

## RESEARCH ARTICLE

# Knowledge and Awareness of Human Papillomavirus (HPV), Cervical Cancer and HPV Vaccine among Women in Two Distinct Nepali Communities

Derek Christopher Johnson<sup>1</sup>, Madhav Prasad Bhatta<sup>2</sup>, Santosh Gurung<sup>3</sup>, Shilu Aryal<sup>4</sup>, Pema Lhaki<sup>5</sup>, Sadeep Shrestha<sup>1\*</sup>

### Abstract

**Background:** This study assessed human papillomavirus (HPV), cervical cancer, and HPV vaccine knowledge and awareness among women in two sub-populations in Nepal - Khokana, a traditional Newari village in the Lalitpur District about eight kilometers south of Kathmandu, and Sanphebagar, a village development committee within Achham District in rural Far-Western Nepal. **Methods:** Study participants were recruited during health camps conducted by Nepal Fertility Care Center, a Nepali non-governmental organization. Experienced staff administered a Nepali language survey instrument that included questions on socio-demographics, reproductive health and knowledge on HPV, cervical cancer, and the HPV vaccine. **Results:** Of the 749 participants, 387 (51.7%) were from Khokana and 362 (48.3%) were from Sanphebagar. Overall, 53.3% (n=372) of women were aware of cervical cancer with a significant difference between Khokana and Sanphebagar (63.3% vs 43.0%; p=0.001). Overall, 15.4% (n=107) of women had heard of HPV and 32% (n=34) of these women reported having heard of the HPV vaccine. If freely available, 77.5% of the women reported willingness to have their children vaccinated against HPV. Factors associated with cervical cancer awareness included knowledge of HPV (Khokana: Odds Ratio (OR)=24.5; 95% Confidence Interval (CI): 3.1-190.2, Sanphebagar: OR=14.8; 95% CI: 3.7-58.4) and sexually transmitted infections (Khokana: OR=6.18; 95% CI: 3.1-12.4; Sanphebagar: OR=17.0; 95% CI: 7.3-39.7) among other risk factors. **Conclusions:** Knowledge and awareness of HPV, cervical cancer, and the HPV vaccine remains low among women in Khokana and Sanphebagar. Acceptance of a freely available HPV vaccine for children was high, indicating potentially high uptake rates in these communities.

**Keywords:** HPV - HPV vaccine - cervical cancer - Nepal - rural communities

*Asian Pac J Cancer Prev*, 15 (19), 8287-8293

### Introduction

Cervical cancer is the second most common cancer among women worldwide. About 86% of cervical cancer cases occur in developing countries, representing 13% of female cancers worldwide (Ferlay et al., 2010). In developed countries, Pap tests have reduced cervical cancer incidence and mortality by 80%. However, in resource limited countries like Nepal, cervical screening is not readily available for most women and cervical cancer remains one of the leading causes of cancer mortality among all cancers in Nepali women. According to the World Health Organization (WHO) Information Centre on Human Papillomavirus (HPV) and Cervical Cancer, the age-standardized annual incidence of cervical cancer in Nepal is 19.0 per 100,000, making Nepal a country

with one of the highest cervical cancer rates in South Asia (Bruni, 2014). However, this estimate is most likely an underestimation of the true incidence of the disease due to a low number of cervical screening facilities and a lack of a national cancer registry.

Only 2.4% of Nepali women are reported to undergo cervical cancer screening every three years with a higher percentage of women in urban areas (4.7%) undergoing screening than women in rural areas (2.0%) (Human Papillomavirus and Related Cancers Fact Sheet 2013, 2014). In addition to the limited availability of cervical screening, other major barriers to reducing cervical cancer incidence in Nepal include low levels of education and lack of accurate knowledge and awareness of cervical cancer including its cause, signs and symptoms, and prevention methods. Over 80% of the cervical cancer cases in Nepal

<sup>1</sup>Department of Epidemiology, University of Alabama at Birmingham, Birmingham, AL, <sup>2</sup>Department of Epidemiology and Biostatistics, Kent State University, Kent, OH, USA, <sup>3</sup>World Health Organization, Program for Immunization Preventable Diseases, <sup>4</sup>Family Health Division, Department of Health Services Ministry of Health and Population, <sup>5</sup>Nepal Fertility Care Center, Kathmandu, Nepal \*For correspondence: sshrestha@uab.edu

are diagnosed at an advanced clinical stage, which often have a very poor prognosis (Gyenwali et al., 2013). One study in Pokhara, a city in the western development region, reported that even among college educated women, only 58% were aware of cervical cancer and 52% were aware of HPV (Joy et al., 2011). In a hospital based study, Gyenwali et al reported that illiterate women were over 8 times more likely to be diagnosed with cervical cancer at a later time than literate women (Gyenwali et al., 2013).

