Knowledge, attitudes, and practices toward cervical cancer prevention among women in Khartoum state, Sudan

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Abstract

Background

Cervical cancer is considered as the third most leading cause of death among female worldwide with most of the deaths were found to occur in the developing countries. Several etiological agents were studied however Human papilloma virus (HPV) is identified as the most common etiological agent that involved in the induction of cervical cancer. The aim of our current study was to assess the Knowledge, attitudes, and practices toward cervical cancer prevention among women in Khartoum state, Sudan.

Methods

this is a descriptive cross-sectional community-based study. An electronic questionnaire was used for data collection. Descriptive statistics like frequency, mean and percentage were computed using SPSS version 20.0 software program.

Results

About 716 females in age between 18 and 74 years old with a mean age 27.58 years (STD 8.74 years) have enrolled in this study. 93.7 of them are educated at university level or higher. Although that 580 (81.0%) of our study participants have heard about cervical cancer only 29 (4.1%) were vaccinated against HPV as a preventive measure against the disease.

Conclusion

We highly recommended conducting health education sessions for both the Obstetrician and females in reproductive age regarding the benefit of the Pap test in the early detection of the cervical intraepithelial lesions and malignancy as well as HPV vaccination should be introduced in the local healthcare facilities

Background

Cervical cancer, also called cervical carcinoma, is considered one of the most common cervical tumors affecting the female genitalia. This type of cancer affects females worldwide, with 80% of the cases reported from developing countries [1–3]. In Sudan, cervical cancer has been reported as the second most common cancer among female patients between 1954 and 1961 [4]. Furthermore, previous studies have demonstrated that cervical cancer represents about 8.2% of all cancer types in females during 2000 – 2006 [5]. Currently, cervical carcinoma is estimated to be more than eight thousand cases reported annually. They are usually presented at a late stage of the disease [6].

Different etiological factors had been attributed to the development and progression of cervical carcinoma. The Human papillomavirus (HPV) is considered the most common etiological agent that leads to the development of cervical cancer [7, 8]. Fortunately, cervical cancer is preventable through early and regular screening, eventually leading to better case management [9–11]. The screening program for cervical carcinoma has successfully led to cancer detection in an early stage using Papanicolaou smear (Pap smear), which is considered the gold standard tool for early detection of the cancerous and precancerous lesions of the cervix [1–8, 10, 12]. Adopting Pap smear as a screening tool for the detection of cervical cancer in the population-based screening programs has successfully reduced the incidence of late cervical carcinoma up to 85% in several developed countries over the past decades. About 99.7% of all cervical cancers are associated with human papillomavirus infection [11].

Cervical cancer can be prevented by either preventing human papillomavirus (HPV) infection and/or by the early detection and treatment of the precancerous lesions before their progression into invasive cancer [13, 14]. However, cervical carcinoma is a highly preventable disease in western countries. Sadly, it is one of the leading causes of death in African women [15]; this is likely due to a shortage in screening, early detection, and poor case management of the disease. Multiple factors contribute to the incompetent cervical cancer screening in low-income countries, such as inadequate national screening system, shortage of trained healthcare expertise, limited access to healthcare, and lack of public awareness [16–18]. A study conducted in Sudan has demonstrated that lack of awareness, poverty, and limited health insurance in the country resulted in deficient access to health care services leading to late diagnosis of cervical cancer [10]. Another study in the Congo revealed that a low level of knowledge, lack of good health practices, and poor attitude toward cervical cancer were associated with high incidence and mortality rates [17]. It has been experimentally shown that raising awareness about cervical cancer's risk factors and symptoms were associated with a significant increase in the numbers of patients diagnosed in early stages I and II [19].

In Sudan, there is limited data on women's awareness of cervical cancer. Therefore, this study was designed to assess women's level of knowledge, attitude, and practice regarding cervical cancer and their beliefs about the disease risk factors and preventive methods. Furthermore, investigating the link between the marital status, socioeconomic level, education level, and other factors to women's knowledge and practices towards cervical cancer. Besides exploring the obstacles of early screening and other preventive measures.

Methods

A community-based cross-sectional study was conducted in Khartoum state, Sudan, from 01st August 2020 till 01st September 2020 to assess women's knowledge, attitudes, and practice (KAP) toward cervical cancer prevention. We have adopted a well-established KAP questionnaire to be used in this study through an electronic survey (Google Form). The questionnaire was eventually sent to different groups in social media. English and Arabic versions of the questionnaire were developed and translated into an Arabic version. The English and Arabic versions of the questionnaire were pre-tested among a

small group of women to validate and modify the questionnaire to ensure that the questions are simple to be understood by the interviewees and data collectors without losing their power to capture the accurate information.

