4) [¶]	47.1	(43.1–51.2) [¶]	44.3	(42.4–46.1)**	37.2	(35.2–39.3)
≥3 doses	19.5	(16.8–22.5)	23.2	(20.3–26.4)	25.7	(22.6–29.0) [¶]	33.2	(29.5–37.1) [¶]	31.6	(27.9–35.5) [¶]	26.7	(25.2–28.3)**	17.9	(16.3–19.6)

* Adolescents (N = 20,066) in the 2009 NIS-Teen were born during January 1991–February 1997. National estimates do not include adolescents living in the U.S. Virgin Islands (i.e., St. Croix, St. Thomas, St. John, and Water Island) (n = 333).

[†] Weighted percentage and confidence interval. Estimates with CI widths >20 might not be reliable.

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

[¶] Statistically significant difference (p<0.05) by t-test in estimated vaccination coverage, compared with reference group aged 13 years.

** Statistically significant difference (p<0.05) by t-test in estimated vaccination coverage, compared with 2008 NIS-Teen overall estimates.

^{††} By parent/guardian report or provider records.

^{§§} Previous publications reported "history of disease or received ≥1 dose varicella vaccination." This publication reports "history of disease or received ≥2 doses varicella vaccination" to follow current Advisory Committee of Immunization Practices guidelines for adequate protection against varicella infection.

^{¶¶} Includes tetanus and diphtheria toxoid vaccine (Td); tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap); or tetanus-unknown vaccine at or after age 10 years.

^{***} Meningococcal conjugate vaccine or meningococcal-unknown type vaccine.

^{†††} Human papillomavirus vaccine, either quadrivalent or bivalent, among females (n = 9,621).

among females, 33.6% (CI = 31.8–35.4) received ≥1 dose of Td/Tdap, ≥1 dose of MenACWY, and ≥1 dose of HPV.

Among vaccines either administered during childhood or as catch-up adolescent vaccinations, coverage with ≥2 doses of MMR was similar to coverage during 2008 at 89.1%; coverage with ≥3 doses of HepB increased from 87.9% to 89.9% (Table 1). Reported history of varicella disease continued to decrease among adolescents from 59.8% to 52.7%. Among adolescents, 75.7% had protection from varicella disease (i.e., history of varicella or received ≥2 doses of VAR). Coverage with ≥2 doses of MMR, ≥3 doses of HepB, ≥1 dose of VAR, ≥2 doses of VAR, ≥1 dose of Tdap, and ≥1 dose of MenACWY differed by age, with generally lower rates among older age groups. However, coverage rates with ≥1 and ≥3 doses of HPV, and ≥1 dose of Td or Tdap, generally were higher among older than younger adolescents.

Coverage estimates varied by state and local area (Table 2) with rates ranging from 22.6% (Mississippi)

to 76.6% (Colorado) for ≥1 doses of Tdap, from 19.3% (Mississippi) to 78.3% (District of Columbia) for ≥1 dose of MenACWY, and from 22.9% (Mississippi) to 69.0% (Massachusetts) for ≥1 dose of HPV. Four states (Connecticut, Massachusetts, New Hampshire, and Rhode Island) had coverage of >60% for all three routinely administered adolescent vaccines (Tdap, MenACWY, and HPV). Many states had a ≥15 percentage point increase from 2008 to 2009 in coverage for ≥1 dose of Tdap, ≥1 dose of MenACWY, or ≥1 dose of HPV. ^{††}

^{††} ≥1 dose of Tdap: Connecticut, Florida, Iowa, Kansas, Massachusetts, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming; ≥1 dose of MenACWY: Arizona, Colorado, Connecticut, District of Columbia, Florida, Massachusetts, North Carolina, North Dakota, Ohio, Tennessee, Vermont, Washington, and Wyoming; ≥1 dose of HPV: Alabama, Colorado, Connecticut, District of Columbia, Georgia, Hawaii, Massachusetts, Montana, Nebraska, North Carolina, North Dakota, Oregon, South Dakota, and Utah.

