Human Papillomavirus Vaccination Trends Among Adolescents: 2015 to 2020

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Abstract

OBJECTIVE: To assess trends in recent human papillomavirus (HPV) vaccination initiation and factors associated with vaccination among adolescents.

METHODS: The 2015 to 2020 National Immunization Survey–Teen data were used to assess vaccination trends. Multivariable logistic regression analysis were conducted to assess factors associated with vaccination.

RESULTS: Overall, HPV vaccination coverage (1 dose) among adolescents significantly increased from 56.1% in 2015 to 75.4% in 2020. There were larger increases in coverage among males (4.7 percentage points annually) than females (2.7 percentage points annually) and coverage differences between males and females decreased in 2015 through 2020. Coverage in 2020 was 75.4% for adolescents aged 13 to 17 years; 73.7% for males and 76.8% for females ($P < .05$); 80.7% for those with a provider recommendation and 51.7% for those without ($P < .05$); and 80.3% for those with a well child visit at age 11 to 12 years, and 64.8% for those without ($P < .05$). Multivariable logistic regression results showed that main characteristics independently associated with a higher likelihood of vaccination included: a provider recommendation, age 16 to 17 years, non-Hispanic Black, Hispanic, or American Indian or Alaskan Native, Medicaid insurance, 2 provider contacts in the past 12 months, a well–child visit at age 11 to 12 years and having 1 or 2 vaccine providers ($P < .05$).

CONCLUSIONS: Overall, HPV vaccination coverage among adolescents increased during 2015 to 2020. Coverage increased faster among males than females and differences by sex narrowed

during this time. Receiving a provider recommendation vaccination was important to increase vaccination coverage.

Human papillomavirus (HPV) is the most common sexually transmitted infection in men and women in the United States.[1] Vaccination is an important tool to prevent and control HPV infection and associated outcomes, including genital warts, precancerous lesions, and cancers, such as cervical, vaginal, vulvar, anal, penile, and oropharyngeal cancers.[2–6] Since 2006, routine HPV vaccination of females aged 11 or 12 years (vaccine can be administered as young as age 9 years), as well as those aged 13 through 26 years not previously vaccinated, has been recommended by the Advisory Committee on Immunization Practices (ACIP).[2] In 2011, ACIP recommended routine vaccination of males aged 11 to 12 years and those aged 13 to 21 years not previously vaccinated; recommendations stated that males aged 22 to 26 years may be vaccinated.[3] Initially, ACIP recommended a 3-dose schedule for HPV vaccine. However, in 2016, this recommendation was revised to allow a 2-dose schedule (with an interval of at least 5 months between doses) if the vaccination series is initiated before the 15th birthday.[5] In 2019, recommendations for catch-up HPV vaccination were harmonized across genders through age 26 years.[6]

HPV vaccination coverage among adolescents has been reported previously.[7,8] The purpose of this study is to assess trends in recent HPV vaccination coverage and factors associated with vaccination among adolescents aged 13 to 17 years using data from the 2015 to 2020 National Immunization Survey–Teen (NIS–Teen). We could not provide HPV vaccination coverage on a wider age range since NIS-Teen is designed to assess vaccination coverage among adolescents aged 13 to 17 years.

METHODS

NIS–Teen is a national, random–digit–dial (RDD) telephone survey conducted by the Centers for Disease Control and Prevention (CDC). Survey data are collected in 2 phases. In the first phase, an RDD telephone interview is conducted to identify households with age–eligible adolescents (aged 13 to 17 years at the time of interview) and to collect demographic information from the parent or guardian on adolescent, maternal, and household characteristics. The interview also includes questions about the adolescent's reported vaccination history. After completing the interview, parents or guardians are asked for consent to contact the adolescent's vaccination provider(s). If consent is obtained, the adolescent's vaccination providers are mailed a questionnaire to collect provider–reported vaccination histories for each recommended adolescent vaccine and selected childhood vaccines. The provider reported histories are used for determining vaccination coverage estimates.[7–10] Beginning in 2018, the NIS–Teen used a single-frame sample of cell phone numbers. The landline telephone sample frame that was used from 2006 through 2017 was discontinued because of the declining number of landline-only households in the United States.[11]

NIS-Teen data from 2015 through 2020 were used to assess HPV vaccination coverage by year based on provider report. SUDAAN 11.0.1 was used to calculate point estimates and 95% confidence intervals (CIs). All analyses account for the complex sampling design

of the NIS–Teen.[9,10] *T*–tests were used to conduct trend analysis and comparison tests with the significance level set at *P* < .05. Multivariable logistic regression and predictive marginal modeling were conducted to derive the adjusted vaccination coverage estimates and adjusted prevalence ratios using the 2020 NIS–Teen. The NIS–Teen was approved by the CDC, National Center for Health Statistics Research Ethics Review Board and the National Opinion Research Center at the University of Chicago Institutional Review Board.

RESULTS

The Council of American Survey Research Organizations (CASRO) response rate for the 2020 NIS–Teen was 20.7%, and 45.2% of adolescents with completed interviews had adequate provider data. Sample characteristics of the study population by demographic and access-to-care characteristics are shown in Table 1. During 2015 through 2020, the prevalence of receiving a provider recommendation for HPV vaccine among adolescents aged 13 to 17 years increased from 68.4% in 2015 to 81.5% in 2020. During 2015 through 2020, the prevalence of having a well-child visit at age 11 to 12 years ranged from 46.3% to 50.4%, and the proportion of adolescents living in non-metropolitan statistical area (MSA) areas ranged from 10.7% to 13.0% among adolescents aged 13 to 17 years (Table 1).

Overall, HPV vaccination coverage (1 dose) among adolescents aged 13 to 17 years significantly increased from 56.1% in 2015 to 75.4% in 2020, with a total increase of 19.1 percentage points and an average increase of 3.8 percentage points annually (Table 2). HPV vaccination series completion coverage among adolescents aged 13 to 17 years significantly increased from 40.3% in 2015 to 59.3% in 2020, with a total increase of 18.4 percentage points and an average increase of 3.6 percentage points annually. From 2015 through 2020, HPV vaccination coverage among adolescents significantly increased across almost all levels of demographic and access-to-care characteristics (Table 2).

Vaccination coverage among adolescents aged 16 to 17 years (range:58.8% in 2015 to 78.1% in 2020) was significantly higher than those aged 13 to 15 years in all survey years assessed (*P* < .05) except 2019 (*P* > .05) (range:54.4% in 2015 to 73.4% in 2020) (*P* < .05) (Table 2). Vaccination coverage among female adolescents (range:62.8% in 2015 to 76.8% in 2020) was significantly higher than male adolescents in all survey years assessed (range:49.8% in 2015 to 73.7% in 2020) (*P* < .05) (Table 2, Fig 1). Overall, HPV vaccination coverage (1 dose) among male adolescents aged 13 to 17 years significantly increased from 2015 to 2020, with a total increase of 24.0 percentage points and an average increase of 4.7 percentage points annually (Table 2, Fig 1). Overall, HPV vaccination coverage (1 dose) among female adolescents aged 13 to 17 years significantly increased from 2015 to 2020, with a total increase of 14.0 percentage points and an average increase of 2.7 percentage points annually (Table 2, Fig). Coverage increased faster among males than females and difference between males and females narrowed during this time. Vaccination coverage among non-Hispanic Black (range: 60.1% in 2015 to 78.3% in 2020) and Hispanic adolescents (range: 63.6% in 2015 to 80.7% in 2020) was significantly higher than non-Hispanic White adolescents in all years assessed (*P* < .05) except 2019, where coverage among non-Hispanic Black adolescents was not higher than coverage among non-Hispanic White adolescents (*P* > .05) (range: 51.4% in 2015 to 71.4% in 2020) (*P* < .05) (Table 2).

