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USE OF HUMAN PAPILLOMAVIRUS VACCINES AMONG YOUNG ADULT WOMEN IN THE UNITED STATES: AN ANALYSIS OF THE 2008 NATIONAL HEALTH INTERVIEW SURVEY

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Abstract

BACKGROUND—The CDC recommends catch-up administration of human papillomavirus (HPV) vaccines to girls and women ages 13 to 26 who have not been vaccinated previously. In response to debate regarding catch-up vaccination of young adult women, this study examines whether 18 to 26 year old women most likely to benefit from catch-up vaccination were aware of the HPV vaccine, and initiated the vaccine series by the end of 2008.

METHODS—We used data from the 2008 National Health Interview Survey to assess HPV vaccine awareness and use, and reasons for not vaccinating among women ages 18 to 26 (n = 1,583). Sociodemographic, health care access, and health history factors associated with vaccine initiation were assessed using multivariate logistic regression.

RESULTS—Overall, 11.7% of women ages 18 to 26 reported receiving at least one dose of the HPV vaccine by the end of 2008. In multivariate analyses, younger age, history of previous HPV infection, unmarried status, health insurance, flu shot in the past year, and receipt of one or more recommended lifetime vaccines were significantly associated with HPV vaccine initiation. Two-fifths (39.6%) of unvaccinated women were interested in receiving the HPV vaccine (n = 1,327). Primary reasons for lack of interest in the vaccine were not needing it, not knowing enough about it and concerns about safety.

CONCLUSIONS—HPV vaccine coverage among young adult women was low, and lower among the uninsured than the insured. Public financing and care provision programs have potential to expand vaccine coverage among uninsured women, who are at increased risk of cervical cancer.

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Keywords

human papillomavirus (HPV); vaccines; cervical cancer; disparities

BACKGROUND

Quadrivalent and bivalent human papillomavirus (HPV) vaccines, approved by the Food and Drug Administration (FDA) for females aged 9 to 26 years old in June 2006 and October 2009 respectively,[1–2] protect against HPV 16 and 18, two carcinogenic strains of HPV responsible for approximately 70% of cervical cancers.[3–5] Eleven and twelve year old girls are the priority population for HPV vaccination, as the vaccines are most efficacious when received before initiating sexualactivity.[6] Also at that age, clinical exams are advised to allow for administration of other vaccines and preventive services.[7–8] The Centers for Disease Control and Prevention Advisory Committee on Immunization Practices (ACIP) also recommends “catch-up” HPV vaccination of girls and women age 13 to 26 who have not been vaccinated previously or have not completed the three-dose series.[6] Catch-up recommendations promote vaccination of young women who missed the opportunity to be vaccinated by age 12, either because they entered adolescence or adulthood before HPV vaccines were introduced, or because they were not aware of, interested in, or able to access vaccines before they aged out of preadolescence.

There is some debate regarding the value of catch-up vaccination among young adult women. Benefits and cost-effectiveness of HPV vaccination decline with age, [9] as more women become sexually active and infected with HPV as they enter their 20s.[10–11] Although HPV vaccines can protect against types of HPV with which a woman has not yet been infected, the vaccines provide no therapeutic benefit to those already infected with HPV vaccine types. [12–15] In addition, routine cervical cancer screening is currently recommended for adult women regardless of HPV vaccination status.[16–18] Screening is highly effective at detecting the cervical abnormalities that can result from persistent HPV infections.