TABLE 2. Estimated vaccination coverage among adolescents aged 13–17 years,* by state and selected areas and selected vaccines and doses — National Immunization Survey (NIS)–Teen, United States, 2009

State/Area	Vaccine doses routinely recommended during childhood (adolescent catch-up vaccines)				Vaccine doses routinely recommended for adolescents											
	≥2 MMR†		≥3 Hep B‡		≥1 VAR§		≥2 VAR**		≥1 Td or Tdap††		≥1 Tdap		≥1 MenACWY §§		≥1 HPV¶¶	
	%***	(95% CI***)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
United States	89.1	(88.3–89.9)	89.9	(89.2–90.6)	87.0	(85.7–88.2)	48.6	(46.6–50.6)	76.2	(75.1–77.2)	55.6	(54.3–56.8)	53.6	(52.4–54.9)	44.3	(42.4–46.1)
Alabama	91.4	(87.0–94.4)	82.9	(78.1–86.7)	90.2	(84.1–94.1)	34.0	(26.3–42.7)	71.6	(65.5–77.0)	57.6	(51.4–63.6)	43.5	(37.5–49.8)	49.4	(40.8–58.1)
Alaska	87.4	(82.2–91.2)	91.8	(87.8–94.6)	81.0	(70.1–88.5)	44.8	(34.8–55.2)	70.1	(63.6–75.8)	55.8	(49.0–62.4)	40.2	(33.8–46.9)	40.8	(31.7–50.6)
Arizona	81.4	(75.8–85.9)	84.3	(79.0–88.4)	78.0	(68.8–85.0)	57.8	(48.5–66.6)	83.6	(78.3–87.8)	66.6	(60.0–72.7)	69.7	(63.4–75.3)	52.8	(43.6–61.7)
Arkansas	85.9	(81.2–89.5)	88.0	(83.3–91.6)	82.8	(75.4–88.3)	21.9	(14.6–31.4)	52.7	(46.6–58.6)	34.6	(28.9–40.7)	21.9	(17.3–27.2)	34.6	(26.6–43.5)
California	87.2	(82.6–90.8)	89.6	(85.5–92.7)	88.0	(81.6–92.3)	56.9	(48.2–65.1)	76.7	(71.0–81.5)	53.1	(46.7–59.5)	58.4	(52.0–64.6)	49.2	(39.9–58.6)
Los Angeles County	84.0	(76.5–89.4)	87.2	(79.5–92.3)	82.8	(71.9–90.0)	57.8	(45.5–69.2)	78.9	(70.9–85.1)	55.0	(46.4–63.4)	58.3	(49.4–66.7)	63.5	(51.7–74.0)
Rest of state	88.5	(83.4–92.7)	90.6	(85.4–94.1)	89.6	(81.3–94.5)	56.6	(45.8–66.7)	75.8	(68.4–81.9)	52.4	(44.1–60.5)	58.5	(50.2–66.3)	43.6	(31.8–56.1)
Colorado	88.6	(84.5–91.7)	91.2	(87.5–93.9)	86.6	(79.2–91.6)	54.4	(45.4–63.2)	83.6	(78.8–87.5)	76.6	(70.9–81.5)	53.7	(47.5–59.9)	52.7	(43.7–61.4)
Connecticut	94.4	(89.1–97.2)	96.3	(91.7–98.4)	94.0	(85.8–97.6)	62.6	(53.4–71.0)	88.9	(84.2–92.4)	68.3	(62.2–73.7)	68.1	(61.8–73.9)	61.2	(52.6–69.2)
Delaware	94.4	(90.2–96.8)	91.4	(86.7–94.5)	84.0	(75.1–90.1)	49.8	(40.8–58.9)	74.4	(67.9–80.0)	53.4	(46.9–59.7)	58.4	(51.8–64.7)	51.5	(42.4–60.5)
District of Columbia	99.4	(98.2–99.8)	97.9	(94.1–99.3)	96.6	(91.6–98.7)	72.0	(64.2–78.7)	89.3	(85.4–92.2)	46.1	(40.2–52.2)	78.3	(72.5–83.1)	60.0	(51.4–68.0)
Florida	90.4	(84.9–94.1)	95.9	(92.6–97.7)	88.2	(81.5–92.6)	68.7	(31.3–46.8)	86.8	(80.9–91.1)	47.2	(41.2–53.3)	52.7	(46.6–58.7)	39.3	(31.3–48.0)
Georgia	93.0	(88.5–95.8)	96.0	(92.9–97.7)	91.8	(83.3–96.2)	38.0	(59.0–75.8)	73.0	(67.1–78.2)	50.8	(44.7–56.9)	53.3	(47.2–59.4)	38.6	(30.8–47.1)
Hawaii	93.7	(89.1–96.4)	93.8	(89.4–96.4)	95.5	(89.2–98.2)	55.3	(46.3–64.0)	79.1	(73.0–84.1)	46.0	(39.3–52.9)	51.0	(44.2–57.7)	65.0	(55.2–73.6)
Idaho	83.7	(76.8–88.9)	83.5	(76.6–88.7)	74.6	(62.0–84.1)	25.6	(16.5–37.4)	61.4	(53.5–68.7)	38.6	(31.4–46.3)	34.2	(27.3–41.8)	30.2	(21.0–41.4)
Illinois	90.9	(87.7–93.4)	93.7	(91.0–95.5)	82.1	(75.6–87.1)	41.6	(34.6–48.9)	72.1	(67.3–76.4)	59.5	(54.5–64.3)	53.5	(48.5–58.4)	34.3	(28.0–41.3)
City of Chicago	84.6	(79.1–88.8)	86.3	(81.0–90.3)	80.3	(71.7–86.7)	39.7	(32.1–47.8)	71.4	(65.2–76.8)	58.7	(52.5–64.7)	58.4	(52.2–64.3)	36.2	(28.3–44.2)