HPV vaccination coverage among adolescents aged 13 to 17 years with a reported provider recommendation significantly increased from 69.3% in 2015 to 80.7% in 2020 (test for trend, $P<$), and vaccination coverage of adolescents with a provider recommendation was consistently and significantly higher than those without a provider recommendation in all years assessed (range: 30.7% in 2015 to 51.7% in 2020) ($P<.05$) (Table 2). HPV vaccination coverage among male adolescents aged 13 to 17 years with a provider recommendation significantly increased from 67.5% in 2015 to 79.7% in 2020 (test for trend, $P<.05$), and vaccination coverage of male adolescents with a provider recommendation was consistently and significantly higher than those without a provider recommendation in all years assessed (range: 25.4% in 2015 to 52.4% in 2019) ($P<.05$) (Fig 1). HPV vaccination coverage among female adolescents aged 13 to 17 years with a provider recommendation significantly increased from 70.8% in 2015 to 81.8% in 2020 (test for trend, $P<.05$), and vaccination coverage of female adolescents with a provider recommendation was consistently and significantly higher than those without a provider recommendation in all years assessed (range: 39.8% in 2016 to 53.5% in 2020) ($P<.05$) (Fig 1). HPV vaccination coverage among adolescents aged 13 to 17 years with a well–child visit at age 11 to 12 years significantly increased from 61.6% in 2015 to 80.3% in 2020 (test for trend, $P<.05$), and vaccination coverage of adolescents with a well–child visit at age 11 to 12 years was consistently and significantly higher than those without a well–child visit at age 11 to 12 years over all years assessed (range: 47.1% in 2015 to 64.8% in 2020) ($P<.05$) (Table 2). Vaccination coverage among adolescents with 1 or more provider contacts within the past year was significantly higher than those without a provider contact within the past year in all years assessed ($P<.05$).

Additionally, vaccination coverage among adolescents with a mother who had equal to or more than a high school education was significantly lower than those with less than high school education in all years assessed ($P<.05$) (Table 2). Coverage among adolescents living in non-MSA areas was significantly lower than those living in MSA principal cities in all years assessed ($P<.05$) (Table 2).

In multivariable analyses of 2020 data, characteristics independently associated with a higher likelihood of HPV vaccination included: receiving a provider recommendation, being age 16 to 17 years, being of non-Hispanic Black, Hispanic, or American Indian or Alaskan Native (AIAN) adolescents (reference: non-Hispanic White adolescents), having a mother who is widowed, divorced, or separated (reference: married), having Medicaid insurance (reference: private insurance), having 2 provider contacts in the past 12 months (reference: without a provider contact), having a well–child visit at age 11 to 12 years (reference: without a well–child visit), and having 1 or 2 vaccination providers (reference: 3 vaccination provider) ($P<.05$). Participants having a mother with high school, some college or college graduate (reference: <high school), those with an income to poverty ratio between 133% and 503% (reference: <133%) and those living in non-MSA – more rural MSAs (reference: MSA principal city) had a lower likelihood of HPV vaccination ($P<.05$) (Table 3).

DISCUSSION

Overall, HPV vaccination coverage among adolescents increased from 2015 to 2020. Vaccination coverage (1 dose) significantly increased across almost all levels of variables assessed. There were larger increases among males than females and difference between males and females narrowed during this time. Vaccination coverage significantly differed over the years assessed by age group, race and ethnicity, provider recommendation, well-child visit, number of provider visits within previous 12 months, and other characteristics. Even though coverage substantially increased over the years, ~25% of adolescents had not received at least 1 dose of HPV vaccination in 2020. Targeted strategies are needed to increase coverage and narrow down inequalities.

Overall, HPV vaccination coverage (1 dose) among adolescents 13 to 17 years in 2020 was 76.8% among females, and 73.7% among males. Historically, coverage in female adolescents increased from 25.1% in 2007 to 62.8% in 2015 (about 8 years since vaccination was initially recommended).[12–14] Likewise, among males, HPV vaccination coverage has also substantially increased since the vaccine was first recommended for males in 2011.[15] Coverage among males increased from 20.9% in 2012 to 73.7% in 2020 (about 9 years since vaccination was first recommended for male adolescents).[16] Data from our study found that coverage in adolescents during 2015 through 2020 significantly increased a total of 24.0 percentage points for males and 14.0 percentage points for females, with an average increase of 4.7 percentage points annually for males and 2.7 percentage points annually for females. During this time, the difference between coverage among males and females decreased from 13 to 3 percentage points. Coverage among adolescents substantially increased in recent years is encouraging, especially among males.

Studies consistently have found that a provider recommendation is highly associated with HPV vaccination.[17–19] Results from our study confirmed this association. One study showed that the prevalence of providers strongly recommending HPV vaccination substantially increased over the years for female and male children.[20] However, based on data from the 2020 NIS-Teen, even among those who reported a provider recommendation for the vaccine, only 80.7% received vaccination, indicating that other factors might also contribute to adolescents not being vaccinated. The result from our study also showed that the prevalence of receiving a provider recommendation among adolescents substantially increased during 2015 to 2020. One study found coverage in female adolescents (1 dose) was 58.3% in 2008 to 2009 among adolescents with a provider recommendation compared with those without (20.7%).[21] Another study among male adolescents showed that "a provider recommendation was associated with higher HPV vaccination coverage across the majority of states."[18] Studies also showed that "recommendations from providers increase parental acceptance of HPV vaccination and that parents change their minds about delaying and refusing vaccines because of information or assurances from health care providers."[22,23] However, our study showed that 18.5% of parents of adolescents did not receive a provider recommendation. Providers should routinely recommend the vaccine and highlight importance of vaccination in preventing HPV-related cancers.

The results from our study demonstrated that provider contacts and a well–child visit had a positive impact on vaccination coverage. Persons with more provider contacts may have more chance to consult with providers regarding their immunization situation, get a recommendation, and receive vaccination. The ACIP and partner organizations recommend a well–child visit to vaccinate teens who have not initiated vaccinations; administer a booster dose if needed; and provide other recommended preventive services.[24,25] Even though the well–child visit provides a chance to discuss vaccination status and receive recommended vaccinations, only 46.3% to 50.4% of children had a well–child visit at age 11 to 12 years based on the 2015 to 2020 NIS–Teen. Providers should educate parents and adolescents about the diseases that can be prevented by vaccines, review medical records, and administer all age-appropriate vaccinations at all health care visits.[26]

Findings from our study indicated that coverage for adolescents residing in non-MSA areas was consistently and significantly lower than those residing in MSA principal cities in all years assessed, and this association remained after controlling for other variables. The inequity in coverage by MSA is not clear; however, the lower provider recommendation rate and less vaccination-related information available in non-MSA areas might contribute to coverage disparity.[8,27,28]

HPV vaccination coverage among adolescents was higher for non-Hispanic Black, Hispanic, and AIAN adolescents compared with non-Hispanic White adolescents. Increased vaccine access by the Vaccine for Children program (providing free recommended vaccines to children without health insurance and children who are under-insured) or risk-based provider recommendations for HPV on the perceived level of the patient's risk for HPV-related cancer morbidity and mortality might contribute to the increased HPV vaccination coverage in these minority groups.[29–31]

Findings from our study indicated that mothers with higher education were associated with decreased HPV vaccination coverage, which is similar to the findings from the previous reports.[18,27] Another study also found that intent to have their child vaccinated was lower among mothers with higher education.[31] Further research should be conducted to understand why teens whose mothers with a higher education had lower HPV vaccination coverage.

The findings in this study are subject to 2 limitations. First, the overall household response rate in 2020 was 20.7%, and 45.2% of adolescents with completed interviews had adequate provider data. However, the estimated total survey error of HPV vaccination coverage from the 2018 NIS–Teen is −1.6 percentage points, indicating HPV vaccination coverage based on NIS–Teen was only ~1.6 percentage points too low.[9] Additionally, the distribution of characteristics (eg, age, gender, and race and ethnicity) from the 2020 NIS–Teen were close to those observed in the child core data of the 2020 National Health Interview Survey (CDC unpublished data). Second, bias in estimates might remain even after adjustment for household and provider nonresponse and phoneless households.

