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Factors Associated with HPV Vaccination among Cambodian American Teenagers

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Abstract

Background—Parents have general influence over their children's health and health behavior. However, given the dearth of specific literature regarding knowledge level and social and cultural factors influencing HPV vaccination behaviors among Cambodian American (CA) parents, it is difficult to develop an effective, evidence-based public health HPV vaccination program for this particular population without further investigation.

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Methods—CA mothers (n=130) completed a health survey through face-to-face interviews in either English or Khmer language.

Results—Girls vaccination rates were 29% while that of boys was 16%. Awareness and knowledge of HPV among CA mothers was very low, and many believed that their daughters, who speak English and were educated in the U.S., had more knowledge about health than they did. Logistic regression analysis showed that Cambodian American girls had significantly higher odds of vaccination when their mothers possessed a higher level of English reading ability and had greater awareness and knowledge of HPV.

Conclusions—The strikingly low rates of HPV vaccination among CA girls and boys underscore the need to improve vaccination outreach, education, and uptake. The findings can be used to develop targeted public health HPV vaccination programs for CAs which will reduce cervical cancer disparities.

Keywords

HPV vaccination rates; health knowledge; Cambodian Americans; family health

Introduction

The cervical cancer rate remains high among ethnic minority and foreign-born women in the U.S. despite reduced cervical cancer incidence and mortality rates overall (National Cancer Institute, 2013). While the cervical cancer rate is low among Asian American and Pacific Islanders (AAPI) women, Southeast Asian American women have a higher incidence rate of invasive cervical cancer than most other racial/ethnic groups in the U.S. (Ho and Dinh, 2011; Kem and Chu, 2007; Yang, Mills and Riordan, 2004) with rates among Cambodian American (CA) women (15.0/100,000) and Vietnamese American women (14.0/100,000) twice that of White women (Kem and Chu, 2007; McCracken et al., 2007). Hmong American women also experience significantly higher cervical cancer rates than those of Asian American Pacific Islanders (AAPI) women overall and non-Hispanic white women (33.7/100,000, 11.0/100,000 and 8.1/100,000 respectively) (Yang et al., 2004). Genital HPV infection is both common, with sexually transmitted infection through HPV in in the U.S. ranging in prevalence from 14% to 90% (Markowitz et al., 2014) and infection related to almost 100% of cervical cancer cases. Approximately 70% of cervical cancers are caused by two strains of HPV (16 and 18) (World Health Organization, 2015). Cervical cancer is a gender-specific disease caused by HPV infection; however, infection also affects men and is the cause of cancers of the vulva, vagina, penis, anus, oropharynx (Forman et al., 2012).

Three HPV vaccines are now available for the prevention of HPV: abivalent HPV2 (Cervarix), a quadrivalent, HPV4 (Gardasil), and the most recent a 9-valent HPV (Gardasil 9). The bivalent vaccine is directed against two oncogenic HPV types 16 and 18. The quadrivalent targets oncogenic HPV types 16 and 18 and non-oncogenic HPV types 6 and 11. The most recent HPV vaccine, the 9-valent HPV was approved in December 2014 by the FDA to protect against 9 strains of HPV: 4 strains from the previous quadrivalent plus 5 additional strains also associated with cervical cancer (Lowy, 2016). These vaccines have high efficacy against HPV 16 and 18 related cervical precancerous lesions and appear promising in the

effort to reduce cervical cancer (Handler, Handler, Majewski, & Schwartz, 2015; Lowy, 2016). The U.S. Advisory Committee on Vaccination recommended the HPV vaccine for adolescent girls in 2006 and added adolescent boys in 2011; however, HPV vaccine coverage rates are much lower, with only 57.5% participation in girls in 2013, a rate far below the Healthy People 2020 target of 80% (Elam-Evans et al., 2014; Petrosky et al., 2015; U.S. Department of Health and Human Services, 2013).

