

## RESEARCH ARTICLE

# Vietnamese Health Care Providers' Preferences Regarding Recommendation of HPV Vaccines

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### Abstract

Physician recommendation is an important predictor of HPV vaccine acceptance; however, physician willingness and preferences regarding HPV vaccination may be influenced by factors including patient age, vaccine type, and cost. A cross-sectional survey was administered to a convenience sample of health care providers in Da Nang, Vietnam, to evaluate awareness, perceptions about HPV and HPV vaccines, and willingness to vaccinate a female patient. Willingness to vaccinate was evaluated using a full-factorial presentation of scenarios featuring the following factors: vaccine cost (free vs 1,000,000 VND), patient age (12, 16, or 22 years), and HPV vaccine type (bivalent vs quadrivalent). Responses from 244 providers were analyzed; providers had a mean age of 34 ± 11.9 years; a majority were female, married, and had children of their own. Thirty-six percent specialized in obstetrics/gynecology and 24% were providers in family medicine. Of the three factors considered in conjoint analysis, vaccine cost was the most important factor in willingness to vaccinate, followed by patient age, and vaccine type. The most favorable scenario for vaccinating a female patient was when the vaccine was free, the patient was 22 years of age, and the HPV4 vaccine was described. In multivariable analysis, older age, being a physician, being married, and having children were all associated with increased willingness to recommend HPV vaccination ( $p < 0.05$ ). Provider willingness is an important aspect of successful HPV vaccination programs; identifying preferences and biases in recommendation patterns will highlight potential areas for education and intervention.

**Keywords:** Cervical cancer prevention - conjoint analysis - human papillomavirus vaccine - provider preferences

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### Introduction

Globally, cervical cancer is the second most common cancer in women and is the most common cancer among women in developing countries. Approximately half a million women are newly affected by cervical cancer each year and more than half die from the disease (International Agency for Research on Cancer [IARC], 2012). Of the estimated 266,000 annual cervical cancer deaths in 2012, almost nine out of ten occur in less developed countries (IARC, 2012). In Vietnam, cervical cancer is the fifth most frequent cancer among women, with approximately 5,174 new diagnoses and 2,472 deaths each year (Bruni et al., 2014). This largely preventable cancer has the highest age-specific incidence of all cancers among women 15-44 years of age, at 9.6 per 100,000 women in Vietnam (Bruni et al., 2014). Vaccines to prevent human papillomavirus (HPV), the causative agent in invasive cervical cancer (Walboomers et al., 1999), are potentially life-saving

interventions for thousands of Vietnamese women.

Two HPV vaccines are now licensed and available in Vietnam (Bruni et al., 2014). The HPV2 vaccine prevents HPV types 16 and 18 which cause 70% of cervical cancers, and the HPV4 vaccine prevents HPV types 16 and 18, as well as 6 and 11, which cause 90% of genital warts (Centers for Disease Control and Prevention, 2013a). Clinical trials have demonstrated the safety and efficacy of the vaccines (Harper et al., 2004; Villa et al., 2005; Harper et al., 2006; Romanowski et al., 2009). HPV vaccines offer the greatest benefit when administered to women who have not been exposed to HPV. In the United States (U.S.), HPV prevalence increases with each year of age from 14 to 24 years (Dunne et al., 2007); globally, the recommended age at which HPV vaccination should occur will vary with differences in the normative timing of sexual debut (World Health Organization [WHO], 2014). In Vietnam, vaccine cost and effectiveness influence decisions surrounding HPV uptake among mothers (Poulos et al., 2011) as well

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as the advice of health workers (Cover et al., 2012).

