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English Proficiency, Knowledge, and Receipt of HPV Vaccine in Vietnamese-American Women

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Abstract

Cervical cancer is one of the most important disease burdens experienced by Vietnamese-American women. Human papillomavirus (HPV) is the etiological agent in almost all cases of cervical cancer. We surveyed Vietnamese-American women to determine receipt of HPV vaccine and assessed if limited English proficiency and knowledge related to HPV vaccine were associated with HPV vaccine uptake. Of the 113 Vietnamese-American women who participated in the study, 58 % ($n = 68$) was born in Vietnam. The mean years of residency in the United States was 12.75 years. Only 16 (14 %) reported receiving HPV vaccine and 11 (9 %) reported receiving all three shots. Thirteen women responded that they are not at all likely to receive HPV vaccine. Of the whole sample, 47 % ($n = 53$) reported proficiency in spoken and written English. English proficiency was significantly associated with receipt of HPV vaccine (OR = 4.4; confidence interval (95 % CI) = 1.2; 16.50; $p = 0.03$). Of the knowledge items, 70 % ($n = 79$) responded correctly that HPV increases the risk for cervical cancer. However, as many as 60 % responded incorrectly, that HPV infection can be cured with medication. The item, “People infected with HPV can be cured with medication,” was the most important variable associated with receipt of HPV vaccine. Specifically, those with correct response were 3.8 times more likely to report receiving the HPV vaccine (OR = 3.8; 95 % CI = 1.1; 13.5; $p = 0.04$). Important public health

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needs are the development and evaluation of educational programs on HPV and cervical cancer that are designed for Vietnamese-American women.

Keywords

Asian-American; HPV; English proficiency; Cervical cancer

Introduction

Asian-Americans [1] account for 13.4 million of the US population. Characterized by heterogeneous immigration histories and cultures, Asian-Americans consist of more than 60 different ethnicities and 30 different languages [2]. More than 1.5 million of Asian-Americans are of Vietnamese descent [1]. A relatively recent immigrant group, a majority of Vietnamese-Americans came to the US as refugees, and with limited English proficiency (LEP). LEP, defined as a limited ability to read, write, speak, or understand English [3], has been shown to influence health behaviors and health outcomes. Among Asian immigrants, LEP is an important factor for access to primary prevention services and is a significant correlate of knowledge, attitudes, and beliefs related to health [4–10].

To date, Vietnamese-Americans have a disproportionate disease burden relative to other ethnic groups in the US. Vietnamese women in particular, have two times higher incidence of cervical cancer compared to non-Hispanic white women [11]. Indeed, the President's Advisory Commission [12] on Asian-Americans identified cervical cancer among Vietnamese women as one of the most important disease burdens experienced by Asian-Americans. Thus, prevention programs for cervical cancer targeting Vietnamese-American women have immense public health significance.

Human papillomavirus (HPV) is the etiological agent in almost all cases of cervical cancer [13]. It has been found that persistent infection with high risk Human Papillomavirus (HR-HPV) (types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, or 68) can lead to development of anogenital cancers (i.e., cervical cancer); in fact, HPV has been found in 90 % [14] to 100 % [15] of cervical cancer lesions. HPV infection is the most common sexually transmitted infection (STI) in young sexually active populations in developed countries. In the US, approximately 20 million Americans are infected with HPV, almost half (9.2 million) of whom are adolescents and young adults aged 15–24 years [16]. Moreover, an estimated 6.2 million new cases of HPV infection are diagnosed annually among the US population aged 15–44 years, 75 % of which occur among individuals 15–24 years of age [16].

In June 2006, a quadrivalent vaccine to protect against HPV types 16 and 18 which are responsible for over 70 % of cervical cancers [17, 18] and HPV types 6 and 11 which are responsible for the infections associated with anogenital warts [19, 20] was licensed for females. The release of this vaccine was groundbreaking. It was the first approved vaccine which could prevent cancer. It is routinely recommended for females ages 11–12 and catch-up vaccination is recommended for females ages 13–26 who had not received it [21]. It is administered intramuscularly in a 3-dose series; the second and third doses are administered at 2 and 6 months after the first dose. Receipt of the HPV vaccine has the huge potential to

decrease cervical cancer morbidity and mortality. In this study, we surveyed Vietnamese-American women in the Houston Metropolitan area to determine receipt of HPV vaccine and specifically assessed the influence of limited English proficiency and knowledge related to HPV vaccine on receipt of HPV vaccine. We hypothesized that both English proficiency and knowledge will be significant correlates of receipt of HPV vaccine in this population. The city of Houston has the largest number of Asian-Americans in the state of Texas, with Vietnamese-Americans as one of the largest Asian-American populations in the Houston metropolitan area [2, 10]. The findings from this study may therefore, help inform the development of health services to meet the unique needs of Vietnamese-Americans in the Houston metropolitan area.

