


# Parent-Reported Reasons for Nonreceipt of Recommended Adolescent Vaccinations, National Immunization Survey—Teen, 2009

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## Abstract

**Objectives:** To identify parent-reported reasons for non-receipt of adolescent vaccinations by provider recommendation status. **Methods:** Parental reasons for non-receipt of adolescent vaccines were analyzed among adolescents 13–17 years using data from the 2009 National Immunization Survey-Teen (n=20,066). **Results:** Among unvaccinated adolescents, 87.9% (Td/Tdap), 90.9% (MenACWY), and 66.0% (HPV) of parents reported that they did not receive a healthcare provider recommendation for their adolescent to receive the vaccine. Among those without a provider recommendation, the most common reasons for not receiving the vaccines were ‘vaccine not recommended’ [Td/Tdap, MenACWY] and ‘not needed’ [HPV]. Among those with a recommendation, the most common parental reasons were ‘lack of knowledge’ [Td/Tdap], ‘vaccine not needed’ [MenACWY], and ‘lack of knowledge’ [HPV]. **Conclusions:** Non-receipt of provider recommendations was a main parent-reported reason for not getting vaccinated. Increasing parental knowledge and vaccination coverage through increased provider-parent communication about disease risk and vaccine benefits is needed.

## Keywords

adolescent medicine, general pediatrics

## Introduction

The routine adolescent vaccination schedule has expanded since 2005, adding 4 additional vaccination recommendations, including the reduced tetanus-diphtheria-acellular pertussis (Tdap), meningococcal conjugate (MenACWY), human papillomavirus (HPV), and influenza vaccines.<sup>1–4</sup>

US coverage estimates for at least one dose of Tdap, MenACWY, and HPV (among girls) have increased from 2006 to 2009, yet are below 60%.<sup>5–8</sup> Parental acceptance of adolescent-administered vaccines has been widely studied for HPV but has not been as well evaluated for Tdap and MenACWY.

Some of the factors that have been associated with the uptake of childhood and adolescent-administered vaccines include physician recommendations, health care access, parent attitudes toward vaccination, and perceived barriers to getting vaccinated.<sup>9–11</sup> Recommendations from health care providers increase patient and parent acceptance of vaccination.<sup>9,12–15</sup> Parents change their minds

about delaying and refusing vaccines because of information or assurances from health care providers.<sup>9</sup> Yet despite a provider recommendation, some parents still may not have their adolescents vaccinated.