In conclusion, HPV vaccination coverage among adolescents aged 13 to 17 years increased during 2015 to 2020. Vaccination coverage significantly differed over the years when assessed by provider recommendation, well-child visit at age 11 to 12 years, number

of provider contacts in the past 12 months, age group, race and ethnicity, and other characteristics. Targeted strategies should be implemented to providers who serve different communities, particularly those who serve non-Hispanic White children. The association between mother's education and HPV vaccination coverage indicated that interventions should consider maternal education attainment, and further research should be conducted to understand why teens whose mothers with a higher education had lower HPV vaccination coverage. It is encouraging that coverage among male adolescents substantially increased in recent years. To increase HPV vaccination coverage and further reduce HPV-related morbidity and mortality, providers, parents, and adolescents should use every health care visit as a chance to review vaccination histories and ensure that every adolescent receives the HPV vaccine and other needed vaccines.[32–36]

ACKNOWLEDGMENTS

ABBREVIATIONS

HPV	human papillomavirus
ACIP	Advisory Committee on Immunization Practices
PR	prevalence ratio
95% CI	95% confidence interval
RDD	random-digit–dial
CDC	Centers for Disease Control and Prevention
STD	sexual transmitted diseases
WIC	Women, Infants, and Children
MSA	metropolitan statistical area
NIS-Teen	National Immunization Survey-Teen
VFC	Vaccines for Children
CASRO	The Council of American Survey Research Organizations
NORC	National Opinion Research Center

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WHAT'S KNOWN ON THIS SUBJECT

Human Papillomavirus (HPV) is the most common sexually transmitted infection. Vaccination is an important tool to prevent and control HPV infection and its complications. HPV vaccination in the United States has been recommended for girls since 2006 and for boys since 2011.

WHAT THIS STUDY ADDS

This study examines HPV vaccination trends. HPV vaccination coverage among adolescents increased during 2015 to 2020. Coverage increased faster among males than females and differences by sex narrowed. Receiving provider recommendation is important to increase vaccination coverage.
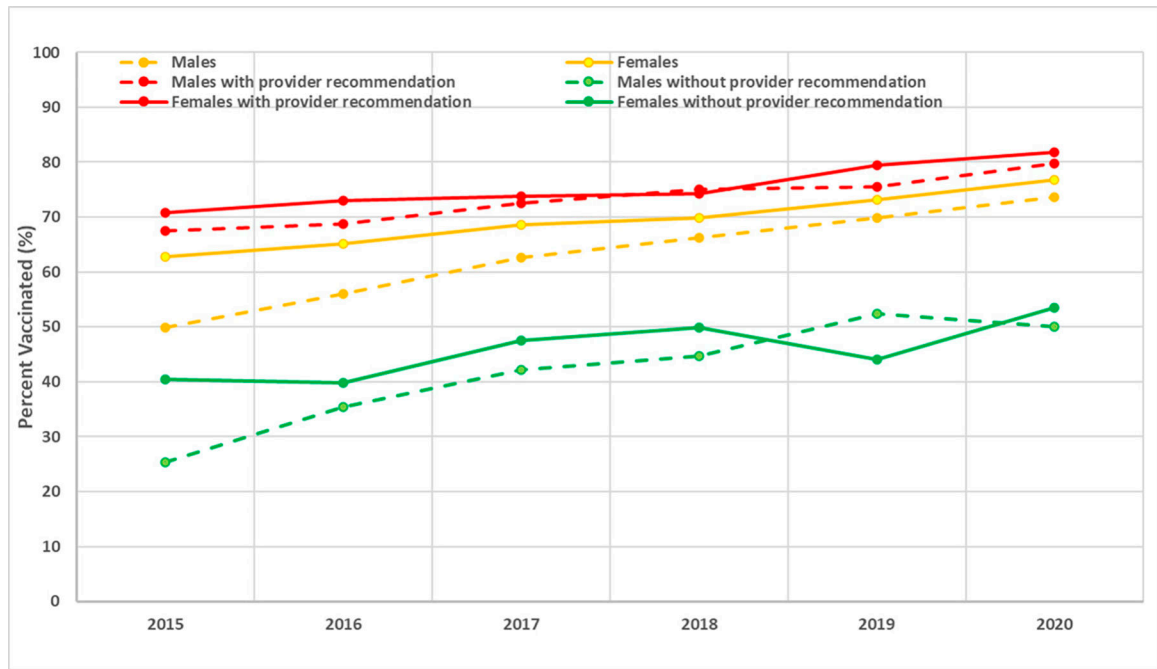
FIGURE 1.
HPV vaccination coverage (1 dose) among adolescents 13 to 17 years, United States, 2015 to 2020. Source: national immunization survey teen, 2015 to 2020. Males, females, males with provider recommendation, males without provider recommendation, females with provider recommendation, and females without provider recommendation.

TABLE 1

Sample Characteristics of Adolescents Aged 13 to 17 Years in the United States, by Demographic and Access-to-Care Variables, NIS-Teen, 2015 to 2020

Subgroup and Age Group, y	Survey Year											
	2015		2016		2017		2018		2019		2020	
	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %
Total	21 875	100	20 475	100	20 949	100	18 700	100	18 788	100	17 970	100
Parental report of provider recommendation for HPV vaccine												
Yes	13 964	68.4 (67.1–69.6)	13 733	71.4 (70.2–72.7)	14906	75.3 (74.1–76.5)	13 559	77.5 (76.4–78.7)	14054	79.6 (78.2–80.9)	13 786	81.5 (80.4–82.7)
No	5935	31.6 (30.4–32.9)	4908	28.6 (27.3–29.8)	4294	24.7 (23.5–25.9)	3693	22.5 (21.3–23.6)	3280	20.4 (19.1–21.8)	2747	18.5 (17.3–19.6)
Age, y												
13–15	13 488	60.7 (59.4–61.9)	12 578	60.5 (59.2–61.7)	12 924	60.7 (59.5–62.0)	11 468	60.5 (59.2–61.8)	11 687	61.2 (59.6–62.6)	11 071	60.6 (59.2–61.9)
16–17	8387	39.3 (38.1–40.6)	7897	39.5 (38.3–40.8)	8025	39.3 (38.0–40.5)	7232	39.5 (38.2–40.8)	7101	38.8 (37.4–40.4)	6899	39.4 (38.1–40.8)
Sex												
Male	11 367	51.1 (49.8–52.4)	10814	51.1 (49.8–52.3)	11 104	51.0 (49.7–52.3)	9772	51.0 (49.7–52.4)	9872	51.0 (49.5–52.6)	9445	51.5 (50.1–52.9)
Female	10 508	48.9 (47.6–50.2)	9661	48.9 (47.7–50.2)	9845	49.0 (47.7–50.3)	8928	49.0 (47.6–50.3)	8916	49.0 (47.4–50.5)	8525	48.5 (47.1–49.9)
Race or ethnicity												
Non-Hispanic White	12 835	53.5 (52.3–54.8)	12 883	52.7 (51.5–54.0)	13010	52.3 (51.1–53.6)	11 128	51.9 (50.6–53.2)	11 883	52.0 (50.5–53.5)	11 348	50.7 (49.4–52.0)
Non-Hispanic Black	2228	14.0 (13.2–14.9)	1990	13.7 (12.9–14.6)	1743	13.8 (12.9–14.8)	1488	13.7 (12.7–14.7)	1367	13.7 (12.6–14.8)	1614	14.2 (13.2–15.2)
Hispanic	4610	22.8 (21.6–24.0)	3223	23.2 (22.0–24.5)	3882	23.7 (22.4–24.9)	4021	24.2 (23.0–25.4)	3466	24.7 (23.2–26.3)	3007	23.6 (22.3–25.0)
American Indian or Alaskan Native	290	0.8 (0.7–1.0)	300	1.0 (0.8–1.2)	257	0.8 (0.6–1.1)	247	0.7 (0.6–0.9)	237	0.8 (0.6–1.0)	195	0.7 (0.6–1.0)
Asian	751	4.0 (3.5–4.6)	862	4.2 (37–4.8)	818	4.4 (3.8–5.0)	601	4.0 (3.4–47)	607	3.6 (3.1–4.2)	689	4.8 (41–5.5)
Other	1161	4.8 (4.3–5.3)	1217	5.1 (4.6–57)	1239	5.0 (4.6–5.5)	1215	5.5 (5.0–6.2)	1228	5.3 (47–5.9)	1117	6.0 (5.4–6.7)
Mother's educational level												
<High school	2955	13.5 (12.5–14.5)	2205	13.4 (12.4–14.4)	2565	13.2 (12.3–14.1)	2368	12.3 (11.4–13.1)	1780	11.5 (10.6–12.5)	1516	12.3 (11.2–13.5)