In contrast to clinical practice guidelines from the American Academy of Pediatrics and American College of Obstetrics and Gynecology,[19–20] and to the ACIP guidance, which recommends HPV vaccination for all young adult women although clinicians cannot assess the extent of benefit for individual women,[6] the American Cancer Society’s guidelines state that there is currently insufficiently evidence for or against universal vaccination of women ages 19 to 26 in the general population.[21]

The present study uses data from the 2008 National Health Interview Survey (NHIS), a nationally representative survey of a broad range of health topics, to examine whether 18 to 26 year old women most likely to benefit from catch-up vaccination are aware of the HPV vaccine, and have received initial and subsequent doses in the three-dose series. We characterize women as potentially receiving greatest HPV vaccine benefit if they: (1) have no previous history of HPV or abnormal Pap test results; (2) are likely to face continued risk of HPV infection due to sexual activity with new partners; (3) do not participate in routine cervical cancer screening; and (4) are members of racial and ethnic minority, socioeconomic, or health care access subgroups that traditionally experience higher burdens of cervical cancer morbidity and mortality.[22–27] As previous studies have documented a relationship between use of the HPV vaccine and women’s use of other vaccines,[28–29] we also assess whether HPV vaccination differs according to previous receipt of other recommended vaccines.

METHODS

Data

We analyzed data from the 2008 National Health Interview Survey. NHIS is an annual, in-person household survey that collects health information on the U.S. civilian, noninstitutionalized population [30]. The survey employs a complex, stratified, multistage sample and provides nationally representative estimates when appropriately weighted. Hispanics, African Americans and Asians are oversampled so as to ensure adequate representation and stable estimates for these racial and ethnic groups. Further details of the survey are located at http://www.cdc.gov/nchs/nhis.htm. In 2008, 21,781 adult sample persons were surveyed, representing a response rate of 62.6%. The sample under study consists of adult women ages 18 to 26 (n = 1,583). As off-label use of HPV vaccines among women ages 26 and older is very limited (approximately 1%), we excluded these women from our analyses.

Outcomes

The outcomes of primary interest, awareness of the HPV vaccine, and receipt of a first vaccine dose (vaccine "initiation"), were measured via two questions, "A vaccine to prevent HPV infection is available and is called the HPV shot, cervical cancer vaccine, or GARDASIL®. Before this survey, have you ever heard of the HPV shot or cervical cancer vaccine?" and "Have you ever received the HPV shot or cervical cancer vaccine?" We also analyzed receipt of all three doses of the vaccine (vaccine "completion"); interest in receiving the vaccine (among those not previously vaccinated); main reasons for not vaccinating (among those not interested in vaccination); willingness to pay $360 – $500 for the vaccine (among those interested but not previously vaccinated); and willingness to receive the vaccine for lower cost (among those interested, not previously vaccinated, and not willing to pay $360 – $500).

Covariates

Covariates were selected to measure subgroups who we identified as most likely to benefit from catch-up HPV vaccination in adulthood.

Previous exposure to HPV was measured as whether the respondent reported past HPV infection, or past abnormal Pap test results. Those with previous exposure to HPV were considered to have less to gain from HPV vaccination.

Likelihood of future risk of HPV infection was measured indirectly by marital status (married or all other, including not currently married and living with a partner). Unmarried women were grouped, regardless of whether they were living with partners, because our preliminary analyses showed that unmarried women with and without partners exhibit similar patterns of HPV vaccine use. Unmarried women were considered to be at higher risk of future HPV infection than married women because they are considered more likely to have multiple sexual partners, a risk factor for HPV infection.

Cervical cancer screening participation was categorized as recent (defined as Pap test within the past three years) or not (Pap test over three years ago or never).

Groups at high risk for cervical cancer were identified by their race and ethnicity, education, income, immigration status, and health care access. Race/ethnicity was categorized as non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian, and all other. Education was categorized by highest level of school completed (high school graduate or less, some college, and college graduate or more). Family income was

categorized according to percentage of the federal poverty line (300% or more, 200% – <300%, 100% – <200%, and <100%). Birth in the United States was represented by a dichotomous variable (yes or no). Health care access was assessed by type of health insurance coverage (uninsured, public/non-military, and private/military) and health care utilization, measured by whether respondents had seen a physician or obstetrician/gynecologist in the past year.

