

Human Papillomavirus Knowledge, Perception, and Willingness to Receive Vaccination Among Female University Students in Addis Ababa University, Ethiopia, 2022: A Cross-Sectional Study

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Abstract

Background: Cervical cancer is considered a leading cause of morbidity and mortality among females worldwide. Human papillomavirus is a highly prevalent sexually transmitted infection associated with increased cancer risks. Effective human papillomavirus vaccines are recommended for females in the adolescent years, but uptake has been less than optimal.

Objective: The objective of the study is to assess human papillomavirus knowledge, perception, and willingness to receive vaccination among female students in Addis Ababa University, Addis Ababa, Ethiopia, in 2022.

Methods: Institutional-based cross-sectional study was applied. The data were collected from 7 February to 15 April 2022. A total of 398 female students were recruited, and a multistage sampling technique was used to select the study participants. The data were entered into EpiData version 4.6 and analyzed using SPSS version 25. Bivariate and multivariable logistic regression analyses were used to determine the associations of variables.

Results: In this study, 161 (41%) of the students had good knowledge. About 226 (57.5%) had a more favorable perception regarding human papillomavirus and its vaccine, and 30% of the respondents were willing to receive the vaccine. The year level of study, having a history of sexual intercourse, having a family history of vaccination, and perception toward human papillomavirus and its vaccine were factors associated with students' willingness to receive the human papillomavirus vaccine.

Conclusion: Educational programs are required to aware female students in Ethiopia considering their poor knowledge of human papillomavirus and its vaccine and the willingness of the students to receive the vaccine and related diseases. The inclusion of the HPV vaccine in the national immunization program that is in line with the World Health Organization's recommendation should be considered as 118 (30%) of the participants show willingness to be vaccinated worldwide.

Keywords

awareness, vaccine, college, view, virus

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Introduction

Human papillomaviruses (HPVs) are among the nonenveloped double-stranded DNA viruses in the Papillomaviridae family and the most common sexually transmitted infection (STI) of the reproductive tract in which both sexually active women and men will be infected at some point in their lives (Isara & Osayi, 2021). Out of 200 known HPVs, at least 40 of them spread through sexual contact (Oluwole et al., 2019). While many HPVs establish an infection that is cleared by the host immune system, small types are the most concerning since they are linked to cancer development (Mushasha et al., 2021; Tesfaye et al., 2019).

Almost all cases of cervical cancer are caused by HPV with certain types also causing cancers of the vulva, and vagina in females, penile in males, and anal and

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oropharyngeal cancer in both females and males (Maharajan et al., 2015). The serotypes of HPV are classified as high-risk (HR), probable high-risk (PHR), and low-risk (LR). Among the subtypes, HPV 16 and 18 are the most commonly observed high-risk serotypes with oncogenic properties and cause 70% of cervical cancers (Tesfaye et al., 2019).

Globally, the first HPV vaccines were rolled out in 2006, and many countries have included it in their national immunization schedules, and currently, three prophylactic vaccines (Gardasil, Gardasil 9, and Cervarix) are available against HPV infection. Gardasil 9 is a 9-valent HPV vaccine that prevents HPV types 6 and 11, which cause 90% of genital warts, HPV types 16 and 18, two high-risk HPVs that cause about 70% of cervical cancers, and HPV types 31, 33, 45, 52, and 58, high-risk HPVs that account for an additional 10%–20% of cervical cancers (Oluwole et al., 2019; You et al., 2020). Cervarix prevents infection with types 16 and 18, and Gardasil prevents infection with types 6, 11, 16, and 18 infections (You et al., 2020). All three HPV vaccines are effective when administered to young adolescents before they become sexually active, aged 9–14 years (Navalpakam et al., 2016).

In 2018, the HPV vaccine was introduced in Ethiopia by the Ministry of Health, with support from the Global Alliance for Vaccines and Immunizations (GAVI). Initially, the government of Ethiopia had planned to provide the HPV vaccine through a routine immunization program for 6 million girls of 9–14 years of age (Kassa et al., 2021). However, due to a global HPV vaccine shortage, the vaccine is being delivered in a single age cohort through a school-based approach and in health centers (Kellogg et al., 2019). The highest regional incidence and mortality is in Sub-Saharan Africa with rates elevated in Eastern Africa, Southern Africa, and Middle Africa, and incidence rates are 7–10 times lower in Northern America, Australia, and Western Asia, with mortality rates varying up to 18 times (Fernandes et al., 2018).

In Ethiopia, cervical cancer is a major reproductive health problem and accounts for a large proportion of cancer-related morbidity and mortality in women. It ranks as the second leading cause of cancer mortality among women next to breast cancer and the third leading cause of cancer deaths in women aged 15–44 (Begoihn et al., 2019). Annually, an estimated 6,300 new cervical cancer cases are diagnosed, and 4,884 deaths occur in Ethiopia (Dereje et al., 2021). As of 2020, the age-specific incidence and mortality rate were 21.5 and 16 deaths per 100,000 females, respectively (Dereje et al., 2021; Kassa et al., 2021).

Around 80% of sexually active women are at risk of contracting the HPV, despite a global target of 70% to eliminate intensive cervical cancer (Agosti & Goldie, 2007; Widjaja, 2019). Most women in underdeveloped and industrialized countries, especially female university students, have little understanding or awareness of HPV and associated cervical cancer (Widjaja, 2019). Although HPV infection is preventable and avoidable, its incidence among women is becoming high, especially in low- and middle-income countries. This

can be attributed mainly due to the lack of knowledge on the risks of HPV, low socioeconomic status, absence of implementation of the HPV vaccination, and low participation of the target group in effective prevention techniques (Chan et al., 2019). On the other hand, a few developing countries fail to include HPV vaccines in their immunization programs considering the cost involved in vaccine delivery and competing for public health priorities (Siu et al., 2019).