The questionnaire included 28 questions covering demographic and socioeconomic characteristics, knowledge of cervical carcinoma, its risk factors, the screening methods including Pap smear, preventive measures towards HPV, and the vaccination programs. Demographic data comprised age, education level, occupation, family monthly income, and marital status. Regarding reproductive-health data, we asked about the number of children, presence or absence of a family history of cervical carcinoma, history of sexually transmitted diseases, methods used for family planning, number of sexual partners, and smoking and alcohol consumption. Furthermore, questions regarding the knowledge on cervical carcinoma included were; have you ever heard about cervical cancer; also, what is the most important risk factor of cervical cancer. The questionnaire was designed as a close-ended question (Yes, No, and I do not know), while some other questions had multiple answers.

The online form questionnaire experiment was performed in accordance with relevant guidelines and regulations. A pre-questionnaire filling statement was included as an informed consent of agreeing to participate was obtained from all the participants.

Statistical analysis:

The study data were homogenized to be exploitable using Microsoft Office software (version 2109). A verification step based on the respondent age groups to ensure the sample's representativeness compared to the source population was made. No significant difference was observed between the sample population and the general population. The mean, standard deviations, and frequency of each variable among the respondent were calculated. The Chi-square test was used to test the significance level; a P value <0.05 was considered statistically significant. Also, Multiple linear regression models were tested to predict the effectors on participants' knowledge, attitude, and practice. All statistical analysis was conduct using the Statistical Package for Social Sciences (SPSS version 20).

Results

The socio-economic characteristic of participants:

The study participants consisted of 716 females. The minimum age among the participants was 18, and the maximum was 74; the mean was 27.58 years (STD 8.74 years). Age was grouped into six different age groups of ten years intervals. The most frequent age group was 20 to 30 years; 440 (61.5%), followed by 31 to 40 years; 121 (16.9%). The remaining age groups constituted 94 (13.1%), 41 (5.7%), 14 (2.0%), and 6 (0.8%), for the age groups less than 20 years, 41 to 50 years, 51 to 60 years, and more than 60 years, respectively. Among the participants, 35.1% were students, while 22.1% were unemployed. The remaining occupations were 10.6% medical doctors, 6.0% laboratory technologists, 5.7% were teachers,

and 5.4% were managers. The remaining 15.1% consisted of other occupations that were insignificantly frequent.

Levels of education among the participants were mostly for those who finished university; 506 (70.7%). For those who continued their higher education (postgraduate) were 165 (23.0%). Participants with pre-university education levels were 45 (6.2%) (Table 1). Participants were generating family income in range of middle (7,001 – 15,000 SDG) and high-income (> 15,000); 356 (49.7%) and 299 (41.8%), respectively. Whereas low-income participants constituted 8.5% of the study participants (61/716). According to the marital status, 448 (62.6%) participants were single, 245 (34.2%) were married, and 23 (3.2%) were divorced. One child was more frequent; 68 (9.5%) among distribution those who have children. About 70.3% of the study participants did not have children (503/716).

When we asked about the family history of cervical cancer, 148 (20.7%) of the participants didn't know about their family history. In comparison, 523 (75.0%) have confirmed no family history of cervical cancer; the remaining participants, 31 (4.3%), reported a family history of cervical cancer.

The history of sexually transmitted diseases (STDs) was not significant among most of the respondents, as 548 (76.5%) did not know whether they were previously infected with STDs or not. While those who confirmed no previous or current infection were 163 (22.8%), only 5 (0.7%) participants indicated previous STDs infection.

Respondents who reported avoiding contraceptives were 440 (61.5%), while 149 (20.8%) stated they were using contraceptives for family planning. Around 127 (17.7%) did not know what contraceptives were or their use. Not smoking was reported by 658 (91.9%), whereas current smokers and former smokers were 37 (5.2%) and 21 (2.9%), respectively. Only 21 (2.9%) drink alcohol on certain occasions, while 695 (97.1%) do not drink alcohol.

The number of lifetime sexual partners mainly was within one or two partners; 184 (25.7%), while those with more than two partners were only 11 (1.5%). Participants with no sexual life partners were 521 (72.8%) (Table 1).

A total of 580 (81.0%) heard about cervical cancer, while 136 (19.0%) did not hear about it. However, a total of 229 (32.0%) have heard about the Pap test, while 487 (68.0%) did not hear about the Pap test. The knowledge about cervical cancer concerning early detection by screening was known among 421 (58.8%) participants, whereas 285 (39.8%) did not know about cervical cancer screening. When we investigated the risk factors for cervical cancer perceived by the participants, 109 (15.2%) assumed it to be related to alcohol drinking. In comparison, 51 (7.1%) considered it is related to giving birth to many children, 118 (16.5%) to age, 335 (46.8%) to having many sexual partners, 300 (41.9%) to having HPV infection, 256 (35.6%) to the prolonged use of birth control pills, and 162 (22.6%) related to smoking.