Rest of state	92.5	(88.4–95.2)	95.5	(92.2–97.5)	82.7	(74.1–88.9)	42.2	(33.2–51.7)	72.2	(66.4–77.4)	59.6	(53.6–65.5)	52.2	(46.2–58.1)	33.8	(26.2–42.1)
Indiana	89.4	(85.7–92.3)	89.0	(85.5–91.7)	75.0	(64.7–83.1)	35.0	(27.1–43.7)	57.9	(52.3–63.3)	44.4	(39.0–49.9)	41.7	(36.5–47.1)	37.1	(30.2–44.6)
Lake County	84.1	(77.1–89.3)	85.5	(79.0–90.2)	71.1	(57.0–82.0)	17.0	(10.2–26.9)	51.9	(43.7–60.0)	38.7	(31.3–46.6)	31.6	(24.9–39.2)	30.9	(20.8–43.2)
Marion County	87.4	(82.1–91.3)	86.2	(81.4–90.0)	77.4	(67.3–85.1)	38.9	(29.9–48.7)	65.5	(58.7–71.7)	49.7	(43.1–56.3)	53.4	(46.7–59.9)	52.0	(42.4–61.4)
Rest of state	90.4	(85.5–93.8)	89.9	(85.3–93.1)	75.0	(60.8–85.3)	36.4	(26.1–48.2)	57.2	(50.1–63.9)	44.1	(37.3–51.0)	40.7	(34.2–47.6)	35.0	(26.5–44.5)
Iowa	88.1	(83.8–91.4)	79.8	(74.3–84.4)	81.3	(72.5–87.8)	35.4	(26.4–45.6)	70.5	(64.2–76.1)	61.2	(54.9–67.1)	46.4	(40.2–52.5)	42.4	(34.3–51.1)
Kansas	84.2	(78.3–88.8)	76.1	(69.5–81.6)	78.4	(67.1–86.6)	46.4	(35.1–58.0)	74.5	(67.8–80.2)	63.6	(56.6–70.0)	38.3	(31.7–45.4)	44.1	(33.9–54.9)
Kentucky	93.3	(90.1–95.6)	92.3	(88.4–94.9)	84.8	(77.5–90.1)	23.9	(17.8–31.4)	80.7	(75.3–85.1)	37.5	(32.1–43.1)	36.3	(31.2–41.7)	31.0	(23.8–39.2)
Louisiana	91.6	(86.4–94.9)	90.2	(84.7–93.8)	80.9	(69.8–88.6)	42.2	(32.1–53.0)	70.1	(63.0–76.4)	47.3	(40.2–54.6)	65.8	(58.5–72.4)	48.6	(37.6–59.7)
Maine	89.4	(84.7–92.8)	84.4	(78.3–89.0)	91.8	(84.3–95.9)	48.7	(38.7–58.9)	75.7	(69.4–81.0)	53.9	(47.2–60.6)	47.3	(40.7–54.1)	44.4	(35.3–53.8)
Maryland	92.5	(86.5–95.9)	92.2	(85.8–95.8)	96.5	(90.2–98.8)	49.9	(39.6–60.1)	80.2	(72.5–86.2)	51.8	(43.9–59.7)	59.3	(51.1–67.0)	39.6	(28.7–51.6)
Massachusetts	97.3	(94.4–98.7)	97.5	(95.4–98.7)	97.9	(94.1–99.3)	53.7	(45.3–61.8)	93.7	(89.9–96.1)	62.7	(56.8–68.2)	74.0	(68.6–78.8)	69.0	(60.4–76.5)
Michigan	93.0	(89.0–95.6)	91.4	(86.9–94.5)	93.5	(88.2–96.4)	47.7	(39.9–55.7)	69.3	(64.0–74.2)	46.2	(40.8–51.8)	52.6	(47.0–58.1)	39.0	(31.4–47.1)
Minnesota	90.7	(86.6–93.6)	90.8	(86.8–93.7)	91.5	(84.9–95.4)	59.3	(50.1–67.9)	90.3	(85.7–93.5)	52.0	(46.0–58.0)	43.9	(38.1–49.9)	44.9	(36.5–53.5)
Mississippi	93.1	(90.0–95.3)	78.6	(73.8–82.7)	47.2	(38.7–55.9)	12.2	(7.6–18.9)	29.1	(24.5–34.1)	22.6	(18.4–27.3)	19.3	(15.5–23.7)	22.9	(16.5–30.9)
Missouri	86.2	(81.0–90.1)	89.7	(84.8–93.2)	78.6	(70.6–84.9)	42.3	(33.4–51.7)	74.7	(69.3–79.4)	60.1	(54.3–65.7)	45.5	(39.6–51.4)	32.7	(25.5–40.8)
Montana	81.0	(75.1–85.8)	76.2	(70.1–81.4)	69.3	(58.9–78.1)	28.3	(19.7–38.9)	81.1	(75.8–85.4)	63.8	(57.6–69.6)	26.9	(21.7–32.9)	35.0	(26.7–44.2)
Nebraska	89.4	(84.7–92.7)	90.5	(85.9–93.7)	91.4	(84.8–95.3)	47.8	(38.4–57.3)	78.8	(73.1–83.5)	51.5	(45.1–57.9)	53.2	(46.8–59.6)	49.4	(40.2–58.6)
Nevada	88.1	(82.8–91.9)	86.4	(80.9–90.5)	83.7	(75.2–89.8)	39.7	(31.1–49.0)	75.3	(68.9–80.7)	64.0	(57.4–70.1)	39.5	(33.4–45.9)	38.9	(30.2–48.4)
New Hampshire	95.2	(92.1–97.1)	94.7	(91.6–96.7)	97.1	(92.9–98.8)	67.7	(58.0–76.0)	88.0	(82.7–91.8)	72.2	(66.2–77.5)	67.8	(61.6–73.4)	60.0	(51.3–68.2)
New Jersey	90.8	(86.6–93.7)	92.8	(88.6–95.6)	88.2	(81.8–92.6)	51.1	(43.4–58.8)	81.2	(76.2–85.4)	61.1	(55.4–66.5)	71.4	(65.6–76.5)	42.2	(34.4–50.4)