Most of the young female students in the universities are in the premarital phase of life and will become healthy parents and populate the future society (Cinar et al., 2019). In addition, increasing the level of knowledge of female university students play an important role in the promotion of healthy behaviors and the use of preventive methods like HPV vaccination (Kwang et al., 2014).

Review of Literature

As students begin their university life, they start to experience a sense of independence that may lead them to potential increase in social and sexual pressures. It can be assumed that with these increased social and sexual pressures, female university students may engage in unprotected sex and put themselves at bigger risk for HPV infection. Therefore, this provides a review of literature on HPV knowledge, perception, and willingness to receive vaccination among female university students. It will also discuss factors that affect knowledge, perception, and willingness to receive HPV vaccination among female university students.

Globally, the prevalence of HPV among women with normal cytology is 12%, while the rates are much higher in Sub-Saharan Africa, which is 24% (Ebrahim et al., 2016; Kombe Kombe et al., 2020). In all females, the highest prevalence of HPV was found in Asian regions (57.7% in Eastern and Central Asia, 44.4% in Southern Asia) followed by Sub-Saharan Africa, which were 42.2% and 32.3% in Southern and Eastern Africa, respectively. In European countries, the HPV prevalence was low (<30%). Young women aged <25 years are highly affected by HPV with prevalence rate of 19.2% globally and 43.9% in Sub-Saharan Africa (Kombe Kombe et al., 2020). About three out of four people have HPV at some point in their lives, and a woman's lifetime risk of acquiring HPV infection is more than 80%, and most infections occur within 3–4 years of sexual contact. HPV infections are observed in over 99% of patients with cervical cancer (Kisaakye et al., 2018). Among female college students on behavioral perceptions of HPV vaccination, the majority of participants (73%) confirmed that HPV infections cause cervical cancer, while a minority (19%) thought that it causes ovarian cancer. Although 52% of them knew that HPV is a STI that can cause genital warts, 73% of the participants thought that only women can be infected with HPV and manifest the symptoms. About two-thirds of the participants (65%) believed that all HPV infections are caused by one strain of

the virus (Navalpakam et al., 2016). The study also found that 78.6% of the respondents did not know men could be infected by HPV, and 78.5% of the participants know that HPV infection could cause cervical cancer and some other cancers (Wang et al., 2021).

A cross-sectional study conducted on knowledge of HPV and uptake of its vaccine among female undergraduate students in Nigeria showed that only 34 (14.8%) out of 229 had good knowledge of HPV infection, and this study revealed 109 (47.6%) of the students had heard of HPV infection, 103 (45.0%) and 101 (44.1%) knew that HPV was a viral infection and is sexually transmitted, respectively, in which only 81 (35.4%) knew that HPV can cause cervical cancer while 84 (36.7%) affirmed that HPV infection can be prevented by vaccination (Tesfaye et al., 2019). A study done in the USA on sample of high school adolescents showed that many students did not perceive to be at risk for HPV infection, and the study indicated that more females (96.2%) than males (65.6%) agreed or strongly agreed that they would feel ashamed if found out they had an HPV infection (Barrett et al., 2020). According to a cross-sectional study conducted in the USA on HPV vaccine knowledge, attitudes, and uptake in college students, HPV vaccine uptake was reported by 47.3% (181/383) of the females and 15.8% (60/383) of the males (Barnard et al., 2017). A study conducted in Indonesia on knowledge, attitude, and acceptability of the HPV vaccine and vaccination among university students indicated that about 228 (95.8%) students out of 238 were willing to receive the HPV vaccination (Khatiwada et al., 2021). A study conducted in Nigeria on cervical cancer and HPV knowledge and acceptance of vaccination among medical students revealed that 128 (75.7%) out of 169 students were willing to be vaccinated if the vaccine is free, six (3.6%) were not willing to obtain the vaccine, and 35 (20.7%) were not sure whether to receive the vaccine by stating the main reasons reported to affect students' willingness to receive the vaccine were inadequate information, high cost of vaccine, poor access to vaccine, worry about efficacy, worry about safety, and religious barriers (Adejuyigbe et al., 2015).

In the study setting, there is a gap in the literature that assesses knowledge, perception, and willingness to receive the HPV vaccine among female university students. These students are future parents, and if they are aware of HPV infection and cervical cancer, they will play a vital role in making positive decisions in vaccinating their future children. The main objective of the study is to determine the overall level of HPV knowledge, perception, and willingness to receive the HPV vaccine among female university students at Addis Ababa University, Ethiopia.

Methods

The study was conducted at Addis Ababa University, which is found in Addis Ababa, Ethiopia. There are seven student clinics and two counseling centers (Addis Ababa

University main campus registrar, January 2022). The study period took place from February to 15 April 2022.

Study Design

An institutional-based cross-sectional study was applied among female undergraduate students of Addis Ababa University to assess HPV knowledge, perception, and vaccine uptake. A cross-sectional study measures the prevalence of health outcomes or determinants of health, or both, in a population at a point in time or over a short period. Randomly selected regular female undergraduate students of Addis Ababa University were included in the study.

Research Questions

Data were collected by structured questionnaire to assess women's knowledge, perception, and HPV vaccine uptake. Two data collectors with BSc in Nursing and previous experience on data collection were recruited. Training for data collector was given about the main principles that have to be respected during data collection and how each question in the questionnaires has to be understood. The research questions were classified into four parts as follows:

Part I: Sociodemographic characteristics of the participants

Part II: Sexual history of the participants, and source of information about HPV vaccine

Part III: Knowledge about the HPV, risk factors, and cervical cancer and vaccine uptake (previous and future)

Part IV: Women's perception about the HPV, risk factors, and cervical cancer

Inclusion/Exclusion Criteria

The following were the inclusion criteria: all Addis Ababa University female students attending the regular undergraduate programs, willing to participate, and available in the class at selected campuses of the university during the data collection period. As for the exclusion criteria, the female students who were critically ill were excluded.