Health care providers' acceptance and recommendation of vaccines may vary by country, provider characteristics, and by patient characteristics such as sex, age, and race/ethnicity (Cover et al., 2012; Ylitalo et al., 2013). In the U.S., physician recommendation has been identified as an important predictor of uptake of HPV and other adolescent vaccines (Do et al., 2009; Gargano et al., 2013; Ylitalo et al., 2013), with a 4-fold greater likelihood of vaccination resulting from a strong recommendation (Rosenthal et al., 2011). Similarly, in Vietnam, the advice of health workers is a primary motivator for parents to participate in HPV vaccine programs (Cover et al., 2012). Other influences in Vietnam include vaccination being a recognized way of preventing disease and trusted involvement of the government in vaccination programs (LaMontagne et al., 2011; Cover et al., 2012). It is important to understand physician attitudes and beliefs regarding vaccination against HPV to ensure consistent recommendation and administration of the vaccine by health care providers. The objective of this study was to compare Vietnamese health care providers' preferences and the tradeoffs that they are willing to make to recommend HPV vaccination with regard to three factors: patient age, type of HPV vaccine, and cost.

## Materials and Methods

### Study design and participants

The study design was cross-sectional and used survey methodology. Data collection occurred in December 2009 in Da Nang, Vietnam. A convenience sample of Vietnamese health care providers at Da Nang General Hospital and its associated clinics were recruited in person to participate in an anonymous survey about HPV vaccination. Individuals were eligible if they were at least 18 years of age, self-identified as a health care provider, and provided oral assent to participate. The study was approved under expedited review procedures by a U.S. Institutional Review Board and by the Director of Da Nang General Hospital.

### Measures

The survey instrument was developed in English, translated into Vietnamese by a bilingual individual whose native language was Vietnamese, and back-translated into English by a second bilingual individual who was unfamiliar with the original survey content. Item translation was refined during this process, and one item with no meaningful Vietnamese translation was omitted. Surveys were self-administered and anonymous.

Questions assessed socio-demographic variables, including age, marital status, number of children, and medical specialty (internal medicine, family medicine, obstetrics/gynecology [OBGYN], pediatrics, other), as well as awareness ("Have you heard about the human papillomavirus [HPV] before today?"), and knowledge regarding HPV infection (three true/false questions). Additional questions assessed the likelihood of recommending vaccination for boys (7-point Likert scale), the ideal age for vaccination (9-12, 13-15, 16-18,

>18, other), and a rank-ordering (1-"most important to you" to 5-"least important to you") of the importance of different endorsements (National Department of Health, hospital colleagues, Director of the hospital, medical societies in France or the U.S., medical societies in Vietnam) on providers' willingness to recommend HPV vaccination for their patients. Overall endorsement toward recommending HPV vaccination was assessed with a single item (7-point "extremely unfavorable" to "extremely favorable"). A question assessing perception of the type of physician who would be "most likely to convince parents to vaccinate their children against HPV" was also posed. Finally, as supported by the literature (Molano et al., 2003; Miyashita et al., 2009; Poulos et al., 2011; Hoang et al., 2013), we presented 12 different scenarios manipulating three key factors (attributes) that may be associated with provider willingness to vaccinate against HPV: patient age (12, 16, or 22 years of age), vaccine cost (0 Vietnamese Dong [VND]/free vs 1,000,000 VND [about 63 United States Dollars, USD, at the time of the study]), and vaccine type (HPV2 vs HPV4). Using a full factorial design (3×2×2), we assessed providers' willingness to vaccinate in each scenario using a 10-point Likert scale where 10=extremely willing to vaccinate. All scenarios reflected a female patient and were presented in the same order for all providers.

### Analysis

Descriptive statistics included frequencies, means, and standard deviations. Conjoint analysis was performed to examine providers' willingness to vaccinate across different hypothetical vaccine scenarios presented in the survey. Conjoint analysis is a methodological technique often used for assessing consumers' preferences for products, however this technique has been applied to health related studies (Stockwell et al., 2011; Poulos et al., 2011; Tsunematsu et al., 2013). The technique allows the relative importance of an attribute or factor to be estimated thus showing how the factors of interest influence each other, and assesses the weights/preferences assigned to those various factors. A conjoint analysis of 12 scenarios was used to examine the relative importance providers assigned to each of the levels within each factor. An overall willingness to vaccinate score was calculated by assessing the mean and standard deviation of each attribute. Providers' socio-demographic characteristics (age, being a physician, marital status, medical specialty, and having children) were examined with linear regression analysis. Statistical significance was declared at  $p < 0.05$ .