New Mexico	86.6	(82.1–90.2)	89.3	(85.4–92.2)	77.0	(69.1–83.5)	42.4	(34.8–50.4)	84.3	(79.8–88.1)	63.5	(57.8–68.8)	51.2	(45.6–56.8)	53.0	(45.0–60.9)
New York	92.1	(89.1–94.4)	92.3	(88.5–94.9)	89.1	(82.9–93.3)	48.8	(41.3–56.2)	87.7	(84.0–90.6)	69.2	(64.3–73.7)	62.9	(57.7–67.8)	48.8	(41.4–56.3)
City of New York	88.9	(83.3–92.8)	87.3	(79.0–92.6)	87.4	(76.3–93.7)	39.1	(29.5–49.7)	89.1	(84.2–92.6)	72.2	(65.1–78.4)	61.0	(53.0–68.4)	43.2	(32.4–54.7)
Rest of state	94.3	(90.5–96.7)	95.7	(92.4–97.6)	90.5	(82.1–95.2)	56.1	(46.0–65.8)	86.7	(81.3–90.8)	67.1	(60.4–73.2)	64.2	(57.3–70.4)	52.6	(42.8–62.2)
North Carolina	84.1	(77.7–88.9)	86.9	(81.7–90.8)	81.3	(72.6–87.8)	54.0	(43.7–64.0)	73.8	(67.7–79.1)	54.7	(48.3–61.1)	46.8	(40.4–53.3)	50.3	(40.9–59.6)
North Dakota	96.0	(92.6–97.9)	89.8	(85.4–93.0)	88.9	(80.8–93.8)	54.3	(44.0–64.2)	85.7	(80.4–89.8)	71.6	(65.4–77.1)	66.0	(59.5–72.0)	45.1	(36.0–54.6)
Ohio	94.4	(91.3–96.5)	91.1	(87.4–93.8)	82.9	(73.0–89.7)	40.3	(31.1–50.2)	67.7	(61.6–73.2)	50.2	(44.0–56.4)	53.7	(47.5–59.9)	40.6	(31.8–49.9)
Oklahoma	86.9	(82.2–90.6)	87.1	(82.4–90.7)	87.6	(80.5–92.3)	26.3	(19.9–33.8)	55.5	(49.3–61.5)	35.1	(29.6–41.1)	29.5	(24.3–35.2)	40.1	(31.9–48.9)
Oregon	89.0	(85.0–92.0)	87.4	(83.0–90.8)	89.5	(84.2–93.2)	50.3	(42.6–58.0)	68.8	(63.2–73.9)	55.5	(49.9–61.1)	41.5	(36.1–47.2)	52.9	(45.2–60.5)
Pennsylvania	93.5	(89.6–96.0)	95.2	(92.0–97.1)	97.2	(94.5–98.6)	67.4	(58.9–75.0)	84.7	(79.6–88.7)	67.9	(61.7–73.5)	71.9	(65.8–77.3)	53.2	(43.8–62.4)
Philadelphia County	88.4	(83.5–91.9)	89.1	(84.5–92.4)	93.0	(87.4–96.2)	66.4	(58.9–73.2)	81.9	(77.0–86.0)	65.2	(59.2–70.8)	75.3	(69.7–80.2)	58.2	(49.1–66.8)
Rest of state	94.3	(89.5–97.0)	96.1	(92.2–98.1)	97.9	(94.4–99.2)	67.6	(57.6–76.3)	85.1	(79.1–89.6)	68.3	(61.1–74.7)	71.4	(64.3–77.5)	52.4	(41.6–62.9)
Rhode Island	96.9	(93.7–98.5)	93.8	(89.3–96.5)	96.5	(92.4–98.4)	70.4	(63.2–76.8)	91.4	(87.9–94.0)	60.1	(54.0–65.9)	75.7	(70.2–80.5)	68.3	(58.9–76.4)
South Carolina	89.7	(85.3–92.9)	91.5	(87.0–94.5)	76.4	(64.6–85.1)	19.9	(13.6–28.1)	52.7	(45.8–59.5)	37.5	(31.4–44.0)	34.5	(28.6–40.9)	28.5	(21.0–37.4)
South Dakota	88.5	(83.1–92.4)	73.6	(67.1–79.3)	69.1	(56.6–79.4)	12.8	(6.9–22.4)	58.0	(51.2–64.4)	39.6	(33.2–46.4)	24.9	(19.6–31.1)	62.4	(53.2–70.8)
Tennessee	85.2	(79.5–89.6)	87.4	(82.4–91.2)	78.9	(70.7–85.2)	33.6	(26.0–42.1)	63.3	(57.3–68.9)	48.0	(42.0–54.0)	52.1	(46.1–58.1)	43.6	(35.4–52.1)
Texas	81.5	(77.1–85.2)	86.1	(82.3–89.1)	89.3	(83.6–93.2)	46.7	(39.1–54.4)	75.8	(71.0–80.1)	57.2	(52.0–62.2)	51.0	(45.7–56.2)	37.6	(31.2–44.5)
Bexar County	80.7	(73.9–86.1)	82.0	(75.3–87.2)	87.3	(79.2–92.5)	32.8	(24.2–42.7)	79.3	(72.7–84.7)	56.4	(49.1–63.4)	54.8	(47.5–61.9)	47.7	(37.7–57.9)
City of Houston	78.6	(70.8–84.8)	82.1	(75.2–87.3)	89.3	(81.3–94.1)	47.3	(36.1–58.9)	76.0	(67.8–82.7)	52.6	(44.0–61.0)	64.8	(56.0–72.8)	41.7	(29.8–54.7)
Dallas County	77.4	(70.5–83.1)	82.3	(75.4–87.6)	88.7	(81.3–93.4)	46.1	(36.4–56.0)	76.2	(68.9–82.2)	54.4	(47.1–61.5)	52.5	(45.2–59.6)	47.0	(36.7–57.7)
El Paso County	85.6	(80.5–89.5)	87.0	(82.0–90.8)	86.8	(79.5–91.7)	51.8	(43.3–60.2)	84.9	(80.2–88.6)	64.5	(58.7–70.0)	67.4	(61.5–72.8)	57.8	(49.0–66.1)
Rest of state	82.3	(76.1–87.1)	87.3	(82.1–91.2)	89.7	(80.9–94.7)	47.8	(37.2–58.7)								