Sample

The sample size was calculated using the following single population proportion formula;

$$n = (Z \ a/2)^2 * P * (1 - P) / d^2$$

Where,

n = minimum sample size

p = proportion of HPV knowledge, perception, and vaccine uptake. For this study, the value of p was taken as 19.5% from a study done at the University of Gondar (Tesfaye et al., 2019).

Z = standard score for 95% confidence level = 1.96

d = margin of error = 5%

Furthermore, a nonresponse rate of 10% is assumed, and a design effect of 1.5 is taken to control the clustering effect since a multistage sampling technique will be used. Based on the above assumptions, sample size is calculated as follows:

$$n = (1.96)^2(0.195)(0.805)(1.5) / (0.05)^2$$

$n = 362$ and adding a 10% nonresponse rate, the final sample size was $n = 398$

Multistage sampling technique was used to select the study participants. Out of 10 colleges in Addis Ababa University, four colleges with the highest number of female students were purposively selected. Then two departments from each college with the highest number of female students were selected to find an adequate sample size. Finally, calculated sample size was allocated based on probability proportional to the size of female students in each selected department and the year level of study, respectively. The stratification by the year level of study was made due to variables of interest that might vary across the year. The study participants from each selected department and year level of study were picked up using a simple random sampling technique. The data quality assurance was done before, during, and after data collection process. Before data collection, a structured self-administered questionnaire was prepared by reviewing relevant literatures. Training was given for data collectors on the objectives and relevance of the study, data collection, confidentiality of information, and informed consent.

Pretesting of the questionnaires was done by taking 5% of the sample among female undergraduate students of college of social science. There was a close supervision during the data collection process and checking of questionnaire for completeness and consistency. After data collection, the principal investigator checked the completeness of the data, gave nonoverlapping numerical code for each questionnaire, and entered into Epidata version 4.6.0.4.

Ethical Statement and Informed Consent

Ethical approval for this study was obtained from Addis Ababa University, College of Health Sciences, and School of Nursing and Midwifery research ethics committee with (protocol number SNM/M. D/017/14). A written permission to carry out the research was submitted to all selected colleges of Addis Ababa University. The objectives of the study and the risks and benefits of participating in the study were communicated prior to asking willingness of the study participants to participate in the study. Informed

verbal and written consent were obtained from each respondent prior to data collection. After getting informed consent from the respondents, the right of the respondents to refuse answer for few or all of the questions was also valued.

The participants were informed that their participation will be purely voluntary and assured of the confidentiality of identity and other personal information. The participants' privacy and confidentiality of the information were maintained in accordance with the Declaration of Helsinki.

Statistical Analysis

The collected data were checked for completeness, coded and entered into EpiData version 4.6. Then, the entire data were corrected for errors and exported to statistical package for social sciences (SPSS) version 25 for analysis. The descriptive statistics (means, percentages, or frequency) were calculated, and the bivariate logistic regression analysis was used to see the relationship between dependent and independent variables. Mean was used for normally distributed continuous variables and independent samples t -test was used to compare mean score for the knowledge and perception. Variables having a P -value of ≤ 0.25 in bivariate analysis were considered to have an association with the dependent variable and entered into multivariate analysis. The strength of the association was measured using an odds ratio and interpreted by using a 95% confidence interval, and $P < .05$ were statistically significant in multivariate analysis.

Results

A total of 393 female students were included in this study, with 98.7% response rate. The mean age of the study participants was 20.69 (± 1.206) ranging from 18 to 26 years. Among the participants, 205 (52.2%) were from towns other than Addis Ababa by residence, and 379 (96.4%) of them were single by marital status. The results of sociodemographic characteristics of the study participants are shown in Table 1.

Sexual History of the Participants

Among the study participants, majority of them, 359 (91.3%) of the respondents, are not currently sexually active, while only 34 (8.7%) said that they had sexual intercourse before the study. Out of the participants who had sexual intercourse, 17 (50%) of the respondents had sexual intercourse between the age of 15–19, and the rest had sexual intercourse after the age of 19. The result also shows that 21 (61.8%) of the respondents had had one sexual partner, whereas 13 (38.1%) had two or more sexual partners. Among the participants who had sexual intercourse before, 15 (44.1%) and eight (23.5%) of the respondents sometimes and always use a condom during sexual intercourse, respectively, while 10 (29.4%) of the respondents never used condom during

Table 1. Sociodemographic Characteristics of the Study Participants ($n = 393$).

Variables	Frequency(n)	Percent (%)
Age(years)		
18–22	362	92.1
23–26	31	7.9
Department		
Accounting	30	7.6
Architecture	44	11.2
Biology	45	11.5
Biomedical engineering	22	5.6
Civil engineering	21	5.3
Computer science	42	10.7
COTM	69	17.6
Management	47	12.0
Pre-engineering	73	18.6
Year level of study		
Second	172	43.8
Third	143	36.4
Fourth	34	8.7
Fifth and above	44	11.2
Religion		
Orthodox	267	67.9
Muslim	47	12.0
Protestant	67	17.0
Catholic	3	.8
Others	9	2.3
Residence		
Addis Ababa	188	47.8
Other town/city	205	52.2
Mother's level of education		
No formal education	48	12.2
Primary school	45	11.5
Secondary school	106	27.0
College and above	194	49.4
Mother's occupation		
Government employee	113	28.8
Private	127	32.3
Unemployed/house wife	153	38.9
Father's level of education		
No formal education	33	8.4
Primary school	21	5.3
Secondary school	76	19.3
College and above	263	66.9
Father's occupation		
Government employee	156	39.7
Self-employed	182	46.3
Unemployed	55	14
Marital status		
Single	379	94.5
Married	14	3.5

sexual intercourse and one (2.9%) of the participant responded that she was not currently sexually active.