## Results

### Respondent characteristics

Surveys were returned by a total of 244 health care providers during the one-month data collection period. Nearly half ( $n=114$ , 47%) were between 18-29 years of age, with a mean age of  $34 \pm 12$  range of 19-80 years (Table 1). More than half of the participants ( $n=146$ , 60%) were married and 56% had at least one child. Twenty-six percent ( $n=64$ ) of survey respondents were physicians; approximately one-third (36%) of the participants

**Table 1. Participant Characteristics (N=244)**

Characteristic	n	%	
Sex	Female	195	79.9
	Male	42	17.2
	Missing	7	2.9
Marital Status	Single	93	38.1
	Married	146	59.8
	Divorced	1	0.4
	Widowed	3	1.2
	Missing	1	0.4
Have Children	Yes	136	55.7
	No	104	42.7
	Missing	4	1.6
Physician	Yes	64	26.2
	No	176	72.2
	Missing	4	1.6
Medical Specialty	Internal medicine	10	4.1
	Ob-Gyn	87	35.7
	Pediatrics	28	11.5
	Surgery	14	5.7
	Family medicine	59	24.2
	Othera	39	15.9
	Missing	7	2.9
	Age (years) b	18-29	114
	30-39	38	15.6
	40-49	64	26.2
	50-59	20	8.2
	60-80	6	2.5
	Missing	2	0.8

\*Abbreviation: SD, standard deviation. <sup>b</sup>Mean = 34 ± SD; Range, 19-80.  
<sup>a</sup>Dermatology (n=12), lab technician (n=8), nutrition (n=6), pharmacy (n=5), oncology (n=3), radiology (n=3), student/assistant (n=2)

**Table 2. Mean Willingness to Vaccinate for the 12 Scenarios in Ascending Order**

Scenario	Patient Age	Vaccine Type	Cost (VND)	Estimated mean
3	12	HPV2	1,000,000	6.39
10	12	HPV4	1,000,000	6.59
2	16	HPV2	1,000,000	6.79
11	22	HPV2	1,000,000	6.86
5	16	HPV4	1,000,000	6.98
7	22	HPV4	1,000,000	7.05
12	12	HPV2	0	8.09
1	12	HPV4	0	8.29
8	16	HPV2	0	8.49
4	22	HPV2	0	8.56
6	16	HPV4	0	8.68
9	22	HPV4	0	8.76

\*Abbreviation: VND, Vietnamese Dong

identified their medical specialty as OBGYN, 24% as family practice, and 11% as pediatrics. Over sixty percent (n=152) of the providers reported spending more than half of their time working in direct patient care activities.

#### Awareness, knowledge, and perceptions surrounding HPV vaccination

A majority (n=207, 85%) of providers were aware of HPV; 72% recognized that HPV causes genital warts in males and females, while 49% indicated that HPV is an uncommon sexually transmitted infection (STI). Overall, 80% (n=195) of providers indicated a favorable attitude toward recommending a vaccine to prevent HPV to their patients; over three-quarters of respondents (n=189,