Subgroup and Age Group, y	2015 Sample	2015 Weighted %	2016 Sample	2016 Weighted %	2017 Sample	2017 Weighted %	2018 Sample	2018 Weighted %	2019 Sample	2019 Weighted %	2020 Sample	2020 Weighted %
High school	3626	22.9 (21.7–24.1)	3253	22.4 (21.3–23.6)	3141	22.1 (21.0–23.3)	2929	21.9 (20.7–23.2)	2679	21.8 (20.4–23.3)	2700	20.9 (19.8–22.1)
Some college or college graduate	5776	25.8 (24.7–26.9)	5369	25.0 (23.9–26.1)	5166	23.8 (22.7–24.9)	4721	24.2 (23.1–25.3)	4918	23.6 (22.3–24.9)	4570	24.3 (23.1–25.5)
>College graduate	9518	37.9 (36.7–39.1)	9648	39.2 (38.0–40.4)	10 077	40.9 (39.7–42.1)	8682	41.7 (40.4–43.0)	9411	43.1 (41.6–44.6)	9184	42.5 (41.2–43.8)
Mother's married status												
Married or living with partner	16 403	69.3 (68.1–70.5)	15 544	69.3 (68.1–70.5)	16 000	70.4 (69.2–71.7)	14 095	70.0 (68.7–71.2)	14 327	70.2 (68.6–71.7)	13 528	70.3 (69.0–71.5)
Widowed, divorced, or separated	3778	22.4 (21.3–23.5)	3448	22.0 (20.9–23.1)	3503	21.2 (20.1–22.3)	3257	21.1 (20.1–22.3)	3155	20.9 (19.6–22.4)	3058	20.6 (19.5–21.7)
Never married	1475	8.3 (7.7–9.0)	1301	8.7 (8.0–9.5)	1240	8.4 (77–9.2)	1182	8.9 (8.1–9.8)	1139	8.9 (8.0–9.9)	1233	9.2 (8.4–10.0)
Mother's age, y												
34	1866	9.0 (8.3–9.8)	1686	8.9 (8.2–97)	1599	8.4 (77–9.2)	1407	7.9 (7.2–87)	1286	7.7 (6.9–86)	1187	7.3 (6.6–8.1)
35–44	9241	44.2 (42.9–45.5)	8310	44.1 (42.8–45.4)	8447	42.8 (41.5–44.1)	7955	43.4 (42.1–44.7)	8097	44.7 (43.2–46.2)	7623	43.6 (42.2–44.9)
45	10 768	46.8 (45.5–48.0)	10 479	47.0 (45.7–48.3)	10 903	48.8 (47.6–50.1)	9338	48.7 (47.3–50.0)	9405	47.6 (46.1–49.1)	9160	49.2 (47.8–50.5)
Place of birth												
Born in United States	20 825	95.1 (94.5–95.6)	19 403	93.9 (93.2–94.6)	19 723	93.1 (92.3–93.9)	17 605	93.8 (93.1–94.5)	17 932	95.0 (94.3–95.7)	17 111	94.9 (94.1–95.6)
Born outside United States	891	4.9 (4.4–5.5)	948	6.1 (5.4–68)	1097	6.9 (6.1–77)	975	6.2 (5.5–6.9)	740	5.0 (4.3–57)	732	5.1 (44–5.9)
Income to poverty ratio												
<133%	6307	33.1 (31.8–34.4)	5103	31.7 (30.5–33.0)	5277	31.3 (30.1–32.5)	4860	29.1 (27.9–30.4)	4073	27.3 (25.9–28.8)	3741	27.2 (25.9–28.5)
133% to <322%	5987	28.3 (27.2–29.5)	5787	28.8 (27.6–30.0)	5469	27.1 (25.9–28.2)	4976	27.2 (26.0–28.5)	5100	28.1 (26.7–29.6)	4846	28.9 (27.6–30.2)
322% to <503%	4851	19.7 (18.8–20.7)	4121	17.6 (16.8–18.6)	4160	17.2 (16.3–18.1)	3614	18.3 (17.4–19.3)	3899	17.4 (16.4–18.4)	3836	18.4 (17.4–19.3)
503%	4730	18.9 (18.0–19.8)	5464	21.8 (20.8–22.8)	6043	24.4 (23.4–25.5)	5250	25.3 (24.2–26.5)	5716	27.2 (25.9–28.5)	5547	25.6 (24.5–26.7)

Survey Year

		Survey Year										
Subgroup and Age Group, y	**2015**		**2016**		**2017**		**2018**		**2019**		**2020**	
	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %
Medical insurance[a]												
Private only	12157	51.4 (50.1–52.7)	11889	51.2 (49.9–52.5)	11919	50.5 (49.2–51.8)	10315	52.1 (50.8–53.5)	11183	54.3 (52.8–55.9)	10764	53.5 (52.1–54.9)
Any Medicaid	7010	36.5 (35.2–37.8)	6203	37.2 (35.9–38.5)	6504	37.5 (36.3–38.8)	5999	35.8 (34.5–37.2)	5366	34.5 (33.0–36.0)	5259	35.4 (34.0–36.8)
Other[b]	1800	7.7 (7.0–8.4)	1679	7.6 (7.0–8.2)	1708	7.6 (7.0–8.2)	1605	7.5 (6.9–8.1)	1545	7.1 (6.4–7.8)	1343	6.8 (6.2–7.5)
Uninsured	908	4.4 (3.9–5.0)	702	4.1 (3.5–4.7)	818	4.4 (3.9–4.9)	781	4.5 (4.0–5.1)	694	4.1 (3.6–4.7)	604	4.3 (3.7–5.0)
Provider contacts within past year												
None	2932	14.9 (14.0–15.9)	2608	14.9 (13.9–16.0)	2816	15.8 (14.8–16.8)	2402	14.6 (13.6–15.6)	2252	14.1 (13.0–15.3)	2433	16.7 (15.6–17.8)
1	6119	30.0 (28.8–31.3)	5884	30.4 (29.2–31.6)	5798	29.7 (28.5–30.9)	5303	29.8 (28.5–31.1)	5281	29.9 (28.6–31.4)	5499	32.4 (31.1–33.7)
2–3	7929	35.2 (34.0–36.4)	7385	35.3 (34.1–36.5)	7600	35.1 (33.9–36.3)	6724	35.8 (34.5–37.1)	6978	36.3 (34.9–37.8)	6443	34.1 (32.8–35.3)
4	4681	19.9 (18.9–20.9)	4392	19.4 (18.5–20.4)	4524	19.5 (18.5–20.4)	4085	19.9 (18.9–20.9)	4123	19.6 (18.5–20.8)	3447	16.9 (15.9–17.9)
Well child visit at age 11–12 y[c]												
Yes	10472	47.1 (45.8–48.4)	9898	46.3 (45.1–47.6)	10325	47.6 (46.3–48.9)	9260	48.5 (47.2–49.9)	9948	50.4 (48.9–51.9)	9016	49.9 (48.5–51.3)
No	5341	22.8 (21.8–23.8)	4785	22.7 (21.7–23.8)	4733	21.6 (20.6–22.7)	4139	20.5 (19.5–21.6)	4053	21.1 (19.9–22.4)	3171	17.6 (16.6–18.7)
Don't know	6062	30.2 (29.0–31.4)	5792	30.9 (29.7–32.2)	5891	30.8 (29.6–32.0)	5301	30.9 (29.7–32.3)	4787	28.5 (27.0–29.9)	5783	32.5 (31.2–33.8)
Number of providers												
1	12138	58.2 (56.9–59.5)	11760	59.2 (57.9–60.5)	12216	60.5 (59.2–61.7)	10721	60.5 (59.2–61.8)	10497	58.7 (57.2–60.2)	10867	62.1 (60.7–63.4)
2	6150	26.3 (25.2–27.5)	5578	26.2 (25.1–27.3)	5617	26.6 (25.4–27.8)	5098	26.4 (25.3–27.5)	5147	26.9 (25.5–28.3)	4777	26.0 (24.8–27.2)
3	3539	15.5 (14.6–16.4)	3061	14.6 (13.7–15.6)	3050	12.9 (12.1–13.8)	2817	13.1 (12.3–14.0)	3078	14.4 (13.5–15.4)	2277	12.0 (11.1–12.9)
MSA												
MSA principal city	9105	39.8 (38.6–41.0)	7979	40.1 (38.9–41.4)	8544	41.2 (40.0–42.5)	7564	42.4 (41.1–43.7)	7354	40.0 (38.5–41.5)	6927	40.6 (39.2–41.9)

