

Research Article

# Willingness and Attitude Towards Human Papilloma Virus (HPV) Vaccination Among Early-Adolescent Female School Students, in Harar, Ethiopia, 2024: A Cross-Sectional Study

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## Abstract

Human papillomavirus (HPV) is a sexually transmitted disease that causes various cancers, particularly in women with early sexual activity, multiple partners, and unprotected sex. However, the willingness of adolescents to receive the vaccine is influenced by community, organization, policy, and parental conditions. A study was conducted in Harar, Ethiopia, from January to February 2024. The study used a questionnaire adapted from previous studies and data collection involved face-to-face interviews. Descriptive statistics were calculated and binary logistic was used to assess associated factors. The overall favorable attitude and willingness to take HPV vaccination in this study was 66.67% (95% CI: 61.9%, 71.2%) and 50.6% (95% CI: 45.7%, 55.5%), respectively. The factor associated with the willingness to get HPV vaccination was living with parents (AOR =2.06 95% CI 1.07, 3.95), having a father's education (AOR=1.63 95% CI 1.01, 2.66), vaccine hesitancy (AOR=0.63, 95% CI 0.41, 0.98), hesitancy and complacency (AOR=1.7, 95% CI 1.07, 2.69), (AOR=1.86, 95% CI 1.18, 2.93) respectively. The factor associated with the attitude towards HPV vaccination was access to the minimal media, the occupation of the parents was non-governmental, vaccine hesitancy. The study indicates a moderate willingness and attitude towards HPV vaccination among early adolescent female students.

## Keywords

Willingness, Attitude, HPV, Early Adolescent, Students, Ethiopia

## 1. Introduction

Human papillomavirus (HPV) is the most prevalent sexually transmitted disease. The virus causes oral, oropharyngeal, vulvar, vaginal, and cervical cancers. The most common method of transmission of HPV from an infected person to a noninfected person is through unprotected sexual intercourse. In most cases, women with early sexual activity, multiple partners, unprotected sex, gay or bisexual sex are highly vulnerable to HPV infection [1].

Cervical cancer is the second leading cause of cancer in

Ethiopia. Annually, around 6,294 new cases of cervical cancer are reported in Ethiopia. In 2022 around 604,000 new cases and about 342,000 deaths from cervical cancer occurred in the world. Ninety percent of new cases and deaths from cervical cancer occurred in LMICs [2]. In the world, around 570,000 women are affected by cervical cancer, and around 311,000 deaths occur each year. Most of the deaths (more than 85%) occurred in low developed countries [3]. Cervical cancer is the second leading cause of cancer in Ethiopia. Annually,

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around 6,294 new cases of cervical cancer are reported in Ethiopia. In Ethiopia, around 4884 deaths and 6294 new cases occur each year with incidence rates according to age being 21.5 and 16 per 100,000 females in 2020, respectively [5].

Human papillomavirus (HPV) vaccination is a worldwide approach to prevent cervical cancer. The World Health Organization prequalified three vaccines, namely bivalent (Cervarix) and Gardasil 9 (nine valent) [4]. HPV vaccination played a great role in prevention and in decreasing the effect of cervical cancer. The vaccines target high-risk HPV (types 16 and 18) to eliminate around 70% of invasive cervical cancers in women [6]. According to a study conducted in Turkey among university freshman students, only 11.6% of the students wished for HPV vaccination [7]. In Ethiopia, HPV vaccination was first started and allowed publicly on 6 December 2018 and was held for the first time at Tesfa Kokeb Primary School in Lideta Sub-city of Addis Ababa. In that year, Ethiopia's Ministry of Health scheduled to provide vaccines to more than one million girls aged 14 years [1].

Different studies showed that factors at various levels, including the community (social group values and norms, media coverage of the HPV vaccine), the organization (allocated resources, information provision, consent process, immunization setting, and environment), the policy (HPV vaccine program) and the organization (information provision) affect adolescents' willingness to accept the HPV vaccine [8]. Parental conditions were another factor that has a link with adolescent resistance to the HPV vaccine [9]. Parents believe that HPV vaccinations can encourage sexuality and risky sexual behavior [10].

There have been several studies carried out before, but the problem still exists, so this study was the basis for the researcher in the area and to recommend the concerned body, this study aimed to assess the willingness and attitude toward HPV vaccination among early-adolescent female students, in Harar, Ethiopia.

## 2. Methods

All methods were performed in accordance with the relevant guidelines and regulations.

Informed, voluntary, written, and signed consent was obtained from a parents and/or legal guardian after a brief explanation of the objective of the study, which ensures that participation was voluntary.

### 2.1. Study Design, Period, and Setting

An institution-based cross-sectional study was conducted. The study was conducted in selected public and private primary and secondary schools in Harar City from February 1 to 30 in 2024. The study was conducted in selected public and private primary schools in Harar City in 2024. Harar City has 10 public primary schools and 5 private primary schools [11].