Materials and Methods

Subjects

Our population of interest was Vietnamese-American women, age 18 and older and living in the metropolitan area of Houston, Texas. Eligibility criteria were: (1) age 18 years or older, (2) a resident of metropolitan Houston area, (3) Vietnamese-American, (4) female, and (5) provide informed consent. Over a 2-month period, potential participants were approached by bilingual interviewers at community centers frequented by the Vietnamese community. Participants were compensated with a \$10 gift certificate for their time. The project was approved by the University of Houston Committee for the Protection of Human Subjects.

Data Collection

All surveys were conducted in person, either in Vietnamese or English by trained staff members who were fluent in the participant's preferred language, and at community centers or at the recruitment sites to provide a comfortable setting. All survey instruments were pre-transcribed into Vietnamese.

Instruments

Content and face validity of survey instruments (described below) were assessed and approved by the Project Advisory Committee (PAC). The PAC was comprised of 10 members, including health practitioners (one physician and nurses), advocates, and community representatives. Of the 10 PAC members, four were Vietnamese-Americans. The instruments were translated and back-translated by bilingual (English-Vietnamese) interpreters.

English Proficiency Assessment

Limited English proficiency (LEP) is defined as a limited ability to read, write, speak, or understand English [22]. We assessed the respondents' level of English proficiency using the English proficiency subscale of the acculturation scale for Southeast Asians developed by Anderson and colleagues (36). The items included the following: "How well do you understand English when spoken to you?"; "How well do you speak in English?"; "How well do you read in English?"; and "How well do you write in English?". Likert-type response options were "very well," "well," "somewhat well", "not well," and "not at all," with a corresponding score of 5, 4, 3, 2, and 1, respectively. A higher total score on these

four items indicated a higher level of proficiency in English. For this study, we found internal consistency reliability, Cronbach's $\alpha = 0.97$.

Knowledge Related to HPV, HPV Vaccine Uptake, and Likelihood of HPV Vaccine Uptake

Knowledge related to HPV was assessed using items from the work of Massad et al. [23, 24] and Brabin et al. [25]. Receipt of HPV vaccine was assessed by asking "Have you ever received the HPV Vaccine or HPV shots" and a follow-up question "Did you receive all three doses of the HPV vaccine?"

The likelihood of receiving HPV vaccine was assessed by asking How likely are you to get the vaccine? Would you say you are not at all likely, somewhat likely, very likely, or extremely likely? These items were taken from the 2007 California Health Interview Survey [26].

Demographic characteristics, access to care (insurance status) and other variables (relationship status) were also assessed to better characterize the study population.

Statistical Analyses

The associations between the study variables were assessed using Pearson's Chi square analysis and analyses of variance. Logistic regression analyses were conducted to: (1) assess the association between English proficiency and receipt of the HPV vaccine and (2), the association between the knowledge items and receipt of the HPV vaccine. We used multivariable logistic regression to assess the relative importance of the knowledge items with respect to receipt of the HPV vaccine. All tests were two-sided. The SPSS version 17 was used in the analyses.

Results

Demographics

A total of 113 Vietnamese-American women participated in the study. Table 1, Panel A shows the distribution of the whole sample by selected characteristics. The mean years of residency in the United States for the whole sample was 12.75 years [standard deviation (SD) = 8.6]. The mean age overall was 22 years (SD = 3). Fifty-eight percent (n = 68) of the sample was born in Vietnam. A majority (n = 65) of the sample reported themselves as students. Approximately 32 % reported having no health insurance.

Receipt of HPV Vaccine

Only 14 % (n = 16) of the sample reported receiving HPV vaccine. Of these, 69 % (n = 11) reported receiving all three shots. Overall, 44 % (n = 50) reported not receiving the vaccine. Interestingly, 13 women responded that they are not at all likely to receive HPV vaccine; 20 are somewhat likely; 20 are very likely and 12 are extremely likely to receive the vaccine in the future. Table 1, Panel B, shows receipt of HPV vaccine by selected study variables. We found that the variable, years of residency in the US, is associated with receipt of HPV vaccine. Specifically, those who have lived longer in the US are more likely to receive HPV

vaccine (17.07 vs. 12.04; $p = 0.05$). We also found that English proficiency is significantly associated with receipt of HPV vaccine ($p = 0.04$).