## Objective

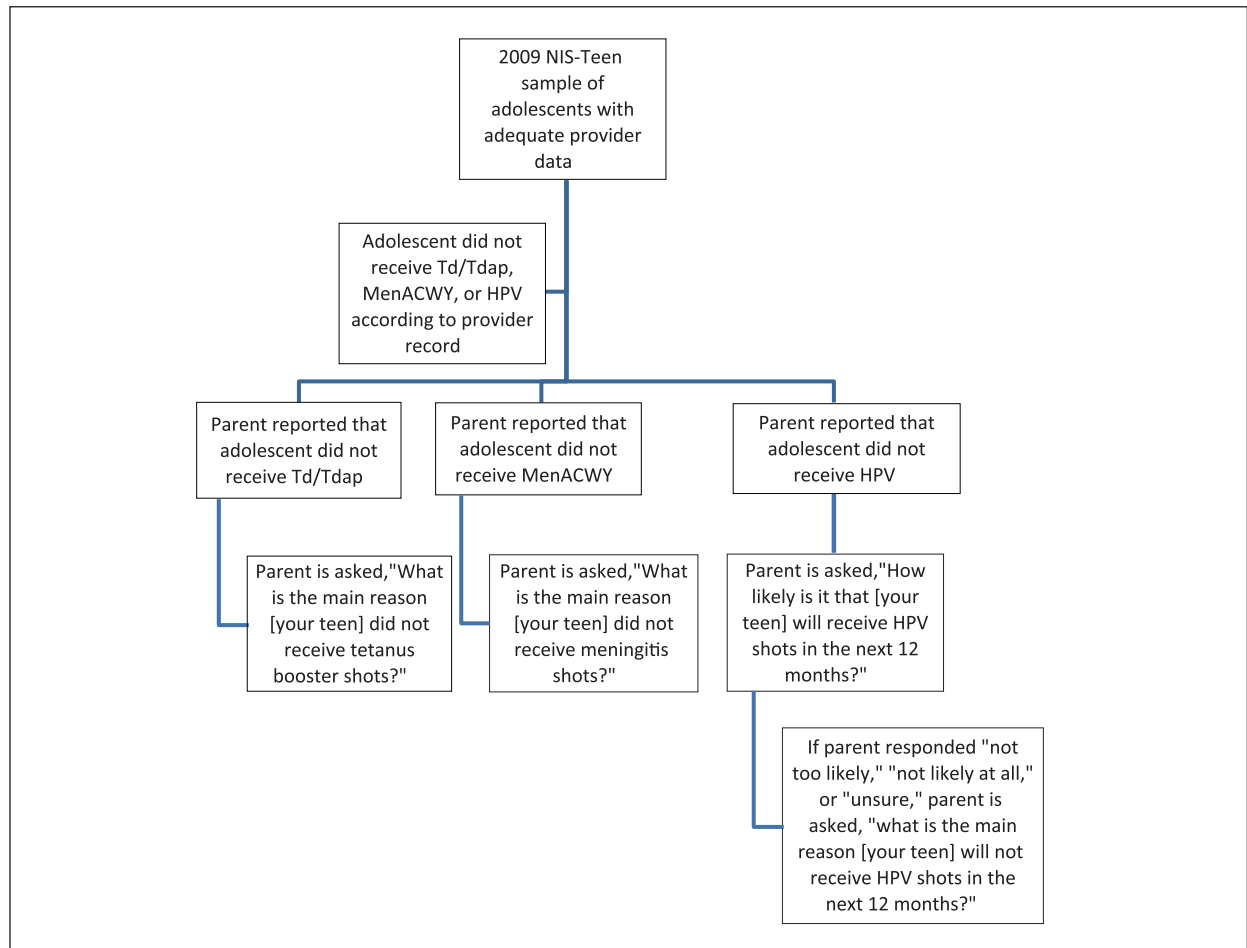
This analysis is the first to identify and compare parental reasons for nonreceipt of 3 routinely adolescent-administered vaccines. Parental reasons are assessed by receipt or nonreceipt of a provider recommendation. Understanding parental reasons for not vaccinating adolescents with recommended vaccines can inform targeted

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**Figure 1.** Flow chart describing analysis inclusion criteria

Abbreviations: NIS, National Immunization Survey; Tdap, tetanus-diphtheria-acellular pertussis; MenACWY, meningococcal conjugate; HPV, human papillomavirus.

public health interventions that increase vaccine acceptance among adolescents.

## Methods

We used data from the 2009 National Immunization Survey—Teen (NIS-Teen) composed of 2 phases: (1) a random-digit-dialed household survey used to identify adolescents aged 13 to 17 years and (2) a mailed provider survey collecting provider-reported vaccination histories for the adolescents. NIS-Teen represents a stratified national probability sample of households in the United States, the District of Columbia, and select local areas. It is built on the sampling frame of telephone numbers used by the NIS, which seeks to identify vaccination rates in children 19 to 35 months of age. Methods and weighting procedures for the NIS and NIS-Teen have been described.<sup>16</sup>

Inclusion criteria for this analysis are described in Figure 1. Parent-reported reasons are described for adolescents not receiving at least 1 dose of the vaccine according to the provider records. Parents were asked if their adolescent received tetanus toxoid or Tdap (Td/Tdap) and MenACWY vaccines. Parents who reported that their adolescent did not receive Td/Tdap were asked, “What is the main reason [your teen] did not receive tetanus booster shots?” Parents who reported that their adolescent did not receive MenACWY were asked, “What is the main reason [your teen] did not receive meningitis shots?” Parents who reported that their daughters did not receive HPV were asked “How likely is it that [your teen] will receive HPV shots in the next 12 months?” Parents who responded “not too likely,” “not likely at all,” or “unsure” were considered as having no intention to have their daughters vaccinated in the near future. They were asked, “What is the main reason [your teen]

will not receive HPV shots in the next 12 months?" These questions were open ended, and the responses were coded into categories. Multiple responses were allowed and 1 person was counted with each reason. Children for whom parents responded "don't know" (20.3% [Td/Tdap], 16.5% [MenACWY], 3.9% [HPV]) and "refused" (0% [Td/Tdap], 0.01% [MenACWY], 0.05% [HPV]) were excluded from this analysis. Reasons for nonreceipt of HPV are reported for girls only.