TABLE 2. (Continued) Estimated vaccination coverage among adolescents aged 13–17 years,* by state and selected areas and selected vaccines and doses — National Immunization Survey (NIS)—Teen, United States, 2009

State/Area	Vaccine doses routinely recommended during childhood (adolescent catch-up vaccines)				Vaccine doses routinely recommended for adolescents											
	≥2 MMR [†]		≥3 Hep B [§]		≥1 VAR [¶]		≥2 VAR ^{**}		≥1 Td or Tdap ^{††}		≥1 Tdap		≥1 MenACWY ^{§§}		≥1 HPV ^{¶¶}	
	% ^{***}	(95% CI ^{***})	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
West Virginia	79.9	(73.2–85.3)	79.4	(72.7–84.8)	78.7	(68.3–86.4)	33.9	(24.7–44.4)	52.2	(45.1–59.2)	40.4	(33.8–47.5)	39.0	(32.4–45.9)	38.5	(29.4–48.4)
Wisconsin	91.8	(87.9–94.5)	93.4	(89.5–95.9)	95.7	(91.2–97.9)	71.8	(63.4–78.9)	85.3	(80.1–89.3)	72.3	(66.3–77.5)	55.7	(49.5–61.8)	49.2	(40.7–57.6)
Wyoming	87.4	(83.2–90.7)	79.7	(74.5–84.1)	79.6	(71.6–85.8)	38.1	(29.8–47.1)	82.8	(78.0–86.7)	48.2	(42.4–54.0)	47.8	(42.0–53.6)	43.6	(35.8–51.7)
U.S. Virgin Islands ^{†††}	86.1	(80.5–90.3)	89.7	(84.3–93.4)	82.3	(74.6–88.0)	29.3	(23.5–36.0)	73.5	(67.0–79.1)	34.9	(28.9–41.3)	21.1	(16.2–26.9)	14.9	(9.6–22.4)