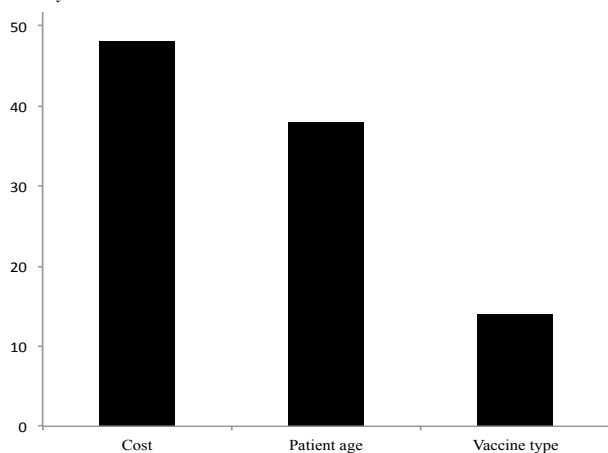
77%) indicated that OBGYNs are the physicians most likely to convince parents to vaccinate their children against HPV followed by pediatricians at 11%. Of the 244 respondents, 28% indicated that the ideal age range for HPV vaccination is 9-12 years. Twenty-four percent chose 13-15 years, 24% chose 16-18 years, and 17% indicated that the ideal age for HPV vaccination is greater than 18 years. Sixty-eight percent were likely to recommend HPV vaccine for boys (“*extremely likely*” [31%], “*quite likely*” [15%], and “*slightly likely*” [22%]). Twelve percent of providers were unlikely to recommend HPV vaccine for boys while 18% were indifferent about recommending the vaccine for boys.

Regarding external influences on providers’ own opinions as to whether or not to recommend HPV vaccination to their patients, 59% (n=145) of providers gave a ranking of 1 (most important) to “*endorsement by international medical societies in France or the U.S.*”. Other entities which providers gave a ranking of 1 included endorsements by the National Department of Health (n= 64, 26%), medical societies in Vietnam (n=7, 17%) and colleagues in the hospital (n=4, 2 %). However, 72% of providers gave a ranking of 5 (least important) to “*endorsement by colleagues in the hospital*”.

#### Willingness to vaccinate

Across all 12 scenarios, the mean willingness to vaccinate score was 7.62±2.62. Estimated means for each scenario are presented in Table 2. The scenario with the highest mean score (most favorable toward vaccination) was as follows: “*The patient is a 22 year old girl, the vaccine is effective against the HPV types that cause both cervical cancer and genital warts (HPV4), the vaccine is free.*” For this scenario (scenario 9), the estimated mean score was 8.76 and 64% of providers gave this scenario a score of 10 (extremely willing to vaccinate). The scenario with the lowest estimated mean (least favorable toward vaccination) was as follows: “*The patient is a 12 year old girl, the vaccine is effective against the HPV types that cause cervical cancer only, the vaccine costs 1,000,000 VND.*” For this scenario (scenario 3), the estimated mean score was 6.39 and only 18% of providers gave this scenario a score of 10. Of the three factors that we varied across scenarios (patient age, vaccine type, and cost), the most important factor influencing providers’ willingness to vaccinate a patient was the cost of vaccination, p<0.001 (importance score=48.1) followed by patient age, p<0.001 (importance score 37.9), and vaccine type, p<0.05 (importance score 14.0), as illustrated in the Figure and Table 3. Post- hoc pairwise comparisons of patient age showed significant differences between ages 12 and 16 years (p<0.001) and 12 and 22 years (p<0.001), but not between ages 16 and 22 years (p=0.35).

We examined associations between providers’ socio-demographic characteristics (age, provider type and specialty, marital status, and number of children) and their willingness to vaccinate. Older age, being a physician, being married, and having children were all associated with significant increases in willingness to recommend HPV vaccination (p<0.05). Being an OBGYN was not associated with provider’s willingness to vaccinate.