English Proficiency

Forty-seven percent ($n = 53$) of the whole sample reported having the ability to understand spoken English very well, as well as having the ability to read, speak, and write in English very well. Mean English proficiency score for the whole sample was 17.44 ($SD = 2.96$). Table 1, column C, shows the mean English proficiency scores by selected variables. We observed that mean English proficiency scores significantly varied by length of residence in the United States ($p < 0.0001$); country of birth ($p < 0.001$); and insurance status ($p < 0.001$). Of interest is that we did not observe statistically significant differences in mean English proficiency score by level of education ($p = 0.078$).

Knowledge Related to HPV

Table 2, Panel A shows the distribution of correct responses on the knowledge items related to HPV vaccine. Seventy percent of the sample ($n = 79$) responded correctly that HPV increases the risk for cervical cancer. However, as many as 60 % responded incorrectly, that HPV infection can be cured with medication. In addition, only 58 % correctly responded that adolescents are likely to get infected with HPV once they start having sex. When we assessed the extent to which these knowledge items are associated with receipt of HPV vaccine, we found that most items were significantly associated with receipt of HPV vaccine (Table 2, Panel B). Marginal significance for the items regarding transmission of HPV (Women get infected with HPV and pass the virus to partners and men get infected with HPV and pass the virus to partners) was observed ($p = 0.061$; $p = 0.069$, respectively).

Multivariable Analysis

We conducted multivariable logistic regression in order to assess the influence of limited English proficiency on receipt of the HPV vaccine, adjusting for years of residency in the US. We also assessed which of the knowledge items was most associated with receipt of the HPV vaccine.

Table 3, Panel A, shows that English proficiency was significantly associated with receipt of the vaccine. Those who were proficient were 4 times more likely to receive HPV vaccine. Of the knowledge items (Table 3, Panel B), the item “People infected with HPV can be cured with medication” was the most important predictor for receiving HPV vaccine. Specifically, those who correctly responded were 3.8 times more likely to report receiving the HPV vaccine ($OR = 3.8$; 95 % confidence interval = 1.1; 13.5; $p = 0.04$).

Discussion

Our hypothesis that limited English proficiency would be a correlate of receipt of the HPV vaccine in Vietnamese American women was supported by the results. Women who reported having the ability to write, understand, read, and speak English very well were significantly more likely to have received the HPV vaccine than women who reported less proficiency in English. Only 14 % of the sample reported receiving the HPV vaccine or shots, and only

69 % of these individuals had received all three shots. National surveys of representative samples of American women have also found that vaccination rates for the HPV vaccine remain low. The National Immunization Survey of Adults in 2007 found that only 9.9 % of the adult women surveyed in the age range of 18–26 had received at least one dose of HPV vaccine (CDC, 2007). Similarly, a cross-sectional survey of females aged 13–26 found that only 9 % of 18- to 26-year-olds reported receipt of at least one HPV vaccine. Thirty percent of 13- to 17-year-olds reported receiving at least one HPV vaccine [27]. The National Health and Nutrition Examination Survey in 2007–2008 found that 15.2 % of the females aged 11–26 reported HPV vaccine initiation [28]. Unfortunately, the vaccination rates for Vietnamese-American women were not reported in any of the national surveys.

It should be noted that 9 women responded that they are not at all likely to receive HPV vaccine. Vietnamese-American women face multiple barriers to receiving optimal medical care, including preventive vaccines. Limited English proficiency is associated with less than adequate primary health care, including preventive care [29–31]. When health care providers do not speak the language of their patients, then communication barriers typically exist. Many clinics lack adequate translation services and may rely on family members or others who are not trained medical translators.

In addition to language barriers, many Vietnamese-American women may face financial barriers to obtaining preventive vaccines. In our sample, 32 % of the women had no health insurance, and only 26 % reported private health insurance. Recent research results suggest that cost of the HPV vaccine is a significant barrier for individuals who lack adequate health insurance [32, 33].

In our results, knowledge related to HPV was also significantly associated with receipt of the HPV vaccine. Most of the knowledge items were significantly associated with initiation of the vaccine. The incorrect belief that people infected with HPV can be cured with medication was the most important variable in the multivariate analyses associated with receiving the vaccine. Women who did not endorse this belief were almost four times more likely to report receiving the vaccine. Previous research has documented that Asian-American women had limited knowledge about HPV [34].