Source of Population and Study Population.

All the female populations living in Harar City were source populations. Selected female students who studied in selected

Harar city schools during the study period were the study population.

### 2.2. Inclusion and Exclusion Criteria

All female students who are eligible for the HPV vaccine and students who are of an eligible age and are available during the data collection period were included in the study, and girls at eligible age but have a history of allergic disease, suspected allergy, or reactions and participants will be unable to communicate or refuse to participate were excluded from the study.

### 2.3. Sample Size Determination

The required sample size was determined using the single population proportion formula based on the following assumptions. The proportion of attitude was taken from the results of a study done at the University of Gondar, Ethiopia, 67.7% [12], and the proportion of willingness was taken from Dire Dawa, Ethiopia 56% [13] with 95% CI,  $\alpha$ -level 5%, and considered the margin of error 5%. The minimum sample size was calculated on the basis of the following formula:

$$n = \frac{(z\alpha/2)^2 * p(1-p)}{d^2}$$

After considering the 10% nonresponse rate, the calculated sample size for the attitude variable was 370 and for willingness 417. Then select the largest sample size for the final study. Therefore, the final sample size for this study would be 417.

### 2.4. Sampling Technique

A systematic random sampling technique was used to recruit early adolescent school girls from public and private primary schools. According to the Harar City Educational Bureau, there are 10 public primary and there are also 5 private primary. Three primary public schools and two primary private schools have been selected using the lottery method within those schools. There are 2,112 female public primary students in these schools and 2010 primary students in private schools. Based on female students in each public and private school, the calculated sample size was allocated proportionally. The sampling interval (K) was calculated by dividing the total number of female students (N) by the calculated sample size (n). Therefore, the sampling interval is approximately equal to  $4122/417 = 10$  and all 10 female school students were included in the study.

### 2.5. Study Variables

#### 2.5.1. Dependent Variables

Willingness and attitude toward receiving the HPV vaccine.

#### 2.5.2. Independent Variables

Sociodemographic variables include age, parental educational

status, parental occupation, religion, monthly income, participation in school minimedia club, ownership of mobile phone; socioeconomic status of parents, different personal belief rumors; and 5C psychological antecedents confidence, complacency, constraints, calculation and collective responsibility.

## 2.6. Operational Definition

*Human papillomavirus (HPV) vaccine:* A vaccine that helps protect the body against infection with certain types of human papillomavirus (HPV). Human papillomavirus vaccines are being used to prevent some of these cancers [14].

*5C + model:* five psychological antecedents of vaccination behavior represented in the 5C model that measures vaccine hesitancy: confidence, complacency, constraints, calculation, and collective responsibility [15].

*Attitude to HPV vaccine:* The attitude of adolescents was measured based on nine attitudes related items. Those adolescents who answered a mean score and more on attitude-related questions were considered favorable attitudes, whereas those participants who scored below a mean score from attitude-related items [16].

*Willingness to take the HPV vaccine:* Adolescent willingness to take the HPV vaccine was measured based on eight willingness-related items. Participants who scored a mean score and higher on willingness-related questions were considered to have a high willingness to take the test.

HPV vaccine, while those participants who scored below a mean score for willingness-related items were considered low willingness to take the HPV vaccine [17].

## 2.7. Data Collection Tools and Procedures

The questionnaire used in the study was adapted from previous studies conducted elsewhere. Data collection techniques involved conducting face-to-face interviews with participants using the structured questionnaire. 5C psychological antecedents of vaccination, which include confidence, complacency, constraints, calculation, and collective responsibility, were probably assessed using questionnaires administered by interview.

## 2.8. Data Quality Control

To ensure the quality of data, the questionnaires adapted from standard tools, and translated into Amharic and Afan Oromo, and then back to English. Pretesting of the questionnaire was undertaken to check the understandability by taking 5% of the sample from other schools which are not included in the actual data collection. Data collectors and supervisors received training on the importance of maintaining participant confidentiality throughout the data collection process. The

completeness and consistency of the questionnaires were checked during and after data collection.

## 2.9. Data Management and Data Analysis

After data collection is done on the Kobo Tool, download it in Excel format and export it to SPSS version 20 statistical software to clean and check missing data. The analysis was performed using Stata version 17 statistical software. Descriptive statistics such as frequency distribution and measures of central tendency and variability were calculated. The first crude association between each independent variable and the dependent variable will be assessed in bivariate analyses. Then those independent variables with a P value of 0.25 will be transported to multivariate analysis to control the cofounders. A P-value of 0.05 will be used as the criterion for statistical significance, and OR with a 95% confidence interval will be used to indicate the strength of the association.