Given that HPV vaccines are now targeted at both males and females with emphasis placed on receiving these vaccines at ages 11 and 12 in order to promote inoculation prior to the onset of sexual activity, parental permission is required for them (National Conference on State Legislation, 2009). Studies have documented that parents exert influence over their children's health and health behavior, and mothers are widely acknowledged to be the primary health educators for children and families (Katherine et al., 2012; Murphy, Roberts and Herbeck, 2012; Tiro et al., 2012). In addition, most adolescents not only make vaccination decisions with their parents but also need their financial support. In studies done with White, Black, and Hispanic/Latino adolescent girls, mothers with higher levels of knowledge about their children's health issues, who talked to their children about vaccination and sex were associated with higher vaccination rates (Katherine et al., 2012; McRee, Reiter, Gottlieb & Brewer, 2011; Murphy et al., 2012). However, there is a dearth of literature about knowledge levels and social and cultural factors that influence vaccination behaviors among Cambodian American parents. As a result, developing an effective HPV prevention program for this group has been difficult. AAPIs are a diverse population with varied social and demographic characteristics that may affect their health and health behaviors. Because targeting specific subgroups of AAPIs rather than viewing AAPIs as homogenous group is important, CA mothers were specifically selected for this study. Our purposes were to 1) examine the HPV vaccination rates among CA teenagers; 2) assess the knowledge levels CA mothers possess about HPV infection and their willingness to allow vaccinations for their teenage girls; and 3) examine factors influencing HPV vaccine uptake.

Methods

Study Design and Population

A descriptive, cross-sectional survey was designed and implemented among CA mothers residing in Massachusetts. Asian Americans comprise 6% of the population of Massachusetts (MA) (U.S. Census Bureau, 2012). MA ranks tenth among all states in its AAPI population, and has one of the largest Southeast Asian populations in the U.S. The population of CAs in MA is 24,424, with the majority residing in the cities of Lowell (14,470), Lynn (3,899), and Fall River (1,241). Lowell, MA has the second largest Cambodian population (after Long Beach, California) and the highest proportion of residents of Cambodian origin (10.4%) of any city in the U.S (Lo, 2012). CA students account for one-third of the enrollment of Lowell High School with 1400 of roughly 4,000 students enrolled in grades nine through twelve. More than 70% of CAs are refugees and immigrants, many of whom face the task of developing new networks and social relations both with members of their ethnic group and with the mainstream population. Among AAPIs, CAs are especially vulnerable to cultural, linguistic and economic isolation from

Western medical systems. The 2010 U.S. Census indicated that among all AAPIs, CAs had the highest poverty rate and the highest proportion of those who were linguistically isolated with over 90% speaking Khmer at home (Presto, October 31, 2009; U.S. Census Bureau, 2012).

Sampling Methods

A combination of network and targeted sampling methods that were culturally and scientifically appropriate for Cambodian Americans was used to recruit to the study. AAPIs are a hard-to-reach ethnic group and difficult targets for subject recruitment due to linguistic barriers, lack of insurance, low utilization of health care systems, dispersion of the population, and attitudes and knowledge about research participation (Lee and Back, 2011; Lo, 2012; Presto, October 31, 2009; U.S. Census Bureau, 2012). CAs are difficult to locate, and accurate, comprehensive lists of CAs do not exist. However, targeted-AAPI community studies have shown that good sample coverage of minority groups can be achieved through well-planned convenience sampling in concentrated, targeted areas or in AAPI community locations where group members can be found (Islam, et al., 2010; Lee and Baik, 2011; Lee and Cheng, 2006; Park and Sha, 2015).