Subgroup and Age Group, y	Survey Year											
	2015		2016		2017		2018		2019		2020	
	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %	Sample	Weighted %
MSA non-principal city	8459	47.4 (46.1–48.6)	8248	46.9 (45.6–48.1)	8282	46.9 (45.7–48.2)	7543	46.9 (45.6–48.2)	7745	49.3 (47.8–50.8)	7720	48.7 (47.4–50.1)
Non-MSA	4311	12.8 (12.2–13.5)	4248	13.0 (12.4–13.6)	4123	11.8 (11.2–12.4)	3593	10.7 (10.2–11.3)	3689	10.7 (10.0–11.3)	3323	10.7 (10.1–11.3)
Region												
Northeast	4049	16.6 (16.2–17.1)	4049	16.5 (16.0–16.9)	3975	16.4 (15.9–16.8)	3437	16.2 (15.6–16.8)	3597	16.0 (15.4–16.6)	4020	17.5 (17.0–18.1)
Midwest	4666	21.6 (21.0–22.1)	4313	21.4 (20.9–22.0)	4485	21.3 (20.9–21.8)	4094	21.2 (20.7–21.8)	3985	21.2 (20.5–21.8)	4508	23.4 (22.8–24.1)
South	8355	38.0 (37.3–38.8)	7620	38.3 (37.5–39.0)	8032	38.4 (37.6–39.2)	7184	38.6 (37.8–39.4)	7057	38.8 (37.8–39.8)	7189	43.2 (42.3–44.2)
West	4805	23.8 (22.9–24.7)	4493	23.8 (23.0–24.7)	4457	23.9 (23.0–24.8)	3985	24.0 (23.0–25.0)	4149	24.1 (22.8–25.4)	2253	15.8 (14.9–16.8)
Facility type												
All private facilities	10 891	54.7 (53.5–56.0)	10146	53.0 (51.7–54.3)	10 337	52.5 (51.3–53.8)	9038	52.8 (51.5–54.2)	9257	53.4 (51.8–54.9)	8840	54.3 (53.0–55.7)
All public facilities	3157	13.6 (12.8–14.5)	2925	14.5 (13.6–15.5)	3123	16.3 (15.3–17.3)	2724	15.2 (14.1–16.2)	2616	15.2 (14.0–16.5)	2392	13.7 (12.7–14.7)
All hospital facilities	2311	9.1 18.5–9.8)	2426	10.1 (9.4–10.9)	2485	9.9 (9.2–10.6)	2267	10.2 (9.5–10.9)	2469	10.9 (10.0–11.8)	2742	12.4 (11.6–13.2)
All sexually transmitted diseases, school, and teen clinics or other facilities	331	1.6 (1.3–2.0)	328	2.0 (1.6–2.5)	377	2.3 (1.8–2.8)	302	1.8 (1.5–2.2)	278	1.8 (1.3–2.4)	260	1.5 (1.2–1.9)
Mixed[d]	4753	19.7 (18.7–20.7)	4209	19.0 (18.1–20.0)	4173	17.8 (16.9–18.8)	3974	18.8 (17.8–19.8)	3762	17.6 (16.5–18.8)	3410	17.1 (16.1–18.1)
Other[e]	301	1.2 (1.0–1.5)	289	1.3 (1.1–1.6)	310	1.2 (1.0–1.4)	262	1.2 (1.0–1.5)	274	1.1 (0.9–1.4)	213	1.0 (0.8–1.3)

[a] Insurance categories are mutually exclusive.

[b] Indian Health Service, Children's Health Insurance Program, military, and some private.

[c] Status of health-care visit at age 11 to 12 y based on provider reported data.

[d] Mixed indicates that the facility is identified to be in more than 1 of the facility categories such as private, public, hospital, sexually transmitted diseases, school, or teen clinics.

[e] Includes military, WIC clinics, and pharmacies.

TABLE 2

HPV Vaccination Coverage (≥1 Dose) of Adolescents Aged 13–17 Years in the United States, by Demographic, and Access-to-Care Variables, NIS–Teen, 2015 to 2020

Subgroup and Age Group, y	2015 % (95% CI)	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)	2019 % (95% CI)	2020 % (95% CI)	Total Change %	Average Annual Change %
Total	56.1 (54.9 to 57.4)	60.4 (59.2 to 61.6)[a]	65.5 (64.3 to 66.7)[a]	68.1 (66.8 to 69.3)[a]	71.5 (70.1 to 72.8)[a]	75.4 (74.2 to 76.6)[a]	19.1 (17.4 to 20.8)[b]	3.8 (3.4 to 4.1)[b]
Parental report of provider recommendation for HPV vaccine								
Yes	69.3 (67.8 to 70.8)[d]	71.1 (69.7 to 72.4)[d]	73.2 (71.8 to 74.5)[a,d]	74.7 (73.3 to 76.0)[d]	77.5 (76.0 to 79.0)[a,d]	80.7 (79.6 to 81.9)[a,d]	11.4 (9.5 to 13.3)[b]	2.2 (1.9 to 2.6)[b]
No[c]	30.7 (28.5 to 33.0)	37.1 (34.5 to 39.8)[a]	44.1 (41.1 to 47.1)[a]	46.7 (43.8 to 49.6)	49.1 (45.6 to 52.7)	51.7 (48.2 to 55.3)	21.0 (16.8 to 25.2)[b]	4.3 (3.5 to 5.1)[b]
Age, y								
13 to 15[c]	54.4 (52.7 to 56.1)	58.3 (56.7 to 59.9)[a]	64.1 (62.6 to 65.7)[a]	66.4 (64.8 to 68.0)[a]	71.0 (69.4 to 72.7)[a]	73.4 (71.8 to 74.9)[a]	19.0 (16.7 to 21.2)[b]	3.9 (3.5 to 4.3)[b]
16–17	58.8 (56.8 to 60.7)[d]	63.6 (61.7 to 65.4)[a,d]	67.7 (65.8 to 69.5)[a,d]	70.7 (68.7 to 72.5)[a,d]	72.1 (69.8 to 74.3)	78.1 (76.4 to 79.8)[a,d]	19.3 (16.7 to 21.9)[b]	3.6 (3.1 to 4.1)[b]
Sex								
Male[c]	49.8 (48.0 to 51.6)	56.0 (54.3 to 57.7)[a]	62.6 (60.9 to 64.2)[a]	66.3 (64.6 to 68.0)[a]	69.8 (67.9 to 71.7)[a]	73.7 (72.1 to 75.4)[a]	24.0 (21.5 to 26.4)[b]	4.7 (4.3 to 5.2)[b]
Female	62.8 (61.0 to 64.5)[d]	65.1 (63.3 to 66.8)[d]	68.6 (66.9 to 70.2)[a,d]	69.9 (68.1 to 71.6)[d]	73.2 (71.3 to 75.0)[a,d]	76.8 (75.2 to 78.4)[a,d]	14.0 (11.6 to 16.4)[b]	2.7 (2.3 to 3.2)[b]
Race or ethnicity								
Non-Hispanic White[c]	51.4 (49.9 to 52.9)	54.7 (53.2 to 56.1)[a]	60.0 (58.6 to 61.5)[a]	63.5 (62.0 to 65.1)[a]	68.3 (66.8 to 69.9)[a]	71.4 (69.9 to 72.8)[a]	19.9 (17.9 to 22.0)[b]	4.1 (3.8 to 4.5)[b]
Non-Hispanic Black	60.1 (56.7 to 63.4)[d]	65.9 (62.5 to 69.1)[a,d]	70.0 (66.4 to 73.3)[d]	72.8 (69.3 to 76.1)[d]	72.0 (67.8 to 75.9)	78.3 (75.0 to 81.5)[a,d]	18.2 (13.5 to 22.9)[b]	3.2 (2.3 to 4.1)[b]
Hispanic	63.6 (60.1 to 67.0)[d]	69.8 (66.6 to 72.7)[a,d]	74.5 (71.7 to 77.1)[a,d]	75.5 (72.7 to 78.2)[d]	76.8 (73.3 to 79.9)[d]	80.7 (77.9 to 83.5)[d]	17.1 (12.6 to 21.5)[b]	3.1 (2.2 to 3.9)[b]
American Indian or Alaskan Native	64.2 (55.0 to 72.5)[d]	62.3 (52.5 to 71.3)	60.2 (45.5 to 73.2)	70.1 (59.6 to 78.9)	71.1 (58.2 to 81.3)	85.6 (79.3 to 91.9)[a,d]	21.4 (10.5 to 32.2)[b]	3.9 (1.2 to 6.7)[b]