**Figure 1. Relative Contribution (Importance Score) of Each Factor in Explaining the Entire Variability of the Mean Willingness to Vaccinate Scores.** A higher score indicates greater influence on willingness to vaccinate

**Table 3. Willingness to Vaccinate Against HPV as a Function of Patient Age, Vaccine Type and Vaccine Cost**

Factor	Mean (SD)	P Value
Patient Age		0.001
12	7.34 (2.79)	
16	7.73 (2.54)	
22	7.81 (2.53)	
Vaccine Type		0.004
HPV2	7.53 (2.64)	
HPV4	7.72 (2.61)	
Cost of Vaccine (VND)		0.001
0	8.48 (2.40)	
1,000,000 VND ~ 63 USD*	6.78 (2.57)	

\*Abbreviations: SD, standard deviation; VND, Vietnamese Dong; USD, United States Dollar. \* At the time of study

## Discussion

HPV vaccines are licensed and available in Vietnam; however, a growing body of literature including prior work in Vietnam (Dinh et al., 2007; Breitkopf et al., 2009) suggests that patient and provider characteristics are both influential with regard to recommendation and administration of HPV vaccines (Caskey et al., 2009; Do et al., 2009; Gargano et al., 2013; Kester et al., 2013; Perkins et al., 2013). This study of Vietnamese health care providers characterizes several factors as they relate to willingness to recommend HPV vaccines to female patients, and how three factors in particular, patient age, vaccine type, and cost, influence willingness.

Although many of the providers in this study indicated that they have heard about HPV, nearly half also indicated that it is an uncommon STI. The perception that HPV is “uncommon” could arguably affect a provider’s recommendation for the need to adopt a preventive measure through vaccination. This finding is congruent with other reports of misconceptions and limited knowledge about the magnitude of cervical cancer, HPV as a cause of cervical cancer, and HPV vaccines in Vietnam (Paul et al., 2012). The current findings suggest that providers may benefit from epidemiologic estimates of various STIs in Vietnam and specific guidance surrounding discussions related to sexuality that are gender, age, and culturally

appropriate to maximize comfort for providers, patients and parents.

Interestingly the providers we surveyed perceived that OBGYNs, relative to other physician specialties, were “most likely to convince parents to vaccinate their children against HPV”. Subsequent analysis of the data however, showed no association between specific physician specialty (i.e. OBGYN) and reported willingness to vaccinate. These findings are important when considered with regard to the target groups for HPV vaccination i.e., girls (and boys) in their adolescence years, as they typically would receive care from pediatricians as opposed to OBGYNs. In the U.S., pediatricians, relative to other physician specialties, have the highest likelihood of consistently recommending HPV vaccination (Vadaparampil et al., 2011). Although beyond the scope of this study, there are probable cultural and health care system differences between the U.S. and Vietnam that affect the delivery of adolescent vaccines that are worthy of investigation.

In this study, 80% of those surveyed held a favorable attitude toward recommending a vaccine to prevent HPV infection, confirming other reports of general support for HPV vaccines among health care providers in Vietnam (Nghie et al., 2010). Based on analysis of providers’ preference and willingness to vaccinate, we found the cost of HPV vaccination (of the three factors examined) to be the factor that most influenced providers’ willingness to vaccinate, followed by patient age, and vaccine type. This finding is consistent with an earlier report addressing the cost-effectiveness of cervical cancer prevention strategies and the tradeoffs between a national and region-based policy in Vietnam (Kim et al., 2008). In this study, HPV vaccination was favored only when cost was low. On the other hand, formative studies in Vietnam have reported parents’ willingness to obtain HPV vaccine for their children, regardless of cost (PATH, 2009).

HPV vaccination for the primary prevention of cervical cancer is recommended at 11 or 12 years of age from the standpoint of behavior (initiation of sexual activity and subsequent HPV exposure) and biology (immune response) (Centers for Disease Control and Prevention, 2013b). Nevertheless, in the U.S., delayed initiation has been described (Hofstetter et al., 2014) and several studies have reported that health care providers’ willingness to recommend HPV vaccination is directly related to patient age (Daley et al., 2006; Kahn et al., 2007). Importantly, this pattern of increasing provider willingness with increasing patient age is reflected in actual immunization rates in the U.S. (Centers for Disease Control and Prevention, 2013c) thus the implications of providers favoring vaccination for older girls in this study are likely to be similar.