Receipt of non-HPV vaccines was measured in terms of recommended lifetime vaccinations (i.e. – receipt of hepatitis A, hepatitis B, and/or tetanus vaccines), and receipt of annual influenza vaccination. We included both variables, since lifetime vaccinations may have been administered when the respondents were minors, under the health care direction of parents or guardians, while the recent decision to receive a flu shot may more closely reflect the respondents' independent decision making regarding vaccination.

The relationship between age and outcomes was also assessed, since younger members of the study sample may have been educated about, or received vaccines, while still in adolescence or in college settings. Respondents were categorized into two age groups: 18 through 20 years and 21 through 26 years.

Statistical Analysis

We used cross-tabulations to assess the relationship between the outcomes and covariates of interest; for the outcome of HPV vaccine initiation, we conducted multivariate logistic regression. Respondents missing one or more covariates were excluded from multivariate models (n = 90). The number of covariates in the final model was constrained by the small sample of vaccinated respondents (n = 179). As a result, we built a parsimonious model that included the independent variables described above, with the exception of: household income and educational status because these covariates are in flux for women in the study age group; Pap test history because it showed little variability by vaccination status; and birth in the United States, which was highly correlated with Hispanic ethnicity. A multivariate model including separate categories for Hispanic women born in the United States and those born outside of the United States did not fit the data significantly better than a simpler model that categorized all Hispanic women together; consequently, we present the simpler model. Analyses were adjusted for the complex survey design using SUDAAN version 9.0.1.

RESULTS

Awareness of HPV Vaccine

Overall, 68.5% of women ages 18 to 26 reported ever having heard of the HPV vaccine (Table 1). In bivariate analyses, White women were substantially and significantly more likely than Black, Hispanic or Asian women to have heard of the vaccine (82.5% versus 59.9%, 49.1% and 45.7%, respectively). Women born in the United States were more than twice as likely as those born outside of the country to have heard of the vaccine (76.7% versus 36.9%). Awareness of the vaccine was also significantly higher among those with private health insurance rather than no insurance or public coverage, and among those who had seen a physician or OB/GYN in past year or received recommended lifetime vaccinations ($p<0.01$). Small differences in awareness by marital status did not reach statistical significance.

HPV Vaccine Initiation and Completion

Overall, 11.7% [95% CI: 9.8, 13.8] of women ages 18 to 26 reported receiving at least one dose of the HPV vaccine (Figure 1). Vaccine initiation decreased significantly with

increasing age. Women ages 18–20 were significantly more likely to be vaccinated than women ages 21 to 26 (20.9% versus 7.9%, p = 0.0000; Table 1). In bivariate analyses, women who were White, married, born in the US, covered by any health insurance, or who had visited any physician or an OB/GYN in the past year, received one or more recommended lifetime vaccines or received an annual flu shot were significantly more likely than their counterparts to be vaccinated (p<0.01; Table 1). Recency of Pap testing, and history of previous HPV infection or abnormal Pap test results were not significantly associated with HPV vaccine initiation.

In multivariate analyses, younger age, unmarried status, health insurance, flu shot in the past year, and receipt of recommended lifetime vaccines remained significantly associated with HPV vaccine initiation (Table 2); history of HPV diagnosis or an abnormal Pap test was also significantly associated with initiating the HPV vaccine series in the multivariate model. In the controlled model, disparities in HPV vaccine use were no longer apparent across racial and ethnic groups.

More than half (53.8% [95% CI:45.5, 61.8]) of those initiating HPV vaccination completed all three doses, for a total completion rate of 6.2% [95% CI: 4.9, 7.7]. Rates of three-dose completion varied little by sociodemographics, health care access, or health behaviors.