Inadequate access to health services (Haviland et al., 2014) exacerbated by poor transportation and perceived long wait times for treatment (Gyenwali et al., 2014) could potentially indicate poor potential vaccine uptake. Recent studies on the use and efficacy of the HPV vaccine in developing countries have suggested that vaccine distribution could be an effective way to mitigate cervical cancer in low- and middle-income countries (Fesenfeld et al., 2013; Termrungruangler et al., 2012). Demonstration projects in Peru, India, Uganda, and Vietnam have shown high levels of vaccination coverage using school-based programs targeting teen girls (LaMontagne et al., 2011). While effective rollout of the HPV vaccine has been shown to be possible in low-income countries, disseminating knowledge of HPV and cervical cancer remains challenging.

To the best of our knowledge, currently there are no studies on HPV vaccine awareness or acceptability among the general population of Nepali women. This study assessed the knowledge and awareness of HPV, cervical cancer, and HPV vaccine among Nepali women from two ethnically diverse sub-populations in urban and rural Nepal. The knowledge gained through this study will help further cervical screening and HPV vaccine efforts in Nepal.

## Materials and Methods

### *Study sites and populations*

This study was conducted in populations of two distinct Nepali communities; Khokana, a suburban community in central Nepal and Sanphebagar, a rural community in far-western Nepal. Khokana is a traditional ethnic Newari village in the Lalitpur District on the outskirts of Nepal's capital of Kathmandu. Agriculture is the main source of income for the people of Khokana, supplemented by small cottage industries and handicraft production (Nepal Demographic and Health Survey, 2011). Khokana's proximity to Kathmandu provides its residents with access to some of the best healthcare infrastructure in the country. In contrast, Sanphebagar village development committee (VDC) is located in the Achham District, one of the most remote hill districts in Far-Western Nepal with poor transportation, communication and healthcare infrastructure. The population of the district and Sanphebagar is composed of diverse ethnic groups (Ministry of Health & Population, Government of Nepal, 2013). The district's residents experience a greater burden of disease morbidity and mortality than the general Nepali population. Currently, only two hospitals operate in Achham District and access to these facilities for most residents in the district likely involves several hours of

walking through a hilly terrain. In addition, the district has a high rate of seasonal migration, which puts the population at a higher risk of adverse health outcomes, such as sexually transmitted infections (STIs) and HIV.

### *Study design and survey instrument*

This study is nested within two one-day health camps conducted by a Nepali non-governmental organization (NGO), Nepal Fertility Care Center (NFCC), (NFCC, 2012) in collaboration with the local Khokana women's co-operative on February 12<sup>th</sup> 2013 and Sanphebagar on July, 5<sup>th</sup> 2013. Women who attended the NFCC health camps received a wide array of free reproductive health services including family planning counseling and sexually transmitted infection (STI) testing. Volunteer health professionals assisted in recruitment of women of reproductive age from the health camps. Nepali language consent forms were distributed and read to each participant before asking for their written agreement to enroll in the study. Women who opted not to participate in the research study were provided the same clinical services during the health camp as those participating in the research study. Trained health professionals administered a Nepali language survey instrument that included questions on socio-demographics, reproductive health, HPV, cervical cancer, and the HPV vaccine. The Institutional Review Board at the University of Alabama at Birmingham and Ethics Review Board at the Nepal Health Research Council approved this study.

Seven questions were used to assess knowledge and awareness of HPV, cervical cancer and the HPV vaccine. Four questions assessed HPV and cervical cancer knowledge and awareness: a) "Have you ever heard about human papillomavirus?"; b) "Is human papillomavirus infection a necessary part of cervical cancer?"; and c) "Have you ever heard about cervical cancer?" and d) "If you have heard about cervical cancer, where did you hear about it?" Three questions were used to assess knowledge and awareness of the HPV vaccine and willingness of study participants to vaccinate their children. These included: e) "Have you heard about a HPV vaccine?"; f) "Would you give the HPV vaccine to your children if it you had to pay?"; and g) "Would you give the HPV vaccine to your children if free?". In order to help assure the validity and comprehensiveness of the survey instrument, questions were based on English translations of the Demographic and Health Survey (Nepal Demographic and Health Survey, 2011 ) and the National Living Standards Survey (NLSS) (Nepal Living Standards Survey 2010/2011, 2011).