We surveyed a convenience sample of health care providers in a single setting in Da Nang, Vietnam where a majority of survey respondents were female therefore our findings have limited generalizability. Furthermore, this investigation considered the two types of HPV vaccines available at the time of the study, HPV2 and HPV4. Recent reports have identified other HPV types that are common in Vietnam (HPV 52, 58), but not targeted by the HPV2 and HPV4 vaccines (Vu and Le, 2011; Vu et al., 2013).



These types are, however, covered in the nonavalent vaccine recently approved for use in the U.S., but not yet approved in Vietnam. As further investigation continues with new HPV vaccines and alternative dosing schedules (Lamontagne et al., 2013; WHO, 2014), additional behavioral, cost-effectiveness, and epidemiologic studies will be essential.

### Conclusion/ recommendation

The use of conjoint analysis in this study elicited providers' preferences for age, cost and type of vaccine with regard to their willingness to recommend HPV vaccine. Although over half of providers indicated that the ideal age range for HPV vaccination in Vietnam was 9-15 years, providers' willingness to vaccinate was significantly associated with increasing age in the patient scenarios (12 vs 16 vs 22 years of age). Greater understanding of providers' willingness to recommend HPV vaccines and their actual HPV vaccination practices may help guide intervention programs. Furthermore, it seems important to address the intersectionality of age and sexuality in Vietnam. It is believed that adolescents in Vietnam have relatively low rates of sexual activity and available information regarding the timing of initiation of intercourse is supportive of this belief (Bruni et al., 2014; Vu and Le, 2011). However, the evidence is weak, and for many other high-risk sexual behaviors, the data are quite incomplete (Bruni et al., 2014). Social and economic transformations in recent years have fundamentally altered the experiences and environment of Vietnamese youth, including the weakening of ideals such as chastity before marriage (Long, 2000). It will be critical to prepare and train health care providers to engage younger female patients in traditionally sensitive discussions in order to provide effective care for their sexual and reproductive health. Successful implementation of HPV vaccination programs in the setting of a developing country requires an integrated and comprehensive approach that addresses each of the factors influencing provider willingness to administer vaccines and patient acceptance of HPV vaccines

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### References

Breitkopf CR, Pearson HC, Dinh TA, et al (2009). Human papillomavirus vaccine decision-making in Da Nang, Vietnam: perceived spousal and adolescent-parent concordance. *Vaccine*, **27**, 2367-71.

Bruni L, Barrionuevo-Rosas L, Albero G, et al (2014). ICO information centre on HPV and cancer (HPV information centre). human papillomavirus and related diseases in Viet

Nam. Summary Report 2014-12-18. <http://www.hpvcentre.net/statistics/reports/VNM.pdf>.

Caskey R, Lindau ST, Alexander GC (2009). Knowledge and early adoption of the HPV vaccine among girls and young women: results of a national survey. *J Adolesc Health*, **45**, 453-62.

Centers for Disease Control and Prevention (2013a). HPV vaccine information for clinicians - fact sheet. <http://www.cdc.gov/std/hpv/stdfact-hpv-vaccine-hcp.htm>.

Centers for Disease Control and Prevention (2013b). HPV Vaccines. <http://www.cdc.gov/hpv/vaccine.html>.

Centers for Disease Control and Prevention (2013c). National and state vaccination coverage among adolescents aged 13-17 years--United States, 2012. *MMWR Morb Mortal Wkly Rep*, **62**, 685-93.

Cover JK, Nghi NQ, LaMontagne DS, et al (2012). Acceptance patterns and decision-making for human papillomavirus vaccination among parents in Vietnam: an in-depth qualitative study post-vaccination. *BMC Public Health*, **12**, 629.

Daley MF, Liddon N, Crane LA, et al (2006). A national survey of pediatrician knowledge and attitudes regarding human papillomavirus vaccination. *Pediatrics*, **118**, 2280-9.