The result also indicated that 365 (92.9%) of the students had no family history of vaccination. In this study, family history of vaccination represents female students whose little sisters have been vaccinated against HPV.

Sources of Information About HPV Vaccine

Among the study participants, the majority of them, 270 (68.7%), have not heard about HPV vaccine while only 123 (31.3%) have heard about HPV vaccine from different sources. Social media and internet were the major sources of information for the study participants who have heard about HPV vaccine 53 (45.3%), followed by television/radio 31 (26.5%), formal class 15 (12.8%), healthcare provider 12 (10.3), and others 6 (5.1%), respectively. Six participants who have responded as they have heard about HPV vaccine have not identified their sources of information (Figure 1).

Knowledge About HPV, Vaccination, Risk Factors, and Cervical Cancer

In this study, 15 items were used to assess knowledge of HPV, HPV vaccination, risk factors, and cervical cancer. The lowest score was 0 and the highest was 15. The mean total knowledge score was 5.44 with standard deviation (± 3.597). The participants who score less than the mean score (5.44) were considered as having poor knowledge, while those scores greater than 5.44 were regarded as having good knowledge. Out of the 393 participants who fully filled the questionnaire, 161 (41%) had good knowledge and 232 (59%) had poor knowledge.

Among the study participants, only 183 (46.6%) of them know that HPV can cause cervical cancer. All the participants' responses to knowledge statements are summarized in Table 2.

Perceptions Toward HPV and its Vaccine

In this study, 10 items were used to assess perception of participants toward HPV and its vaccine. The lowest perception score was 10 and the highest was 47. The mean score was 32.96 with SD of 5.7. The participants who score less than the mean score (32.96) were considered as having less favorable perception, whereas those who scores greater than or equal to 32.96 were considered as having more favorable perception. Overall, 226 (57.5%) of the participants had a more favorable perception. Less than half of the participants 143 (36.4%) agreed or strongly agreed that they would want to take the HPV vaccine because they feel

Sources of information about HPV vaccine

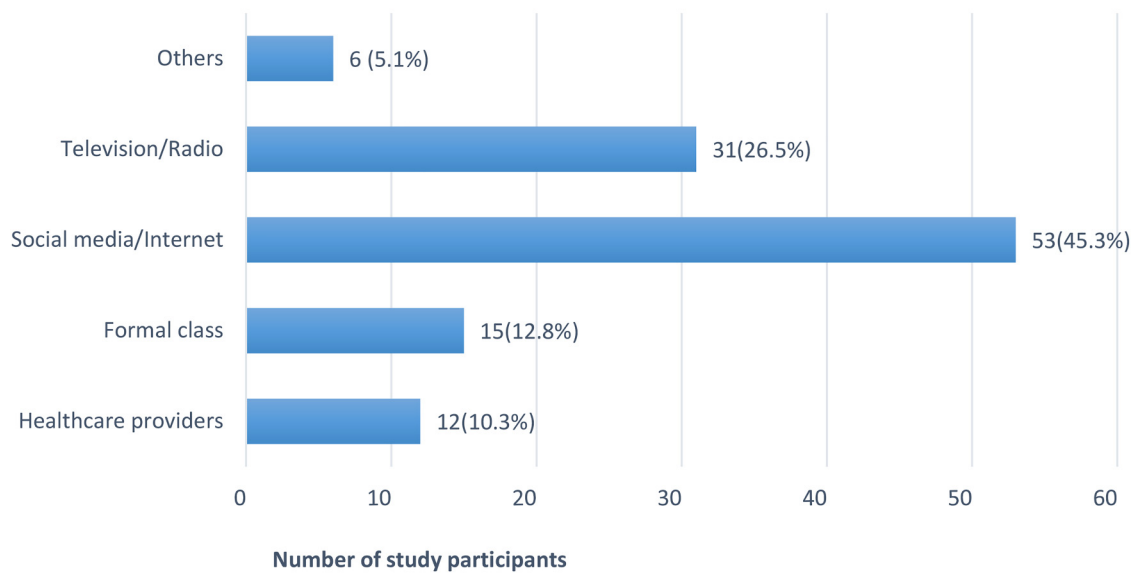


Figure 1. Distribution of sources of information about HPV vaccine among female students in Addis Ababa University, Ethiopia, 2022 ($n = 123$).

Table 2. Knowledge About the Human Papilloma Virus (HPV), Risk Factors, and Cervical Cancer Among Female Students in Addis Ababa University, Ethiopia, 2022 ($n = 393$).

Knowledge statements	Yes	<i>n</i> %	No	<i>n</i> %
HPV is a viral infection	223	56.7	170	43.3
HPV can cause anal cancer	109	27.7	284	72.3
HPV is a sexually transmitted infection	189	48.1	204	51.9
Multiple sexual partners predispose to HPV infection	201	51.1	192	48.9
HPV can cause cervical cancer	183	46.6	210	53.4
HPV can cause genital warts	111	28.2	181	71.5
HPV infection can be prevented by vaccination	212	53.9	181	46.1
HPV infection can be prevented by use of condom	111	28.2	282	71.8
HPV infection can be prevented by regular HPV screening	118	30	275	70
Early sexual debut increases the risk for HPV infection	164	41.7	229	58.3
The best time for HPV vaccine is age 11–12 years old	63	16	330	84
Being sexually active puts a woman greater risk of CC	129	32.8	264	67.2
HPV can cause penile cancer	67	17	326	83
HPV Can infect both men and women	106	27	286	72.8
There is a vaccine available to prevent HPV infection in Ethiopia	142	36.1	251	63.9

at risk of getting HPV infection. Majority of the participants, 243 (61.6%), agreed or strongly agreed that HPV infection increases the likelihood of getting cervical cancer as shown in Table 3.

Willingness to Receive the HPV Vaccination

Among the study participants, only six (1.5%) of the respondents have received the HPV vaccine, and 118 (30%) of the respondents were willing to receive the vaccine (Figure 2).