The socio-demographic variables examined included age, age at first marriage, and formal education, household income, employment and husband's migration for employment ('traveled outside of the district', 'outside of Nepal' and 'not traveled'). The reproductive health variables examined included awareness of STIs, current use of contraceptives, ever having had an abortion and number of children.

### *Data analysis*

Women responding "don't know" for a survey

item were counted as missing for that variable and were excluded from the univariate and multivariate analyses. The mean, standard deviation, median, inter-quartile range, and percentages were calculated for self-reported sociodemographic characteristics and reproductive health status. Chi-square, student T-test, and Wilcoxon signed-rank tests were used to assess univariate associations. Logistic regression models generated odds ratios describing factors associated with knowledge and awareness of HPV, cervical cancer, and the HPV vaccine. In the multivariate logistic regression analyses, a significance level of  $p < 0.10$  from the univariate analyses was used as the cutoff for selecting variables for inclusion in the multivariable models. Multinomial logistic regression was used to determine odds ratios associated with women choosing to vaccinate their children with HPV vaccine if they had to pay for the vaccine or if the vaccine was offered for free.

## Results

Of the 749 women who participated in the study, 387 (51.7%) were from Khokana and 362 (48.3%) were from Sanphebagar. Participants from Sanphebagar were younger (Sanphebagar: 32 years, IQR 25.0-40.0, Khokana:

40 years, IQR 34.0-50.0,  $p$ -value 0.001), married earlier (Sanphebagar: 17 years, IQR 15.0-19.0, Khokana: 19 years, IQR 17.0-20.0,  $p$ -value 0.01), a higher percentage had had an abortion (Sanphebagar: 53%, Khokana: 6.8%,  $p$ -value 0.001), and had husbands who traveled (Sanphebagar: 46.8, Khokana: 20.8,  $p$ -value 0.001) than participants from Khokana (Table 1).

### Cervical cancer knowledge

Overall, more than half (53.3%) of the women who participated were aware of cervical cancer (Table 1). Of those, 32.7% women did not know where they learned about cervical cancer and 26.5% reported having learned from a governmental clinic, NGO clinic, or school. However, more women from Khokana were aware of cervical cancer than women from Sanphebagar (63.3% vs. 43%,  $p < 0.001$ ).

Women from both populations who were aware of STIs were significantly more likely to also be aware of cervical cancer compared to women who did not have knowledge of STIs (Sanphebagar: OR 17.04 (7.3-39.7), Khokana: OR 6.18 (3.1-12.4); Table 2). Women who were aware of HPV from both populations were highly likely to be aware of cervical cancer compared to women who did not know of HPV (Sanphebagar: OR 14.8 (3.7-58.4),

**Table 1. Sociodemographics, Knowledge and Awareness of Human Papillomavirus (HPV), Cervical Cancer and HPV Vaccine among Participating Women in Rural Far West in Sanphebagar and Suburban Central Region in Khokana, Nepal**