Interest and Willingness to Pay

Of those women who did not receive the HPV vaccine (n = 1,327), 39.6% indicated interest in receiving it. As shown in Table 3, the most common primary reasons for lack of interest in the HPV vaccine were not needing it (35.9%), not knowing enough about it (17.1%), concerns about safety (12.7%), and not being sexually active (10.3%). Of women not interested in the vaccine, only 1.8% cited expense as the primary reason for their lack of interest. However, among respondents interested in the vaccine, 75.0% reported that they were *not* willing to pay $360 to $500 (i.e., full price). Virtually all (97.8%) of those unwilling to pay full price reported that they would receive the vaccine if it were available for free or at a much lower cost.

DISCUSSION

Our analysis of a nationally representative survey finds limited HPV vaccine initiation among young adult women in the United States. Previous national estimates reported that 10–11% of 18 to 26 year old women had received at least one dose of the vaccine by the end of 2007. [28, 31] We estimate that, in 2008, 12% of this age group received the vaccine. This minimal increase in vaccine uptake among young adult women stands in contrast to coverage among adolescents ages 13 to 17, which increased substantially, from 25% in 2007 to 37% in 2008 and to 44% in 2009, according to estimates from the National Immunization Survey-Teen.[32–34]

Higher vaccine coverage among adolescents than among young adults may be due, in part, to differences in recommendations regarding adult vaccination. A previous study identified provider recommendation as a driving factor in HPV vaccination among 19 to 26 year old women.[35] In keeping with American Cancer Society guidelines, some clinicians may be consulting with patients on a case by case basis to determine if HPV vaccination is likely to be beneficial. In addition, public financing of vaccines for uninsured and under-insured minors through the Vaccines for Children program may be helping to boost overall HPV vaccination rates among adolescents, and to reduce disparities in vaccine coverage by insurance, income and race or ethnicity in this age group.[33] Most federal and state vaccine financing programs do not extend to adult women, unless they initiate the HPV vaccine series before turning age 19.[36] Thus, in the vaccine's initial two years on the market, it is not

surprising to observe that young adult women exhibit lower overall vaccination rates than adolescents, and that uninsured young adult women are significantly less likely than privately or publicly insured young women to receive the vaccine. Uninsured women are at high risk for poor cervical cancer screening participation,[37] and consequently, for cervical cancer morbidity and mortality.[38] Uninsured women would, therefore, greatly benefit from catch-up HPV vaccination, especially if they have not initiated sexual activity. Discretionary use of Section 317 funds to pay for HPV vaccines for uninsured adults, Merck's Vaccine Patient Assistance Program, and state-level efforts to bundle free HPV vaccination with cervical cancer screening services, may help to expand vaccine coverage among uninsured young adult women.[36, 39] Such efforts may be particularly important given that the majority of women interested in receiving the HPV vaccine are not willing to pay full price, but would be willing to obtain the vaccine free or at much lower cost.

Although HPV vaccine initiation is higher among adolescents than among adults, 2008 NHIS data indicate that the dose completion rate is higher among adults than among adolescent girls (58% versus 41%).[40] This high completion rate among young adults may be reflective of the higher motivation of women who seek and complete the vaccine series of their own volition, rather than due to prompts from parents or school-based programs. Examination of the drivers and barriers to vaccine completion is a priority for future research, as vaccine efficacy is unknown for receipt of fewer than three doses.[6]

We found preliminary evidence that unmarried women – that is, women with a higher risk of future HPV infection through sexual contact with new partners – were much more likely to be vaccinated than married women, despite the fact that married and unmarried young adult women were equally likely to have heard of the HPV vaccine. This finding suggests that some young adult women or health care providers may be appropriately assessing future risk of HPV infection, and the potential benefits from HPV vaccination.

Nearly half of respondents who were not interested in the HPV vaccine reported that their lack of interest was because they did not need the vaccine, or were not sexually active. In the absence of information on the sexual history of respondents, these results must be interpreted with caution. It is possible that women who are in long-term, monogamous relationships, or those who are not planning to become sexually active in the foreseeable future, are making accurate assessments of their low future risk of HPV infection, and therefore, their limited potential benefits from HPV vaccination. Alternatively, however, these stated reasons for lack of interest in the HPV vaccine may indicate that women who have not yet initiated sexual activity do not know that the HPV vaccine is more efficacious if administered before they become sexually active. If this latter scenario is the case, then public education targeted to this age group regarding the benefits of HPV vaccination is warranted.