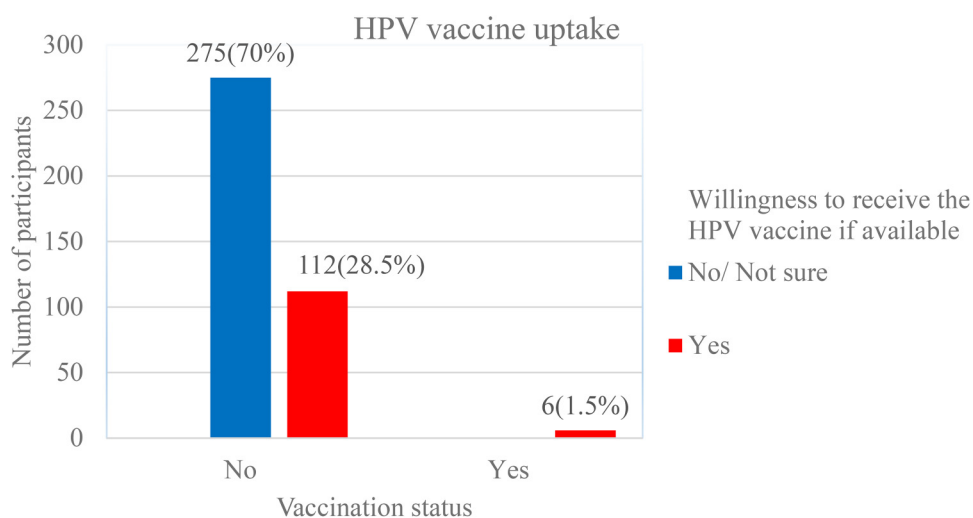
Factors Associated with Willingness to Receive HPV Vaccination

Among the study participants, only six (1.5%) were vaccinated against HPV infection while 387 were not vaccinated. With regard to their willingness to vaccination, 118 (30.0%) of the study participants were willing to receive the HPV vaccine if available.

The multivariate analysis indicated that female students who had family history of vaccination were 10.05 times more likely willing to be vaccinated against HPV infection

Table 3. Perception About the HPV, Risk Factors, and Cervical Cancer Among Female Students in Addis Ababa University, Ethiopia, 2022 ($n = 393$).

Perception statements	Disagree	<i>n</i> %	Neutral	<i>n</i> %	Agree	<i>n</i> %
I will take the vaccine because I feel at risk of getting HPV infection	118	30	132	33.6	143	36.4
HPV infection increases the likelihood of getting CC	32	8.1	119	30.3	242	61.6
I feel I know enough information about cervical cancer	243	61.8	83	21.1	67	17
I would tell my sexual partner if I had HPV	52	13.2	64	16.3	277	70.5
If I had HPV, I would be at risk for transmitting it to others	95	24.2	97	24.7	201	51.1
I would need the HPV vaccine if I had multiple sexual partners	64	16.3	114	29	215	54.7
Women should do pap smear once a year	56	14.2	192	48.9	145	36.9
I would need the regular condom use when engaging in sexual activity	69	17.6	125	31.8	199	50.6
If a woman receives HPV vaccine, she doesn't need to do pap smear any more	152	38.7	183	46.6	58	14.8
The HPV vaccine is an effective way to prevent HPV infection	44	11.2	126	32.1	223	56.7

**Figure 2.** HPV vaccine uptake status and willingness to receive the vaccine if available among female students in Addis Ababa University, Ethiopia, 2022 ($n = 393$).

than those who have no family history of vaccination (AOR = 10.05; 95% CI = 3.48–29.01; $P < .001$). Similarly, having history of sexual intercourse before the study (AOR = 2.78; 95% CI = 1.17–6.47; $P = .02$) and having more favorable perception toward the HPV and its vaccine (AOR = 3.92; 95% CI = 2.23–6.9; $P < .001$) were 2.78 and 3.92 more likely willing to receive HPV vaccine than their counterparts, respectively.

In other ways, female students who were in their third year of study were 0.45 less likely willing to be vaccinated against HPV infection than those who were in their second year of study (AOR = 0.45; 95% CI = 0.25–0.81; $P = .007$) and female students whose mothers have private work were 0.32 (AOR = 0.32; 95% CI = 0.16–0.65; $P = .002$) less likely willing to vaccinate than those whose mothers were government employee as presented in Table 4.

Discussion

This study sought to shed light on students' understanding of HPV and its vaccine, attitudes regarding HPV infection, use

of the HPV vaccine, and readiness to receive the HPV vaccine if it were offered. Less than half of 183 students (46.6%) in the study were aware that HPV is the primary cause of cervical cancer, according to the study's findings. Two studies done in Nigeria revealed a similar pattern, with the population under observation showing a degree of knowledge of 35.4% and 37.2%, respectively (Agosti & Goldie, 2007; Begoihn et al., 2019). Awareness about HPV and its vaccine has been majorly obtained from social media, broadcast media, and health care providers. The results of this study were also supported by the study that was conducted in South Africa 30.3% (Chan et al., 2019) and Gondar, Ethiopia, 40.4% (Dereje et al., 2021). The result of current study is lower compared to studies conducted among medical students in Malaysia 93.7% and among female college students in China 78.5% (Siu et al., 2019), Oakland University (Navalpakam et al., 2016), and in Ethiopia 80.5% (Kassa et al., 2021). The results also showed that more than half of the students 204 (51.9%) were unaware that HPV is a sexually transmitted virus.

Table 4. Bivariate and Multivariate Logistic Regression of Factors Associated with Willingness to be Vaccinated Against HPV among Female Students in Addis Ababa University, Ethiopia, 2022.