Characteristics		Overall (n=749)	Sanphebagar (n=362)	Khokana (n=387)	p value
Age, years (n=746)	Mean (SD)	37.9 (11.4)	33.5 (9.1)	42.1 (11.8)	0.001
	Median (IQR)	36.5 (29.5-45.0)	32.0 (25.0-40.0)	40.0 (34.0-50.0)	
Any formal education	Yes	145 (19.4)	88 (24.3)	57 (14.7)	0.001
	No	604 (80.6)	274 (75.7)	330 (85.3)	
Self Employment	Yes	480 (65.3)	264 (74.8)	216 (56.5)	0.001
	No	255 (34.7)	89 (25.2)	166 (43.6)	
Age at first marriage, years (n=729)	Mean (SD)	18.2 (3.3)	17.3 (2.6)	19.1 (3.6)	0.001
	Median (IQR)	18.0 (16.0-20.0)	17.0 (15.0-19.0)	19.0 (17.0-20.0)	
Number of children (n= 709)	Mean (SD)	2.9 (1.5)	3.3 (1.5)	2.6 (1.4)	0.001
	Median (IQR)	3.0 (2.0-4.0)	3.0 (2.0-4.0)	2.0 (2.0-3.0)	
Husband traveled for work	Outside of the district	43 (0.06)	27 (7.7)	16 (4.3)	0.001
	Outside of Nepal	199 (0.27)	137 (39.1)	62 (16.5)	
	Has not travelled	483 (0.67)	186 (53.1)	297 (79.2)	
Currently use contraceptives	Yes	386 (53.2)	175 (50.9)	211 (55.2)	0.24
	No	340 (46.8)	169 (49.1)	171 (44.8)	
Ever had an abortion	Yes	212 (28.9)	186 (53.0)	26 (6.8)	0.001
	No	523 (71.1)	165 (47.0)	358 (93.2)	
Awareness of sexually transmitted infections	Yes	405 (58.2)	187 (54.1)	218 (62.3)	0.03
	No	291 (41.8)	159 (45.9)	132 (37.7)	
Awareness of Cervical Cancer	Yes	372 (53.3)	148 (43.0)	224 (63.3)	0.001
	No	326 (46.7)	196 (57.0)	130 (36.7)	
Awareness of HPV	Yes	107 (15.4)	51 (15.5)	56 (15.3)	0.92
	No	588 (84.6)	277 (84.5)	311 (84.7)	
Know HPV causes cervical cancer	Yes	71 (12.4)	42 (15)	29 (10)	0.07
	No	500 (87.6)	238 (81)	262 (90)	
Knowledge of the HPV vaccine	Yes	55 (7.5)	21 (5.6)	34 (9.5)	0.03
	No	677 (92.5)	352 (94.4)	325 (90.5)	
Have her child vaccinated against HPV if available for free	Yes	572 (77.5)	270 (75.2)	302 (79.7)	0.15
	No	50 (6.8)	23 (6.4)	27 (5.1)	
	I have to ask my family	37 (5.0)	19 (5.3)	18 (4.8)	
Have her child vaccinated against HPV if had to pay	I have to ask my husband	79 (10.7)	47 (13.1)	32 (8.4)	0.01
	Yes	465 (63.8)	224 (62.8)	241 (64.6)	
	No	102 (13.9)	63 (17.6)	39 (10.5)	
	I have to ask my family	52 (7.1)	14 (3.9)	39 (10.5)	
	I have to ask my husband	110 (15.1)	56 (15.7)	54 (14.5)	

**Table 2. Factors Associated with Knowledge and Awareness of Cervical Cancer among Women Residing in the Nepali Communities of Khokana and Sanphebagar**

Factor	Adjusted Odds Ratio (95% Confidence Interval)	
	Khokana	Sanphebagar
Age, per year	0.99 (0.96-1.02)	0.96 (0.92-1.01)
Any formal education <sup>a</sup>	0.8 (0.3-2.0)	0.6 (0.2-1.4)
Awareness of sexually transmitted infections <sup>a</sup>	6.1 (3.1-12.4) <sup>c</sup>	17.0 (7.3-39.7) <sup>c</sup>
Awareness of human papillomavirus <sup>a</sup>	24.5 (3.1-190.2) <sup>c</sup>	14.8 (3.7-58.4) <sup>c</sup>
Currently working <sup>a</sup>	1.05 (0.5-1.9)	2.19 (0.9-5.0)
Currently use contraceptives <sup>a</sup>	2.3 (1.2-4.4) <sup>b</sup>	0.71 (0.3-1.4)
Ever have had an abortion <sup>a</sup>	2.3 (0.6-8.6)	2.18 (1.04-4.56) <sup>b</sup>

<sup>a</sup>Reference group: no; <sup>b</sup>p-value<0.05; <sup>c</sup>p-value<0.01

**Table 3. Factors Associated with Knowledge and Awareness of Human Papillomavirus (HPV) among Women Residing in The Nepali Communities of Khokana and Sanphebagar**

Factor	Adjusted Odds Ratio (95% Confidence Interval)	
	Khokana	Sanphebagar
Age, per year increase	1.00 (0.95-1.06)	1.02 (0.97-1.08)
Any formal education <sup>a</sup>	4.09 (1.27-13.21)	1.56 (0.5-4.2)
Awareness of sexually transmitted infections <sup>a</sup>	11.2 (1.3-93.2) <sup>b</sup>	4.57 (1.5-13.5) <sup>b</sup>
Currently work <sup>a</sup>	1.27 (0.4-3.8)	0.60 (0.2-1.4)
Currently use contraceptives <sup>a</sup>	0.36 (0.13-1.02)	2.03 (0.8-5.1) <sup>b</sup>
Ever have had an abortion <sup>a</sup>	1.05 (0.09-11.99)	1.11 (0.4-2.6)

<sup>a</sup>Reference group: no; <sup>b</sup>p-value <0.01

**Table 4. Factors Associated with Knowledge and Awareness of Human Papillomavirus (HPV) Vaccine among Women Residing in The Nepali Communities of Khokana and Sanphebagar**