Dinh TA, Rosenthal SL, Doan ED, et al (2007). Attitudes of mothers in Da Nang, Vietnam toward a human papillomavirus vaccine. *J Adolesc Health*, **40**, 559-63.

Do H, Seng P, Talbot J, et al (2009). HPV vaccine knowledge and beliefs among Cambodian American parents and community leaders. *Asian Pac J Cancer Prev*, **10**, 339-44.

Dunne EF, Unger ER, Sternberg M, et al (2007). Prevalence of HPV infection among females in the United States. *JAMA*, **297**, 813-9.

Gargano LM, Herbert NL, Painter JE, et al (2013). Impact of a physician recommendation and parental immunization attitudes on receipt or intention to receive adolescent vaccines. *Hum Vaccin Immunother*, **9**, 2627-33.

Harper DM, Franco EL, Wheeler C, et al (2004). Efficacy of a bivalent L1 virus-like particle vaccine in prevention of infection with human papillomavirus types 16 and 18 in young women: a randomised controlled trial. *Lancet*, **364**, 1757-65.

Harper DM, Franco EL, Wheeler CM, et al (2006). Sustained efficacy up to 4.5 years of a bivalent L1 virus-like particle vaccine against human papillomavirus types 16 and 18: follow-up from a randomised control trial. *Lancet*, **367**, 1247-55.

Hoang HT, Ishizaki A, Nguyen CH, et al (2013). Infection with high-risk HPV types among female sex workers in northern Vietnam. *J Med Virol*, **85**, 288-94.

Hofstetter AM, Stockwell MS, Al-Husayni N, et al (2014). HPV vaccination: are we initiating too late? *Vaccine*, **32**, 1939-45.

International Agency for Research on Cancer (IARC). GLOBOCAN 2012: Cervical cancer estimated incidence, mortality and prevalence worldwide in 2012. [http://globocan.iarc.fr/pages/fact\\_sheets\\_cancer.aspx](http://globocan.iarc.fr/pages/fact_sheets_cancer.aspx).

Kahn JA, Rosenthal SL, Tissot AM, et al (2007). Factors influencing pediatricians' intention to recommend human papillomavirus vaccines. *Ambul Pediatr*, **7**, 367-73.

Kester LM, Zimet GD, Fortenberry JD, et al (2013). A national study of HPV vaccination of adolescent girls: rates, predictors, and reasons for non-vaccination. *Matern Child Health J*, **17**, 879-85.

Kim JJ, Kobus KE, Diaz M, et al (2008). Exploring the cost-effectiveness of HPV vaccination in Vietnam: insights for evidence-based cervical cancer prevention policy. *Vaccine*, **26**, 4015-24.