Sampling strategies for the study were developed in partnership with the Khmer Cultural Association, Metta Health Center, and Community Health Leaders (CHLs). The Metta Health Center of Lowell Community Health Center (LCHC; funded by the CDC) serves as the major community clinic in Lowell for Cambodians, and provides care for approximately 5,000 Khmers. Our multi-pronged, collaborative approach to recruitment, with all parties recognized as equal partners facilitated the inclusion of community perspectives and involvement in all phases, from program announcement to data collection. This resulted in building and strengthening both individual and community capacity. Before commencing recruitment and working with community health leaders (CHLs), we sought to increase awareness and encourage participation on the study by 1) advertising on local Khmer TV and radio, which are trusted health messengers for CA communities; 2) posting flyers at locations frequented by CAs (e.g, temples, ethnic grocery stores, restaurants, and community health centers); and 3) using word of mouth message through CHLs and key informants to target CAs in MA. We used "*Tell-A-Friend about Data is Power*" as an ad campaign to communicate the importance of collecting data from CAs for CAs. The social network of the researchers and CHLs who were involved in CA health care and who knew many CA leaders was utilized. We also purchased booths at local Cambodian or Southeast Asian festivals for the study. The targeted sampling method helped us to recruit the participants who were not socially networked with other CAs.

Inclusion criteria were the ability to speak and read Khmer or English, being at least 18 years of age, the mother of a 12 to 17 year-old girl, and a resident in U.S. CA mothers who had more than one daughter between the ages of 12 to 17 were asked to think about their younger daughter as they answered the survey questions. Assuming 30% of CA girls received HPV vaccination (Reagan-Steiner et al., 2015; Taylor et al., 2012), a sample size of 130 would provide 80% power to detect a multivariable model odds ratio as small as

OR=1.8 attributable to the factor of interest, after adjustment for additional predictors that are correlated to the factor of interest with an R^2 of 10%, with two-sides α=0.05.

Data Collection Procedures

The study was approved by the institutional review board of University of Massachusetts Boston. Cambodian American mothers completed a health survey through face-to-face interviews in either English or Khmer. A bilingual Khmer and English health survey about HPV vaccination was developed based on exhaustive literature review and qualitative data and was tested for face and content validity (Lee et al., 2015). The health survey was pretested with cognitive interviews which provided formative validity through assessing item content, item styles, comprehensiveness, and responsiveness (Lee et al., 2015). During the cognitive testing stage of research, we discussed whether the participants who had never heard of HPV should then skip the subsequent knowledge questions. Two issues arose in discussing this concern. One is that Cambodians perceived their answer of "have never heard of HPV" not in the sense of word for word definition but in the sense that they should have knowledge or direct or indirect experience with the topic. Furthermore, there is no precise Khmer word for HPV. Therefore, as suggested by Cambodian health leaders and interviewers, we decided to add an additional statement about HPV with a diagram after we asked the question about awareness of HPV (Lee et al., 2015). HPV vaccination rates for girls, boys, and mothers were measured. Data on factors associated with vaccination rates such as the mother's age, percent of life lived in the U.S., income, education in the U.S., English reading ability, awareness and knowledge of HPV, and comfort level in speaking with their daughters about STDs were collected. The average time to complete the survey was 30 minutes and the participants were offered $60 payments in the form of a gift certificate.

Statistical Methods

Descriptive statistics were computed on all variables using means with standard deviations or percentages, as appropriate to each measure. An overall knowledge score was calculated as the sum of correct answers on the 8-item scale. One point was given for each correct answer and no points were given for either an incorrect answer or an uncertain (did not know) answer. Scores of more than 5 correct responses out on 8 questions were categorized as knowledgeable. Logistic regression models were used to examine the relationships between the daughters' HPV vaccination status, sociodemographic characteristics, mother's knowledge of HPV, and health communication between mothers and daughters. The results of the models are presented as odds ratios (ORs) which estimate the likelihood mothers with a given factor would have their daughters vaccinated compared to those without such a factor. Statistical analysis was performed using SPSS 23.0 (IBM, Armonk, NY, USA). Statistical significance level was set at $p< 0.05$.

Results

Descriptive statistics of the total sample of 130 are presented in Table 1. We conducted 80 surveys (62%) in Khmer and 50 surveys (38%) in English. Of the 130 Khmer mothers, 92% were born in Cambodia and the majority lived in refugee camps before moving to the US.

The mean age was 45 years, and only 48% were married or living with someone as couple. Only 47% attended/finished high school in the U.S., and 23% reported that monthly family income from all sources was less than $1,000. Overall, the survey sample was fairly similar to the CA sociodemographic profile in Lowell and in MA overall.