Although recent cervical cancer screening participation was associated with awareness of the HPV vaccine, neither recent nor ever screening was correlated with likelihood of HPV vaccination. As the majority of women in our study had been screened recently, or were younger than the age at which clinical guidelines definitively recommend cervical cancer screening initiation, we may not have been able to detect differences between screened and unscreened subgroups of women. However, we did find evidence that women's other vaccination behavior was associated with receipt of the HPV vaccine. Consistent with previous studies, we found that those who had received a flu shot in the past year, or had received one or more recommended lifetime vaccines (Hepatitis A or B, and/or tetanus), were substantially more likely than those who had not to receive the HPV vaccine.[28–29]

Our study has a number of limitations. First, unlike the National Immunization Survey, self-reported NHIS data are not validated against provider immunization records. Consequently, there may be response biases; however, given how new and widely discussed the HPV vaccine is, it seems likely that respondents would remember and report their HPV vaccine status accurately. Second, NHIS 2008 did not collect data on sexual history, which limited our ability to evaluate whether HPV vaccines reached subgroups of women likely to benefit from vaccination. NHIS could be used to examine this issue if questions on age of sexual initiation and timing of vaccine dose administration were included in future rounds of data collection.

Third, as NHIS 2008 data were collected within two years of the introduction of HPV vaccine, older members of the cohort under study never had the opportunity to vaccinate as adolescents. Therefore, we do not expect our results to generalize to the HPV vaccination behavior of future groups of young adult women. Future research should monitor whether the patterns of use we observe continue as the vaccine has been on the market for a more extended period. In addition, as data become available, vaccine dose completion rates should be examined to identify factors that promote and/or impede completion. Current estimates of dose completion likely underestimate true completion rates, as insufficient time has elapsed for many of the respondents to have received second and third doses of the vaccine.

Conclusions

HPV vaccine coverage among young adult women was low in 2008, and was largely driven by high rates of vaccination among 18 to 20 year olds, who may have been vaccinated as minors. Catch-up was higher among insured than uninsured young adult women. As uninsured women are at greater risk of cervical cancer morbidity and mortality, they should be a high priority for catch-up vaccination. Coordinated public vaccine financing programs like Vaccines for Children seem to be effective at promoting vaccine coverage among uninsured adolescents, and may have potential for expanding catch-up vaccination among young adult women who stand to benefit the most from HPV vaccines.

