



ELSEVIER

Contents lists available at ScienceDirect

Papillomavirus Research

journal homepage: www.elsevier.com/locate/pvr

Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan

Tahir Mehmood Khan ^{a,*}, Malik Allah Buksh ^b, Inayat Ur Rehman ^a, Ahsan Saleem ^c^a School of Pharmacy, Monash University, Bandar Sunway, Jalan Lagoon Selatan, 46700 Selangor, Malaysia^b Institute of Pharmaceutical Sciences, University of Veterinary & Animal Sciences, Lahore, Pakistan^c Department of Pharmacy, Islamia University, Bahawalpur, Pakistan

ARTICLE INFO

Article history:

Received 12 April 2016

Received in revised form

14 June 2016

Accepted 20 June 2016

Available online 21 June 2016

Keywords:

Human papillomavirus

Vaccine

Knowledge

Attitude

University students

Pakistan

ABSTRACT

This cross-sectional study comprises a questionnaire-based survey regarding knowledge about human papillomavirus and its vaccine among students in different educational fields at public and private universities in the city of Lahore in Pakistan. A 26-item questionnaire was used to attain the objective of this study. The reliability of this tool was assessed using Cronbach's alpha (0.79) and the Kaiser-Meyer-Olkin value was 0.827. The response rate to the survey was 78.0%, of whom the majority (74.9%) were females and 308 (79%) were single (median age=23 years). While assessing the respondents' knowledge about HPV, 223(57%) students reported that they had already heard of HPV (human papillomavirus) and nearly 215 (55%) reported that HPV causes cervical cancer and can infect both men and women. Gender and field of study were two main factors found influencing the respondents' knowledge about HPV. Moreover, students' understanding about the mode of transmission of HPV was cursory: 40.51% said they did not know how HPV is transmitted, 133 (34.10%) stated that HPV spreads through the exchange of bodily fluids, and 22 (5.64%) selected cough/sneezing. In terms of prevention, 175 (44.87%) students stated that HPV can be prevented by vaccination, 30.0% reported sexual abstinence, 21.54% using condoms, and nearly 5.38% disclosed use of antibiotics. Addressing the knowledge of students regarding HPV vaccine, nearly 53% stated there is no vaccine against HPV and almost 64% rejected the statement that HPV vaccine prevents cervical cancer. In addition, students reported that they will be more than willing to get vaccinated for HPV if their physician recommend them (RII=0.74) followed by parents (RII=0.69). The results of this study revealed a poor understanding among respondents about the health problems associated with HPV, its prevention, modes of transmission and arability of HPV vaccine in Pakistan.

© 2016 Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Human papillomavirus (HPV) is the most common viral infection of the reproductive tract [1]. Human papillomavirus is a renowned cause of cervical cancer but also other cancers including the vulva, anus, vagina, penis, head and neck [2–4]. Most sexually active women and men will be infected at some point in their lives and some may be repeatedly infected. The peak time for acquiring infection for both women and men is shortly after becoming sexually active. Skin-to-skin genital contact is a well-recognized mode of transmission for HPV [1].

In 2006, the human papillomavirus vaccine got its first approval from the US Food and Drug Administration [5]. Worldwide, two vaccines for HPV are available, and a few new vaccines are in the developmental stage [6]. The WHO has endorsed the HPV

vaccine as the prime approach for the prevention of cervical cancer, to be administered prior to first sexual contact. Certain countries have also initiated vaccination against HPV in males, as the vaccines available are found to be effective for the prevention of anal pre-cancers and genital warts in both sexes [7]. In 2008, the HPV-associated infection incidence was very high, with about 14 million cases globally [4]. According to a WHO report from 2013, globally about 0.27 million deaths occur due to cervical cancer every year, which the leading cause of deaths and 85% of the deaths are in middle or low income countries due to poor and inadequate access to screening and treatment [7]. In 2008, nearly 27,000 new cases of vulva cancer and 13,200 cases of vaginal cancer were reported worldwide. It has been estimated that almost 60% of vulva cancer cases and 68% of vaginal cancer cases occur in developed countries [3].

Most developed countries like Australia, Hungary and the United Kingdom have incorporated the HPV vaccination into their national vaccination program [6]. As the HPV epidemic spread in 2014, the HPV vaccination became part of the national

* Corresponding author.