### Statistical Analysis

Data were collected from January 2009 to February 2010 and analyzed using SUDAAN version 9.2 to account for the complex sampling design of the NIS-Teen (Research Triangle Institute, Research Triangle Park, NC). Weights were adjusted for unit nonresponse, multiple telephone lines, noncoverage of nonlandline telephone households, and subsampling of 1 eligible adolescent per household. Weights also reflected the distribution of race/ethnicity, age, and maternal educational attainment of the US noninstitutionalized civilian population aged 13 to 17 years.

We performed univariate analyses to describe the sociodemographic characteristics of unvaccinated adolescents from our survey. Because health care provider recommendations can influence parental acceptance of vaccinations, we stratified the parent-reported reasons by receipt of a recommendation and used Wald  $F \chi^2$  to test for associations ( $\alpha \leq .05$ ) between provider recommendation and parent-reported reasons for nonreceipt of the vaccines. NIS-Teen was approved by the Centers for Disease Control and Prevention's institutional review board.

## Results

### Sample Characteristics

A total of 20 066 adolescents, aged 13 to 17 years, had adequate provider data in the 2009 NIS-Teen. According to provider records, the proportion of unvaccinated adolescents was 22.8% (Td/Tdap), 45.6% (MenACWY), and 55.7% (HPV). The sociodemographic characteristics of our sample are described in Table 1. Among unvaccinated adolescents, 87.9% (Td/Tdap) and 90.9% (MenACWY) of parents reported that they did not receive a recommendation from a health care provider for their adolescent to receive the vaccine. Among parents of unvaccinated girls who intended not to receive HPV (60.3%), 66.0% reported that they did not receive a provider recommendation. Parents of 17.5% and 8.9% of the unvaccinated girls reported that they had never heard

of HPV disease or of the HPV vaccine before the interview, respectively. Parents who received a provider recommendation to receive HPV were more likely than those without a recommendation to report intention to receive the vaccine (48.9% vs 33.6%;  $P < .001$ ).

### Most Common Parental Reasons for Nonvaccination

Table 2 lists all the main parent-reported reasons for nonreceipt of the 3 adolescent vaccines stratified by receipt and nonreceipt of a health care provider recommendation. Among those who reported not receiving a recommendation, the most common parental reasons for not receiving the vaccines were "not recommended" (Td/Tdap, MenACWY) and "not needed" (HPV). The second most common parental reasons were "lack of knowledge" (Td/Tdap, MenACWY) and "daughter not sexually active" (HPV). Among those who reported receiving a provider recommendation, the most common parental reasons were "lack of knowledge" (Td/Tdap, HPV) and "not needed" (MenACWY). The second most common parental reasons were "not needed" (Td/Tdap), "not the appropriate age" (MenACWY), and "daughter not sexually active" (HPV).

### Parental Reasons Among Those Who Received a Provider Recommendation Versus Those Who Did Not Receive a Provider Recommendation

Our bivariate analysis showed significant differences in parental reasons for nonreceipt of the vaccines by recommendation status (Table 2). Among those without a provider recommendation, a significantly higher proportion of parents responded that "lack of knowledge" (19.1% vs 7.4%) was the main reason for not receiving MenACWY. Regarding HPV, parents without a provider recommendation were more likely to respond "no doctor/no doctor's visit scheduled" (1.3% vs 0.1%). Among those with a provider recommendation, a significantly higher proportion of parents responded "child already up-to-date" (13.0% vs 2.6%) as a main reason for not receiving Td/Tdap. Some of the parental reasons significantly associated with a provider recommendation for MenACWY included "not the appropriate age" (15.2% vs 4.4%), "family/parental decision" (9.4% vs 1.3%), and "college shot" (4.3% vs 0.9%). Regarding HPV, a significantly higher proportion of parents with a provider recommendation responded "family/parental decision" (9.3% vs 4.8%) and "more information needed/new vaccine" (8.3% vs 4.3%).