Our results suggest that Vietnamese-American women in the Houston area could benefit from education on the HPV vaccine and its role in preventing cervical cancer. Future research should address the development and evaluation of culturally appropriate educational programs on HPV and cervical cancer for Vietnamese-American women. As the recommended age for receiving the vaccine is 11–12 years, with catch-up vaccinations recommended for ages 13–26, such programs should focus on educating parents as well as the girls and young women who may receive the vaccine. Given the importance of elders in Vietnamese-American culture, including parents and grandparents in educational programs should enhance their efficacy [35].

Our study has several limitations. We used a convenience sample of women, limiting the generalizability of our findings. It is possible that our sample is not representative of the population of Vietnamese-American women living in the Houston area. A selection bias also

is possible given that the women were willing to complete an interview on preventive health practices. Our measure of vaccine receipt was based on self-report and not corroborated by medical records. Previous research, however, has documented that self-report is a valid measure of receipt of preventive vaccines [36, 37].

In conclusion, Vietnamese-American women experience disparities in the incidence of cervical cancer. The HPV vaccine is crucial for preventing the development of this potentially life-threatening disease. Our results indicate that limited English proficiency and knowledge of HPV are important factors associated with receipt of the HPV vaccine in Vietnamese-American women. Important public health needs are the development and evaluation of educational programs on HPV and cervical cancer that are designed for Vietnamese-American women.

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References

1. United States Census Bureau. [Retrieved July 28, 2010] American community survey 1-year estimates. 2008. <http://factfinder.census.gov/>
2. Yi JK, Gor B, Hoang T. What we know and don't know about Asian American health in Texas. *Texas Medicine*. 2004; 100:64–70.
3. The National Archives Title VI. [Accessed May, 2012] Prohibition against national origin discrimination affecting limited English proficient persons. Available from <http://www.archives.gov/eo/laws/title-vi.html#intro>
4. Farmer GC, Papachristou T, Gotz C, Yu F, Tong D. Does primary language influence the receipt of influenza and pneumococcal immunizations among community-dwelling older adults? *Journal of Aging Health*. 2010; 22:1158–1183. [PubMed: 20660635]
5. Ma GX, Shive SE, Fang CY, et al. Knowledge, attitudes, and behaviors of hepatitis B screening and vaccination and liver cancer risks among Vietnamese Americans. *Journal of Health Care for the Poor and Underserved*. 2007; 18:62–73. [PubMed: 17337798]
6. Nguyen GT, Leader AE, Hung WL. Awareness of anticancer vaccines among Asian American women with limited English proficiency: An opportunity for improved public health communication. *Journal of Cancer Education*. 2009; 24:280–283. [PubMed: 19838885]
7. Nguyen GT, Chen B, Chan M. Pap testing, awareness, and acceptability of a human papillomavirus (HPV) vaccine among Chinese American women. *Journal of Immigrant and Minority Health*. 2012; 14:803–808. [PubMed: 22447177]
8. Taylor VM, Talbot J, Do HH, et al. Hepatitis B knowledge and practices among Cambodian Americans. *Asian Pacific Journal of Cancer Prevention*. 2011; 12:957–961. [PubMed: 21790233]
9. Uwemedimo OT, Findley SE, Andres R, Irigoyen M, Stockwell MS. Determinants of influenza vaccination among young children in an inner-city community. *Journal of Community Health*. 2012; 37:663–672. [PubMed: 22045471]
10. Yi JK, Swartz MD, Reyes-Gibby CC. English proficiency, symptoms, and quality of life in Vietnamese- and Chinese-American breast cancer survivors. *Journal of Pain and Symptom Management*. 2011; 42:83–92. [PubMed: 21227634]
11. Miller BA, Chu KC, Hankey BF, Ries LA. Cancer incidence and mortality patterns among specific Asian and Pacific Islander populations in the US. *Cancer Causes and Control*. 2008; 19:227–256. [PubMed: 18066673]
12. US Department of Health and Human Services. Washington DC: US Government Printing Office; 2000. *Healthy People 2010—understanding and improving health*; p. 3-23.2012