E-mail address: tahir.mehmood@monash.edu (T.M. Khan).

vaccination and immunization program of 84 countries [8]. According to the Human Papillomavirus and Related Diseases Report in Pakistan (2015), there is no HPV vaccination and immunization program in Pakistan, as a result of which a major epidemic of HPV has been reported, and many people have fallen victim to this deadly virus [9].

As Pakistan is a developing country, the human papillomavirus is a major threat to public health. To date, HPV screening is generally not implemented in Pakistan. A major hurdle to exact statistical assessment and evaluation of HPV epidemic are social restrictions [10]. In Pakistan, to date it is a taboo to discuss about sexually transmitted diseases and sexual education, due to which, a majority of young female population, mainly from the rural areas have poor understanding about the sexually transmitted disease (STDs) and gender-specific cancers. Perhaps due to which the cervical cancer caused by HPV is ranked the 3rd major contributing source of deaths among women in Pakistan. In Pakistan more than 60 million female population aged 15 or over are at risk of cervical cancer, with a crude incidence rate of 5.9 [11]. Back in 2013, nearly 5233 cervical cancer cases were reported, and nearly 2876 deaths occurred in the country [11].

However, to date there is little research that explores public knowledge and understanding of HPV in Pakistan. Various screening studies have reported high risk HPV 16 and 18 strains among the samples collected from Punjab province [10,12]. Moreover, there are a lack of public health initiatives to improve education among the young adults about HPV symptoms, causes and prevention. Internet and some online blogs might have served as the main source of information about HPV among young Pakistani women. However, to date there is a lack of provincial or nationwide campaigns to raise awareness among Pakistani women about STDs and HPV. Therefore this study explores university students' knowledge, attitudes, and perception towards HPV. The results from the present study are expected to provide the baseline knowledge and understanding of young adults, who might be at risk of HPV, and will assist the public health department to intervene accordingly.

2. Methodology

A cross-sectional study was conducted among students enrolled at public and private universities in the city of Lahore in Pakistan. The study lasted from 1st Dec 2015 till 28th Feb 2016. A convenience sample method was adapted and self-administered (paper-and-pencil) twenty-six-item questionnaire was used to assess the university students' knowledge about human papillomavirus and its vaccine.

2.1. Study tool

A questionnaire for the survey was first designed with 32 questions, which were believed to be important on the basis of the literature review. A panel of four academic experts was approached to validate the contents of the study tool. Upon completion of content validity, a 26-item questionnaire was finalized and piloted among 20 respondents to meet the requirements of face validity. The reliability scale was applied for these 20 respondents and the alpha value was found at 0.878, confirming that the tool is adequate to meet the objectives of this study. Internal consistencies of individual items for 390 university students are given in Appendix A. Furthermore, to address any concerns about the tool's content, its adequacy was measured using the Bartlett test of sphericity. The Kaiser-Meyer-Olkin measure of sampling adequacy is an effective technique for judging content adequacy. In this study, the Kaiser-Meyer-Olkin value was 0.827, and the

interclass correlation coefficient was found to be significant. As the Kaiser-Meyer-Olkin value was more than 0.6, it demonstrates that the contents of the instrument are satisfactory to meet the study's needs.

2.2. Contents of the questionnaire

The questionnaire was comprised of five sections. Section one had six items aiming to gather the demographic information of the respondents. The primary focus of section two was to assess general knowledge about human papillomavirus. A nominal scale [yes/no] was provided for the respondents' convenience to disclose their responses (Table 2). Section three was comprised of three main items, aiming to explore respondents' knowledge about symptoms, prevention and spread of human papillomavirus (Table 3). Section four was comprised of five items that were aiming to gather respondents' knowledge and understanding about HPV vaccines using a nominal scale [yes/no] (Table 4). The last section of the study tool consisted of three main items aiming to record respondents' opinion about the HPV vaccination using five items likert scale.

3. Data collection

The respondents who participated in this survey attended different private and public universities of Lahore, with different ages, genders, marital status and educational backgrounds. No specific criteria for inclusion and exclusion were made for this survey and the questionnaire was given to all these respondents. However, respondents who were not willing to participate were excluded for this study. Verbal consent was taken from all the respondents to participate in this study as an ethical requirement.