The knowledge concerning the transmission of HPV through sexual contact was stated by 335 (46.8%) respondents. In contrast, 318 (44.4%) did not know about it. Regarding the best time to be vaccinated

against HPV, participants who did not know were 381 (53.2%); however, 110 (15.4%) pointed the best time for vaccination is to be after marriage, 17 (2.4%) after first sexual contact, or childbirth, and 208 (29.1%) considered the best time for vaccination is before the first sexual contact. When we checked the knowledge of the participants about whether cervical cancer is preventable via vaccination, 163 (22.8%) answered yes, while 167 (23.3%) answered no, and 386 (53.9%) did not know about cervical cancer prevention. Accordingly, the overall knowledge about HPV and cervical cancer and their associated risk factors was significantly related to the participant's age group; specifically, the age group between 20 and 30 years old had the highest knowledge score among all other age groups. (P value 0.000) (Table 2). Additionally, the knowledge about cervical cancer and HPV was positively associated with the highest education levels; university and post-university groups. (P value 0.000) (Supplementary Table S1).

We asked the participants if they were offered a free cervical cancer screening would they do it or not. A total of 112 (15.6%) did not respond, while 521 (72.8%) agreed to be screened and 83 (11.6%) refused to be screened. Also, those confirmed to be screened for cervical cancer within the next three years were 256 (35.8%). Respondents' attitudes and practices towards cervical cancer screening were also significant among different age groups. The willingness to get cancer screening was highest among the age group of 20 – 30 years old. (p-value .001). Again, cancer screening willingness was also highest among the university and post-university group 109 (96%). (Supplementary Table S2). Nevertheless, 112 (15.6%) of study participants have expressed that their reason for refusing the cervical cancer screening was mainly because of their psychological fear of finding out that they have it already.

Those who had HPV vaccination were 29 (4.1%), while those who did not get the vaccine were 687 (95.9%), the percentage of vaccine recipients was insignificantly associated with the age group (P-value 0.74). The question about willingness to receive the HPV vaccine for free was yes for 473 (66.1%), the frequency had slightly decreased to 52.9% (379/716) when they were asked whether they are willing to be vaccinated even if they have to pay for it. Regarding vaccine refusal reasons, 83 (11.6%) responded that they do not trust the vaccine safety, 75 (10.5%) considered there is no need to have the vaccine as they are not sexually active, 43 (6.0%) were due to the cost of vaccine might be very high. (Table 3). The correlation of the educational levels with the respondent practices related to HPV and cervical cancer is shown in Supplementary Table S3.

The regression models to predict the effectors on participants' knowledge, attitude, and practice were showing a low standard deviation of the estimate with higher values of the adjusted R square; [R: 0.041, 0.017, and 0.006; STD: 1.527, 0.417, and 0.426] indicates that the participant's knowledge, attitude, and practice levels are more influenced by the combination of occupation, educational level, family income, and marital status all together than affected by each affecter separately (Table 4).

Discussion

Recently the availability of HPV vaccine and the massive development in screening programs decreased the rate of cervical cancer-related mortality significantly [20]. However, the application of these health

measures is highly affected by the level of awareness for the early signs and risk factors among the general population and medical staff [10].

According to our current study population, 386 (53.9%) of the participants were not aware that cervical cancer is a preventable disease. And 68% of them had not heard about the Pap test. This indicates poor awareness regarding cervical cancer prevention and screening programs. This finding agrees with several studies conducted in developing countries such as Ghana, Ethiopia, and Iraq, in which they showed that only 3.3%, 28.79%, and 21.4% have heard about the Pap test, respectively [21–23]. Furthermore, according to Ferlay and associates, 80% of cervical cancer death worldwide occurs in such countries; thereby, the level of awareness can be considered the main factor for reducing cervical cancer-related death [24]. However, despite the poor knowledge about the Pap test, the knowledge about cervical cancer concerning early detection is relatively high, which is known among 421 (58.8%) participants. This may be attributed to general knowledge about the advantages of cancer early detection, which indicates that the application of the Pap test as an essential health measure among primary health facilities is poor and need more attention from health staff. Eventually, this can contribute to health staff training as well as public awareness about Pap test importance.