**Table 1.** Sample Characteristics of Unvaccinated Adolescents Aged 13 to 17 Years in the United States<sup>a</sup> by Select Sociodemographic Variables: National Immunization Survey—Teen, 2009

Characteristic	Td/Tdap		MenACWY		HPV <sup>b</sup>	
	Sample	Percentage (95% CI)	Sample	Percentage (95% CI)	Sample	Percentage (95% CI)
Total	923	100.0 (—)	5083	100.0 (—)	2727	100.0 (—)
Age (years)						
13-14	465	47.0 (41.3-52.9)	1962	37.5 (35.2-39.9)	1245	45.6 (42.2-49.0)
15-17	458	53.0 (47.1-58.7)	3121	62.5 (60.1-64.8)	1482	54.4 (51.0-57.8)
Gender						
Male	483	53.4 (47.6-59.2)	2670	52.7 (50.3-55.1)	N/A	N/A
Female	440	46.6 (40.8-52.4)	2413	47.3 (44.9-49.7)	N/A	N/A
Race/ethnicity						
White, non-Hispanic	726	66.0 (59.3-72.0)	4032	70.5 (68.0-72.9)	2012	61.7 (58.0-65.3)
Hispanic	67	13.4 (9.0-19.4)	385	11.9 (10.1-14.0)	254	16.5 (13.1-20.5)
Black, non-Hispanic	87	14.1 (10.1-19.2)	351	10.9 (9.4-12.7)	284	14.2 (12.1-16.6)
Other	43	6.6 (3.4-12.4)	315	6.6 (5.4-8.2)	177	7.6 (5.9-9.7)
Poverty level <sup>c</sup>						
Below 200% PVL	305	40.8 (34.9-46.9)	1371	32.6 (30.3-35.1)	785	35.0 (31.7-38.4)
200% to <300% PVL	186	16.9 (13.7-20.7)	983	18.2 (16.6-20.0)	531	18.8 (16.4-21.5)
300% to <400% PVL	161	14.7 (11.6-18.5)	899	17.8 (16.0-19.8)	457	15.2 (13.2-17.5)
400% to <500% PVL	107	11.8 (8.1-16.7)	707	12.1 (10.6-13.7)	384	12.5 (10.7-14.7)
≥500% PVL	164	15.9 (12.1-20.5)	1123	19.2 (17.4-21.1)	570	18.4 (15.8-21.5)
Metropolitan statistical area <sup>d</sup>						
Urban	270	30.3 (24.8-36.5)	1552	30.1 (27.9-32.5)	980	32.9 (29.8-36.0)
Suburban	339	44.6 (38.8-50.5)	1904	46.4 (44.0-48.9)	1063	48.3 (44.9-51.8)
Rural	314	25.1 (21.2-29.5)	1627	23.4 (21.8-25.2)	684	18.8 (16.8-21.0)
Region						
Northeast	63	5.9 (4.0-8.6)	605	10.8 (9.5-12.3)	406	15.2 (13.2-17.5)
Midwest	274	29.3 (24.8-34.1)	1468	29.0 (27.3-30.8)	716	24.1 (21.9-26.5)
South	393	41.6 (36.1-47.3)	1738	38.8 (36.7-41.0)	997	39.0 (36.1-42.0)
West	193	23.2 (17.7-29.8)	1272	21.4 (19.2-23.7)	608	21.7 (18.3-25.4)
Mother's education						
<High school	76	13.3 (9.1-19.0)	325	9.2 (7.7-10.9)	204	11.8 (9.3-14.9)
High school	217	32.0 (26.7-37.7)	1031	28.0 (25.7-30.3)	543	26.5 (23.4-29.9)
>High school, college, nongraduate	301	26.4 (21.8-31.6)	1640	28.0 (26.0-30.2)	850	26.0 (23.4-28.8)
College graduate	329	28.4 (23.6-33.7)	2087	34.9 (32.6-37.2)	1130	35.7 (32.6-38.8)
Parent-reported health care visit at age 11 to 12 years						
Yes	132	12.5 (9.7-16.0)	1355	25.0 (23.0-27.2)	747	28.8 (25.5-32.3)
No	791	87.5 (84.0-90.3)	3195	64.3 (62.0-66.7)	1101	38.9 (35.8-42.1)
>12 Years when vaccine licensed <sup>e</sup>	N/A	N/A	533	10.6 (9.2-12.3)	879	32.3 (29.2-35.6)
Number of health care visits in the past 12 months						
0	239	28.5 (23.4-34.3)	1047	23.4 (21.3-25.7)	562	22.1 (19.4-25.1)
1	240	24.6 (19.9-29.9)	1389	27.8 (25.6-30.1)	758	27.1 (24.3-30.1)
2-3	298	32.9 (27.5-38.7)	1674	31.6 (29.4-33.9)	896	33.3 (30.1-36.5)
4-9	110	10.9 (8.1-14.6)	783	14.1 (12.6-15.7)	399	14.0 (11.5-17.0)
>10	28	3.1 (1.6-6.0)	171	3.1 (2.4-3.9)	100	3.5 (2.5-4.8)
Medical insurance type						
Private	613	62.3 (56.2-68.1)	3666	69.1 (66.7-71.4)	1935	70.0 (66.7-73.1)
Public	215	22.4 (18.2-27.3)	1031	22.7 (20.6-24.8)	566	22.0 (19.3-24.9)
None	81	15.3 (10.6-21.5)	306	8.2 (6.8-9.9)	176	8.0 (6.1-10.4)