Variables	Willing to be vaccinated		COR (95% CI)	AOR (95% CI)	P-value
	No	Yes			
Age					
18–22	251	11			.526
23–26	24	7	0.66(0.28, 1.58)	0.65(0.17, 2.49)	
Year level of study					
Second	102	70			.007
Third	116	27	0.34(0.20–0.57) ***	0.45(0.25, 0.81) **	.982
Fourth	23	11	0.70(0.32–1.52)	0.99(0.4, 2.48)	.957
Fifth and above	34	10	0.43(0.20–0.92) **	1.04(0.29, 3.68)	
Residence					
Addis Ababa	139	49			.064
Other town	136	69	1.44(0.93, 2.23)	1.71(0.97, 3.00)	
Mother's occupation					
Government employee	67	46			.002
Private	103	24	0.34(0.19, 0.61) ***	0.32(0.16, 0.65) **	.14
Unemployed	105	48	0.67(0.4, 1.11) *	0.62(0.32, 1.17)	
Father's level of education					
No formal education	36	12			.942
Primary school	32	13	0.55(0.16, 1.87)	0.95(0.24, 3.79)	.436
Secondary school	76	30	0.58(0.24, 1.41) *	0.66(0.23, 1.88)	.563
College and above	131	63	0.79(0.37, 1.69)	0.75(0.28, 1.99)	
Father's occupation					
Governmentt employee	103	53			.584
Self-employed	132	50	0.74(0.46, 1.17) *	0.84(0.44, 1.59)	.415
Unemployed	40	15	0.73(0.37, 1.44)	0.71(0.31, 1.61)	
Sexual history					
No	257	102			.002
Yes	18	16	2.24(1.10–4.56) **	2.78(1.17, 6.47) **	
Heard about HPV vaccine?					
No	204	66			.197
Yes	71	52	2.26(1.44–3.56) ***	1.43(0.83, 2.46)	
Family history of vaccination					
No	269	96			.001
Yes	6	22	10.27(4.05–26.1) **	10.05(3.48, 9.28) ***	
Perception toward HPV and its vaccine					
Less favorable	144	23			.001
More favorable	131	95	4.54(2.72–7.59) ***	3.92(2.23, 6.9) ***	

Note. * $P < .5$, ** $P < .05$, *** $P < .005$.

This result is in line with that of a prior study conducted among female undergraduates in Lagos State, Nigeria. (Oluwole et al., 2019). The results also showed that the majority of the students, 286 (72.8%), believed that HPV cannot infect both men and women, 229 (58.3%) did not know that an early sexual debut increases the risk of contracting HPV, and 251 (63.9%) did not know that the HPV vaccine is available in Ethiopia. The study's overall knowledge score, which was 161 (41%), was subpar. This might be because there is not much information available, and some of the participants graduated from high school before the vaccine was made available in educational settings. Less than half of the 143 participants in the survey (36.4%) agreed

that they would want to obtain the HPV vaccine because they felt at risk of contracting the disease, according to the study's findings. This finding revealed that the uptake of HPV vaccines among students was 1.5%, which is in line with a study conducted among female undergraduate students in Lagos State, Nigeria, where about 10 (2.6%) students have been vaccinated with HPV vaccine (Begoihn et al., 2019). This finding was lower than the previous study conducted in the USA 49.1% (Barrett et al., 2020), Canada 49% (Fernandes et al., 2018), China 11% (Wang et al., 2021), and Indonesia 12.2% (Khatiwada et al., 2021), respectively.

In other ways, the outcome of the current study is better than that of a study conducted in Nigeria, where only one

respondent (0.4%) had gotten an HPV vaccination (Agosti & Goldie, 2007). The reasons for low uptake found in the current study as mentioned by the participants were scarcity of information about HPV vaccine, the HPV vaccine is not included in the national immunization program, ineligibility of participants to the target group, and misconception regarding HPV vaccine.

Another significant finding of the study was that 118 (28.5%) female students were willing to receive HPV vaccination. However, the current finding is lower than a similar study conducted in Indonesia, USA, China, Malaysia, and Nigeria in which students were willing to get vaccinated (Barrett et al., 2020; Khatiwada et al., 2021), (Widjaja, 2019), (Isara & Osayi, 2021), respectively.

The recent introduction of the HPV vaccine in Ethiopia may be a contributing factor in the decreased acceptance rate seen in the current study. Other findings of this study included poorer knowledge scores, which may be a significant factor influencing students' willingness to receive vaccinations. The smaller knowledge gap demonstrates that enhancing student understanding is a key factor in increasing desire to have an HPV vaccination. Similar studies conducted in China and Nigeria provided evidence in favor of this (Shu et al., 2020; Wang et al., 2021). The participants made the suggestion that increasing students' willingness to obtain the vaccine may be accomplished by increasing awareness of the HPV vaccine through broadcast media such as TV, radio, and social media.

Despite having a more positive impression of the HPV vaccine, the students' desire to get the shot was low. Only 28.5% of the participants in this study indicated willingness to receive the HPV vaccine. In comparison to other studies done in China and Indonesia, where 66% and 95.8% of the students were willing to receive the HPV vaccine, this statistic is lower (Widjaja, 2019).

In this study, female students in their third year of study were 0.45 times less likely than those in their second year to be willing to have an HPV vaccination (AOR = 0.45; 95% CI = 0.25–0.81; $P = .007$). This result contrasted with a study of female undergraduates in Lagos State, Nigeria, which found that individuals with greater levels of education were more likely to be willing to receive an HPV vaccination (Oluwole et al., 2019).

According to the current study, the students who had sexual contact before the study were 2.78 times more likely than their peers to be open to receiving the HPV vaccine (AOR = 2.78; 95% CI = 1.17–6.47; $P = .002$), which is consistent with Chinese study results that students who had less favorable perception toward HPV vaccine were less likely willing to get vaccinated than their counterparts (You et al., 2020).