* Adolescents (N = 20,066) in the 2009 NIS-Teen were born during January 1991–February 1997.

[†] ≥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.

^{††} Tetanus and diphtheria toxoids vaccine (Td); or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap); or tetanus-unknown vaccine on or after age 10 years.

^{§§} Meningococcal conjugate vaccine or meningococcal-unknown type vaccine.

^{¶¶} Human papillomavirus vaccine, either quadrivalent or bivalent among females (n = 9,621).

^{***} Weighted percentage and confidence interval. Estimates with CI widths >20 might not be reliable.

^{†††} Includes St. Croix, St. Thomas, St. John, and Water Island (n = 333). Not included in the United States estimates.

No statistically significant differences were found in coverage with ≥1 dose of Tdap or MenACWY by racial/ethnic group^{§§} or by poverty status^{¶¶} (Table 3). For ≥1 dose of HPV, no differences were found in coverage by race/ethnicity; however, compared with those living at or above the poverty level, HPV initiation was higher among those living below the poverty level (51.9% versus 42.5%). Coverage with ≥3 doses of HPV was lower among blacks (23.1%) and Hispanics (23.4%) compared with whites (29.3%). Among vaccines either administered during childhood or as catch-up adolescent vaccinations, coverage with ≥2 doses of MMR was higher among whites than among blacks (90.2% versus 86.3%) and protection from varicella disease was higher among whites than among blacks (77.0% versus 71.3%). Having a history of varicella disease was higher among whites than among Hispanics (55.0% versus 50.1%). Coverage with ≥1 dose of VAR without history of disease was higher among those living at or above the poverty level (87.6% versus 82.9%); and, coverage with ≥1 dose of Td/Tdap was higher among those living at or above the poverty level (77.0% versus 71.8%).

Measured against the *Healthy People 2010* targets of 90% coverage (3), vaccination coverage for adolescents aged 13–15 years was 89.0% (CI = 87.9–90.0) for ≥2 doses of MMR, 91.2% (CI = 90.3–92.1) for

≥3 doses of HepB, 74.7% (CI = 73.3–76.0) for ≥1 dose of Td/Tdap, and 90.5% (CI = 89.1–91.7) for ≥1 dose of VAR.

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Editorial Note

In 2009, vaccination coverage among adolescents aged 13–17 years increased substantially. As in 2008, adolescent vaccination coverage in 2009 also continued to vary widely among states and local areas, a variation that might be explained, in part, by different vaccination-promoting initiatives. Some of these initiatives include communication campaigns, strong partnerships with local professional organizations, universal funding of adolescent vaccinations, and middle school entry vaccination requirements. During the 2009–10 school year, for entry to middle school, 27 states required Tdap, seven required MenACWY, and two had requirements for HPV with opt-out provisions (4). Evaluation of vaccination-promoting initiatives, vaccine financing policies, and school requirements regarding Tdap, MenACWY, and HPV are ongoing and are needed to understand their impact on adolescent vaccination to promote effective state-based practices.

Although ≥1 dose HPV coverage was higher among Hispanics compared with whites in 2008 (2), no racial/ethnic differences for HPV initiation

^{§§} Adolescents identified as white, black, Asian, or American Indian/Alaska Native all were considered non-Hispanic. Persons who self-identified as Hispanic might be of any race.

^{¶¶} 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 is available at <http://www.census.gov/hhes/www/poverty.html>. Poverty status was unknown for 779 adolescents.