## 2.10. Ethical Consideration and Informed Consent

Ethical approval and clearance were obtained from the Haramaya University School of Medicine and Health Sciences Research and Ethics Review Committee (Ref. No: IHRERC/286/2024) and was presented to Harar city schools for permission. In addition to that, informed, voluntary, written, and signed consent was obtained from a parents and/or legal guardian after a brief explanation of the objective of the study, which ensures that participation was voluntary.

## 3. Results

### 3.1. Sociodemographic Characteristics of the Participants

A summary of the characteristics of the respondents can be found in Table 1. 100 of the 417 eligible participants responded to the survey. The average age of the respondents was 13 years ( $13 \pm 0.83$ ). Muslims made up 34.53% of the respondents, followed by Orthodox (30.70%). The majority (77.94%) of the parents were not employed in the civil service, and the majority (38.13%) of the mothers of the participants could not read or write. The majority (68.35%) of the school had mini-media. Only 13.91% of fathers reached higher than grade 12. More than half (52.52%) reported having no hesitation in uptake of HPV vaccination, while the majority (87.53%) of the study participants reported living with a steady partner. (Table 1).

**Table 1.** Sociodemographic characteristics of early adolescent female school students in Harar, Harar, Ethiopia, 2024.

Variables	Count	%
Age	Mean (SD) 13 (0.83)	Min Max 11 14
Religion		
Orthodox	128	30.70
Muslim	144	34.53
Protestant	118	28.30
Catholic	27	6.47
Grade Level	Mean (SD) 8 (0.94)	Min Max 8 9
Whom do you live with		
Parents	365	87.53
Relatives	52	12.47
Mother Educational status		
Unable to read and write	159	38.13
Able to read and write	27	6.47
Primary (1-8)	33	7.91
Secondary (9-12)	144	34.53
Above 12	54	12.95
Father Educational status		
Unable to read and write	161	38.61
Able to read and write	27	6.47
Primary (1-8)	32	7.67
Secondary (9-12)	139	33.33
Above 12	58	13.91
Parents occupation		
Non- governmental employee	325	77.94
Governmental Employee	92	22.06
Parents monthly income		
< 7000	188	45.08
>7000	229	54.92
Hesitancy of vaccine		
Yes	198	47.48
No	219	52.52
Are you participating in school mini-media		
Yes	285	68.35
No	132	31.65
Do you have a mobile cell phone?		
Yes	244	58.51
No	173	41.49

### 3.2. Willingness to Take the HPV Vaccine and Attitudes Toward HPV Vaccine Uptake

More than half (45.56%) of early adolescent girls plan to agree to receive a vaccine against cervical cancer 39.57% of

the participants strongly agree to plan to receive a vaccine against cervical cancer of the total participants 35% agree that the HPV vaccine is effective to prevent cervical cancer and 51.8% of the participants agree that education about the HPV vaccine should be given to school adolescents. (Table 2).

**Table 2.** Willingness to take the HPV vaccine and attitudes toward HPV vaccine uptake among early adolescent school students in Harar City, Ethiopia, 2024.

Items	Strongly disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)
willingness to receive the HPV vaccine					
I intend to receive the vaccine against Cervical cancer	95 (22.78)	54 (12.95)	0	190 (45.56)	78 (18.51)
I predict I will receive a vaccine against cervical cancer	194 (46.52)	114 (27.34)	13 (3.12)	60 (14.39)	36 (8.63)
I plan to receive a vaccine against cervical cancer	55 (13.19)	192 (46.04)	4 (0.96)	1 (0.24)	165 (39.57)
Attitude toward HPV vaccine					
The HPV vaccine is effective in preventing cervical cancer.	13 (3.12)	72 (17.27)	54 (12.95)	146 (35.01)	132 (31.65)
HPV vaccine education should be given to school adolescents	67 (16.07)	34 (8.15)	12 (2.88)	216 (51.80)	88 (2.88)
Girls should get the HPV vaccine before their first sexual intercourse	89 (21.34)	35 (8.39)	11 (2.64)	199 (47.72)	83 (19.90)
Health information about the HPV vaccine needed for adolescents.	86 (20.62)	29 (6.95)	12 (2.88)	206 (49.40)	84 (20.14)

### 3.3. Characteristics of 5C Psychological Precedents, Belief in Rumors, and Different Personal Beliefs of Participants

Most early adolescent students agree that they worry that the vaccine is safe (39.33%), and 40.29% do not agree with trusting healthcare workers for accurate vaccination information. Most (37.41%) of the students believe that cervical cancer is a serious disease and should get vaccinated, and