LaMontagne DS, Barge S, Le NT, et al (2011). Human

- papillomavirus vaccine delivery strategies that achieved high coverage in low- and middle-income countries. *Bull World Health Organ*, **89**, 821-30.
- Lamontagne DS, Thiem VD, Huong VM, et al (2013). Immunogenicity of quadrivalent HPV vaccine among girls 11 to 13 Years of age vaccinated using alternative dosing schedules: results 29 to 32 months after third dose. *J Infect Dis*, **208**, 1325-34.
- Long LD, Population Council (Vietnam), United Nations Population Fund (2000). The Doi Moi generation: coming of age in Vietnam today. Hanoi, Vietnam: Population Council.
- Miyashita M, Agdamag DM, Sasagawa T, et al (2009). High-risk HPV types in lesions of the uterine cervix of female commercial sex workers in the Philippines. *J Med Virol*, **81**, 545-51.
- Molano M, Van den Brule A, Plummer M, et al (2003). Determinants of clearance of human papillomavirus infections in Colombian women with normal cytology: a population-based, 5-year follow-up study. *Am J Epidemiol*, **158**, 486-94.
- Nghi NQ, Lamontagne DS, Bingham A, et al (2010). Human papillomavirus vaccine introduction in Vietnam: formative research findings. *Sex Health*, **7**, 262-70.
- PATH and National Institute of Hygiene and Epidemiology (NIHE) (2009). Shaping a strategy to introduce HPV vaccines in Vietnam: formative research results from the HPV vaccines: evidence for impact project. [http://www.rho.org/files/rb3/Shaping\\_Strategy\\_Introduce\\_HPV\\_vaccines\\_Vietnam\\_PATH\\_2009.pdf](http://www.rho.org/files/rb3/Shaping_Strategy_Introduce_HPV_vaccines_Vietnam_PATH_2009.pdf).
- Paul P, LaMontagne DS, Le NT (2012). Knowledge of cervical cancer and HPV vaccine post-vaccination among mothers and daughters in Vietnam. *Asian Pac J Cancer Prev*, **13**, 2587-92.
- Perkins RB, Anderson BL, Gorin SS, et al (2013). Challenges in cervical cancer prevention: a survey of U.S. obstetrician-gynecologists. *Am J Prev Med*, **45**, 175-81.
- Poulos C, Yang JC, Levin C, et al (2011). Mothers' preferences and willingness to pay for HPV vaccines in Vinh Long Province, Vietnam. *Soc Sci Med*, **73**, 226-34.
- Romanowski B, de Borja PC, Naud PS, et al (2009). Sustained efficacy and immunogenicity of the human papillomavirus (HPV)-16/18 AS04-adjuvanted vaccine: analysis of a randomised placebo-controlled trial up to 6.4 years. *Lancet*, **374**, 1975-85.
- Rosenthal SL, Weiss TW, Zimet GD, et al (2011). Predictors of HPV vaccine uptake among women aged 19-26: importance of a physician's recommendation. *Vaccine*, **29**, 890-5.
- Stockwell MS, Rosenthal SL, Sturm LA, et al (2011). The effects of vaccine characteristics on adult women's attitudes about vaccination: a conjoint analysis study. *Vaccine*, **29**, 4507-11.
- Tsunematsu M, Kawasaki H, Masuoka Y, et al (2013). Factors affecting breast cancer screening behavior in Japan: assessment using the health belief model and conjoint analysis. *Asian Pac J Cancer Prev*, **14**, 6041-8.
- Vadapampil ST, Kahn JA, Salmon D, et al (2011). Missed clinical opportunities: provider recommendations for HPV vaccination for 11-12 year old girls are limited. *Vaccine*, **29**, 8634-41.
- Villa LL, Costa RL, Petta CA, et al (2005). Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: a randomised double-blind placebo-controlled multicentre phase II efficacy trial. *Lancet Oncol*, **6**, 271-8.
- Vu LT, Bui D, Le HT (2013). Prevalence of cervical infection with HPV type 16 and 18 in Vietnam: implications for vaccine campaign. *BMC Cancer*, **13**, 53.
- Vu LT, Le HT (2011). Cervical human papilloma virus infection among the general female population in Vietnam: a situation analysis. *Asian Pac J Cancer Prev*, **12**, 561-6.
- Walboomers JM, Jacobs MV, Manos MM, et al (1999). Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. *J Pathol*, **189**, 12-9.
- World Health Organization (WHO) (2014). Evidence based recommendations on human papilloma virus (HPV) vaccines schedules. Background paper for SAGE discussions, March 11, 2014. [http://www.who.int/immunization/sage/meetings/2014/april/1\\_HPV\\_Evidence\\_based\\_recommendationsWHO\\_with\\_Appendices2\\_3.pdf](http://www.who.int/immunization/sage/meetings/2014/april/1_HPV_Evidence_based_recommendationsWHO_with_Appendices2_3.pdf)
- Ylitalo KR, Lee H, Mehta NK (2013). Health care provider recommendation, human papillomavirus vaccination, and race/ethnicity in the US national immunization survey. *Am J Public Health*, **103**, 164-9.