TABLE 3. Estimated vaccination coverage among adolescents aged 13-17 Years,* by race/ethnicity,[†] poverty level,[§] and selected vaccines and doses — National Immunization Survey (NIS)-Teen, United States, 2009

Vaccines	Race/Ethnicity						Poverty Status			
	White (n = 14,107)	Black (n = 2,047)	Hispanic (n = 2,479)	American Indian/ Alaska Native (n = 258)	Asian (n = 444)	Other (n = 731)	Below poverty level (n = 2,506)		At or above poverty level (n = 16,781)	
	% [¶] (95% CI [¶])	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	
MMR** ≥2 doses	90.2 (89.3–91.1)	86.3 (83.6–88.5) ^{††}	87.6 (84.9–89.9)	90.4 (84.1–94.3)	92.9 (88.5–95.8)	87.1 (80.8–91.6)	87.8 (85.5–89.8)	89.3 (88.4–90.2)		
Hepatitis B ≥3 doses	90.2 (89.4–91.0)	88.9 (86.7–90.8)	90.0 (87.7–91.9)	89.7 (83.2–93.9)	89.5 (83.3–93.6)	89.1 (83.1–93.1)	88.3 (86.1–90.1)	90.3 (89.5–91.1)		
Varicella										
History of varicella disease ^{§§}	55.0 (53.6–56.4)	49.0 (45.6–52.4) ^{††}	50.1 (46.3–53.9) ^{††}	52.3 (42.2–62.3)	40.2 (31.8–49.3) ^{††}	53.6 (46.2–60.8)	52.5 (49.0–56.0)	53.0 (51.6–54.4)		
Among adolescents without history of disease:										
≥1 dose vaccine	88.5 (87.0–89.8)	82.4 (78.7–85.7) ^{††}	85.5 (81.1–89.0)	87.9 (76.4–94.2)	88.1 (79.9–93.2)	91.5 (86.2–94.9)	82.9 (79.0–86.3) ^{††}	87.6 (86.1–88.9)		
≥2 dose vaccine	48.8 (46.5–51.2)	43.9 (39.2–48.6)	49.7 (44.0–55.5)	41.0 (26.6–57.1)	54.2 (41.9–66.0)	55.9 (44.3–66.8)	46.2 (41.0–51.5)	48.7 (46.6–50.9)		
History of disease or received ≥2 doses varicella vaccination	77.0 (75.7–78.2)	71.3 (68.2–74.3) ^{††}	74.9 (71.4–78.1)	71.9 (60.3–81.1)	72.6 (63.7–80.0)	79.5 (73.0–84.8)	74.4 (71.2–77.4)	75.9 (74.7–77.1)		
Td or Tdap since age 10 years^{¶¶}										
≥1 dose Td or Tdap	76.5 (75.4–77.7)	72.5 (69.4–75.5) ^{††}	76.7 (73.2–79.9)	78.0 (66.8–86.2)	84.5 (77.2–89.8)	73.9 (66.8–79.9)	71.8 (68.5–74.8) ^{††}	77.0 (75.8–78.1)		
≥1 dose Tdap	55.8 (54.3–57.2)	52.7 (49.3–56.1)	55.6 (51.8–59.4)	59.3 (48.8–69.1)	64.3 (55.5–72.3)	54.5 (47.2–61.7)	52.8 (49.3–56.3)	56.1 (54.7–57.4)		
MenACWY ≥1 dose^{***}	53.1 (51.7–54.5)	53.0 (49.6–56.4)	55.9 (52.0–59.7)	46.9 (37.3–56.8)	58.8 (49.5–67.5)	50.2 (42.9–57.4)	52.5 (49.0–55.9)	53.8 (52.4–55.2)		
HPV^{†††}										
≥1 dose	43.9 (41.8–46.1)	44.6 (39.9–49.5)	45.5 (40.3–50.8)	52.3 (39.0–65.2)	41.5 (29.5–54.5)	42.2 (31.5–53.6)	51.9 (47.0–56.8) ^{††}	42.5 (40.5–44.5)		
≥3 doses	29.1 (27.3–31.0)	23.1 (19.1–27.6) ^{††}	23.4 (19.7–27.6) ^{††}	29.6 (20.0–41.4)	22.1 (14.7–31.8)	21.5 (13.6–32.2)	25.5 (21.4–30.1)	26.8 (25.1–28.4)		

* Adolescents (N=20,066) in the 2009 NIS-Teen were born during January 1991–February 1997. National estimates do not include adolescents living in the U.S. Virgin Islands (i.e., St. Croix, St. Thomas, St. John, and Water Island) (n = 333).

† Adolescents identified as white, black, Asian, or American Indian/Alaska Native all were considered non-Hispanic. Persons who self-identified as Hispanic might be of any race. Persons who self-identified as Native Hawaiian or 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 779 adolescents.