4. Data analysis

For data analysis, Statistical Package for Social Sciences (SPSS) version 20 was used. Binary and linear regression was applied to see the association among demographic and binary/ordinal responses. a relative importance index (RII) was applied (Eq. (1)) [13] to identify the main factors that may hinder respondents' opinion about the HPV vaccination. Items were ranked base on the RII values, with the item having an RII value closest to one being ranked as the main factor affecting the HPV reporting process [14].

$$RII = \frac{\sum W}{A * N} (0 \leq RII \leq 1) \quad (1)$$

where: W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where “1” is “strongly disagree” and “5” is “strongly agree”); A – is the highest weight (i.e. 5 in this case) and; N – is the total number of respondents. Furthermore to identify the factors affecting the knowledge towards HPV vaccination regression analysis was applied using gender (ref male) and field of education (ref non-health science) as covariates. A significant value 0.05 was assigned for analysis of respondents' replies.

5. Results

A total of N=500 respondents were approached, of whom 390 responded to the survey with a response rate of 78.0%. The majority of respondents (74.9%) were females and N=308 (79%) were single. The median age of the students was 23 (range 16–65). The majority (55.1%) were undergraduates, and N=175 (44.9%) were graduate students. N=180 (46.2%) were enrolled in

Table 1
Demographics of respondents participated in survey N=390.

Demographics	N (%)
Gender	
Male	98 (25.1%)
Female	292 (74.9%)
Marital status	
Married	82 (21.0%)
Single	308 (79.0%)
Age [Mean SD25 ± 8.1 years]	
Median 23 years [Range18–65 years]	
18–30 years	339 (86.9%)
31–40 years	27 (6.9%)
41–50 years	15 (3.8%)
51 and over	9 (2.3%)
Education level	
Undergraduate	215 (55.1%)
Graduate	175 (44.9%)
Field of study	
Health sciences	250 (64.1%)
Non-health sciences	140 (35.9%)
Course registered	
Pharmacy	180 (46.2%)
Bachelor of Medicine and Bachelor of Surgery	18 (4.6%)
Biological Sciences	38 (9.7%)
Education	61 (15.6%)
Business and Management Sciences	30 (7.7%)
Arts Humanities	9 (2.3%)
Social Sciences	24 (6.2%)
Physical Sciences	16 (4.1%)
Doctor of Veterinary Medicine	4 (1.0%)
Bachelor of Dental Studies	6 (1.5%)
Physiotherapy	4 (1.0%)

Pharmacy, N=61 (15.6%) in Education, and N=38 (9.7%) in Biological Sciences, with lower participation observed from other disciplines (see Table 1).

5.1. Knowledge of students about HPV

While exploring the general knowledge of students regarding HPV, N=223 (57%) students reported that they had already heard of HPV (human papillomavirus). N=215 (55%) students reported that HPV causes cervical cancer and almost the same number of students stated that HPV infects both men and women. The majority (71%) of students stated that HPV is not a rare disease in Pakistan. However, nearly 68% of students did not believe that HPV occurs without any symptoms. About 68% of students stated that the incidence of HPV is not high among women aged 20–30 years, nearly N=201 (52%) stated that HPV causes external genital warts,

and about 47% stated that HPV causes penile and anal cancers. The regression analysis showed that gender of students was strongly associated with the majority of answers from this section except Q9 (OR 0.629 CI 0.369–1.074), Q10 (OR 0.609 CI 0.385–0.966), and Q12 (OR 0.885 CI 0.538–1.457). Moreover, the field of study was also found strongly associated with the majority of answers except Q12 (OR 0.723 CI 0.459–1.140), Q13 (OR 0.723 CI 0.459–1.140) and Q8 (OR 0.664 CI 0.438–1.007). For more details, see Table 2.