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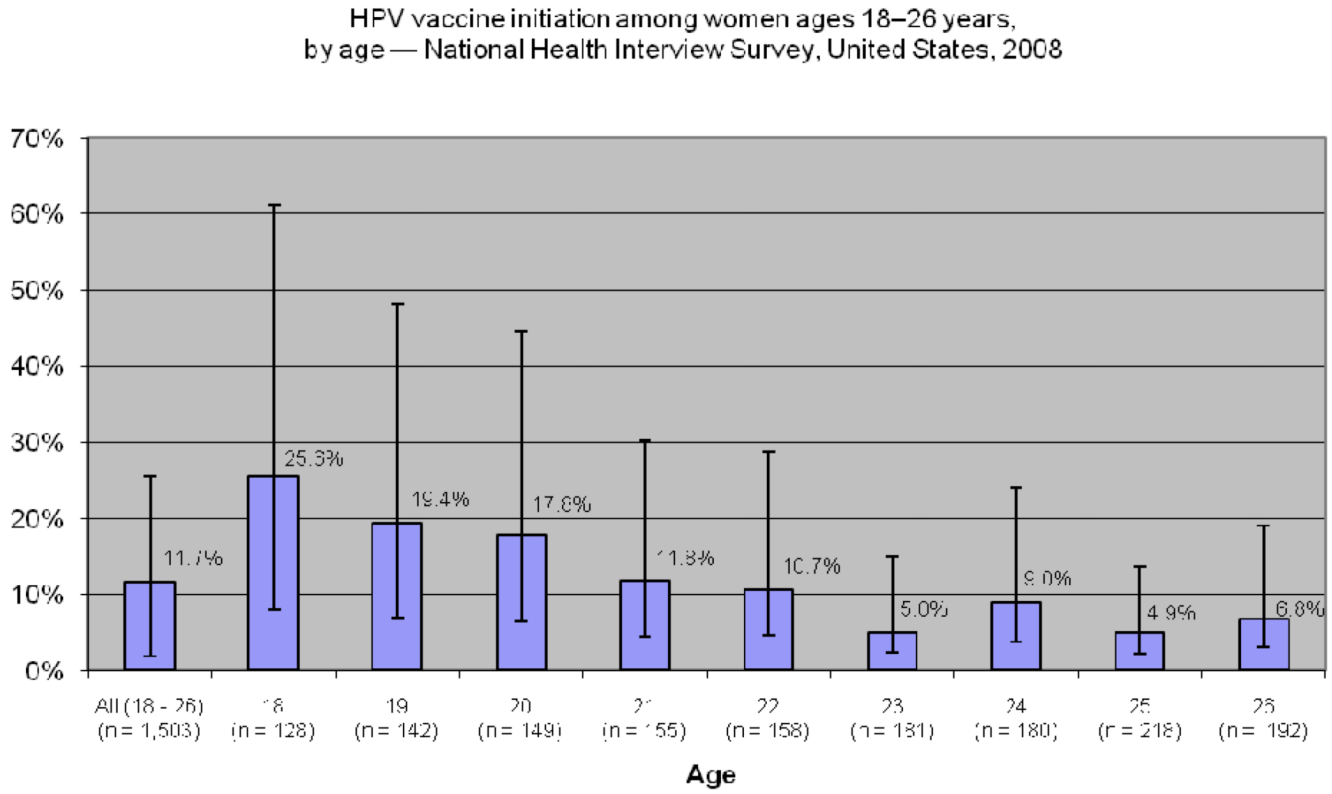

Figure 1.
HPV vaccine initiation among women ages 18–26 years, by age, National Health Interview Survey, United States, 2008.

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Table 1

Sample Characteristics, Awareness, and Use of Human Papillomavirus Vaccine by Sociodemographic, Health Care Access and Health Behavior Variables, Adult Women Ages 18 to 26, National Health Interview Survey 2008.