(continued)

Table 1. (continued)

Characteristic	Td/Tdap		MenACWY		HPV <sup>b</sup>	
	Sample	Percentage (95% CI)	Sample	Percentage (95% CI)	Sample	Percentage (95% CI)
Provider recommendation						
Yes	112	12.1 (8.6-16.8)	475	9.1 (7.9-10.6)	873	34.0 (30.7-37.5)
No	788	87.9 (83.2-91.4)	4529	90.9 (89.4-92.1)	1809	66.0 (62.5-69.3)
Heard about HPV vaccine						
Yes	N/A	N/A	N/A	N/A	2552	91.1 (88.3-93.3)
No	N/A	N/A	N/A	N/A	169	8.9 (6.7-11.7)
Know of HPV disease						
Yes	N/A	N/A	N/A	N/A	2295	82.5 (79.6-85.1)
No	N/A	N/A	N/A	N/A	408	17.5 (14.9-20.4)

Abbreviations: Tdap, tetanus-diphtheria-acellular pertussis; MenACWY, meningococcal conjugate; HPV, human papillomavirus; CI, confidence interval; PVL, poverty level.

<sup>a</sup>Includes adolescents whose parents responded to questions about parent reasons for nonreceipt of the vaccines and who had sufficient provider reported data.

<sup>b</sup>Includes girls unvaccinated with the HPV vaccine and with no parental intent for vaccination within next 12 months.

<sup>c</sup>Poverty status was defined by using the reported household income and the 2008 federal poverty threshold defined by the US Census Bureau.

<sup>d</sup>Metropolitan statistical area was determined by the telephone area code/exchange.

<sup>e</sup>MenACWY and HPV were licensed by the Federal Drug Administration on January 17, 2005, and June 8, 2006, respectively.

## Discussion

Similar to other studies, our analysis shows variation in the parental reasons for why adolescents did not get specific vaccines, and reasons differed by provider recommendation. More than 65% of parents of unvaccinated adolescents reported not receiving a recommendation from a health care provider to receive the vaccines; this was the most common parental reason for not receiving Td/Tdap and MenACWY among those who did not receive a recommendation. Regarding HPV, parents who reported a provider recommendation were more likely to have intentions to receive the vaccine. This highlights missed opportunities to educate parents and to vaccinate adolescents. Yet children of some parents who reported receiving a provider recommendation still did not receive the recommended vaccines. Lack of knowledge of the vaccines and the need for them were common reasons for not receiving the vaccines for both parents who received and those who did not receive provider recommendations. Increasing parental knowledge of adolescent vaccines is needed to increase vaccination rates among adolescents.