5.2. Knowledge about transmission of HPV

When students were asked about the mode of transmission, 40.51% said they did not know, N=133 (34.10%) students HPV spreads through exchange of bodily fluids, N=175 (44.87%) chose genital skin-to-skin contact, and only N=22 (5.64%) selected coughing/sneezing. When students were asked about the diseases associated with HPV, the majority, 211 (54.10%), reported cervical cancer, N=156 (40.00%) said genital warts, N=99 (25.38%) reported penile cancer, and a few (9.49%) students said HIV. N=145 (37.18%) responded that they didn't know anything about it. Furthermore, when asked about preventive measures, 175 (44.87%) students stated that HPV can be prevented by vaccination, 117 (30.00%) students reported sexual abstinence, 21.54% chose 'using condoms', and 5.38% students reported antibiotics. A significant portion of students, N=161 (41.28%), stated they did not have knowledge regarding HPV prevention. For more details, see Table 3.

5.3. Attitudes toward HPV

Addressing the knowledge of students regarding the HPV vaccine, it was observed that nearly 53% stated there is no vaccine against HPV and nearly 64% rejected the statement that HPV vaccine prevents the risk of cervical cancer. About 86% of students reported that women no longer needed to be screened for cervical cancer after getting vaccinated against HPV. Nearly 35% stated that the HPV vaccine should be given before first sexual intercourse and nearly 17% reported that HPV vaccine is only for sexually active people. The regression analysis revealed that in the vaccine-related knowledge section, gender was associated with only Q19 (OR 0.017 CI 0.353–0.904), and the field of study was associated with Q19 (OR 0.397 CI 0.258–0.612) and Q23 (OR 0.511 CI 0.324–0.805). For more details, see Table 4. In addition, students reported that they will be more than willing to get vaccinated for HPV if their physician recommend them (RII=0.74) followed by parents (RII=0.69) (Table 5).

Table 2
General knowledge about human papillomavirus.

Item no.	Statement	Yes	No	Gender	Field
7	Before taking this survey, had you ever heard of HPV (human papillomavirus)?	223 (57%)	167 (43%)	0.366* [0.229–0.587]	0.364* [0.238–0.558]
8	Is HPV sexually transmitted?	197 (51%)	193 (49%)	0.472* [0.295–0.757]	0.647* [0.427–0.982]
9	Are HPV infections rare in Pakistan?	114 (29%)	276 (71%)	0.629 [0.369–1.074]	0.507* [0.312–0.824]
10	Does HPV cause cervical cancer?	215 (55%)	175 (45%)	0.609 [0.385–0.966]	0.481* [0.316–0.733]
11	Can HPV infect both men and women?	216 (55%)	174 (45%)	0.509* [0.320–0.808]	0.431* [0.283–0.658]
12	Is the incidence of HPV highest among women in their 20s and 30s?	123 (32%)	267 (68%)	0.885 [0.538–1.457]	0.723 [0.459–1.140]
13	Can a HPV infection occur without symptoms?	123 (32%)	267 (68%)	0.547* [0.321–0.932]	0.723 [0.459–1.140]
14	Does HPV cause genital (external organs of reproduction e.g. testes) warts?	201 (52%)	189 (48%)	0.627* [0.395–0.995]	0.664 [0.438–1.007]
15	Can HPV cause other genital cancers (penis, anus)?	183 (47%)	207 (53%)	0.607* [0.380–0.969]	0.537* [0.352–0.820]

Binary logistic regression.

* Significant ($p < 0.05$); gender (ref male) and field (ref non-health science).

Table 3
Knowledge about human papillomavirus N=390.

Item no.	Statement	Frequency	%
16	Health problems associated with Human papillomavirus		
	Cervical Cancer	211	54.10
	Penile Cancer	99	25.38
	Genital Warts	156	40.00
	HIV	37	9.49
17	Don't know	145	37.18
	Prevention of Human papillomavirus		
	Practicing abstinence (avoiding sex)	117	30.00
	Vaccination	175	44.87
	By using Condoms	84	21.54
18	Antibiotics	21	5.38
	Don't know	161	41.28
	Spread/transmission of Human papillomavirus		
	Cough or sneezing	22	5.64
	Genital skin-to-skin contact	175	44.87
	Contact with bodily fluids (blood)	133	34.10
	Don't Know	158	40.51

Multiple responses were selected by the respondents; therefore the sum of response may not be always 100%.