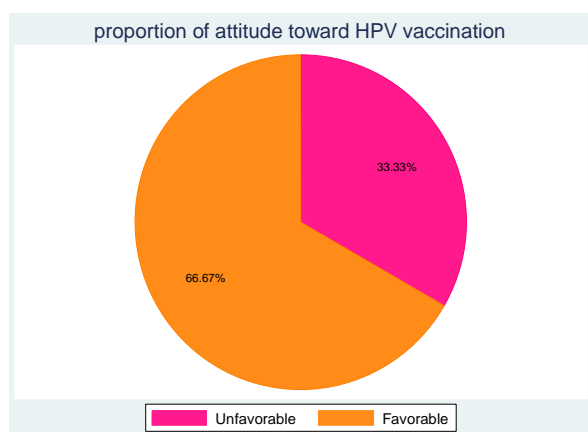
41.73% of the students think that when thinking about vaccinating against HPV, they should weigh the benefits and risks to make the best decision, and when thinking about getting vaccinated against cervical cancer, they should first consider whether it is effective or not. Of the total, 29.26% of the participants disagreed with the rumors that the HPV vaccine destroys the fertility of girls, and 41.25% of the early adolescent school students had barriers to the efficacy of the HPV vaccine. (Table 3).

**Table 3.** Characteristics of 5C Psychological Antecedents, belief in rumors, and different personal beliefs of participants among early adolescents in Harar City, Ethiopia, 2024.

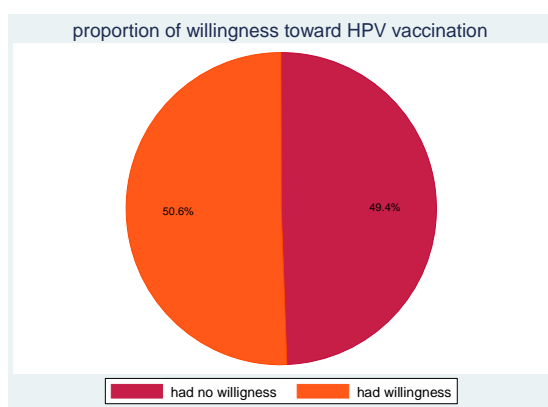
Items	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)
Confidence					
I am worried about the Vaccines are safe	64 (15.35)	48 (11.51)	28 (6.71)	164 (39.33)	113 (27.10)
Public authorities decide in the best interest of the Community	101 (24.22)	203 (48.68)	6 (1.44)	9 (1.66)	98 (23.50)
Trust in healthcare workers for accurate vaccination information	75 (17.99)	168 (40.29)	51 (12.23)	41 (9.83)	82 (19.66)
Constraints					

Items	Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agree N (%)	Strongly agree N (%)
Everyday work stress may prevent me from getting vaccinated	69 (16.55)	34 (8.15)	28 (6.71)	204 (48.92)	82 (19.66)
Compliance					
I think it is unnecessary to receive vaccinations as it cannot prevent HPV	159 (38.13)	16 (3.84)	15 (3.60)	145 (34.77)	82 (19.66)
I believe my immune system is powerful; it will protect me from cervical cancer	141 (33.81)	17 (4.08)	22 (5.28)	169 (40.53)	68 (16.31)
I believe Cervical cancer is not a severe disease that I should get vaccinated against it	156 (37.41)	13 (3.12)	12 (2.88)	154 (36.93)	82 (19.66)
Calculation					
When I think about getting vaccinated against cervical cancer, I weigh the benefits and risks to make the best decision possible	140 (33.57)	23 (5.52)	14 (3.36)	66 (39.81)	74 (17.75)
When I think about getting vaccinated against cervical cancer, I will first consider whether it is effective or not	136 (32.61)	26 (6.24)	13 (3.12)	174 (41.73)	68 (16.31)
Before I get HPV vaccinated, I need to know about this vaccine in detail	31 (7.43)	37 (8.87)	2 (0.48)	154 (37.65)	190 (45.56)
Collective responsibility					
I will take the HPV vaccine because, in that way, I can protect people with a weaker immune system	63 (15.11)	10 (2.40)	32 (7.62)	177 (42.45)	135 (32.37)
I think vaccination against HPV is a collective action to prevent the spread of diseases	135 (32.37)	26 (6.24)	17 (4.08)	169 (40.53)	70 (16.79)
belief in rumours and personal about HPV vaccination					
The prayers prevent cervical cancer	12 (2.88)	67 (16.07)	165 (39.57)	134 (32.13)	39 (9.35)
Vaccines are a means to reduce the population	1 (0.24)	61 (14.63)	159 (38.13)	37 (8.87)	159 (38.13)
HPV vaccine ruins girls' fertility	61 (14.63)	122 (29.26)	104 (24.29)	82 (19.66)	48 (11.51)
I think vaccination is good because it will make me less worried about Cervical cancer	154 (36.93)	164 (39.33)	32 (7.67)	21 (5.04)	46 (11.03)
I believe vaccination will decrease my risk of getting infected by Cervical cancer	84 (20.14)	43 (10.31)	108 (25.90)	98 (23.50)	84 (20.14)
I think the complications of Cervical cancer will decrease if I get vaccinated	152 (36.45)	148 (35.45)	27 (6.47)	26 (6.24)	64 (15.35)
Barriers to HPV vaccination					
I am worried that the possible side effects of the HPV vaccination would interfere with my usual activity	127 (30.46)	14 (3.36)	30 (7.19)	178 (42.69)	68 (16.31)
I am concerned about the efficacy of the HPV vaccine	105 (25.18)	34 (8.15)	38 (9.11)	172 (41.25)	68 (16.31)
I have a concern that I may receive a faulty/fake HPV vaccine	36 (8.63)	198 (47.48)	29 (6.95)	47 (11.27)	107 (25.66)
It concerns me that the development of an HPV vaccine is too rushed to test its safety effectively	18 (4.32)	119 (28.54)	14 (3.36)	100 (23.98)	166 (39.81)
I am concerned about the long-term side effects of the HPV vaccination	26 (6.24)	95 (22.78)	7 (1.68)	100 (23.98)	189 (45.32)