Factor	Adjusted Odds Ratio (95% Confidence Interval)	
	Khokana	Sanphebagar
Age, per year increase	0.94 (0.84-1.05)	0.99 (0.93-1.07)
Any formal education <sup>a</sup>	3.1 (0.4-21.6)	1.5 (0.4-5.7)
Awareness of human papillomavirus <sup>a</sup>	28.0 (3.9-201.3) <sup>b</sup>	40.2 (3.7-436.7) <sup>b</sup>
Awareness of cervical cancer <sup>a</sup>	1.4 (0.1-21.1)	11.8 (3.0-46.2) <sup>b</sup>
Awareness of sexually transmitted infections <sup>a</sup>	0.68 (0.07-6.53)	0.26 (0.05-1.46)
Currently work <sup>a</sup>	1.3 (0.2-8.8)	0.87 (0.2-3.2)
Currently use contraceptives <sup>a</sup>	1.0 (0.2-6.0)	0.61 (0.1-2.2)

<sup>a</sup>Reference group: no.; <sup>b</sup>p-value <0.01

**Table 5. Multinomial Models Assessing Factors Associated with Either Vaccinating Their Children with the Human Papilloma Virus (HPV) Vaccine if They had to Pay for the Vaccine and if the Vaccine was Offered for Free in Women Residing in the Nepali Communities of Khokana and Sanphebagar<sup>a</sup>**

Factor	Khokana				Sanphebagar			
	Paying		Free		Paying		Free	
	Ask Family/Husband (n=70)	Yes (n=204)	Ask Family/Husband (n=36)	Yes (n=274)	Ask Family/Husband (n=54)	Yes (n=196)	Ask Family/Husband (n=49)	Yes (n=233)
Age, per year increase	0.96 (0.91-1.02)	0.9 (0.6-0.9) <sup>b</sup>	1 (0.94-1.07)	0.99(0.95-1.06)	1.01 (0.96-1.06)	0.99 (0.96-1.04)	1.02 (0.96-1.08)	1.01 (0.95-1.08)
Any formal education	0.3 (0.07-1.34)	0.31(0.08-1.21)	0.81(0.06-10.41)	2.4 (0.2-20.1)	0.82 (0.28-2.40)	0.95 (0.43-2.13)	2.69 (0.55-13.27)	4.18 (1.03-16.95)
Awareness of HPV	1.8 (0.1-21.7)	2.4 (0.2-23.9)	0.87(0.07-11.07)	2 (0.2-16.7)	7.05 (1.24-39.84) <sup>b</sup>	3.19 (0.86-11.95)	2.58 (0.37-17.82)	1.4 (0.27-7.37)
Awareness of cervical cancer	0.7 (0.1-2.9)	1.1 (0.3-4.2)	0.6 (0.1-2.3)	1.1 (0.3-3.6)	10.6 (3.22-34.84) <sup>b</sup>	1.59 (0.77-3.31)	0.13 (0.04-0.50)	0.34 (0.12-1.03)
Currently use contraceptives	0.7 (0.1-2.9)	1.2 (0.3-4.7)	1.8 (0.4-8.0)	1.9 (0.5-7.1)	0.8 (0.34-1.91)	0.99 (0.50-1.98)	0.57 (0.18-1.85)	0.54 (0.19-1.51)

<sup>a</sup>Multinomial reference category: No.; <sup>b</sup>p-value <0.05

Khokana: OR 24.5 (3.1-190.2)). In addition, women from Khokana were 2.3 times more likely (OR 2.3 (1.2-4.4)) to be aware of cervical cancer if they also were currently using contraception, while women from Sanphebagar who had had an abortion were twice as likely (OR 2.1 (1.0-4.5)) to be aware of cervical cancer (Table 2).

*HPV knowledge*

Only 15.4% (n=107) of women were aware of HPV and less than 10% (n=71) of women knew that cervical cancer was caused by HPV (Table 1). Awareness of other STIs was significantly associated with knowledge of HPV in both Khokana (OR= 11.2, 1.3-93.2) and Sanphebagar (OR4.57, 1.5-13.5) women (Table 3). Among Khokana women, those with any formal education were 4 times more likely (OR 4.0, 1.2-13.2) to be aware of HPV (Table 3).

*HPV vaccine knowledge and intention to vaccinate children*

Of 107 reporting knowledge of HPV, 34% (n=36) indicated that they had heard of or had knowledge of the HPV vaccine. Awareness of HPV was significantly associated with the knowledge of the HPV vaccine in both groups of women s (Khokana: OR 28.0, 3.9-201.3; Sanphebagar: OR= 40.2, 3.7-436.7). In Sanphebagar, being aware of cervical cancer (OR 11.8, 3.0-46.2), was also highly associated with having knowledge of HPV vaccine (Table 4).