Regarding cervical cancer risk factors awareness, 335 (46.8%) of the participants reported having many sexual partners as a significant risk factor; this is followed by 300 (41.9%) citing HPV as the important risk factor to acquired cervical cancer. Our results are in line with a study conducted by Touch and associates, who demonstrated that having multiple sexual partners and HPV were selected as the most risk factors for cervical cancer in their study that assessed the Knowledge of Cambodian females regarding cervical cancer [25]. Additionally, this is in line with the result findings reported in South Africa and Iraq, in which 48.5% and 36.9% of the participants selected HPV as a causal factor for cervical cancer, respectively [26, 27]. Interestingly, this is per scientific data indicating the direct relationship between sexual behaviors and cervical cancer as eventual results for HPV transmission [28, 29]. Generally, our studied population had good general knowledge regarding the link between HPV and cervical cancer. According to a systematic review study that consisted of 39 studies conducted in 11 countries, the overall understanding of the public regarding HPV and cervical cancer risk is poor [30]. However, several studies support that the HPV is related to several other squamous epithelial carcinomas in Sudan [31–33], emphasizing that the gap between HPV etiology in our study population and HPV awareness is still significant. Therefore, a real need for more effort to eliminate this etiological factor.

Women aged between 20 and 30 years old and those with university and post-university levels were associated with good knowledge. Respondents' attitudes and practices towards cervical cancer screening were also significant among this age group. However, respondents' attitudes and practices were insignificantly associated with education level. This finding is inconsistent with Chinese studies reporting that the education level is the only significant factor related to positive attitudes [34]. Nevertheless, this study agrees with our study regarding that knowledge alone is an insufficient factor for positive attitudes. Thus, there are other important factors to improve the awareness among the population, e.g., education level.

According to vaccine status and attitudes; only 29 (4.1%) of study participants had been vaccinated against HPV, reflecting a meager percentage of vaccinated women in our population comparing to international vaccine program target coverage among developing countries, which exceeds 85% in most of these countries [35]. However, 473 (66.1%) of our participants are ready to receive it. Regarding the vaccine refusal reasons, lack of vaccine trust and vaccine efficiency was the most common response. This indicates that the knowledge about vaccine importance and efficiency among the national health facilities can be considered as HPV vaccine implementation barrier in our population. Several studies also reported similar results indicating that spreading vaccine knowledge with simple explanation is a determining factor for vaccine implementation success [36–38].

Conclusion

The results of our study indicated that Sudanese females had a low awareness of cervical cancer screening programs, and a minority of the population had practiced the Pap test; however, the willingness of our participants to get the HPV vaccination is high. Therefore, we highly recommended conducting health education sessions for both the Obstetrician and females of reproductive age regarding the benefit of the Pap test in the early detection of cervical intraepithelial lesions and malignancy, and HPV vaccination should be introduced in the local healthcare facilities.

Abbreviations

HPV
Human Papillomavirus
KAP
Knowledge, Attitudes, and Practice
Pap
Papanicolaou
STDs
Sexually Transmitted Diseases.

Declarations

Ethics approval and consent to participate

This study protocol has been reviewed and approved under the registration number RECNU-10035 by the Nile University Research Ethics Committee.

Consent to publish

Not Applicable.

Availability of Data and Materials

The datasets generated and/or analysed during the current study are included in within the manuscript and its supplementary information files.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

EES, NSM, and ETA conceived and designed the study; EES, ESA, AA, and YA performed the study; NSM, EES, AA, and MAM analyzed the data; EES, ETA, EK, SME, and AA wrote the manuscript. EES, NSM, AA, and ETA revised the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1: The demographic characteristics, behavioral and history background of the study population