**Figure 1.** Proportion of attitude toward HPV vaccination uptake among early adolescent female students, Harar, Ethiopia, 2024.



**Figure 2.** Proportion of willingness to take HPV vaccination uptake among early adolescent female students, Harar, Ethiopia, 2024.

### 3.4. Proportion of Attitude Toward HPV Vaccination Uptake

Among the 417 participants, the overall favorable attitude toward HPV vaccination uptake in this study was 278 or 66.67% (95% CI: 61.9%, 71.2%). (Figure 1).

### 3.5. Proportion of Willingness to Accept HPV Vaccination

Among the 417 participants, the overall willingness to accept HPV vaccination in this study was 211 or 50.6% (95% CI 45.7%, 55.5%). (Figure 2).

### 3.6. Factor Associated with Attitude Toward HPV Vaccination Uptake

In multiple logistic regression analyzes, min media access, parental occupation, and vaccine hesitancy were found to be statistically significant associations with attitudes towards HPV vaccination at a 0.05 significance level. For students who access the media at school, the odd attitude toward HPV vaccination was 2.04 times (95% CI 1.26, 3.31) those who did not have access to the media at school.

For parents whose occupation was nongovernmental, the odd attitude toward HPV vaccination was 1.74 times (95% CI 1.04, 2.93) higher who work in governmental institutions. Students who had a vaccine hesitancy had an odd attitude toward HPV vaccination 0.3 lower (95% CI 0.19, 0.48) compared to those who had no vaccine hesitancy. (Table 4).

**Table 4.** Factor associated with the attitude towards HPV vaccination uptake among female students in early adolescence, Harar, Ethiopia, 2024.

Variable	Categories	Attitude		COR (95% CI)	AOR (95% CI)	P-value
		Unfavorable	Favorable			
Min media access	No	55	77	1	1	0.00
	Yes	84	201	1.71 (1.11, 2.63)	2.04 (1.26, 3.31)**	
Mobile phone access	No	59	114	1	1	0.72
	Yes	80	164	1.06 (0.7, 1.6)	1.09 (0.69, 1.71)	
Living with	Relative	20	32	1	1	0.59
	Parents	119	246	1.29 (0.71, 2.35)	1.19 (0.69, 2.28)	
Mother education	No	61	119	1	1	0.51
	Yes	78	159	1.04 (0.69, 1.58)	1.18 (0.73, 1.89)	
Father education	No	33	81	1	1	0.54
	Yes	106	197	0.76 (0.47, 1.21)	0.85 (0.5, 1.44)	
Parent occupation	Governmental	39	53	1	1	0.04

Variable	Categories	Attitude		COR (95% CI)	AOR (95% CI)	P-value
		Unfavorable	Favorable			
Parent monthly income	Non-governmental	100	225	1.66 (1.03, 2.66)	1.74 (1.04, 2.93)**	0.32
	<7000	55	133	1	1	
	>7000	84	145	0.71 (0.47, 1.08)	0.8 (0.51, 1.25)	
Vaccine Hesitancy	No	47	172	1	1	0.00
	Yes	92	106	0.31 (0.21, 0.48)	0.3 (0.19, 0.48)**	
Hesitancy confidence	No	87	174	1	1	0.48
	Yes	52	104	1.01 (0.66, 1.52)	0.83 (0.49, 1.4)	
Hesitancy rumour	No	77	124	1	1	0.06
	Yes	62	154	1.54 (1.02, 2.32)	1.63 (0.99, 2.69)	
Hesitancy barrier	No	63	132	1	1	0.67
	Yes	76	146	0.92 (0.61, 1.38)	1.11 (0.69, 1.8)	
Hesitancy complacence	No	60	126	1	1	0.66
	Yes	79	152	0.92 (0.61, 1.38)	0.89 (0.54, 1.47)	
Hesitancy calculation	No	49	117	1	1	0.28
	Yes	90	161	0.48 (0.18, 1.31)	0.53 (0.17, 1.66)	
Willingness	No	76	130	1	1	0.27
	Yes	63	148	1.37 (0.91, 2.07)	1.3 (0.82, 2.06)	

### 3.7. Factor Associated with Willingness Toward HPV Vaccination Uptake

Students who live with their parents have the odds of willingness to accept HPV vaccination 2.06 times (95% CI 1.07, 3.95) higher than a student who lives with their relatives. The father of a student who had an education, the odds of willingness toward HPV vaccination were 1.63 times (95% CI 1.01, 2.66) higher compared to those who had no education.