6. Discussion

This present study was conducted to assess the knowledge of multidisciplinary students regarding HPV in Lahore city, which is a hub of business and education, and a provincial headquarters of Punjab province, Pakistan. To the best of our knowledge, this is the first study of its kind conducted in Lahore. Overall, the study showed that students had borderline or poor knowledge regarding HPV, with the exception of a few questions. Nevertheless, despite being multidisciplinary students, nearly 57% had already heard about HPV, nearly 55% knew HPV causes cervical cancer and infects both genders equally, and nearly 71% knew that HPV is not a rare disease in Pakistan. A similar study conducted in Nigeria reported that only 17.7% of female students were aware of HPV [15], which shows that Pakistani students have better knowledge than Nigerian students. This comparatively good knowledge could be due to a higher participation from health science students in Pakistan. In contrast, a study conducted at Keele University, England, reported that nearly 75% of female participants had heard of HPV. However, despite being aware of HPV, only 27% reported that HPV causes cervical cancer [16]. Similarly, a Malaysian study reported that around 80% of healthcare students knew that HPV causes cervical disease, and nearly 54.6% reported HPV infects both man and women equally. However, only 37% of them considered HPV as a frequently occurring illness [17]. These findings show that HPV knowledge gaps exist everywhere and inadequacy of HPV knowledge is a global issue.

The primary literature suggests that HPV does not show any symptoms at an earlier stage, and mainly affects a sexually active and younger population [17–19]. However, in the present study

the majority of students (68%) rejected the statement that HPV does not show any symptoms. Moreover, approximately the same number of students stated that incidence of HPV is not high among women aged 20–30 years, and only 47% of Pakistani students identified HPV as a cause of penile and anal cancers. In addition, when students were asked questions regarding the mode of transmission, diseases caused by HPV, and methods to prevent HPV infection, a severe lack of knowledge was observed. For instance, 34.10% students reported that HPV spreads through exchange of bodily fluids, and 44.87% reported genital skin-to-skin contact. These findings are much poorer than in studies performed in developed countries [5,20].

Furthermore, 54% reported that HPV causes cervical cancer, 40% reported genital warts, and 25.38% reported penile cancer. These findings are in contrast with a previous study performed elsewhere [21]. The level of knowledge in Pakistan is so poor that some students even reported that HPV causes HIV, and others said that HPV can be prevented by taking antibiotics. This aspect was comparatively new and has not been studied before. Moreover, nearly 40.51%, 37.18%, 41.28% did not know anything about the mode of transmission, diseases caused by HPV, and methods to prevent the occurrence of HPV infection respectively. These findings reflect poor disease-related knowledge among Pakistani students. This lack of knowledge is concerning as the majority of study participants were students from health science or biological science disciplines. This knowledge gap should be filled by taking adequate steps such as adding syllabus content related to HPV, especially in the health sciences disciplines, and by organizing symposiums and conferences to raise awareness in these future professionals.

Another important aspect of the present study is the lack of knowledge in students regarding HPV vaccination. Prevention of HPV infections is essential in prevention of cervical cancer. The advent of the HPV vaccine has been a major breakthrough, so there should be an emphasis on raising awareness regarding HPV prevention and HPV vaccination, as the majority of students (53%) participating in the study stated that there is no vaccine against HPV, and nearly 64% reported that the HPV vaccination does not prevent cervical cancer. These false perceptions regarding HPV vaccination could be due to a lack of knowledge, fear of adverse outcomes and unacceptability of vaccinations by the healthcare professionals in Pakistan [22], which ultimately affects the perception and acceptability of the vaccination by the general population and students. Keeping in mind these issues, students were further asked whether their parents, doctors, and friends would allow them to get vaccinated if they knew about the HPV vaccine. Overall, recommendation from the health care provider and parents were the two main factors found influencing the respondent's willingness to get vaccinated for HPV. These findings report a strong influence of friends, parents and healthcare professionals on the acceptability of the HPV vaccination, which reaffirms the findings of previous studies [23,24].

To date, many studies have been done to assess the knowledge, attitude, and practices about HPV vaccine worldwide. They have

Table 4
Respondents knowledge and understanding about HPV vaccines.