13. Wallin KL, Wiklund F, Angstrom T, et al. Type-specific persistence of human papillomavirus DNA before the development of invasive cervical cancer. *New England Journal of Medicine*. 1999; 341:1633–1638. [PubMed: 10572150]
14. vanMuyden RC, ter Harnsel BW, Smedts FM, et al. Detection and typing of human papillomavirus in cervical carcinomas in Russian women: A prognostic study. *Cancer*. 1999; 85:2011–2016. [PubMed: 10223243]
15. Tabrizi SN, Fairley CK, Chen S, et al. Epidemiological characteristics of women with high grade CIN who do and do not have human papillomavirus. *British Journal of Obstetrics and Gynaecology*. 1999; 106:252–257. [PubMed: 10426645]
16. Weinstock H, Berman S, Cates W Jr. Sexually transmitted diseases among American youth: Incidence and prevalence estimates, 2000. *Perspectives on Sexual and Reproductive Health* [serial online]. 2004; 36:6–10.
17. Clifford GM, Smith JS, Plummer M, Munoz N, Franceschi S. Human papillomavirus types in invasive cervical cancer worldwide: A meta-analysis. *British Journal of Cancer*. 2003; 88:63–73. [PubMed: 12556961]
18. Munoz N, Bosch FX, Castellsague X, et al. Against which human papillomavirus types shall we vaccinate and screen? The international perspective. *International Journal of Cancer*. 2004; 111:278–285. [PubMed: 15197783]
19. Munoz N, Bosch FX, de Sanjose S, et al. Epidemiologic classification of human papillomavirus types associated with cervical cancer. *New England Journal of Medicine*. 2003; 348:518–527. [PubMed: 12571259]
20. Clifford G, Franceschi S, Diaz M, Munoz N, Villa LL. Chapter 3: HPV type-distribution in women with and without cervical neoplastic diseases. *Vaccine*. 2006; 24(Suppl 3) S3–26–S3/34.
21. Advisory Committee on Immunization Practices (ACIP). Quadrivalent human papillomavirus vaccine. *MMWR—Morbidity and Mortality Weekly Report*. 2007; 56:1–24. [PubMed: 17218934]
22. 2010. <http://www.archives.gov/eo/laws/title-vi.html#intro>
23. Massad LS, Evans CT, Wilson TE, et al. Knowledge of cervical cancer prevention and human papillomavirus among women with HIV. *Gynecologic Oncology*. 2010; 117:70–76. [PubMed: 20106513]
24. Massad LS, Evans CT, Weber KM, et al. Changes in knowledge of cervical cancer prevention and human papillomavirus among women with human immunodeficiency virus. *Obstetrics and Gynecology*. 2010; 116:941–947. [PubMed: 20859159]
25. Brabin L, Roberts SA, Farzaneh F, Kitchener HC. Future acceptance of adolescent human papillomavirus vaccination: A survey of parental attitudes. *Vaccine*. 2006; 24:3087–3094. [PubMed: 16500736]
26. 2012 <http://www.chis.ucla.edu/questionnaires.html>.
27. Caskey R, Lindau ST, Alexander GC. Knowledge and early adoption of the HPV vaccine among girls and young women: Results of a national survey. *Journal of Adolescent Health*. 2009; 45:453–462. [PubMed: 19837351]
28. Taylor LD, Hariri S, Sternberg M, Dunne EF, Markowitz LE. Human papillomavirus vaccine coverage in the United States, National Health and Nutrition Examination Survey, 2007–2008. *Preventive Medicine*. 2011; 52:398–400. [PubMed: 21108962]
29. Woloshin S, Schwartz LM, Katz SJ, Welch HG. Is language a barrier to the use of preventive services? *Journal of General Internal Medicine*. 1997; 12:472–477. [PubMed: 9276652]
30. Pearson WS, Zhao G, Ford ES. An analysis of language as a barrier to receiving influenza vaccinations among an elderly Hispanic population in the United States. *Advances in Preventive Medicine*. 2011; 2011:298787. [PubMed: 21991435]
31. Hirano DM. Asian American health research: What community agencies on the front line need to know. *Progress in Community Health Partnerships*. 2012; 6:59–64. [PubMed: 22643789]
32. Conroy K, Rosenthal SL, Zimet GD, et al. Human papillomavirus vaccine uptake, predictors of vaccination, and self-reported barriers to vaccination. *Journal of Women's Health (Larchmt)*. 2009; 18:1679–1686.