Students who had a vaccine hesitancy had an odd willingness to receive HPV vaccination 0.63 lower (95% CI 0.41, 0.98) compared to those who had no vaccine hesitancy. Students who had hesitancy and complacency had the odds of willingness towards HPV vaccination 1.7 times (95% CI 1.07, 2.69) higher than those who did not have hesitancy and complacency. Females who had hesitancy collectively had a slight willingness to HPV vaccination 1.86 times (95% CI 1.18, 2.93) higher than those who had no hesitancy collectively. (Table 5).

**Table 5.** Factor associated with willingness to uptake HPV vaccination among early adolescence female students, Harar, Ethiopia, 2024.

Variable	Categories	Attitude		COR (95% CI)	AOR (95% CI)	P-value
		Unfavorable	Favorable			
Living with	Relative	32	20	1	1	0.03
	Parents	174	191	1.76 (0.97, 3.19)	2.06 (1.07, 3.95)**	
Mother education	No	100	80	1	1	0.11
	Yes	106	131	1.54 (1.05, 2.28)	1.42 (0.92, 2.18)	
Father education	No	65	49	1	1	0.05



Variable	Categories	Attitude		COR (95% CI)	AOR (95% CI)	P-value
		Unfavorable	Favorable			
Parent monthly income	Yes	141	162	1.52 (0.99, 2.35)	1.63 (1.01, 2.66)**	0.24
	<7000	86	102	1	1	
	>7000	120	109	0.77 (0.52, 1.13)	0.78 (0.51, 1.18)	
Vaccine Hesitancy	No	96	123	1	1	0.04
	Yes	110	88	0.62 (0.42, 0.92)	0.63 (0.41, 0.98)**	
Hesitancy confidence	No	117	144	1	1	0.74
	Yes	89	67	0.61 (0.41, 0.91)	1.09 (0.67, 1.78)	
Hesitancy rumour	No	84	117	1	1	0.09
	Yes	122	94	0.55 (0.38, 0.82)	0.67 (0.67, 1.07)	
Hesitancy barrier	No	107	88	1	1	0.73
	Yes	99	123	1.51 (1.03, 2.22)	1.08 (0.69, 1.7)	
Hesitancy compliance	No	114	72	1	1	0.02
	Yes	92	139	2.39 (1.61, 3.55)	1.7 (1.07, 2.69)**	
Hesitancy calculation	No	19	6	1	1	0.07
	Yes	187	205	3.47 (1.36, 8.88)	2.57 (0.93, 7.12)	
Hesitancy collective	No	102	64	1	1	0.01
	Yes	104	147	2.25 (1.51, 3.36)	1.86 (1.18, 2.93)**	
Attitude	No	76	63	1	1	0.13
	Yes	130	148	1.37 (0.91, 2.07)	1.42 (0.9, 2.23)	

## 4. Discussion

HPV vaccination can prevent genital warts in addition to protecting against some malignancies caused by human papillomavirus (HPV) infection, so the aim of this study was the willingness and attitude toward HPV vaccination among students in the first adolescent years, in Harar, Ethiopia.

This study revealed that the overall favorable attitude towards HPV vaccination was 66.67% (95% CI: 61.9%, 71.2%). This finding was higher than the study conducted in Dire Dawa (40.3%) [5], in Nekemte town, Oromia region of Ethiopia (53.9%) [18], in Bahir Dar City, Amhara Region, Ethiopia (58%) [19]. This could be due to variations in the definition of attitude toward HPV vaccination, cultural and religious differences, access to health information, and measurement instruments used to measure attitude toward HPV vaccination. This finding was lower than the study conducted in Greece (91.0%) [20], in Debre Markos town, North West Ethiopia (77.4%) [21]. This could be due to variations in access to health information, the encouragement of girls to participate in school seminars and health-related

school clubs, and the sociocultural influence on the gender of women.

The current study showed that the general willingness to take HPV vaccination was 50.6% (95% CI 45.7%, 55.5%). The finding of this study was consistent with the study conducted in the United States (52%) [22] and China (54%) [23]. The finding of this study was lower than the study conducted in Dire Dawa (56%) [5], in Jimma town (68.9%) [24], in Morocco (67%) [25], in China (67.3%) [26], in Italy (81.7%) [27], in India (92.5%) [1], in Fujian province, China (80%) [28], in Texas, USA (77%) [1], and in Mali (80%) [29]. This discrepancy may be due to the study participants in a study conducted in China and India being medical staff and students, respectively. Healthcare providers have better awareness of health.