Additionally, it was discovered that factors such as having a family history of vaccination, the mother's education level, and her work substantially correlated with the kids' desire to receive the vaccine. Given this, it is crucial to continue working to enhance the intention of HPV vaccination

among female university students, as this will help to increase the uptake of the vaccine. The study's findings showed that the HPV vaccine was widely recognized as a means of preventing HPV-related illness because participants believed it to be a practical means of HPV protection. Similar research from Uganda showed that, in addition to avoiding HPV infection, HPV vaccination offers long-term economic benefits for the vaccinated individuals, their families, and society (Turiho et al., 2017).

Study Strengths and Limitations

One advantage of the study was the use of self-administered questionnaires, which allowed the students to answer the questions without hesitation or restraint. The sample size of the current study was 398, which is a drawback because it may not be large enough to represent all university students in the nation and prevents generalization of the results to all female university students.

Implications for Practice

As part of a campaign to distribute the vaccine, raising community knowledge of HPV and its vaccine is essential. Particular attention should be paid to rural areas where there is a severe lack of information.

Conclusion

The findings of this study revealed that knowledge of HPV infection, cervical cancer, and HPV vaccination among female students were poor. In this study, the students had less favorable perception toward vulnerability to the disease, severity of the disease, and benefits of vaccination. The year level of study, level of education of the student's mother, occupation of the student's mother, having history of sexual intercourse before the study, and having family history of vaccination were factors associated with students' willingness to receive the HPV vaccine.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Statement and Informed Consent

Ethical approval for this study was obtained from Addis Ababa University, College of Health Sciences, and School of Nursing and Midwifery research ethics committee with (protocol number SNM/M. D/017/14). A written permission to carry out the research was submitted to all selected colleges of Addis Ababa University.

The objectives of the study and the risks and benefits of participating in the study were communicated prior to asking willingness of the study participants to participate in the study. Informed verbal and written consent were obtained from each respondent prior to data collection. After getting informed consent from the respondents, the right of the respondents to refuse answer for few or all of the questions was also valued. The participants were informed that their participation will be purely voluntary and assured of the confidentiality of identity and other personal information. The participants' privacy and confidentiality of the information were maintained in accordance with the Declaration of Helsinki.

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References

- Adejuyigbe, F. F., Balogun, M. R., Sekoni, A. O., & Adegbola, A. A. (2015). Cervical cancer and human papilloma virus knowledge and acceptance of vaccination among medical students in southwest Nigeria. *African Journal of Reproductive Health, 19*(1), 140–148.
- Agosti, J. M., & Goldie, S. J. (2007). Introducing HPV vaccine in developing countries—key challenges and issues. *New England Journal of Medicine, 356*(19), 1908–1910. <https://doi.org/10.1056/NEJMp078053>
- Barnard, M., George, P., Perryman, M. L., & Wolff, L. A. (2017). Human papillomavirus (HPV) vaccine knowledge, attitudes, and uptake in college students: Implications from the precaution adoption process model. *PLoS One, 12*(8), e0182266. <https://doi.org/10.1371/journal.pone.0182266>
- Barrett, C., Scoular, S., & Borgelt, L. M. (2020). Knowledge, perceptions, and uptake of the human papillomavirus vaccine in a sample of US high school adolescents. *The Journal of Pediatric Pharmacology and Therapeutics : JPPT : The Official Journal of PPAG, 25*(8), 697–704. <https://doi.org/10.5863/1551-6776-25.8.697>
- Begoihn, M., Mathewos, A., Aynalem, A., Wondemagegnehu, T., Moelle, U., Gizaw, M., & Kantelhardt, E. J. (2019). Cervical cancer in Ethiopia - predictors of advanced stage and prolonged time to diagnosis. *Infect Agent Cancer, 14*(1), 36. <https://doi.org/10.1186/s13027-019-0255-4>
- Chan, C. K., Aimagambetova, G., Ukybassova, T., Kongrtay, K., & Azizan, A. (2019). Human papillomavirus infection and cervical cancer: Epidemiology, screening, and vaccination-review of current perspectives. *Journal of Oncology, 2019*, 3257939. <https://doi.org/10.1155/2019/3257939>
- Cinar, İO., Ozkan, S., Aslan, G. K., & Alatas, E. (2019). Knowledge and behavior of university students toward human papillomavirus and vaccination. *Asia-Pacific Journal of Oncology Nursing, 6*(3), 300–307. https://doi.org/10.4103/apjon.apjon_10_19
- Dereje, N., Ashenafi, A., Abera, A., Melaku, E., Yirgashewa, K., Yitna, M., & Yoseph, Y. (2021). Knowledge and acceptance of HPV vaccination and its associated factors among parents of daughters in Addis Ababa, Ethiopia: A community-based cross-sectional study. *Infect Agent Cancer, 16*(1), 58. <https://doi.org/10.1186/s13027-021-00399-8>
- Ebrahim, S., Mndende, X. K., Kharsany, A. B., Mbulawa, Z. Z., Naranbhai, V., Frohlich, J., & Williamson, A. L. (2016). High burden of human papillomavirus (HPV) infection among young women in KwaZulu-Natal, South Africa. *PLoS One, 11*(1), e0146603. <https://doi.org/10.1371/journal.pone.0146603>
- Fernandes, R., Potter, B. K., & Little, J. (2018). Attitudes of undergraduate university women towards HPV vaccination: A cross-sectional study in Ottawa, Canada. *BMC Women's Health, 18*(1), 134. <https://doi.org/10.1186/s12905-018-0622-0>
- Isara, A. R., & Osayi, N. (2021). Knowledge of human papillomavirus and uptake of its vaccine among female undergraduate students of Ambrose Alli University, Ekpoma, Nigeria. *Journal of Community Medicine and Primary Health Care, 33*(1), 12. <https://doi.org/10.4314/jcmphc.v33i1.6>
- Kassa, H. N., Bilchut, A. H., Mekuria, A. D., & Lewetie, E. M. (2021). Practice and associated factors of human papillomavirus vaccination among primary school students in Minjar-Shenkora district, North Shoa zone, Amhara regional state, Ethiopia, 2020. *Cancer Management and Research, 13*, 6999–7008. <https://doi.org/10.2147/cmar.s324078>
- Kellogg, C., Shu, J., Arroyo, A., Dinh, N. T., Wade, N., Sanchez, E., & Equils, O. (2019). A significant portion of college students are not aware of HPV disease and HPV vaccine recommendations. *Human Vaccines & Immunotherapeutics, 15*(7-8), 1760–1766. <https://doi.org/10.1080/21645515.2019.1627819>
- Khatiwada, M., Kartasasmita, C., Mediani, H. S., Delprat, C., Van Hal, G., & Dochez, C. (2021). Knowledge, attitude and acceptability of the human papilloma virus vaccine and vaccination among university students in Indonesia. *Frontiers in Public Health, 9*, 616456. <https://doi.org/10.3389/fpubh.2021.616456>
- Kisaakye, E., Namakula, J., Kihembo, C., Kisaakye, A., Nsubuga, P., & Babirye, J. N. (2018). Level and factors associated with uptake of human papillomavirus infection vaccine among female adolescents in Lira district, Uganda. *The Pan African Medical Journal, 31*, 184. <https://doi.org/10.11604/pamj.2018.31.184.14801>
- Kombe Kombe, A. J., Li, B., Zahid, A., Mengist, H. M., Bounda, G. A., Zhou, Y., & Jin, T. (2020). Epidemiology and burden of human papillomavirus and related diseases, molecular pathogenesis, and vaccine evaluation. *Frontiers in Public Health, 8*(1), 552028. <https://doi.org/10.3389/fpubh.2020.552028>
- Kwang, N. B., Yee, C. M., Shan, L. P., Teik, C. K., Chandralega, K. N., & Abdul Kadir, A. K. (2014). Knowledge, perception and attitude towards human papillomavirus among pre-university students in Malaysia. *Asian Pacific Journal of Cancer Prevention, 15*(21), 9117–9123. <https://doi.org/10.7314/apjcp.2014.15.21.9117>
- Maharajan, M. K., Rajiah, K., Num, K. S., & Yong, N. J. (2015). Knowledge of human papillomavirus infection, cervical cancer and willingness to pay for cervical cancer vaccination among ethnically diverse medical students in Malaysia. *Asian Pacific Journal of Cancer Prevention, 16*(14), 5733–5739. <https://doi.org/10.7314/apjcp.2015.16.14.5733>
- Mushasha, M. P., Mashau, N., & Ramathuba, D. U. (2021). The knowledge of female students regarding the human papilloma virus and vaccines at a selected university in South Africa. *The Open Public Health Journal, 14*(1), 6. <https://doi.org/10.2174/1874944502114010257>
- Navalpakam, A., Dany, M., & Hajj Hussein, I. (2016). Behavioral perceptions of Oakland University female college students towards human papillomavirus vaccination. *PLoS One, 11*(5), e0155955. <https://doi.org/10.1371/journal.pone.0155955>
- Oluwole, E. O., Idowu, O. M., Adejimi, A. A., Balogun, M. R., & Osayin, G. E. (2019). Knowledge, attitude and uptake of human