Characteristics	Women Ages 18–26 (N=1,583)		Ever Heard of HPV Vaccine (N=1,509)			Ever Had HPV Vaccine (N=1,503)		
	N	Wgtd % (95% CI)	N	Wgtd % (95% CI)	p	N	Wgtd % (95% CI)	p
All	**1,583**	-	**1,509**	**68.5 (65.6, 71.2)**		**1,503**	**11.7 (9.8, 13.8)**	
Age								
18 – 20	433	32.8 (29.6, 36.2)	419	69.8 (64.0, 75.1)	0.4550	419	20.9 (16.3, 26.4)	0.0000
21 – 26	1,150	67.2 (63.8, 70.4)	1,090	72.3 (68.9, 75.5)		1,084	7.9 (6.2, 9.9)	
Previous Exposure to HPV								
Ever had abnormal test OR been told had HPV					0.3636			0.4957
Yes	281	28.5 (25.0, 32.2)	280	86.8 (81.4, 90.9)		279	15.6 (11.6, 20.6)	
No	660	71.5 (67.8, 75.0)	658	89.3 (86.3, 91.6)		656	13.7 (10.9, 17.1)	
Future Risk of HPV Infection (indirect measure)								
Marital status					0.0847			0.0000
Married	332	21.8 (19.4, 24.4)	317	66.8 (60.7, 72.5)		315	3.7 (1.9, 7.2)	
Other	1,248	78.2 (75.6, 80.6)	1,189	72.8 (69.6, 75.8)		1,185	14.6 (12.2, 17.4)	
Cervical Cancer Screening Participation								
Time since last Pap Test					0.0000			0.7472
3 Years Ago or Less	1,142	74.0 (71.1, 76.8)	1,134	76.6 (73.3, 79.5)		1,130	12.5 (10.4, 14.8)	
Over 3 Years Ago or Never	365	26.0 (23.2, 28.9)	360	58.8 (52.1, 65.2)		359	11.7 (8.0, 16.7)	
Subgroups at Higher Risk of Cervical Cancer*								
Race/Ethnicity					0.0000			0.0019
Hispanic*	343	17.2 (15.1, 19.6)	328	49.1 (42.1, 56.1)		323	7.5 (4.7, 11.7)	
NH White	788	60.0 (57.0, 62.9)	754	82.5 (79.1, 85.5)		754	15.4 (12.6, 18.6)	
NH Black*	305	15.4 (13.1, 18.0)	293	59.9 (52.5, 66.9)		292	8.1 (4.8, 13.3)	
NH Asian*	109	4.9 (3.8, 6.4)	99	45.7 (33.5, 58.5)		99	8.0 (3.6, 16.9)	
NH Other/Multiple	36	2.4 (1.6, 3.7)	33	82.7 (64.3, 92.8)		33	4.0 (0.9, 16.1)	
Education					0.0000			0.0008

Characteristics	Women Ages 18–26 (N=1,583)		Ever Heard of HPV Vaccine (N=1,509)			Ever Had HPV Vaccine (N=1,503)		
	N	Wgtd % (95% CI)	N	Wgtd % (95% CI)	p	N	Wgtd % (95% CI)	p
Less than HS or HS Grad / GED*	631	39.9 (36.7, 43.2)	604	59.6 (54.1, 64.8)		602	10.5 (7.9, 13.9)	
Some College	657	42.5 (39.6, 45.5)	631	77.4 (73.2, 81.1)		628	16.2 (12.7, 20.3)	
College Grad	292	17.6 (15.2, 20.4)	271	84.0 (78.1, 88.5)		270	6.6 (4.3, 10.0)	
Family income as % of federal poverty line					0.0019			0.2239
300% +	469	38.7 (35.5, 42.0)	449	78.6 (73.9, 82.6)		449	12.5 (9.6, 16.2)	
200% – <300%	259	16.5 (14.5, 18.7)	247	70.1 (62.8, 76.5)		247	11.3 (7.3, 17.0)	
100% – <200%*	383	22.6 (20.0, 25.4)	361	67.7 (61.1, 73.7)		362	9.0 (6.0, 13.3)	
<100%*	472	22.1 (19.4, 25.2)	451	63.9 (57.1, 70.3)		445	15.7 (10.8, 22.2)	
Immigration status					0.0000			0.0000
Born in U.S.	1,321	86.6 (84.3, 88.7)	1,266	76.7 (73.8, 79.4)		1,267	13.5 (11.3, 16.0)	
Born outside of U.S.*	262	13.4 (11.3, 15.7)	243	36.9 (29.5, 44.9)		236	3.7 (1.8, 7.6)	
Health insurance					0.0000			0.0000
None*	406	24.5 (21.9, 27.3)	388	61.3 (55.6, 66.8)		384	2.4 (1.1, 5.1)	
Public	279	15.4 (13.3, 17.7)	267	58.4 (50.9, 65.6)		265	10.9 (6.8, 16.8)	
Private	892	60.2 (56.9, 63.3)	848	78.9 (75.5, 82.1)		848	16.5 (13.6, 19.8)	
Seen MD or OB/GYN in past year					0.0000			0.0000
Yes	1,333	85.7 (83.4, 87.7)	1,291	75.4 (72.5, 78.1)		1,288	13.5 (11.3, 16.0)	
No*	222	14.3 (12.3, 16.6)	215	48.2 (39.3, 57.1)		212	4.5 (2.2, 8.9)	
Other Vaccination Behavior								
One or more recommended lifetime vaccines†					0.0000			0.0000
Yes	1,211	84.1 (81.7, 86.3)	1,176	78.3 (75.5, 80.9)		1,175	14.4 (12.1, 17.1)	
No	263	15.9 (13.7, 18.3)	257	41.3 (33.4, 49.6)		254	3.1 (1.5, 6.4)	
Flu shot or nose Spray in past year					0.0091			0.0004
Yes	277	17.1 (15.0, 19.5)	273	78.7 (72.5, 83.8)		273	23.0 (17.2, 30.1)	
No	1,274	82.9 (80.5, 85.0)	1,230	69.9 (66.7, 73.0)		1,225	10.0 (8.0, 12.3)	