	Less than 20 years	20 – 30 years	31 – 40 years	41 – 50 years	51 – 60 years	More than 60 years	Total
Occupation							
Dentist	0 (0.0%)	11 (78.6%)	3 (21.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	14 (2.0%)
Engineer	0 (0.0%)	14 (60.9%)	9 (39.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	23 (3.2%)
Lab technologist	0 (0.0%)	34 (79.1%)	9 (20.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	43 (6.0%)
Manager	0 (0.0%)	24 (61.5%)	11 (28.2%)	4 (10.3%)	0 (0.0%)	0 (0.0%)	39 (5.4%)
Medical Doctor	0 (0.0%)	58 (76.3%)	16 (21.1%)	2 (2.6%)	0 (0.0%)	0 (0.0%)	76 (10.6%)
Nurse	0 (0.0%)	6 (85.7%)	1 (14.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (1.0%)
Pharmacist	0 (0.0%)	15 (60.0%)	10 (40.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	25 (3.5%)
Student	91 (36.3%)	158 (62.9%)	2 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	251 (35.1%)
Teacher	0 (0.0%)	17 (41.5%)	13 (31.7%)	8 (19.5%)	2 (4.9%)	1 (2.4%)	41 (5.7%)
Unemployed	2 (1.3%)	81 (51.3%)	39 (24.7%)	21 (13.3%)	10 (6.3%)	5 (3.2%)	158 (22.1%)
Others	0 (0.0%)	22 (56.4%)	8 (20.5%)	7 (18.0%)	2 (5.1%)	0 (0.0%)	39 (5.4%)
Education level							
Higher education	0 (0.0%)	82 (49.7%)	59 (35.8%)	20 (12.1%)	4 (2.4%)	0 (0.0%)	165 (23.0%)
Primary	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (33.3%)	1 (16.7%)	3 (50.0%)	6 (0.8%)
Secondary	10 (25.6%)	7 (17.9%)	4 (10.3%)	9 (23.1%)	6 (15.4%)	3 (7.7%)	39 (5.4%)
University	83 (16.4%)	351 (69.4%)	58 (11.5%)	11 (2.2%)	3 (0.6%)	0 (0.0%)	506 (70.7%)
family income							
High > 15,000	37 (12.4%)	178 (59.5%)	53 (17.7%)	21 (7.0%)	9 (3.0%)	1 (0.3%)	299 (41.8%)
Low 0 - 7,000	6 (9.8%)	43 (70.5%)	9 (14.8%)	3 (4.9%)	0 (0.0%)	0 (0.0%)	61 (8.5%)
Middle 7,001 - 15,000	50 (14.0%)	219 (61.5%)	59 (16.6%)	18 (5.1%)	5 (1.4%)	5 (1.4%)	356 (49.7%)
Marital status							
Divorced	1 (4.3%)	10 (43.5%)	8 (34.8%)	3 (13.0%)	1 (4.3%)	0 (0.0%)	23 (3.2%)
Married	0 (0.0%)	115 (46.9%)	77 (31.4%)	36 (14.7%)	12 (4.9%)	5 (2.0%)	245 (34.2%)
Single	92 (20.6%)	315 (70.3%)	36 (8.0%)	3 (0.6%)	1 (0.2%)	1 (0.2%)	448 (62.6%)
Family history of cervical cancer							
Don't know	36 (24.3%)	93 (62.8%)	11 (7.4%)	6 (4.1%)	2 (1.4%)	0 (0.0%)	148 (20.7%)
No	57 (10.6%)	328 (61.1%)	103 (19.2%)	30 (5.8%)	12 (2.2%)	6 (1.1%)	537 (75.0%)

Yes	0 (0.0%)	19 (61.3%)	7 (22.6%)	5 (16.1%)	0 (0.0%)	0 (0.0%)	31 (4.3%)
History of sexually transmitted diseases							
Don't know	60 (10.9%)	335 (61.1%)	104 (19.0%)	30 (5.5%)	13 (2.4%)	6 (1.1%)	548 (76.5%)
No	33 (20.3%)	101 (62.0%)	16 (9.8%)	12 (7.3%)	1 (0.6%)	0 (0.0%)	163 (22.8%)
Yes	0 (0.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (0.7%)
Contraceptive use							
Don't know	7 (0.1%)	71 (55.9%)	34 (26.8%)	9 (7.1%)	3 (2.4%)	3 (2.4%)	127 (17.7%)
No	86 (19.6%)	294 (66.8%)	41 (9.3%)	16 (3.6%)	2 (0.5%)	1 (0.2%)	440 (61.5%)
Yes	0 (0.0%)	75 (50.3%)	46 (30.9%)	17 (11.4%)	9 (6.0%)	2 (1.3%)	149 (20.8%)
Smoking habit							
Current smoker	1 (2.7%)	26 (70.3%)	7 (18.9%)	2 (5.4%)	1 (2.7%)	0 (0.0%)	37 (5.2%)
Never smoked	90 (13.7%)	399 (60.6%)	110 (16.7%)	40 (6.1%)	13 (2.0%)	6 (0.9%)	658 (91.9%)
Former smoker	2 (9.5%)	15 (71.4%)	4 (19.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	21 (2.9%)
Alcohol drinking							
Yes	0 (0.0%)	13 (62.0%)	4 (19.0%)	4 (19.0%)	0 (0.0%)	0 (0.0%)	21 (2.9%)
No	93 (13.4%)	427 (61.4%)	117 (16.8%)	38 (5.5%)	14 (2.0%)	6 (0.9%)	695 (97.1%)
Number of lifetime sexual partners							
None	92 (17.7%)	355 (68.1%)	55 (10.6%)	12 (2.3%)	5 (1.0%)	2 (0.4%)	521 (72.8%)
1 or 2	0 (0.0%)	79 (42.9%)	63 (34.2%)	29 (15.7%)	9 (4.9%)	4 (2.2%)	184 (25.7%)
3 or more	1 (9.1%)	6 (54.5%)	3 (27.3%)	1 (9.1%)	0 (0.0%)	0 (0.0%)	11 (1.5%)
Total	93 (12.9%)	440 (61.5%)	121 (16.9%)	42 (5.9%)	14 (2.0%)	6 (0.8%)	716 (100%)

Table 2: Knowledge about HPV and cervical cancer and their associated risk factors