This finding suggested that students who live with their parents have the odds of willingness to receive HPV vaccination 2.06 times higher; this evidence is supported by the study conducted in China [30]. Student fathers who had an education the odds of willingness toward HPV vaccination were 1.63 times higher. This result was in line with a systematic review conducted in Ethiopia. There was a 2.80-fold increase in parents' willingness to vaccinate their daughters

when they were educated about the HPV vaccination [31] also study conducted in Logos Nigeria [32]. This may be because literate parents are more likely to be ready to vaccinate their daughters against cervical cancer.

Students who had a vaccine hesitancy had an odd willingness toward HPV vaccination 0.63 lower, this result is consistent with research conducted in Hong Kong [33] and China [34]. For several reasons, people would rather not receive vaccines, but the two most common concerns are concerns about side effects and lack of confidence in the safety of vaccines [35]. Students who had hesitancy and complacency had the odds of willingness toward HPV vaccination 1.7 times this finding was in line with a study conducted in Jordanian [36, 37], explaining that It has been shown that emphasizing the safety of vaccinations and physician advice boosts HPV vaccine compliance.

The result of this study was revealed that for parents whose occupation was non-governmental the odd attitude toward HPV vaccination was 1.74 times higher than those who work in governmental institutions this study result supported by a study conducted in Debra Tabor Ethiopia [38].

This study revealed that when accessing the media at school, the odd attitude towards HPV vaccination was 2.04 times this evidence was supported by the study conducted in rural Bangladesh [39]. Students who have a greater familiarity with the print, social and mass media are more likely to have positive views about information about the HPV vaccine.

The result of this study showed that having a 0.3-times lower attitude toward HPV vaccination, this result was in line with a study conducted in Saudi [40].

## 5. Conclusion

The proportion of willingness and attitude toward HPV vaccination was moderate compared to another study. Females living with their parents, a student from an educated parent, who had vaccine hesitancy complacency collectively had higher odds of HPV vaccination willingness. Students with school media access and parents who work in nongovernmental institutions had higher odds of attitude towards HPV vaccination.

## 6. Recommendation

There is still a need for continued health education to improve the attitude toward HPV vaccination and willingness to accept HPV vaccination. Therefore, all concerned bodies have to work jointly to scale up the attitude and willingness to Human Papillomavirus vaccination.

## Abbreviations and Acronyms

AOR	Adjusted Odd Ratio
CI	Confidence Interval
COR	Crude Odd Ratio

HPV	Human Papillomavirus
LMICs	Low- Middle-Income Countries
WHO	World Health Organization

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## Author Contributions

**Samuel Demissie Darcho:** Conceptualization, Data curation, Formal Analysis, Methodology, Software, Writing – original draft, Writing – review & editing

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## Ethical Consideration and Informed Consent

Ethical approval and clearance were obtained from the Haramaya University School of Medicine and Health Sciences Research and Ethics Review Committee (Ref. No: IHRERC/286/2024) and was presented to Harar city schools for permission. In addition to that, informed, voluntary, written, and signed consent was obtained from each study participant after a brief explanation of the objective of the study, which ensures that participation was voluntary.

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## Data Availability Statement

The corresponding author will provide the data on reasonable request.

## Conflict of Interest

The authors declare no conflicts of interest.

## References

- [1] Biyazin T, Yetwale A, Fenta B. Willingness to accept vaccination with human papillomavirus in Jimma, Ethiopia. *Hum Vaccine Immunother*. 2022; 18(6): 2125701.