Parents often follow what their doctor recommends about vaccines.<sup>9,10,17-19</sup> Without a health care provider recommendation, opportunities to make parents aware of vaccinations and to vaccinate will likely be lost. Pediatricians report that one of the most influential factors in their decision to recommend vaccinations is endorsement by the American Academy of Pediatrics (AAP).<sup>18</sup> Despite endorsement by the AAP and knowledge of their

influence on parental decisions, barriers to providers recommending vaccines remain, leading to missed opportunities for adolescent vaccination. Health care providers report that financial factors are often barriers to recommending vaccines; yet financial factors are essential to their ability to deliver adolescent vaccines.<sup>18,11-13</sup> Consequently, the AAP and the National Vaccine Advisory Committee address cost and reimbursement in their recommendations for improving adolescent vaccination coverage. Both organizations recommend improving business practices to ensure proper reimbursement, participation in vaccine-purchasing pools, and improving reimbursement through the Vaccines for Children Program to increase the availability of vaccines in doctors' offices.<sup>14,15</sup>

Besides cost barriers, providers' perception of disease risk for their patients can be a barrier to vaccinating. Some providers delay recommending the HPV vaccine, preferring to vaccinate older female adolescents, perceiving that younger girls are not sexually active.<sup>18,20</sup> Additionally, some providers support waiting until older adolescence to vaccinate against meningococcal disease, believing that risk is more likely after college entry and because of concerns about waning immunity.<sup>12</sup> Continued education of health care providers on vaccine preventable disease (VPD) risk, vaccine benefits, and current ACIP recommendations is needed to further influence provider decisions to recommend adolescent vaccines.

The adolescent platform promotes an 11- to 12-year preventive health check for vaccination and health screening.<sup>21-23</sup> For each vaccine, less than 30% of unvaccinated

**Table 2.** Main Parental Reasons Why Adolescents, Aged 13 to 17 Years, Did Not Receive Td/Tdap or MenACWY Vaccines or Do Not Intend to Receive the HPV Vaccine by Receipt of a Provider Recommendation for the Vaccine,<sup>a</sup> National Immunization Survey—Teen, 2009