Overall 77.5% (n=572) of the women indicated that they would vaccinate their children against HPV if the vaccine was available for free while 15.7% (n=116) indicated they would need to ask their husband or family before vaccinating their children. Sixty-four percent (n=465) of the women indicated they would vaccinate their children against HPV if they had to pay for the vaccine, while 22% (n=163) indicated that they would have to ask either their husband or family (Table 1). The older women from Khokana were less willing (Age (per year): OR 0.9 (0.6-0.9)) to pay for the HPV vaccine for their children compared to younger women (Table 5). Women in Sanphebagar with awareness of HPV were 7 times more likely (OR 7.0 (1.2-39.8)) to ask permission from their families or husbands before paying for the HPV vaccine and those who were aware of cervical cancer were

over 10 times more likely to ask permission from their families or husbands before paying for the HPV vaccine (OR 10.6 (3.2-34.8)). However, women who were aware of cervical cancer from Sanphebagar were less likely to provide free HPV vaccine to their children without asking for permission first (OR 0.13 (0.04-0.50)). Women from Sanphebagar with any formal education were more likely to give a free version of the HPV vaccine to their children without asking for permission first (OR 4.18 (1.03-16.9)).

## Discussion

To the best of our knowledge, this the first study in Nepal assessing knowledge and awareness of HPV and the HPV vaccine in community based samples of reproductive aged women. This study, conducted in two distinct sub-populations in Nepal, provides important population level information on current knowledge and awareness regarding cervical cancer cause and prevention among women. Approximately half of women who participated in this study were aware of cervical cancer, while less than 15% had knowledge or were aware of HPV or the HPV vaccine. Overall, women from both communities were found to have a low knowledge and awareness of cervical cancer, HPV, and the HPV vaccine. The findings from this study have important implications for designing and implementing cervical cancer prevention strategies in the country including screening and the HPV vaccine programs.

Several studies conducted in various South Asian countries have reported that between 50-85% of women were knowledgeable or aware of cervical cancer (Joy et al., 2011; Raychaudhuri and Mandal, 2012). depending on differing geographic and socio-demographic strata (Sanaullah et al., 2012). More than half (53.3%) of women participating in this study were aware of cervical cancer; however, the percent of women who were aware of cervical cancer was significantly different between the rural area of Sanphebagar (43%) and the more urban area of Khokana (63.3%). Awareness of cervical cancer was positively associated with having knowledge of STIs, any formal education, current contraception use, and previously having had an abortion in our study population. Given that knowledge of STIs and formal education are both associated with health literacy (Dimmitt et al., 2013; Lam et al., 2013; Wang et al., 2014) and that both contraception use and abortion are indicative of accessing medical care, it is possible that women who are accessing health care for reproductive issues unrelated to cervical cancer are learning about cervical cancer through their doctors. Previous studies conducted in developing countries suggest that women who sought treatment of gynecological problems had higher levels of cervical cancer awareness, possibly indicating that knowledge of cervical cancer was transferred from doctor to patient during clinical visits (Dhamija et al., 1993). It is well known that low health literacy influences cervical cancer screening knowledge (Lindau et al., 2006) yet improvements in health literacy are associated with health interventions at the primary health level (Taggart et al., 2012) similar to the results from this study. Women in

our study who displayed treatment seeking behavior (contraceptive use) or reproductive health problems (previous abortion) were more likely to be aware of cervical cancer.

Approximately, 15.4% of women had heard of HPV and 34% of them were aware of a vaccine that prevents infection from common forms of HPV. However, overall only 7.5% participants were aware of such a vaccine. Conversely, 30% of women who had heard of the HPV vaccine had not heard of HPV. Despite the low number of women who were aware of HPV and the HPV vaccine, 77.5% of study participants reported they would give the HPV vaccine to their children if it were free and 63.7% indicated they would give the vaccine even if they had to pay for it.

Women who were aware of HPV and cervical cancer in Sanphebagar were over 10 times more likely to discuss the HPV vaccine with their family members and husbands before purchasing the vaccine. These results strongly indicate that HPV awareness greatly influences HPV vaccine acceptance in rural areas. Further, supporting the theory that learning about HPV increases the vaccine's acceptance in a population (Chow et al., 2010; Zhao et al., 2012) women in our study were more likely to pay for the HPV vaccine if they were aware of HPV, even after controlling for age and education. Knowledge of cervical cancer and HPV has been found to influence HPV vaccine acceptance (Marlow et al., 2009) and influence the correlation between cervical cancer knowledge acquired through a health care provider and the acceptance of the HPV vaccine (Monnat and Wallington, 2013).