- papillomavirus vaccination among female undergraduates in Lagos state, Nigeria. *Journal of Family Medicine and Primary Care*, 8(11), 3627–3633. https://doi.org/10.4103/jfmpc.jfmpc_520_19
- Shu, N. E., Abiola, A. O., Akodu, B. A., Basse, B. A., & Misago, N. (2020). Knowledge, attitudes and preventive practices for human papilloma virus infection among female sex workers in Lagos metropolis. *The Pan African Medical Journal*, 36, 278. <https://doi.org/10.11604/pamj.2020.36.278.17912>
- Siu, J. Y., Fung, T. K. F., & Leung, L. H. (2019). Social and cultural construction processes involved in HPV vaccine hesitancy among Chinese women: A qualitative study. *International Journal for Equity in Health*, 18(1), 147. <https://doi.org/10.1186/s12939-019-1052-9>
- Tesfaye, Z. T., Bhagavathula, A. S., Gebreyohannes, E. A., & Tegegn, H. G. (2019). Knowledge and awareness of cervical cancer and human papillomavirus among female students in an Ethiopian university: A cross-sectional study. *International Journal of Preventive Medicine*, 10(1), 198. https://doi.org/10.4103/ijpvm.IJPVM_181_17
- Turiho, A. K., Okello, E. S., Muhwezi, W. W., & Katahoire, A. R. (2017). Perceptions of human papillomavirus vaccination of adolescent schoolgirls in western Uganda and their implications for acceptability of HPV vaccination: A qualitative study. *Bmc Research Notes*, 10(1), 431. <https://doi.org/10.1186/s13104-017-2749-8>
- Wang, X., Du, T., Shi, X., & Wu, K. (2021). Awareness and knowledge about human papilloma virus infection among students at secondary occupational health school in China. *International Journal of Environmental Research & Public Health*, 18(12), 6321–6331. <https://doi.org/10.3390/ijerph18126321>
- Widjaja, V. N. (2019). Awareness, knowledge and attitudes of human papillomavirus (HPV) among private university students- Malaysia perspective. *Asian Pacific Journal of Cancer Prevention*, 20(7), 2045–2050. <https://doi.org/10.31557/apjcp.2019.20.7.2045>
- You, D., Han, L., Li, L., Hu, J., Zimet, G. D., Alias, H., & Wong, L. P. (2020). Human papillomavirus (HPV) vaccine uptake and the willingness to receive the HPV vaccination among female college students in China: A multicenter study. *Vaccines (Basel)*, 8(1), 31. <https://doi.org/10.3390/vaccines8010031>