As shown in Table 1, overall HPV vaccination rates of both girls and boys were very low, but rates among girls was significantly higher, at 33%, than boys at 19%. Among mothers whose daughters did not have vaccinations or who were not sure about their daughters' vaccination uptakes, only 12% reported that a physician had recommended HPV vaccination for their daughters, and 72% reported they would like their daughters to receive HPV vaccinations in the future.

Awareness and knowledge of HPV among CA mothers were low (Table 2). More than half (55%) of the mothers had never heard the term HPV and about 72% said that HPV is an STD. About half the respondents knew that men can get HPV, and 67% knew that HPV is a risk factor for cervical cancer. Furthermore, 44% wrongly believed that HPV results from poor hygiene and 22% believed HPV resulted from bad food in the refugee camp. The mean score for mothers' knowledge of HPV infection was very low, averaging 3.61 ± 2.30 out of 8 points possible. In general, Khmer mothers thought that their daughters who spoke English and were educated in the U.S. had more knowledge about general health and sex than they did.

Simple logistic regression analysis showed that CA girls had significantly higher odds of vaccination if their mothers had heard of HPV (OR = 2.88; 95% CI: 1.35–6.18), or had a high knowledge score of HPV (OR = 5.73; 95% CI: 2.53–12.97). However, after adjusting for age, percent of life in the U.S., monthly family income, education in the U.S., English literacy level, only the mothers' HPV knowledge (OR = 4.08; 95% CI: 1.50–11.05) was significantly associated with daughters' HPV vaccination rates.

Discussion

Overall, CA mothers reported that 33% of their daughters and 19% of their sons received at least one dose of HPV vaccinations in 2013. These findings are similar to but not higher than those of earlier studies of CA mothers conducted in Seattle, Washington in 2010 and 2013, who reported that 26% and 29% of their daughters received vaccinations. Studies conducted in Los Angeles, California, in 2009 with Chinese and Korean American mothers, indicated that 25% of Chinese American girls and 24% of Korean American girls had received vaccinations (Bastani et al., 2011; Taylor et al., 2012; Taylor et al., 2014). These rates are significantly lower than national average HPV vaccination rates from National Immunization Survey (NIS)-Teen. The national data showed that coverage with >1 HPV doses in 2013 was 57.5% for females and 34.6% for males, and coverage of HPV doses increased on average 4.5% points annually from 2007 to 2013 for females and 9.9% points from 2010 to 2013 for males (Elam-Evans et al., July 25, 2014). The disparities in HPV vaccination rates among CA females have also been observed in cervical cancer screening (Ho & Dinh, 2011; Robinson et al., 2014). Cervical cancer can be prevented with HPV vaccination, early screening, and treatment. The lower utilization of cancer prevention

among AAPIs, including CAs, points to the importance of developing and conducting cervical cancer prevention programs to target AAPIs.

The high level of CA mothers' willingness to allow HPV vaccinations is consistent with what has been reported in other studies with AAPI mothers (Chow et al., 2010; Marlow, Wardle, Forster, and Waller, 2009; Yi, Zahn, Castaneda, and Hwang, 2013). Immunization clinics or health care providers provide a promising avenues to inform mothers of HPV vaccines and recommend vaccinations for their daughters, especially since studies have consistently reported that physicians' recommendations are the most important predictor of vaccination rates. Only 9% of CA mothers reported that a doctor or nurse had recommended HPV vaccinations for their daughters. The majority of mothers (55.0%) had never heard of HPV, and 36.0% were not aware of vaccine recommendations. Such findings stress the importance of health care providers buy in and communication skills. Our findings further reiterate the problem reported by the IOM in 2010 (Smedley, Stith and Nelson, 2003), that many Americans do not understand the health information they receive well enough to make informed decisions and act on them. Our previous studies reported lexical problems CA experience related to the lack of Khmer words for health terms (Lee, Kiang, Kim, et al., 2015; Lee, Kiang, Tang, et al., 2015), suggesting that health care providers need to develop culturally and linguistically relevant health communication skills, such as using culturally and linguistically competent health translators or drawings or stories to ensure that patients relate to information in ways that empower them to act on it.