Medical professionals are often the primary source of reproductive health information. Approximately, a quarter of the women in our study learned about cervical cancer from an institutional source (government clinic/NGO clinic/School) and of these women, 21% of them were aware of HPV and 60% of them had knowledge of the HPV vaccine. Both of these numbers were higher than our study's overall averages of 14.3% and 7.5%, respectfully. This suggests that the Nepali medical staff were serving dual roles as both health care providers and reproductive health educators. Variables such as "Have you ever had an abortion" and "Do you currently use contraception" require that women make use of health care services and were significantly associated with our study's knowledge and awareness outcomes. It is possible that women who seek care for ailments specifically related to reproductive issues are learning about cervical cancer and HPV during their clinical visits. If women are using clinical visits to learn about reproductive health, then access to health care is important to educate Nepali women about HPV, cervical cancer and HPV vaccine.

Health facilities in other developing countries are a major source of health information. About a quarter of adolescent females who took part in a health care voucher program in Nicaragua used their voucher to seek reproductive health care counseling (Meuwissen et al., 2006). In Kenya, a network of over 200 reproductive health care providers called the "Kisumu Medical Education Trust" found individuals who accessed their services used family planning counseling and

contraception counseling more often than individuals who did not access their services (Decker and Montagu, 2007). These studies and ours support the idea that health clinics can be both a source of medical care and a source of medical knowledge and education.

Women from Khokana were increasingly less likely to pay for the HPV vaccine as they got older. This is not uncommon, a negative relationship between age and HPV vaccine acceptance has been found in previous studies (Marlow et al., 2009). It is possible that since the HPV vaccine is costly and the government of Nepal has no immediate plans to subsidize the vaccine, older women were not aware of it and/or the doctors may not have discussed it with them. This was found to be true in a 2010 study in the Indian city of Mysore, which determined that physicians were reluctant to recommend the HPV vaccine to patients because they believed it would not be well received (Krupp et al., 2010).

Nepal is a highly diverse country socially, ethnically, and economically and our study sample may not be nationally representative of Nepal. Only 19% of Nepal's population lives in urban areas, where the majority of Nepal's wealth is concentrated. The "mountain" and "hills" ecological regions represent over 77% of the Nepali land mass, but only represent 52% of the population of Nepal (Karki, 2008). Achham District lies in the ecological "Hills" zone which is geographically and ethnically different from the other districts/ecological zones in the far western region. Likewise, the area of Khokana is a mostly homogeneous community which may not be representative of the Kathmandu valley. Therefore, it is difficult to assess any selection bias during recruitment of participants. Nevertheless, understanding the barriers to cervical cancer screening in Nepal's highly diverse population would require an equally diverse study population.

In summary, knowledge and awareness of HPV, cervical cancer and HPV vaccine remains very low in the Nepali women. Acceptance of a freely available HPV vaccine for children was high indicating potentially high uptake rates in these communities provided adequate information sharing about cervical cancer and HPV is present.

## Acknowledgements

We thank the study participants and the staff at Nepal Fertility Care Center who helped conduct our study, particularly Pankaj Bhattarai who was instrumental in initiating the health camp in Achham. Derek Johnson was supported by a National Institutes of Health Cancer Prevention and Control Training Grant (R25CA47888).

## References

Chow SN, Soon R, Park JS, et al (2010). Knowledge, attitudes, and communication around human papillomavirus (HPV) vaccination amongst urban Asian mothers and physicians. *Vaccine*, **28**, 3809-3.  
Bruni L, et al (2014). ICO Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus

and Related Diseases in Nepal. Summary Report 2014.  
Decker, M, Montagu, D (2007). Reaching youth through franchise clinics: assessment of Kenyan private sector involvement in youth services. *J Adolesc Health*, **40**, 280-2.  
Dhamija S, Sehgal A, Luthra UK, et al (1993). Factors associated with awareness and knowledge of cervical cancer in a community: implication for health education programmes in developing countries. *J R Soc Health*, **113**, 184-1.  
Dimmitt J, Harlin B, Collins JL, et al (2013). Sexual risk behavior and STI health literacy among ethnic minority adolescent women. *Appl Nurs Res*, **26**, 204-2.  
Ferlay J, Shin HR, Bray F, et al (2010). Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer*, **127**, 2893-2.  
Fesenfeld M, Hutubessy R, Jit M (2013). Cost-effectiveness of human papillomavirus vaccination in low and middle income countries: a systematic review. *Vaccine*, **31**, 3786-3.  
Gyenwali D, Khanal G, Paudel R, et al (2014). Estimates of delays in diagnosis of cervical cancer in Nepal. *BMC Womens Health*, **14**, 29.  
Gyenwali D, Pariyar J, Onta SR (2013). Factors associated with late diagnosis of cervical cancer in Nepal. *Asian Pac J Cancer Prev*, **14**, 4373-7.  
Haviland M J, Shrestha A, Decker MR, et al (2014). Barriers to sexual and reproductive health care among widows in Nepal. *Int J Gynaecol Obstet*, **125**, 129-33.  
Human Papillomavirus and Related Cancers, Fact Sheet 2013 (2014). World Health Organization : ICO HPV Information Centre. Institut Català d'Oncologia.  
Joy T, Sathian B, Bhattarai C, Chacko J (2011). Awareness of cervix cancer risk factors in educated youth: a cross-sectional, questionnaire based survey in India, Nepal, and Sri Lanka. *Asian Pac J Cancer Prev*, **12**, 1707-1.  
Karki YB (2008). Effects of Communication Campaigns on the Health Behavior of Women of Reproductive Age in Nepal: Further Analysis of the 2006 Nepal Demographic and Health Survey. Calverton, Maryland, USA: Macro International Inc.  
Krupp K, Marlow LA, Kielmann K, et al (2010). Factors associated with intention-to-recommend human papillomavirus vaccination among physicians in Mysore, India. *J Adolesc Health*, **46**, 379-3.  
Lam Y, Broaddus ET, Surkan PJ (2013). Literacy and healthcare-seeking among women with low educational attainment: analysis of cross-sectional data from the 2011 Nepal Demographic and Health Survey. *Int J Equity Health*, **12**, 95.  
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.  
Lindau ST, Basu A, Leitsch SA (2006). Health literacy as a predictor of follow-up after an abnormal Pap smear: a prospective study. *J Gen Intern Med*, **21**, 829-4.  
Marlow LA, Wardle J, Forster AS, et al (2009). Ethnic differences in human papillomavirus awareness and vaccine acceptability. *J Epidemiol Community Health*, **63**, 1010-5.  
Meuwissen LE, Gorter AC, Segura Z, et al (2006). Uncovering and responding to needs for sexual and reproductive health care among poor urban female adolescents in Nicaragua. *Trop Med Int Health*, **11**, 1858-7.  
Ministry of Health & Population, Government of Nepal 2013. <http://www.mohp.gov.np/english/home/index.php>. Accessed July 13<sup>th</sup> 2013. Retrieved July 13<sup>th</sup>, 2013.  
Monnat SM, Wallington SF (2013). Is there an association between maternal pap test use and adolescent human papillomavirus vaccination? *J Adolesc Health*, **52**, 212-8.  
Nepal Demographic and Health Survey 2011. Kathmandu, Nepal New ERA, and ICF International.

- Nepal Living Standards Survey 2010/2011. Central Bureau of Statistics, Government of Nepal.
- Nepal Fertility Care Center. [www.nfcc.org.np/home.html](http://www.nfcc.org.np/home.html). Accessed August 20th 2013.
- Raychaudhuri S, Mandal S (2012). Socio-demographic and behavioural risk factors for cervical cancer and knowledge, attitude and practice in rural and urban areas of North Bengal, India. *Asian Pac J Cancer Prev*, **13**, 1093-6.
- Sanallah M, Bashir S, Bhatti JA, et al (2012). Promotion of HPV vaccination: potential gaps between knowledge and practices of Pakistani female family practitioners. *J Fam Plann Reprod Health Care*, **38**, 208-9.
- Taggart J, Williams A, Dennis S, et al (2012). A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. *BMC Fam Pract*, **13**, 49.
- Termrungruanglert W, Havanond P, Khemapech N, et al (2012). Cost and effectiveness evaluation of prophylactic HPV vaccine in developing countries. *Value Health*, **15**, 29-34.
- Wang SM, Zhang SK, Pan XF, et al (2014). Human papillomavirus vaccine awareness, acceptability, and decision-making factors among Chinese college students. *Asian Pac J Cancer Prev*, **15**, 3239-45.
- Zhao HF, Tiggelaar S, Hu SY, Zhao N, Hong Y (2012). A multi-center survey of HPV Knowledge and attitudes toward HPV vaccination among women, government officials, and medical personnel in China. *Asian Pac J Cancer Prev*, **13**, 2369-78.