Item no.	Statement	Yes	No	Gender	Field
19	Is there is a vaccine that protects against HPV?	184 (47%)	206 (53%)	0.017* [0.353–0.904]	0.397* [0.258–0.612]
20	The HPV vaccine prevents the chances of cervical cancers	139 (36%)	251 (64%)	0.0788 [0.484–0.284]	0.676 [0.434–1.052]
21	Once vaccinated, women no longer have to be screened for cervical cancer	55 (14%)	335 (86%)	0.910 [0.466–1.777]	0.771 [0.417–1.424]
22	The HPV vaccine is only for people who are sexually active	68 (17%)	322 (83%)	1.089 [0.601–1.975]	1.129 [0.658–1.938]
23	Should the HPV vaccine be given before commencing sexual intercourse?	137 (35%)	253 (65%)	0.629 [0.381–1.040]	0.511* [0.324–0.805]

Linear logistic regression.

* Significant ($p < 0.05$); gender (ref male) and field (ref non-health science).

Table 5
Recommendation of human papillomavirus vaccine.

Item no.	Statement	SA	A	N	D	SD	RI	Rank
24	If my friends knew about the HPV vaccine, they would approve of me getting vaccinated against HPV.	64 (16.4%)	123 (31.5%)	106 (27.2%)	86 (22.1%)	11 (2.8%)	0.47	3
25	If my parents knew about the HPV vaccine, they would approve of me getting vaccinated against HPV.	81 (20.8%)	135 (34.6%)	73 (18.6%)	90 (23.1%)	11 (2.8%)	0.69	2
26	If my doctor knew about the HPV vaccine, he/she would approve of me getting vaccinated against HPV	105 (26.9%)	153 (39.2%)	47 (12.9%)	77 (19.7%)	8 (2.1%)	0.74	1

SA=Strongly Approve, A=Approve, N=Neutral, D=Disapprove, SD=Strongly Disapprove
RI=relative index.

shown that people from developed countries such as the USA, Australia, and Turkey [25,26] have better knowledge than those living in developing countries in Asia [6,27]. Therefore, attention should be paid to the general population and students in developing countries. Overall, the present study clearly reflects our expected outcomes. The majority of students had poor awareness regarding HPV, as there are no such HPV immunization and awareness programs. If the Ministry of Health and non-government organizations would have taken adequate step, the situation might have been quite different.

Lastly, the regression analysis revealed an association among the gender and field of study (disciplines) of students and level of knowledge. Previously conducted studies have reported that HPV knowledge was significantly associated with gender [17,18], age [28], level of education [21], and living conditions of study population [17]. However, in the present study, HPV knowledge was found associated with gender and field of study (disciplines) of students (Tables 2 and 4). Further research should be done to investigate the association of more demographic variables with HPV knowledge. There is also a need to assess the perception of students regarding the HPV vaccination and the barriers to implementation of HPV immunization in Pakistan.

7. Conclusion

The results of this study revealed a poor understanding among respondents about the health problems associated with HPV, its prevention and modes of transmission. Nearly half of the respondents were unaware of the availability of the HPV vaccine, and understanding about preventing HPV and chances of re-occurrence after vaccination were poor in the majority. However,

50–60% of the respondents were willing to get vaccinated for HPV if their physician or parents recommended it to them.

8. Strengths and limitation

This is perhaps the first study aiming to address the health literacy toward HPV among Pakistani students, and providing the some basic understanding of students towards HPV which can be utilized to design an effective educational campaign to create awareness. However, the result of this study cannot be generalized for the students/ young adult's population from rural area. The data presented in the current study is more applicable to urban population and educated adults. Moreover, the current study has not explored the relation of age, and marital status with the responses. Future studies comprising of bigger sample should address this issue in detail, such efforts will also assist in designing educational programs for different age groups.

Conflicts of interest

All authors have no conflict of interest.

Acknowledgements

We are thankful to Richard from English Editing Netherlands for providing assisting in correcting the grammar and sentence structure.