Lack of awareness and knowledge were strong predictors of HPV vaccination rates (Miller et al., 1996; Holman et al., 2014). In our study, significantly lower proportions of CA mothers were aware of HPV infection (45%) and had a low level of knowledge of HPV infection. This low level of knowledge about HPV infection among CAs is consistent with previous studies conducted with CA mothers and other Asian Americans (Bastani et al., 2011; Taylor et al., 2012; Taylor et al., 2014). Our study also revealed that CA mothers are challenged by their traditional perceptions about parenting and by their incorrect belief that their daughters who were educated in the U.S. and who spoke English fluently, had more knowledge of health, sex, and sexually transmitted diseases than they did. Contrary to their beliefs, studies with Asian American college students or adolescents have consistently reported low levels of health knowledge among AAPI college students and adolescents and have pointed out that higher education and English proficiency are not predictors of health knowledge among Asian American young people.

The predictors of vaccine rates among CA girls in unadjusted analysis were: mothers having heard of HPV and having better knowledge of HPV; mothers' English language proficiency levels and mothers' feeling comfortable talking about health issues with their daughters. After adjusting, with the exception of knowledge, the other socio-demographic variables did not exert much influence on HPV vaccination rates. The findings of a significant relationship between vaccination uptake and knowledge levels should be noted.

The study had several limitations. The first is related to the using of non-probability sampling from limited geographic areas so that the participants might not be representative of other Cambodian Americans or Asian Americans. A second limitation is a lack of

variable control including interview settings and participants' mood which might influence participants' responses to the interview questions. Also, the face-to-face interview method might make the participant feel compelled to provide socially acceptable responses.

Public Health Implications

This study highlights the importance of developing multiple strategies for HPV and cervical cancer prevention. First, target group-specific and culturally relevant health education about HPV prevention is urgently needed to increase awareness and knowledge of HPV, HPV vaccination, and cervical cancer prevention among CAs. Second, there is a need for public health programs to assist CA mothers to accurately understand their children's health knowledge and health behaviors as well as to improve health commination with their English-speaking children. Third, it is important to develop and implement community-based public health programs that are proactive in increasing access to health care and that incorporate a linguistically and culturally relevant HPV prevention program rather than waiting for CAs to come to clinical settings. Lastly, public health intervention programs can be developed to improve provider-patient communication, both by encouraging CA mothers to ask their daughters' physicians for HPV vaccination and by encouraging health care providers to recommend HPV vaccinations.

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Table 1

Sociodemographic and Clinical Characteristics and HPV Vaccine Uptake (N=130)

Variables	Mean ± SD or %
Age	44.55 ± 7.59
Marital status	
Married/lived significant other	48.0
Separated or divorced	32.3
Never married	13.4
Widowed	6.3
Education attended in the US	
College, High School or GED	49.2
Other[a]	50.8
Monthly family income	
Less than $1,000	23.2
$1,000 to $2,999	56.0
More than $3,000	20.8
Current employment	
Yes	64.6
Health insurance	
Through government programs (Medicare, Medicaid, or MassHealth)	61.5
Private health insurance (i.e. HMO, Blue Cross)	45.0
Percent of Life in the US <50%	32.0
English Literacy	
Speak English	
Very well/well	44.6
Not very well/so-so	40.8
Not at all	14.6
Read English	
Very well/well	39.6
Not very well/so-so	35.7
Not at all	24.8
HPV Vaccine Uptake among Daughters (n=129)	
Yes	32.6
No	37.2
Don’t know	30.2
HPV Vaccine Uptake among Sons (n=70)	
Yes	18.6
No	60.0
Don’t know	21.4
Has a doctor or nurse ever recommended HPV vaccination?[b] (n=86)	
Yes	11.6

Variables	Mean ± SD or %
No	52.3
Don't know	36.0
Would you like your daughter(s) to receive an HPV vaccination at some time in the future?[b] (n=86)	
Yes	61.6
No	4.7
Undecided/Don't know	33.8

Note. GED=General Educational Development,

[a]Other= No school, English language school, citizenship classes, technical or vocational school

[b]This question was asked of mothers who indicated that their daughter(s) has not received or not sure whether she has received the HPV vaccination.