Reason	No Provider Recommendation	Provider Recommendation	P Value
	Percentage (95% CI)	Percentage (95% CI)	
<b>Td/Tdap</b>			
Unweighted sample size	788	112	
No provider recommendation <sup>b</sup>	33.7 (28.3-39.6)	0	N/A
Lack of knowledge	23.7 (18.5-29.9)	32.6 (15.9-55.2)	.45
Not needed	20.8 (16.1-26.5)	15.0 (7.1-29.0)	.35
Not appropriate age	5.8 (3.1-10.4)	5.7 (1.7-17.3)	.99
Other reason	5.7 (2.8-11.5)	4.8 (1.9-11.4)	.75
No doctor, or no doctor's visit scheduled	3.5 (2.1-5.5)	10.6 (4.2-24.5)	.15
Already up-to-date	2.6 (1.5-4.5)	13.0 (7.0-22.9)	.00
Not a school requirement	1.9 (0.9-3.8)	0.7 (0.1-5.0)	.26
Cost	1.4 (0.4-4.6)	2.5 (0.6-9.9)	.56
Family/parental decision	1.1 (0.5-2.6)	2.9 (1.0-8.0)	.24
Handicapped/special needs/illness	0.5 (0.2-1.6)	4.6 (1.7-12.2)	.07
Not available	0.4 (0.1-1.4)	0	.11
Safety concern/side effects	0.8 (0.3-1.9)	1.0 (0.3-2.7)	.82
College shot <sup>b</sup>	0	0	N/A
More info/new vaccine <sup>b</sup>	0	0	N/A
<b>MenACWY</b>			
Unweighted sample size	4529	475	
No provider recommendation <sup>b</sup>	49.1 (46.5-51.7)	0	N/A
Lack of knowledge	19.1 (17.1-21.3)	7.4 (4.8-11.2)	.00
Not needed	18.3 (16.2-20.7)	18.2 (13.5-24.1)	.97
Not a school requirement	5.7 (4.5-7.2)	5.6 (3.2-9.6)	.96
Not appropriate age	4.4 (3.4-5.6)	15.2 (11.4-20.0)	.00
Other reason	1.9 (1.2-2.8)	7.6 (4.1-13.7)	.02
Family/parental decision	1.3 (0.8-1.9)	9.4 (5.8-14.9)	.00
Not available	1.1 (0.8-1.6)	7.8 (4.9-12.1)	.00
College shot	0.9 (0.5-1.9)	4.3 (2.3-8.1)	.02
Cost	0.7 (0.4-1.2)	3.1 (1.4-6.5)	.05
No doctor, or no doctor's visit scheduled	0.6 (0.3-1.1)	2.8 (1.6-5.0)	.01
Safety concern/side effects	0.5 (0.3-0.9)	3.6 (0.8-14.1)	.25
Already up-to-date	0.3 (0.1-0.5)	4.3 (2.5-7.2)	.00
Handicapped/special needs/illness	0.2 (0.1-0.4)	5.8 (2.3-14.1)	.05
More info/new vaccine	0.2 (0.1-0.7)	2.3 (0.3-13.9)	.36
<b>HPV</b>			
Unweighted sample size	1809	873	
Not needed	20.4 (17.5-23.7)	15.3 (11.6-19.9)	.06
Not sexually active	19.1 (16.3-22.3)	20.1 (15.9-25.1)	.72
Lack of knowledge	17.0 (13.9-20.7)	22.3 (16.4-29.5)	.17
No provider recommendation <sup>b</sup>	16.3 (13.0-20.2)	0	N/A
Safety concern/ side effects	8.7 (6.9-10.8)	12.9 (9.4-17.4)	.06
Not appropriate age	5.8 (4.5-7.5)	7.2 (4.5-11.2)	.47
Family/parental decision	4.8 (3.5-6.7)	9.3 (6.5-13.0)	.01
More info/new vaccine	4.3 (2.7-6.8)	8.3 (6.2-10.9)	.01
Cost	2.8 (2.0-4.1)	5.7 (2.9-11.0)	.16
Other reason	1.5 (0.9-2.5)	1.2 (0.5-2.9)	.68
No doctor, or no doctor's visit scheduled	1.3 (0.6-2.7)	0.1 (0.0-0.6)	.02

(continued)

Table 2. (continued)

Reason	No Provider Recommendation	Provider Recommendation	P Value
	Percentage (95% CI)	Percentage (95% CI)	
Handicapped/special needs/illness	1.2 (0.7-2.0)	0.7 (0.2-2.1)	.40
Not a school requirement	0.6 (0.3-1.3)	0.4 (0.1-1.4)	.75
Already up-to-date	0.4 (0.2-1.0)	1.1 (0.6-2.1)	.08
Increased sexual activity concern	0.2 (0.0-0.9)	0.2 (0.0-1.3)	.92
Not available	0.2 (0.1-0.6)	0.1 (0.0-1.0)	.85
College shot <sup>b</sup>	0.0 (0.0-0.1)	0	N/A

Abbreviations: Tdap, tetanus-diphtheria-acellular pertussis; MenACWY, meningococcal conjugate; HPV, human papillomavirus; CI, confidence interval.

<sup>a</sup>Adolescents whose parents responded “don’t know” to the question, “Has a doctor or other health care professional ever recommended that [TEEN] receive [VACCINE]?” are not included in this table. The percentage of “don’t know” responses were: 3.1% (Td/Tdap), 1.5% (MenACWY), and 1.7% (HPV).