	Age group						Total	P value	Pearson's correlation	
	Less than 20 years	20 - 30 years	31 - 40 years	41 - 50 years	51 - 60 years	More than 60 years			Pearson's r	P value
Had ever heard about cervical cancer										
Yes	47 (8.1%)	367 (63.3%)	113 (19.5%)	39 (6.7%)	12 (2.1%)	2 (0.3%)	**580 (81.0%)**	0.000	-0.176	0.000
No	46 (33.8%)	73 (53.7%)	8 (5.9%)	3 (2.2%)	2 (1.5%)	4 (2.9%)	**136 (19.0%)**			
Had ever heard of pap test										
Yes	7 (3.1%)	133 (58.1%)	60 (26.2%)	27 (11.8%)	2 (0.9%)	0 (0.0%)	**229 (32.0%)**	0.000	-0.19	0.000
No	86 (17.7%)	307 (63.0%)	61 (12.5%)	15 (3.1%)	12 (2.5%)	6 (1.2%)	**487 (68.0%)**			
Cervical cancer can be detected early by screening										
Don't know	56 (19.6%)	182 (63.9%)	33 (11.6%)	10 (3.5%)	4 (1.4%)	0 (0.0%)	**285 (39.8%)**	0.000	0.192	0.000
No	0 (0.0%)	5 (50.0%)	2 (20.0%)	3 (30.0%)	0 (0.0%)	0 (0.0%)	**10 (1.4%)**			
Yes	37 (8.8%)	253 (60.1%)	86 (20.4%)	29 (6.9%)	10 (2.4%)	6 (1.4%)	**421 (58.8%)**			
The most important risk factor of cervical cancer is alcohol drinking										
Yes	12 (11.0%)	78 (71.6%)	13 (11.9%)	1 (0.9%)	5 (4.6%)	0 (0.0%)	**109 (15.2%)**	0.009	0.40	0.285
No	81 (13.3%)	362 (59.6%)	108 (17.8%)	41 (6.8%)	9 (1.5%)	6 (1.0%)	**607 (84.8%)**			
The most important risk factor of cervical cancer is having many child birth										
Yes	4 (7.8%)	29 (56.9%)	7 (13.7%)	6 (11.8%)	4 (7.8%)	1 (1.0%)	**51 (7.1%)**	0.009	-0.113	0.003
No	89 (13.4%)	411 (61.8%)	114 (17.1%)	36 (5.4%)	10 (1.5%)	5 (0.8%)	**665 (92.9%)**			
The most important risk factor of cervical cancer is old age										
Yes	5 (4.2%)	74 (62.7%)	22 (18.6%)	12 (10.2%)	4 (3.4%)	1 (0.8%)	**118 (16.5%)**	0.012	-0.118	0.002
No	88 (14.7%)	366 (61.2%)	99 (16.6%)	30 (5.0%)	10 (1.7%)	5 (0.8%)	**598 (83.5%)**			
The most important risk factor of cervical cancer is having many sexual partners										
Yes	42 (12.5%)	222 (66.3%)	49 (14.6%)	17 (5.1%)	3 (0.9%)	2 (0.6%)	**335 (46.8%)**	0.104	0.08	0.032
No	51 (13.4%)	218 (57.2%)	72 (18.9%)	25 (6.6%)	11 (2.9%)	4 (1.0%)	**381 (53.2%)**			
The most important risk factor of cervical cancer is HPV										
Yes	25 (8.3%)	203 (67.7%)	57 (19.0%)	12 (4.0%)	2 (0.7%)	1 (0.3%)	**300 (41.9%)**	0.000	0.027	0.463
No	68 (16.3%)	237 (57.0%)	64 (15.4%)	30 (7.2%)	12 (2.9%)	5 (1.2%)	**416 (58.1%)**			
The most important risk factor of cervical cancer is the prolonged use of birth control bills										
Yes	35 (13.7%)	162 (63.3%)	33 (12.9%)	17 (6.6%)	7 (2.7%)	2 (0.2%)	**256 (35.8%)**	0.325	0.009	0.816
No	58 (12.6%)	278 (60.4%)	88 (19.1%)	25 (5.4%)	7 (1.5%)	4 (0.9%)	**460 (64.2%)**			