*Groups at higher risk of cervical cancer [22–27].

† Lifetime vaccines include hepatitis A vaccine ever, hepatitis B vaccine ever, tetanus shot in the past 10 years.

Table 2

Odds Ratios for Initiation of HPV Vaccine from Multivariate Logistic Regression Model, Adult Women Ages 18 to 26, National Health Interview Survey 2008 (n = 1,413).

Independent Variables	Odds Ratio	Lower 95% CI	Upper 95% CI
Age			
18 – 20	1.00		
21 – 26	0.30	0.20	0.47
Previous Exposure to HPV			
Ever had abnormal test OR been told you have HPV			
Yes	1.00		
No	0.57	0.35	0.93
Future Risk of HPV Infection (indirect measure)			
Marital status			
Married	1.00		
Other	4.05	1.90	8.64
Subgroups at Higher Risk of Cervical Cancer			
Race/Ethnicity			
NH White	1.00		
Hispanic	0.88	0.47	1.66
NH Black	0.57	0.24	1.35
NH Asian	0.71	0.27	1.90
Health insurance			
Private	1.00		
Public	0.71	0.37	1.34
None	0.14	0.05	0.38
Seen MD or OB/GYN in past year			
Yes	1.00		
No	0.57	0.24	1.35
Other Vaccination Behavior			
One or more recommended lifetime vaccines*			
Yes	1.00		
No	0.32	0.13	0.77
Flu shot or nose spray in past year			
Yes	1.00		
No	0.38	0.24	0.61

* Lifetime vaccines include hepatitis A vaccine ever, hepatitis B vaccine ever, tetanus shot in the past 10 years.

Table 3

Main Reason Not Interested in HPV Vaccine, Unvaccinated Adult Women Ages 18 to 26, National Health Interview Survey 2008.*

Reason	Unvaccinated Women Ages 18–26 Not Interested in HPV Vaccine (n=787)	
	n	Wgtd % (95% CI)
Don't Need	269	35.9 (31.2, 40.8)
Don't Know Enough	154	17.1 (14.0, 20.8)
Worried About Safety	80	12.7 (9.8, 16.2)
Not Sexually Active	66	10.3 (7.3, 14.3)
Doctor Didn't Recommend	45	5.3 (3.9, 7.2)
Too Old	32	3.6 (2.4, 5.5)
Already Have HPV	23	2.7 (1.7, 4.4)
Too Expensive	16	1.8 (0.9, 3.4)
Don't Know Where to Get It	2	0.2 (0.0, 0.9)
Spouse/Family Against It	1	0.1 (0.0, 0.5)
Other	56	6.3 (4.5, 8.6)

*Note: Unvaccinated respondents were asked for their open-ended response regarding one main reason that they were not interested in the HPV vaccine. Responses then were coded into the above categories.