Survey Year

Subgroup and Age Group, y	2015 % (95% CI)	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)	2019 % (95% CI)	2020 % (95% CI)	Total Change %	Average Annual Change %
Asian	56.6 (49.7 to 63.2)	62.5 (55.7 to 68.9)[d]	70.4 (64.5 to 75.7)[d]	65.3 (56.5 to 73.2)	74.8 (68.1 to 80.5)	75.8 (70.0 to 81.6)	19.2 (10.3 to 28.1)[b]	3.6 (1.9 to 5.3)[b]
Other	60.2 (55.0 to 65.3)[d]	60.6 (55.2 to 65.7)[d]	64.9 (60.3 to 69.2)[d]	68.0 (63.0 to 72.6)	73.8 (68.7 to 78.4)[d]	77.6 (72.8 to 82.5)[d]	17.4 (10.3 to 24.5)[b]	3.7 (2.4 to 5.1)[b]
Mother's educational level								
<High school[c]	69.0 (65.3 to 72.6)	71.9 (68.0 to 75.5)	74.6 (71.2 to 77.7)	77.6 (74.6 to 80.3)	78.0 (73.6 to 81.9)	84.2 (80.7 to 87.8)[a]	15.2 (10.1 to 20.3)[b]	2.8 (1.8 to 3.8)[b]
High school	54.8 (51.8 to 57.8)[d]	62.2 (59.5 to 64.8)[a,d]	66.4 (63.6 to 69.0)[a,d]	67.9 (64.8 to 70.8)[d]	71.3 (67.8 to 74.5)[d]	73.1 (70.3 to 76.0)[d]	18.4 (14.2 to 22.5)[b]	3.5 (2.7 to 4.3)[b]
Some college or college graduate	52.2 (49.7 to 54.6)[d]	56.2 (53.7 to 58.6)[a,d]	63.0 (60.5 to 65.4)[a,d]	65.1 (62.7 to 67.4)[d]	68.7 (65.9 to 71.4)[d]	71.8 (69.4 to 74.2)[d]	19.6 (16.2 to 23.1)[b]	4.0 (3.3 to 4.6)[b]
>College graduate	55.1 (53.3 to 56.8)[d]	58.2 (56.4 to 59.9)[a,d]	63.6 (61.9 to 65.4)[a,d]	67.1 (65.2 to 69.0)[a,d]	71.3 (69.5 to 73.1)[a,d]	75.6 (74.1 to 77.2)[a,d]	20.6 (18.2 to 22.9)[b]	4.2 (3.7 to 4.6)[b]
Mother's married status								
Married or living with partner[c]	54.6 (53.1 to 56.1)	58.8 (57.3 to 60.2)[a]	64.0 (62.5 to 65.3)[a]	66.5 (65.0 to 67.9)[a]	69.7 (68.2 to 71.2)[a]	74.0 (72.6 to 75.4)[a]	19.4 (17.4 to 21.4)[b]	3.8 (3.4 to 4.2)[b]
Widowed, divorced, or separated	57.0 (54.0 to 60.0)	61.3 (58.4 to 64.1)[a]	67.3 (64.6 to 70.0)[a,d]	69.7 (67.0 to 72.3)[d]	73.9 (70.4 to 77.1)[d]	77.2 (74.7 to 79.7)[d]	20.3 (16.4 to 24.2)[b]	4.1 (3.2 to 4.9)[b]
Never married	66.3 (62.4 to 70.1)[d]	70.0 (65.8 to 73.8)[d]	73.7 (69.4 to 77.7)[d]	75.9 (71.1 to 80.1)[d]	77.5 (72.3 to 82.0)[d]	80.0 (76.3 to 83.8)[d]	13.7 (8.3 to 19.1)[b]	2.7 (1.6 to 3.7)[b]
Mother's age								
34 y[c]	63.4 (59.2 to 67.5)	66.2 (62.0 to 70.1)	70.2 (66.1 to 74.0)	70.6 (65.9 to 74.8)	78.7 (74.6 to 82.3)[a]	73.3 (68.8 to 77.8)	9.9 (3.8 to 16.0)[b]	2.6 (1.5 to 3.7)[b]
35–44 y	56.7 (54.7 to 58.7)[d]	59.7 (57.7 to 61.5)[a,d]	66.2 (64.3 to 68.1)[a]	67.4 (65.6 to 69.2)	69.6 (67.4 to 71.7)[d]	75.1 (73.4 to 76.8)[a]	18.4 (15.8 to 21.0)[b]	3.5 (3.0 to 4.0)[b]
45 y	54.2 (52.4 to 55.9)[d]	60.0 (58.3 to 61.8)[a,d]	64.1 (62.5 to 65.8)[a,d]	68.3 (66.5 to 70.1)[a]	72.1 (70.2 to 73.8)[a,d]	75.7 (74.0 to 77.4)[a]	21.5 (19.0 to 23.9)[b]	4.2 (3.8 to 4.7)[b]
Place of birth								
Born in United States[c]	55.9 (54.6 to 57.2)	60.0 (58.7 to 61.2)[a]	65.0 (63.8 to 66.2)[a]	67.7 (66.4 to 69.0)[a]	71.3 (69.9 to 72.6)[a]	75.0 (73.8 to 76.2)[a]	19.1 (17.4 to 20.9)[b]	3.8 (3.5 to 4.1)[b]

Subgroup and Age Group, y	Survey Year						Total Change %	Average Annual Change %
	2015 % (95% CI)	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)	2019 % (95% CI)	2020 % (95% CI)		
Born outside United States[c]	60.3 (54.3 to 66.0)	67.4 (61.3 to 73.0)[d]	73.1 (68.1 to 77.5)[d]	74.8 (69.9 to 79.2)[d]	75.7 (70.0 to 80.7)	79.7 (73.5 to 85.9)	19.4 (10.9 to 28.0)[b]	3.5 (1.9 to 5.1)[b]
Income to poverty ratio								
<133%[c]	63.2 (60.8 to 65.6)[d]	67.7 (65.5 to 69.9)[a]	72.7 (70.5 to 74.7)[a]	74.7 (72.4 to 76.8)	76.2 (73.3 to 78.9)	81.2 (79.0 to 83.4)[a]	18.0 (14.7 to 21.2)[b]	3.4 (2.7 to 4.0)[b]
133% to <322%	51.3 (48.9 to 53.7)[d]	56.6 (54.3 to 58.9)[a,d]	60.8 (58.5 to 63.1)[a,d]	64.0 (61.5 to 66.4)[d]	67.7 (65.0 to 70.2)[a,d]	70.2 (67.7 to 72.7)[d]	18.9 (15.5 to 22.4)[b]	3.8 (3.1 to 4.4)[b]
322% to <503%	51.4 (48.7 to 54.0)[d]	53.0 (50.2 to 55.8)[d]	61.1 (58.4 to 63.8)[a,d]	63.7 (60.9 to 66.4)[d]	67.7 (64.9 to 70.3)[a,d]	70.4 (67.9 to 72.8)[d]	19.0 (15.4 to 22.6)[b]	4.0 (3.3–4.7)[b]
503%	56.0 (53.4 to 58.5)[d]	60.8 (58.3 to 63.2)[a,d]	64.7 (62.3 to 67.0)[a,d]	68.1 (65.5 to 70.6)[d]	73.1 (70.6 to 75.5)[a]	78.1 (76.1 to 80.0)[a,d]	22.1 (18.9 to 25.3)[b]	4.3 (3.7–5.0)[b]
Medical insurance[c]								
Private only[c]	52.5 (50.9 to 54.1)	56.0 (54.4 to 57.6)[a]	62.5 (60.8 to 64.1)[a]	65.4 (63.7 to 67.1)[a]	70.6 (68.9 to 72.2)[a]	73.5 (71.9 to 75.0)[a]	21.0 (18.7 to 23.2)[b]	4.3 (3.9 to 4.8)[b]
Any Medicaid	64.1 (61.8 to 66.3)[d]	68.0 (65.9 to 70.1)[a,d]	71.3 (69.3 to 73.3)[a,d]	74.4 (72.3 to 76.3)[a,d]	75.0 (72.4 to 77.5)[d]	79.8 (77.9 to 81.8)[a,d]	15.8 (12.8 to 18.8)[b]	2.9 (2.4 to 3.5)[b]
Other[e,f]	51.6 (47.1 to 56.1)	55.4 (51.4 to 59.4)	62.0 (57.8 to 65.9)[a]	63.7 (59.7 to 67.4)	67.4 (62.9 to 71.7)	71.3 (67.1 to 75.5)	19.7 (13.5 to 25.8)[b]	3.9 (2.7 to 5.1)[b]
Uninsured	41.0 (34.8 to 47.5)[d]	55.5 (48.2 to 62.5)[a]	57.5 (51.8 to 62.9)	56.2 (50.1 to 62.2)[d]	60.3 (53.4 to 66.8)[d]	65.6 (58.4 to 72.7)[d]	24.6 (15.0 to 34.2)[b]	3.9 (2.2 to 5.7)[b]
Provider contacts within past year								
None[c]	46.8 (43.2 to 50.3)	52.9 (49.1 to 56.6)[a]	60.2 (56.8 to 63.5)[a]	58.7 (55.2 to 62.2)	62.9 (58.7 to 67.0)	69.2 (65.9 to 72.6)[a]	22.5 (17.6 to 27.4)[b]	4.0 (3.1 to 5.0)[b]
1	53.7 (51.2 to 56.2)[d]	59.3 (57.0 to 61.6)[a,d]	64.7 (62.3 to 66.9)[a,d]	67.4 (65.0 to 69.6)[d]	70.9 (68.2 to 73.4)[a,d]	75.4 (73.3 to 77.6)[a,d]	21.7 (18.4 to 25.0)[b]	4.2 (3.5 to 4.8)[b]
2–3	59.4 (57.4 to 61.3)[d]	63.2 (61.2 to 65.1)[a,d]	67.5 (65.5 to 69.4)[a,d]	69.9 (67.8 to 71.9)[d]	73.7 (71.6 to 75.7)[a,d]	76.8 (75.0 to 78.7)[a,d]	17.4 (14.8 to 20.1)[b]	3.5 (3.0 to 4.0)[b]
4	60.6 (57.9 to 63.1)[d]	63.1 (60.5 to 65.6)[d]	67.1 (64.6 to 69.5)[a,d]	72.2 (69.4 to 74.7)[a,d]	73.0 (70.4 to 75.5)[d]	77.3 (74.8 to 79.7)[a,d]	16.7 (13.2 to 20.3)[b]	3.4 (2.7 to 4.1)[b]