Appendix A. Supplementary data for internal consistency of the questionnaire

	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
7. Before taking this survey, had you ever heard of HPV (human papillomavirus)?	19.02	53.866	0.649	0.870
8. Is HPV sexually transmitted?	19.08	53.479	0.696	0.868
9. Are HPV infections rare in Pakistan?	19.29	56.100	0.370	0.876
10. Does HPV cause cervical cancer?	19.04	53.212	0.739	0.867
11. Can HPV infect both, men and women?	19.03	53.837	0.650	0.869
12. Is the incidence of HPV is highest among women in their 20's and 30's?	19.27	54.918	0.536	0.872
13. Can a HPV occur without symptoms?	19.27	54.826	0.550	0.872
14. Does HPV causes genital (external organs of reproduction e.g, testis) warts?	19.07	53.023	0.762	0.867
15. Can HPV may cause other genital cancers (penis, anus)?	19.12	53.708	0.665	0.869

16. Health problems associated with Human papillomavirus				
Cervical cancer	19.05	53.391	0.712	0.868
Penile cancer	19.33	55.611	0.466	0.874
Genital warts	19.19	54.132	0.617	0.870
HIV	19.49	57.886	0.192	0.878
Don't Know	19.22	64.905	−0.809	0.898
17. Prevention of Human papillomavirus				
Practicing abstinence (avoiding sex)	19.29	55.419	0.468	0.874
Vaccination	19.14	54.017	0.624	0.870
By using Condoms	19.37	55.627	0.494	0.873
Antibiotics	19.53	58.322	0.132	0.879
Don't Know	19.17	64.905	−0.796	0.898
18. Spread/transmission of Human papillomavirus				
Cough or sneezing	19.19	54.132	0.617	0.870
Genital skin-to-skin contact	19.49	57.886	0.192	0.878
Contact with bodily fluids (blood)	19.37	55.627	0.494	0.873
Don't Know	19.53	58.322	0.132	0.879
19. Is there is a vaccine that protects against HPV?	19.21	54.562	0.562	0.871
20. The HPV vaccine prevents the chances of cervical cancers	19.24	54.793	0.538	0.872
21. The HPV vaccine is only for people who are sexually active	19.41	56.942	0.304	0.877
22. Should the HPV vaccine be given before commencing sexual intercourse?	19.12	53.706	0.665	0.869
23. Once vaccinated, women no longer have to be screened for cervical cancer	19.45	57.219	0.282	0.877
24. Friends knew about the HPV vaccine, they would approve of me getting vaccinated against HPV.	16.22	49.406	0.542	0.874
25. If my parents knew about the HPV vaccine, they would approve of me getting vaccinated against HPV.	16.11	48.959	0.537	0.875
26. If my doctor knew about the HPV vaccine, he/she would approve of me getting vaccinated against HPV	15.89	47.637	0.637	0.870