Table 2

Mothers' HPV Knowledge, Perception of Daughters' Health Knowledge, and Health Communication (n=130)

	Yes %	No %	Don't Know %
Awareness			
Have you ever heard of HPV?	45.0	55.0	–
Mothers' HPV Knowledge[a]			
Do you think that …			
1. women can get HPV because they do not have good personal hygiene	43.8	22.3	33.8
2. women can get HPV through sex	72.3	3.1	24.6
3. women can get HPV by being exposed to an unclean woman exam	51.5	18.5	30.0
4. women can get HPV through bad food eaten in the refugee camp	21.9	43.0	35.2
5. women can get HPV because they were not able to keep clean during Khmer rouge	41.5	26.9	31.5
6. women can get HPV because they were not able to keep clean in the refugee camp	36.9	27.7	35.4
7. men can get HPV	49.2	10.0	40.8
8. HPV can cause cervical cancer	66.9	1.5	31.5
Mothers' Perception of Daughter's Health Knowledge[b]			
1. Do you think that your daughter has more knowledge about *general health* than you do?	61.7	31.3	7.0
2. Do you think that your daughter has more knowledge about *health* because she speaks English better than you do? (n=79)	83.5	13.9	2.5
3. Do you think that your daughter has more knowledge about *sex* than you do?	51.6	26.6	21.9
4. Do you think that your daughter has more knowledge about *sex* because she speaks English better than you do? (n=65)	87.7	9.2	3.1
Health Communication	Very Comfortable	Somewhat Comfortable	Not at All Comfortable
How comfortable are you speaking to your daughter about STD? (n=98)	37.8	36.7	25.5

Note. HPV=human papillomavirus; STD=sexually transmitted diseases

[a] HPV Knowledge (8 questions); Mean=3.61, SD=2.30; Cronbach's Alpha=0.890

[b] Mother's Perception of Daughter's Health Knowledge (4 questions); Cronbach's Alpha=0.723

Table 3

Binary Logistic Regression Analysis on the HPV Vaccination

	Daughter's HPV Vaccination (n=129)[a]	
	Unadjusted OR (95% CI)	**Adjusted OR[b] (95% CI)**
Age	0.97 (0.92–1.02)	0.9 (0.89–1.04)
Percent of Life In the U.S.		
<50% of Life in the U.S.	–	–
More than 50% Of Life in the U.S	1.13 (0.51–2.50)	1.24 (0.36–4.26)
Monthly Family Income		
Less than $1,000	–	–
$1,000 to $2,999	0.81 (0.32–2.05)	1.01 (0.31–3.29)
More than $3,000	0.74 (0.23–2.36)	0.65 (0.12–3.54)
Education attended in the US		
Other[c]	–	–
College, High School or GED	1.02 (0.49–2.14)	0.66 (0.13–3.27)
Read English		
Not Very Well/So-So	–	–
Very Well/Well	1.70 (0.80–3.59)	0.61 (0.11–3.30)
Have you heard of HPV		
No	–	–
Yes	2.88 (1.35–6.18)*	2.21 (0.77–6.31)
Mothers HPV Knowledge		
Low (0–4)	–	–
High (5–8)	5.73 (2.53–12.97)**	4.08 (1.50–11.05)*
How comfortable are you speaking to your daughter about STD?		
Not very/Somewhat comfortable	–	–
Very comfortable	1.36 (0.58–3.18)	1.37(0.47–4.05)

Note. HPV=human papillomavirus, STD=sexually transmitted diseases, OR=Odd ratio, CI=Confidence interval

[a] Daughter's HPV Vaccination: 0=No; 1=Yes

[b] Odds ratios (95% confidence intervals) adjusted for all variables in the table

[c] Other=No school, English language school, citizenship classes, technical or vocational school

* Statistically significant (*p<0.05)*

** Statistically significant (*p<0.001)*