33. Ma GX, Fang CY, Feng Z, et al. Correlates of cervical cancer screening among Vietnamese American Women. *Infectious Diseases in Obstetrics and Gynecology*. 2012; 2012:617234. [PubMed: 23008526]
34. Marlow LA, Wardle J, Forster AS, Waller J. Ethnic differences in human papillomavirus awareness and vaccine acceptability. *Journal of Epidemiology and Community Health*. 2009; 63:1010–1015. [PubMed: 19762455]
35. Nguyen GT, Chen B, Chan M. Pap testing, awareness, and acceptability of a human papillomavirus (HPV) vaccine among Chinese American women. *Journal of Immigrant and Minority Health*. 2012; 14:803–808. [PubMed: 22447177]
36. Zapka JG, Bigelow C, Hurley T, et al. Mammography use among sociodemographically diverse women: the accuracy of self-report. *American Journal of Public Health*. 1996; 86:1016–1021. [PubMed: 8669504]
37. Huhn GD, Brown J, Perea W, et al. Vaccination coverage survey versus administrative data in the assessment of mass yellow fever immunization in internally displaced persons— Liberia, 2004. *Vaccine*. 2006; 24:730–737. [PubMed: 16182416]

Table 1

Characteristics of the study sample (N = 113)

Characteristics	Panel A N (%)	Panel B Receipt of HPV vaccine Yes/no	Panel C English proficiency mean
Years of residency (mean; SD)	12.75 8.6	17.07 ^{*/} 12.04	0.611 ^{***}
Mean age (SD)	22 (3)	22 (3)/ 21 (3)	-0.070
Country of birth			
Vietnam	66 (58)	7/59	16.08 ^{**}
United States	42 (37)	8/34	19.38
Other	5 (5)	1/4	19.00
Education			
Grades 6 or less	0		0
Grades 7–9	0		0
Grades 10–12	20 (25)	6/24	16.33
Some college	26 (33)	6/25	17.88
College degree	21 (27)	2/31	17.60
Post graduate	12 (15)	2/12	18.35
Income			
Less than \$20,000	24 (22)	3/21	17.08
\$20,000 to under \$30,000	13 (12)	1/12	17.16
\$30,000 to under \$40,000	16 (14)	2/14	19.33
\$40,000 to under \$50,000	6 (5)	0/6	19.33
More than \$50,000	17 (15)	4/13	18.35
Don't know/not sure	28 (25)	5/23	17.92
Refused	7 (6)	1/6	14.71
Insurance			
Private	29 (26)	5/24	19.07 ^{**}
Medicare	7 (6)	0/7	17.28
Medicaid	2 (2)	1/1	20.00
Self-pay	8 (7)	1/7	16.00
No insurance	36 (32)	2/34	16.44
Other	13 (12)	2/11	16.53
Don't know	13 (12)	5/8	18.84
Refused	3 (3)	0/3	15.66
Relationship status			
Not dating	44 (39)	6/38	16.79
Dating but no steady partner	31 (27)	2/29	17.10
Steady but not living together	22 (20)	6/16	19.50
Steady and living together	13 (12)	1/12	17.38
Married	3 (3)	1/2	15.66

Characteristics	Panel A N (%)	Panel B Receipt of HPV vaccine Yes/no	Panel C English proficiency mean
Religion			
Catholic	38 (34)	7/31	17.47
Buddhist	50 (44)	4/46	17.32
Other	10 (9)	3/7	19.20
None	13 (12)	2/11	16.69
Job status			
Employed, full-time	17 (15)	1/16	18.11
Employed, part-time	20 (18)	1/19	17.15
Unemployed	7 (6)	3/4	18.42
Student	65 (58)	11/54	17.21
English proficiency	17(3)	19(3)/17(3) *	

*
 $p < 0.05$

**
 $p < 0.01$

 $p < 0.001$

Table 2

Knowledge regarding HPV among the study sample

Items	Panel A Correct responses N (%)	Panel B Receipt of vaccine N (%)
People infected with HPV are at higher risk for cervical cancer	79 (70)	16 (20) *
People infected with HPV can be cured with medication	45 (40)	12 (28) *
Women get infected with HPV, and pass the virus to partners	75 (66)	13 (17)
Men get infected with HPV and pass the virus to partners	70 (62)	13 (19)
People infected with HPV usually can tell they have it	74 (66)	16 (22) *
Vaccination against HPV will help reduce the risk of developing cervical cancer	78 (69)	15 (19) *
Adolescents are likely to get infected with HPV once they start having sex	66 (58)	15 (23) *

* p < 0.05

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Table 3

Association between English proficiency (Panel A) and knowledge item (Panel B) and receipt of HPV vaccine among the study sample

Odds ratio	95 % confidence interval	p value
<i>Panel A: English proficiency</i>		
4.4	1.2; 16.5	0.03
<i>Panel B: Knowledge item*</i>		
3.8	1.2; 13.5	0.03

* Correct response on item "People infected with HPV can be cured with medication" Adjusted for years lived in the US

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