The most important risk factor of cervical cancer is smoking										
Yes	11 (6.8%)	107 (66.0%)	33 (20.4%)	5 (3.1%)	5 (3.1%)	1 (0.1%)	**162 (22.6%)**	0.027	-0.04	0.279
No	82 (14.8%)	333 (60.1%)	88 (15.9%)	37 (6.7%)	9 (1.6%)	5 (0.9%)	**554 (77.4%)**			
Can HPV infection be transmitted by sexual contact?										
Don't know	54 (17.0%)	192 (60.4%)	48 (15.1%)	14 (4.4%)	9 (2.8%)	1 (0.3%)	**318 (44.4%)**	0.002	0.074	0.048
No	9 (14.3%)	36 (57.1%)	10 (15.9%)	5 (7.9%)	0 (0.0%)	3 (4.8%)	**63 (8.8%)**			
Yes	30 (9.0%)	212 (63.3%)	63 (18.8%)	23 (6.9%)	5 (1.5%)	2 (0.6%)	**335 (46.8%)**			
The best time to be vaccinated against HPV?										
After marriage or at anytime	9 (8.2%)	71 (64.5%)	17 (15.5%)	7 (6.4%)	5 (4.5%)	1 (0.9%)	**110 (15.4%)**	0.000	-0.061	0.105
After sexual contact or childbirth	1 (5.9%)	4 (23.5%)	5 (29.4%)	5 (29.4%)	2 (11.8%)	0 (0.0%)	**17 (2.4%)**			
Before sexual contact	29 (13.9%)	143 (68.8%)	24 (11.5%)	11 (5.3%)	1 (0.5%)	0 (0.0%)	**208 (29.1%)**			
Don't know	54 (14.2%)	222 (58.3%)	75 (19.7%)	19 (5.0%)	6 (1.6%)	5 (1.3%)	**381 (53.2%)**			
Can cervical cancer be preventable by vaccination										
Don't know	65 (16.8%)	241 (62.4%)	57 (14.8%)	10 (2.6%)	9 (2.3%)	4 (1.0%)	**386 (53.9%)**	0.000	0.128	0.001
No	17 (10.2%)	97 (58.1%)	37 (22.2%)	13 (7.8%)	1 (0.6%)	2 (1.2%)	**167 (23.3%)**			
Yes	11 (6.7%)	102 (62.6%)	27 (16.6%)	19 (11.7%)	4 (2.5%)	0 (0.0%)	**163 (22.8%)**			

Table 3: Respondents' attitude and practice towards HPV and cervical cancer.

Table 4: The regression models to predict the sociodemographic effectors on participants' knowledge, attitude, and practice

	Age group						Total	P value	Pearson's correlation	
	Less than 20 years	20 - 30 years	31 - 40 years	41 - 50 years	51 - 60 years	More than 60 years			Pearson's r	P value
If you would be offered free cervical cancer screening, would you be willing to be screened?										
Don't know	26 (23.2%)	65 (58.0%)	17 (15.2%)	3 (2.7%)	0 (0.0%)	1 (0.9%)	**112 (15.6%)**	0.001	0.115	0.002
No	13 (15.7%)	51 (61.4%)	13 (15.7%)	1 (1.2%)	2 (2.4%)	3 (3.6%)	**83 (11.6%)**			
Yes	54 (10.4%)	324 (62.2%)	91 (17.5%)	38 (7.3%)	12 (2.3%)	2 (0.4%)	**521 (72.8%)**			
Do you plan to be screened for cervical cancer in the next 3 years?										
Don't know	38 (14.5%)	182 (69.5%)	35 (13.4%)	4 (1.5%)	2 (0.8%)	1 (0.4%)	**262 (36.6%)**	0.0001	0.222	0.000
No	39 (19.7%)	117 (59.1%)	28 (14.1%)	5 (2.5%)	5 (2.5%)	4 (2.0%)	**198 (27.7%)**			
Yes	16 (6.3%)	141 (55.1%)	58 (22.7%)	33 (12.9%)	7 (2.7%)	1 (0.4%)	**256 (35.8%)**			
Had done the HPV vaccination										
Yes	4 (13.8%)	19 (65.5%)	3 (10.3%)	3 (10.3%)	0 (0.0%)	0 (0.0%)	**29 (4.1%)**	0.74	0.018	0.636
No	89 (13.0%)	421 (61.3%)	118 (17.2%)	39 (5.7%)	14 (2.0%)	6 (0.9%)	**687 (95.9%)**			
Willingness to be vaccinated and pay										
Don't know	39 (18.9%)	123 (59.7%)	32 (15.5%)	10 (4.9%)	2 (1.0%)	0 (0.0%)	**206 (28.8%)**	0.005	0.114	0.002
No	23 (17.6%)	73 (55.7%)	23 (17.6%)	5 (3.8%)	4 (3.1%)	3 (2.3%)	**131 (18.3%)**			
Yes	31 (8.2%)	244 (64.4%)	66 (17.4%)	27 (7.1%)	8 (2.1%)	3 (0.8%)	**379 (52.9%)**			
Willingness to be vaccinated for free										
Don't know	32 (18.2%)	105 (59.7%)	27 (15.3%)	9 (5.1%)	2 (1.1%)	1 (0.6%)	**176 (24.6%)**	0.087	0.089	0.017
No	15 (22.4%)	36 (53.7%)	11 (16.4%)	2 (3.0%)	2 (3.0%)	1 (1.5%)	**67 (9.4%)**			
Yes	46 (9.7%)	299 (63.2%)	83 (17.5%)	31 (6.6%)	10 (2.1%)	4 (0.8%)	**473 (66.1%)**			
The biggest reason for not having the HPV vaccination is do not trust vaccine safety										
Yes	9 (10.8%)	53 (63.9%)	16 (19.3%)	5 (6.0%)	0 (0.0%)	0 (0.0%)	**83 (11.6%)**	0.644	0.018	0.632
No	84 (13.3%)	387 (61.1%)	105 (16.6%)	37 (5.8%)	14 (2.2%)	6 (0.9%)	**633 (88.4%)**			
The biggest reason for not having the HPV vaccination no risk as no sexual exposure										
Yes	9 (12.0%)	49 (65.3%)	12 (16.0%)	5 (6.7%)	0 (0.0%)	0 (0.0%)	**75 (10.5%)**	0.74	0.029	0.437
No	84 (13.1%)	391 (61.0%)	109 (17.0%)	37 (5.8%)	14 (2.2%)	6 (0.9%)	**641 (89.5%)**			
The biggest reason for not having the HPV vaccination is high cost										
Yes	8 (18.6%)	20 (46.5%)	8 (18.6%)	2 (4.7%)	2 (4.7%)	3 (7.0%)	**43 (6.0%)**	0.0001	-0.075	0.044
No	85 (12.6%)	420 (62.4%)	113 (16.8%)	40 (5.9%)	12 (1.8%)	3 (0.4%)	**673 (94.0%)**			