¶ Weighted percentage and confidence interval. Estimates with CI widths >20 might not be reliable.

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

†† Statistically significant difference (p≤0.05) by t-test in estimated vaccination coverage, compared with white reference group for race/ethnicity, and compared with at or above poverty level group for poverty status.

§§ By parent/guardian report or provider records.

¶¶ Tetanus and diphtheria toxoids vaccine (Td); or tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap); or tetanus-unknown vaccine on or after age 10 years.

*** Meningococcal conjugate vaccine or meningococcal-unknown type vaccine.

††† Human papillomavirus vaccine, either quadrivalent or bivalent among females (n = 9,621).

were observed in 2009. However, whites had higher completion rates compared with blacks and Hispanics, emphasizing that efforts are needed to ensure administration of 3 doses. Similar to 2008, a higher percentage of adolescent females living below the poverty level had initiated the HPV series than those living at or above poverty level. Although the ACIP-recommended age for HPV vaccination is 11 or 12 years, HPV coverage was higher among older compared with younger adolescent females in 2009. Some studies have found that parents and physicians prefer vaccinating older adolescent females (5,6), making education regarding HPV infection and the benefits of vaccination at the recommended age, before sexual activity begins, an important public health endeavor. Because of the complexity of factors associated with HPV vaccination, including sociodemographic characteristics, local vaccination funding and policies, and parental

attitudes, further analyses are needed to understand how these factors affect HPV coverage.

Coverage with Tdap and MenACWY differed by age. Lower Tdap coverage among older adolescents might be attributed to several factors. For example, many older teens had received Td before licensure of Tdap. Because a 5-year interval is recommended between receipt of Td and Tdap, these adolescents were not yet eligible to receive Tdap^{***} (1). Lower MenACWY coverage among older adolescents can be attributed to at least two factors: limited availability of the vaccine during the first 2 years of MenACWY production (7) and fewer preventive health visits by adolescents as they get older, thus limiting the opportunities for catch-up vaccination.

*** A 5-year interval from the last Td dose is encouraged when Tdap is used as a booster dose; however, a shorter interval may be used if pertussis immunity is needed.

What is already known on this topic?

Since 2006, national coverage with routinely recommended vaccinations among adolescents aged 13–17 years has increased, but adolescent coverage is still below coverage levels for those vaccines administered routinely in childhood.

What is added by this report?

Compared with 2008, vaccination coverage among adolescents in the United States increased for ≥ 1 dose of tetanus, diphtheria, acellular pertussis vaccine (from 40.8% to 55.6%), ≥ 1 dose of meningococcal conjugate vaccine (from 41.8% to 53.6%), ≥ 1 dose of human papillomavirus vaccine (from 37.2% to 44.3%; for females only), and ≥ 3 doses of human papillomavirus vaccine (from 17.9% to 26.7%). By state, coverage levels continued to vary widely for all routinely recommended adolescent vaccines.

What are the implications for public health practice?

Coverage of routinely recommended adolescent vaccines is increasing; however, more effort, including the evaluation of vaccination policies and practices associated with higher coverage in some states, is needed to characterize effective methods and to improve vaccination coverage among adolescents.

The findings in this report are subject to at least three limitations. NIS-Teen is a landline telephone survey; although studies have shown no evidence of bias after adjusting sampling weights for noncoverage of households with no landline telephones in NIS-Teen, nonresponse and noncoverage bias might remain, leading to underestimation or overestimation of coverage rates (8). Second, underestimates of vaccination coverage might have resulted from the exclusive use of provider-verified vaccination histories because completeness of these records is unknown (9). Finally, estimates for particular states and local areas and for racial/ethnic populations should be interpreted with caution because of smaller sample sizes and wider confidence intervals.

Because adolescents are thought to be an important source of pertussis transmission, recent increases in pertussis cases exemplify the need to increase adolescent vaccination rates. In 2007, CDC launched a national campaign to promote parental awareness of adolescent vaccines and developed a program called It's Their Turn to support state health departments in their vaccination campaigns.^{†††} The Vaccines for

Children program provides free vaccine for children aged ≤ 18 years for families who might not be able to afford vaccine. However, additional strategies are needed to increase coverage among adolescents. Evaluation of vaccination policies and practices associated with higher coverage in certain states and areas can help characterize effective methods. Patient reminders by health-care providers can promote preventive health-care visits and vaccinations among adolescents (10). Urging the public and health-care providers to view every health visit as an opportunity for vaccination will decrease missed opportunities to provide vaccines (10). Additionally, exploration of using nontraditional settings to increase vaccination coverage (e.g., schools) should continue.

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^{†††} Information available at <http://www.cdc.gov/vaccines/spec-grps/preteens-adol.htm>.