Well child visit at age 11–12 y[g]

Subgroup and Age Group, y	Survey Year						Total Change %	Average Annual Change %
	2015 % (95% CI)	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)	2019 % (95% CI)	2020 % (95% CI)		
Yes	61.6 (59.8 to 63.4)[d]	66.9 (65.3 to 68.5)[a,d]	71.7 (70.1 to 73.2)[a,d]	73.7 (72.0 to 75.3)[d]	78.0 (76.4 to 79.5)[a,d]	80.3 (78.8 to 81.8)[a,d]	18.7 (16.3 to 21.0)[b]	3.7 (3.2 to 4.1)[b]
No[c]	47.1 (44.6 to 49.6)	51.6 (48.9 to 54.3)[a]	55.8 (53.2 to 58.4)[a]	60.5 (57.8 to 63.2)[a]	61.8 (58.7 to 64.8)	64.8 (61.8 to 67.9)	17.8 (13.8 to 21.7)[b]	3.6 (2.9 to 4.3)[b]
Don't know	54.4 (51.9 to 56.8)[d]	57.2 (54.8 to 59.5)[d]	62.8 (60.5 to 65.1)[a,d]	64.4 (61.9 to 66.8)[d]	67.1 (64.0 to 70.1)[d]	73.0 (70.9 to 75.1)[a,d]	18.7 (15.4 to 21.9)[b]	3.6 (3.0 to 4.2)[b]
Number of providers								
1	56.6 (55.0 to 58.3)	63.1 (61.6 to 64.7)[a,d]	67.4 (65.9 to 68.9)[a,d]	70.1 (68.4 to 71.7)[a,d]	74.3 (72.6 to 76.0)[a,d]	76.7 (75.2 to 78.1)[a,d]	20.0 (17.8 to 22.2)[b]	3.9 (3.5 to 4.3)[b]
2	56.7 (54.2 to 59.2)	57.5 (55.2 to 59.8)	63.3 (60.8 to 65.6)[a]	66.7 (64.4 to 68.9)[a,d]	68.0 (65.3 to 70.6)	75.5 (73.3 to 77.6)[a,d]	18.7 (15.5 to 22.0)[b]	3.6 (3.0 to 4.3)[b]
3[c]	53.6 (50.3 to 56.9)	55.3 (51.7 to 58.8)	61.9 (58.7 to 65.1)[a]	62.3 (58.9 to 65.6)	67.2 (63.8 to 70.4)[a]	68.5 (64.7 to 72.4)	14.9 (9.8 to 20.0)[b]	3.2 (2.3 to 4.1)[b]
MSA								
MSA principal city[c]	62.2 (60.1 to 64.2)	65.9 (64.0 to 67.9)[a]	70.1 (68.2 to 71.9)[a]	71.9 (69.8 to 73.9)	73.8 (71.5 to 75.9)	77.8 (75.9 to 79.7)[a]	15.6 (12.8 to 18.4)[b]	2.9 (2.4 to 3.5)[b]
MSA nonprincipal city	53.3 (51.4 to 55.2)[d]	58.5 (56.6 to 60.3)[a,d]	63.1 (61.3 to 64.8)[a,d]	66.6 (64.8 to 68.4)[a,d]	71.2 (69.2 to 73.1)[a]	74.7 (73.0 to 76.3)[a,d]	21.4 (18.9 to 23.9)[b]	4.2 (3.8 to 4.7)[b]
Non-MSA	47.8 (45.2 to 50.4)[d]	50.4 (47.8 to 53.0)[d]	59.3 (56.6 to 61.9)[a,d]	59.5 (56.8 to 62.2)[d]	64.2 (61.2 to 67.2)[a,d]	68.0 (65.2 to 70.8)[d]	20.2 (16.4 to 24.0)[b]	4.1 (3.4 to 4.8)[b]
Region								
Northeast	62.6 (60.2 to 64.9)	67.3 (65.0 to 69.5)[a]	70.3 (68.1 to 72.5)	71.1 (68.4 to 73.7)	74.1 (71.5 to 76.6)	79.4 (77.3 to 81.5)[a]	16.8 (13.7 to 20.0)[b]	3.0 (2.4 to 3.6)[b]
Midwest	54.0 (51.9 to 56.0)	57.9 (55.7 to 60.0)[a]	64.7 (62.8 to 66.6)[a]	69.3 (67.3 to 71.2)[a]	71.3 (69.2 to 73.2)	75.5 (73.7 to 77.4)[a]	21.6 (18.8 to 24.3)[b]	4.4 (3.8 to 4.9)[b]
South	52.1 (50.2 to 53.9)[d]	54.8 (53.0 to 56.6)[a,d]	61.4 (59.7 to 63.2)[a,d]	63.8 (62.0 to 65.6)[d]	68.0 (66.1 to 69.9)[a,d]	72.3 (70.5 to 74.2)[a,d]	20.3 (17.7 to 22.8)[b]	4.1 (3.6 to 4.6)[b]
West[c]	60.1 (56.4 to 63.7)	67.0 (63.6 to 70.2)[a]	69.5 (66.1 to 72.7)	71.9 (68.3 to 75.2)	75.5 (71.5 to 79.1)	78.1 (74.2 to 82.0)	18.0 (12.7 to 23.3)[b]	3.4 (2.4 to 4.4)[b]
Facility type								
All private facilities[c]	55.9 (54.1 to 57.7)	60.7 (59.0 to 62.4)[a]	65.6 (63.9 to 67.2)[a]	68.4 (66.6 to 70.1)[a]	72.2 (70.3 to 73.9)[a]	76.5 (75.0 to 78.0)[a]	20.6 (18.2 to 22.9)[b]	4.0 (3.5 to 4.5)[b]