<sup>b</sup>Includes cells with fewer than 5 participants.

adolescents in this analysis had an 11- to 12-year preventive health check reported by a parent. Yet the majority of adolescents in our survey accessed health care for preventive or urgent reasons within the 12 months before the interview, presenting multiple opportunities for catch-up vaccination. Humiston et al<sup>18</sup> found that competing patient needs and the additional time required for vaccine counseling during urgent visits has led to few providers routinely providing vaccinations during urgent visits. However, promoting vaccination at the 11- to 12-year preventive health check as well as making all health encounters, including urgent visits, an opportunity for vaccination could improve vaccination coverage among adolescents. Additionally, efforts to increase parental awareness of the importance of the 11- to 12-year preventive check and annual preventive visits are needed to increase opportunities for adolescent vaccination.

Despite provider recommendations, some parents did not have their adolescents vaccinated with Td/Tdap and MenACWY or had intent not to give them HPV. For Td/Tdap, many parents incorrectly believed that their adolescents were “already up-to-date,” exemplifying the need to review an adolescent’s vaccinations at each visit and provide up-to-date immunization cards for parents. In the case of MenACWY, parents who received a provider recommendation were more likely to report that their adolescents were “not the appropriate age” or that the vaccine was a “college shot,” showing that parents may be unaware of their younger adolescents’ risks for meningococcal disease. Two of the most common parental reasons for not receiving HPV among both provider recommendation groups were “my daughter is not sexually active” and “the vaccine is not needed.” Parents are often unaware of when children become sexually active and are poor predictors of disease risk, especially when

considering sexually transmitted infections.<sup>24</sup> Parents who believe that their children are at risk for contracting a VPD have increased acceptability of vaccines; this stresses the need for effective parent–provider communication on disease risk and the benefits of vaccination.<sup>9,25</sup>

Parental trust in their health care providers also plays an important role in decision making about vaccines.<sup>17,19,26</sup> Distrust in the medical community or the information received from their health care provider may have led to vaccine refusals for some parents who received provider recommendations in our analysis. Despite receiving a recommendation for vaccination, the most common reasons for not receiving vaccines were “lack of knowledge” and “not needed,” showing that parents still felt that they did not have sufficient information to receive the vaccine. Addressing parental vaccine questions will require further training of vaccination providers in recognizing parental vaccine concerns, openly discussing the risks and benefits of vaccines, and directing parents to credible sources about vaccines.<sup>27,28</sup>

This analysis has some limitations. NIS-Teen is a random-digit-dialed survey and is limited to landline households. It may not be representative of nonlandline and wireless-only households, contributing to noncoverage bias. According to data from the 2009 National Health Interview Survey (NHIS), the number of wireless-only households is increasing, with 25.9% of children currently living in wireless-only households.<sup>29</sup> Only 2.4% of children live in households without telephone service.<sup>29</sup> The NHIS, a face-to-face household survey that includes landline, nonlandline, and wireless-only households has been assessed for sociodemographic and health-related variables among adolescents. Benchmark comparisons of these variables among adolescents in the NIS-Teen and NHIS have shown no significant evidence

of coverage bias after adjusting sampling weights for noncoverage of nonlandline and wireless-only households in the NIS-Teen.<sup>30</sup>

Small sample sizes may have limited our ability to detect significant differences for parent-reported reasons by provider recommendation status. The NIS-Teen survey design limited our analysis of HPV nonreceipt to those without parental intent to vaccinate their daughters; however, intent not to vaccinate may not translate into a decision not to vaccinate. Reasons of intent not to vaccinate (HPV) and reasons for deciding not to vaccinate (Td/Tdap and MenACWY) may not be directly comparable. Parent-reported reasons were subject to recall bias, and parental report of provider recommendations was not verified by the vaccination providers. Parental and provider report of vaccination recommendations and discussions may have been discordant. A large proportion of parents responded “don’t know” to the reasons for nonreceipt questions, and they were excluded from this analysis.

## Conclusion

Improving the uptake of an expanding adolescent vaccination schedule will require strategies targeted at health care providers, parents, and adolescents. Increased provider recommendations and parent education about their adolescent’s disease risk and vaccine benefits could reduce missed opportunities for adolescent vaccinations. Developing tailored immunization messages for addressing the needs of parental subgroups may also lead to increased vaccine acceptability and increased vaccination coverage rates.

## Authors’ Note

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

## Declaration of Conflicting Interests

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