References

- [1] W.H.O. Human Papillomavirus (HPV) and Cervical Cancer, 2015 (cited 2016 15th February); Available from: (<http://www.who.int/mediacentre/factsheets/fs380/en/>).
- [2] D. Forman, et al., Global burden of human papillomavirus and related diseases, *Vaccine* 30 (2012) F12–F23.
- [3] C. De Martel, et al., Global burden of cancers attributable to infections in 2008: a review and synthetic analysis, *Lancet Oncol.* 13 (6) (2012) 607–615.
- [4] I.U. Park, C. Introcaso, E.F. Dunne, Human papillomavirus and genital warts: a review of the evidence for the 2015 centers for disease control and prevention sexually transmitted diseases treatment guidelines, *Clin. Infect. Dis.* 61 (Suppl. 8) (2015) S849–S855.
- [5] L.A. Marlow, et al., Knowledge of human papillomavirus (HPV) and HPV vaccination: an international comparison, *Vaccine* 31 (5) (2013) 763–769.
- [6] Y. Yu, et al., Human papillomavirus infection and vaccination: awareness and knowledge of HPV and acceptability of HPV vaccine among mothers of teenage daughters in Weihai, Shandong, China, *PloS One* 11 (1) (2016) e0146741.
- [7] W.H.O. Comprehensive Cervical Cancer Prevention and Control: A Healthier Future for Girls and Women, 2013 (cited 2016 12th February); Available from: (http://www.who.int/immunization/hpv/learn/comprehensive_cervical_cancer_who_2013.pdf).
- [8] Action C.C., Global Progress in HPV Vaccination, 2015 (cited 2016 14th June); Available from: (<http://www.cervicalcanceraction.org/comments/comments3.php>).
- [9] L. Bruni, B.-R.L. Albero, G. Aldea, M. Serrano, B. Valencia, S. Brotons, M. Mena, M. Cosano, R. Muñoz, J. Bosch, F.X. de Sanjosé, S. Castellsagué, X. ICO Information Centre on HPV and Cancer, Human Papillomavirus and Related Diseases in Pakistan Summary Report 2015, 2015.
- [10] S. Khan, et al., Human papillomavirus subtype 16 is common in Pakistani women with cervical carcinoma, *Int. J. Infect. Dis.* 11 (4) (2007) 313–317.
- [11] Centre I.H.I., Human papillomavirus and related diseases in Pakistan. Summary Report 2016-02-26. 2016 (cited 2016 13th Jun); (Available from: (<http://www.hpvcentre.net/statistics/reports/PAK.pdf>).
- [12] S. Gul, S. Murad, A. Javed, Prevalence of high risk human papillomavirus in cervical dysplasia and cancer samples from twin cities in Pakistan, *Int. J. Infect. Dis.* 34 (2015) 14–19.
- [13] M.M. Elbarkouky, A. Multi-Criteria, Prioritization framework (MCPF) to Assess infrastructure sustainability objectives, *J. Sustain. Dev.* 5 (9) (2012) p1.
- [14] M. Gündüz, Y. Nielsen, M. Özdemir, Quantification of delay factors using the relative importance index method for construction projects in Turkey, *J. Manag. Eng.* 29 (2) (2012) 133–139.
- [15] C.C. Makwea, R.I. Anorlua, K.A. Odeyemib, Human papillomavirus (HPV) infection and vaccines: knowledge, attitude and perception among female students at the University of Lagos, Lagos, Nigeria, *J. Epidemiol. Glob. Health* 2 (4) (2012) 199–206.
- [16] S. Sherman, et al., Awareness and knowledge of HPV and cervical cancer in female students: a survey (with a cautionary note), *J. Obstet. Gynaecol.* 36 (1) (2016) 1–5.
- [17] K. Rajiah, et al., Awareness and acceptance of human papillomavirus vaccination among health sciences students in Malaysia, *VirusDisease* 26 (4) (2015) 297–303.
- [18] N.B. Kwang, et al., Knowledge, perception and attitude towards human papillomavirus among pre-university students in Malaysia, *Asian Pac. J. Cancer Prev.* 15 (21) (2014) 9117–9123.
- [19] H.W. Kim, et al., The effects of an HPV education program by gender among Korean university students, *Nurse Educ. Today* 35 (4) (2015) 562–567.
- [20] R.H. Dodd, et al., Knowledge of human papillomavirus (HPV) testing in the USA, the UK and Australia: an international survey, *Sex. Transm. Infect.* 0 (2014) 1–7.
- [21] M. Piñeros, et al., HPV knowledge and impact of genital warts on self esteem and sexual life in Colombian patients *BMC, Public Health* 13 (2013) 272.
- [22] T.M. Khan, et al., Knowledge, attitude and awareness among healthcare professionals about influenza vaccination in Peshawar, Pakistan, *Vaccine* 34 (11) (2016) 1393–1398.
- [23] H.L. Gamble, et al., Factors influencing familial decision-making regarding human papillomavirus vaccination, *J. Pediatr. Psychol.* 35 (7) (2010) 704–715.
- [24] D. Ferris, L. Horn, J.L. Waller, Parental acceptance of a mandatory human papillomavirus (HPV) vaccination program, *J. Am. Board Fam. Med.* 23 (2) (2010) 220–229.
- [25] Ö. Uzunlar, et al., A survey on human papillomavirus awareness and acceptance of vaccination among nursing students in a tertiary hospital in Ankara, Turkey, *Vaccine* 31 (17) (2013) 2191–2195.
- [26] L. Bruni, et al., Cervical human papillomavirus prevalence in 5 continents: meta-analysis of 1 million women with normal cytological findings, *J. Infect. Dis.* 202 (12) (2010) 1789–1799.
- [27] Y. Phianmongkhol, et al., Knowledge about human papillomavirus infection and cervical cancer prevention among nurses in Chiang Mai University, *Hosp. Thail. Asian Pac. J. Cancer Prev.* 12 (3) (2011) 823–825.
- [28] E.M. Donadiki, et al., Knowledge of the HPV vaccine and its association with vaccine uptake among female higher-education students in Greece, *Hum. Vaccine Immunother.* 9 (2) (2013) 300–305.