Subgroup and Age Group, y	Survey Year						Total Change %	Average Annual Change %
	2015 % (95% CI)	2016 % (95% CI)	2017 % (95% CI)	2018 % (95% CI)	2019 % (95% CI)	2020 % (95% CI)		
All public facilities	55.4 (52.1 to 58.7)	61.1 (57.9 to 64.2)[a]	64.9 (61.6 to 68.0)	67.2 (63.7 to 70.6)	69.7 (65.6 to 73.5)	73.5 (69.9 to 77.1)	18.0 (13.1 to 22.9)[b]	3.4 (2.5 to 4.3)[b]
All hospital facilities	59.2 (55.5 to 62.7)	66.3 (62.8 to 69.6)[a,d]	67.9 (64.3 to 71.4)	70.6 (67.1 to 74.0)	74.4 (70.9 to 77.5)	75.7 (72.7 to 78.6)	16.5 (11.8 to 21.1)[b]	3.1 (2.2 to 3.9)[b]
All sexually transmitted diseases, school, and teen clinics or other facilities	49.6 (37.7 to 61.5)	59.2 (47.1 to 70.3)	63.9 (54.3 to 72.6)	70.1 (61.2 to 77.8)	72.3 (60.9 to 81.3)	70.2 (59.4 to 80.9)	20.6 (4.4 to 36.8)[b]	4.3 (1.0 to 7.7)[b]
Mixed[e,h]	58.0 (55.2 to 60.7)	58.6 (55.8 to 61.3)	66.9 (64.3 to 69.4)[a]	69.8 (67.2 to 72.3)	71.8 (68.6 to 74.7)	76.4 (73.6 to 79.2)[a]	18.5 (14.5 to 22.4)[b]	3.9 (3.1 to 4.6)[b]
Other[c]	42.9 (33.1 to 53.2)[d]	43.6 (33.2 to 54.5)[d]	52.0 (43.1 to 60.8)[d]	33.9 (25.1 to 44.0)[a,d]	49.5 (38.8 to 60.4)[a,d]	38.1 (27.0 to 49.2)[d]	−4.7 (−19.8 to 10.3)	−0.6 (−3.2 to −2.0)

CI, confidence interval.

[a] $P < .05$ for comparison with the previous year (t test for comparison between 2 y, with the prior year as the reference group- for example, 2016 vs 2015, 2017 vs 2016, 2018 vs 2017, 2019 vs 2018, and 2020 vs 2019).

[b] $P < .05$ for overall trend (Linear trend test for trend from 2015 through 2020).

[c] Reference level.

[d] $P < .05$ compared with reference for each year within each variable.

[e] Insurance categories are mutually exclusive.

[f] Children's Health Insurance Program, Indian Health Service, military, and some private.

[g] Status of health-care visit at age 11–12 y based on provider reported data.

[h] Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD, school, and teen clinics.

[i] Includes military, WIC clinics, and pharmacies.

TABLE 3

Multivariable Logistic Regression and Predictive Marginal Analysis of HPV Vaccination (1 Dose) of Adolescents Aged 13 to 17 Years in the United States, by Demographic and Access-to-Care Variables, NIS–Teen, 2020

Characteristic	Adjusted Coverage % (95% CI)	Adjusted Prevalence Ratio % (95% CI)
Parental report of provider recommendation for vaccine		
Yes	64.4 (62.9–65.9)	1.52 (1.41–1.62)[a]
No[b]	35.8 (32.6–39.0)	ref.
Age, y		
13–15[b]	55.5 (53.7–57.3)	ref.
16–17	65.3 (63.3–67.3)	1.05 (1.02–1.09)[a]
Sex		
Male[b]	57.4 (55.5–59.3)	ref.
Female	61.3 (59.5–63.2)	1.02 (0.99–1.05)
Race and ethnicity		
Non–Hispanic White[b]	55.6 (53.8–57.4)	ref.
Non–Hispanic Black	63.2 (59.3–67.0)	1.10 (1.05–1.15)[a]
Hispanic	65.6 (62.4–68.8)	1.11 (1.07–1.16)[a]
American Indian or Alaskan Native	74.6 (66.6–82.6)	1.18 (1.08–1.27)[a]
Asian	54.8 (47.7–61.9)	1.00 (0.92–1.09)
Other	60.7 (55.9–65.4)	1.06 (1.00–1.13)
Mother's educational level		
<High school[b]	62.7 (57.3–68.1)	ref.
High school	57.5 (54.2–60.8)	0.91 (0.85–0.97)[a]
Some college or college graduate	56.1 (53.4–58.8)	0.90 (0.84–0.96)[a]
>College graduate	61.2 (59.1–63.3)	0.94 (0.88–1.01)
Mother's married status		
Married or living with partner[b]	59.1 (57.4–60.8)	ref.
Widowed, divorced, or separated	61.0 (58.1–63.9)	1.04 (1.01–1.08)[a]
Never married	57.5 (52.5–62.5)	1.03 (0.96–1.10)

Characteristic	Adjusted Coverage % (95% CI)	Adjusted Prevalence Ratio % (95% CI)
Mother's age		
34 y[b]	58.9 (54.0–63.9)	ref.
35–44 y	58.5 (56.5–60.5)	1.02 (0.96–1.09)
45 y	60.2 (58.1–62.3)	1.02 (0.95–1.08)
Place of birth		
Born in United States[b]	59.2 (57.8–60.6)	ref.
Born outside United States	63.1 (55.4–70.8)	1.06 (0.97–1.15)
Income to poverty ratio		
<133%[b]	62.3 (58.9–65.7)	ref.
133% to <322%	55.0 (52.3–57.7)	0.94 (0.89–0.98)[a]
322% to <503%	58.9 (56.1–61.7)	0.93 (0.88–0.99)[a]
503%	61.5 (58.7–64.4)	1.02 (0.96–1.07)
Medical insurance[c]		
Private only[a]	58.2 (56.1–60.4)	ref.
Any Medicaid	62.6 (59.7–65.4)	1.07 (1.02–1.12)[a]
Other[d]	56.2 (51.3–61.2)	1.03 (0.97–1.08)
Uninsured	52.4 (43.9–60.9)	0.94 (0.83–1.05)
Provider contacts within past year		
None[b]	52.5 (48.8–56.2)	ref.
1	58.6 (56.3–61.0)	1.05 (0.99–1.11)
2–3	61.8 (59.7–63.9)	1.08 (1.02–1.14)[a]
4	61.9 (58.9–64.9)	1.06 (1.00–1.13)[a]
Well child visit at age 11–12 y[e]		
Yes	64.4 (62.6–66.3)	1.17 (1.11–1.23)[a]
No[b]	46.5 (43.2–49.8)	ref.
Don't know	58.0 (55.5–60.4)	1.07 (1.00–1.13)[a]
Number of providers		
1	61.1 (59.3–62.9)	1.12 (1.05–1.19)[a]

Characteristic	Adjusted Coverage % (95% CI)	Adjusted Prevalence Ratio % (95% CI)
2	59.3 (56.7–61.8)	1.10 (1.03–1.17)[a]
3[b]	50.9 (46.9–54.9)	ref.
MSA		
MSA Principal City[b]	60.0 (57.9–62.2)	ref.
MSA Non–Principal City	59.8 (57.9–61.8)	0.98 (0.95–1.02)
Non–MSA	54.4 (51.1–57.7)	0.94 (0.89–0.98)[a]
Region		
Northeast	64.4 (61.8–67.0)	1.02 (0.96–1.07)
Midwest	61.6 (59.4–63.9)	1.01 (0.96–1.07)
South	56.0 (53.9–58.1)	0.96 (0.91–1.01)
West[b]	59.4 (55.1–63.7)	ref.
Facility type		
All private facilities[b]	58.6 (56.7–60.5)	ref.
All public facilities	56.3 (52.1–60.6)	1.01 (0.96–1.07)
All hospital facilities	59.6 (56.1–63.1)	1.00 (0.96–1.05)
All sexually transmitted diseases, school, and teen clinics or other facilities	54.7 (44.1–65.4)	0.94 (0.80–1.07)
Mixed[f]	64.7 (61.4–67.9)	1.07 (1.03–1.12)[a]
Other[g]	45.8 (33.8–57.8)	0.70 (0.55–0.85)[a]

CI, confidence interval; ref., reference.

[a] P <.05 compared with reference level.

[b] Reference level.

[c] Insurance categories are mutually exclusive.

[d] Children's Health Insurance Program, Indian Health Service, military, and some private.

[e] Status of health-care visit at age 11 to 12 y based on provider reported data.

[f] Mixed indicates that the facility is identified to be in more than one of the facility categories such as private, public, hospital, STD, school, and teen clinics.

[g] Includes military, WIC clinics, and pharmacies.