The biggest reason for not having the HPV vaccination is lack of knowledge about HPV

Yes	56 (14.6%)	241 (62.9%)	56 (14.6%)	20 (5.2%)	8 (2.1%)	2 (0.5%)	**383 (53.5%)**	0.292	0.074	0.049
No	37 (11.1%)	199 (59.8%)	65 (19.5%)	22 (6.6%)	6 (1.8%)	4 (1.2%)	**333 (46.5%)**			

The biggest reason for not having the HPV vaccination is already vaccinated

Yes	0 (0.0%)	3 (75.0%)	1 (25.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	**4 (0.6%)**	0.95	0.000	0.997
No	93 (13.1%)	437 (61.4%)	120 (16.9%)	42 (5.9%)	14 (2.0%)	6 (0.8%)	**712 (99.4%)**			

Are you afraid of screening because of cancer detection?

Don't know	21 (16.9%)	80 (64.5%)	16 (12.9%)	3 (2.4%)	4 (3.2%)	0 (0.0%)	**124 (17.3%)**	0.021	0.116	0.002
No	59 (12.3%)	297 (61.9%)	87 (18.1%)	29 (6.0%)	5 (1.0%)	3 (0.6%)	**480 (67.0%)**			
Yes	13 (11.6%)	63 (56.3%)	18 (16.1%)	10 (8.9%)	5 (4.5%)	3 (2.7%)	**112 (15.6%)**			

Model predictors	R	R Square	Adjusted R Square	Std. Error of the Estimate	Unstandardized Coefficients		t	Sig.
					B	Std. Error		
Knowledge predictors								
All predictors	0.215	0.046	0.041	1.527	7.793	0.394	19.737	0.000
Occupation	0.104	0.011	0.009	1.624	-0.031	0.011	-2.785	0.005
Education level	0.127	0.016	0.015	1.619	-0.164	0.048	-3.415	0.001
Family income	0.139	0.019	0.018	1.616	-0.237	0.063	-3.750	0.000
Marital status	0.089	0.008	0.006	1.626	-0.261	0.109	-2.375	0.018
Attitude								
All predictors	0.151	0.023	0.017	0.417	2.144	0.103	20.813	0.000
Occupation	0.041	0.002	0.000	0.420	-0.002	0.002	-0.942	0.346
Education level	0.093	0.009	0.007	0.419	-0.023	0.012	-1.840	0.066
Family income	0.017	0.000	-0.001	0.421	-0.007	0.016	-0.427	0.669
Marital status	0.124	0.015	0.014	0.418	-0.088	0.028	-3.089	0.002
Practice								
All predictors	0.107	0.011	0.006	0.426	1.497	0.105	14.211	0.000
Occupation	0.028	0.001	-0.001	0.428	-0.002	0.003	-0.587	0.557
Education level	0.075	0.006	0.004	0.427	-0.020	0.013	-1.583	0.114
Family income	0.006	0.000	-0.001	0.428	-0.002	0.016	-0.122	0.903
Marital status	0.083	0.007	0.006	0.426	-0.059	0.029	-2.000	0.046

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryTableS1.docx
- SupplementaryTableS2.docx
- SupplementaryTableS3.docx