- [2] Sung H, Ferlay J, Siegel RL. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. 2021; 71(3): 209-49.
- [3] Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J, et al. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *The Lancet Global Health*. 2020; 8(2): e191-e203.
- [4] WHO. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020.
- [5] Kassie N, Sema A. Willingness to take the human papilloma-virus vaccine and its associated factors among school adoles-cent girls: A case of a school-based dose one human papillo-mavirus vaccine campaign in Dire Dawa, Ethiopia. 2024; 12: 20503121231225333.
- [6] Smith JS, Lindsay L, Hoots B, Keys J, Franceschi S, Winer R et al. Distribution of human papillomavirus type in invasive cervical cancer and high-grade cervical lesions: a meta-analysis update. *International journal of cancer*. 2007; 121(3): 621-32.
- [7] Durusoy R, Yamazhan M, Taşbakan MI, Ergin I, Aysin M, Pullukçu H, et al. Awareness of HPV vaccine and willingness of first-year students entering university in Western Turkey. *Asian Pacific journal of cancer prevention. APJCP*. 2010; 11(6): 1695-701.
- [8] Black E, Richmond R. Prevention of cervical cancer in sub-Saharan Africa: The Advantages and Challenges of HPV Vaccination. 2018; 6(3).
- [9] Nabirye J, Okwi LA, Nuwematsiko R, Kiwanuka G, Muneza F, Kanya C et al. Factors of the health system that influence the uptake of the human papilloma virus (HPV) vaccine among girls 9-15 years of age in the Mbale District, Uganda. *BMC Public Health*. 2020; 20(1): 171.
- [10] Abou El-Ola MJ, Rajab MA, Abdallah DI, Fawaz IA, Awad LS, Tamim HM et al. Low rate of human papillomavirus vaccination among schoolgirls in Lebanon: barriers to vaccination with a focus on mothers' knowledge about available vaccines. Therapeutics and clinical risk management. 2018; 14: 617-26.
- [11] Ethiopia: Political turmoil in the city-state of Harar. 2011.
- [12] Getaneh A, Tegene B, Belachew T. Knowledge, attitude and practices on cervical cancer screening among undergraduate female students in the University of Gondar, northwest Ethiopia: an institu-tion-based cross-sectional study. *BMC Public Health*. 2021; 21: 1-9.
- [13] Kassie N, Sema A, Amsalu B, Sintayehu Y, Abie A, Mengist B et al. Willingness to take the human papillomavirus vaccine and its associated factors among school adolescent girls: A case of a school-based dose one human papillomavirus vaccine campaign in Dire Dawa, Ethiopia. *SAGE open medicine*. 2024; 12: 20503121231225333.
- [14] Dera M, Wondimagegnehu A, Asfaw ZG. Determinants of hesitancy in the uptake of the human papillomavirus (HPV) vaccine among schoolgirls in Jimma Town, Ethiopia. A mixed approach: quantitative and qualitative. *Reproductive health*. 2023; 20(1): 175.
- [15] Rancher C, Moreland AD, Smith DW, Cornelison V, Schmidt MG, Boyle J, et al. Using the 5C model to understand the hes- itancy of the COVID-19 vaccine in a sample from the National and South Carolina. *Journal of Psychiatric Research*. 2023; 160: 180-6.
- [16] Beyen MW, Bulto GA. Human papillomavirus vaccination uptake and its associated factors among school girls of ado- lescent girls in Ambo town, Oromia region, Ethiopia, 2020. 2022; 17(7): e0271237.
- [17] Mihretie GN, Liyeh TM, Ayele AD. Knowledge and ac- ceptability of the human papillomavirus vaccine in Debre Tabor Town, Ethiopia: a cross-sectional study. 2023; 13(3): e061813.
- [18] M Abera AK, Ayalew TL, Mengesha TL. Human papilloma- virus vaccination practice and its associated factors among secondary school female students in the town of Nekemte, Oromia region, Ethiopia, 2022. 2022.
- [19] Etenesh Adela Lakneh EAM, Melash Belachew Asresie, Habtamu Gebrehana Belay. Knowledge, attitude, and uptake of the human papilloma virus vaccine and associated factors among female preparatory school students in Bahir Dar City, Amhara Region, Ethiopia 2021.
- [20] P Naoum KA, D Zavras, J Kyriopoulos, E Pavi. Knowledge, perceptions, and attitudes towards HPV vaccination: A survey of parents of girls aged 11–18 years in Greece. 2022.
- [21] Sinshaw, M. M., Berhe, S. M., Ayele, S. G. Knowledge and attitude towards the human papillomavirus vaccine and Asso- ciated Factors Among Mothers Who Have Eligible Daughters in Debre Markos Town, northwest Ethiopia. *Infection and drug resistance*. 2022; 15: 781-93.
- [22] You D, Han L, Li L, Hu J, Zimet GD, Alias H, et al. Human Papillomavirus (HPV) Vaccine Uptake and the Willingness to Receive HPV Vaccination among Female College Students in China: A multicenter study. *Vaccines (Basel)*. 2020; 8(1).
- [23] Blumenthal J, Frey MK, Worley MJ, Jr., Tchabo NE, Soren K, Slomovitz BM. Adolescent Understanding and Acceptance of HPV Vaccination in an Underserved Population in New York City. *Journal of Oncology*. 2012; 2012: 904034.
- [24] T Biyazin AY, B Fenta. Willingness to accept human papil- lomavirus vaccination in Jimma town, Ethiopia. 2022.
- [25] A. Yacouti NE, A. El got, A. Benider, F. Hadrya, R. Baddou, A. Forster, M. Mouallif. Awareness, attitudes, and acceptabil- ity of the HPV vaccine among female university students in Morocco. 2020.
- [26] Xi Zhang ORCID Icon ZW, Zefang Ren, Zhifang Li ORCID Icon, Wei Ma, Xiaohong Gao. Acceptability and willing- ness-related factors of the HPV vaccine among Chinese ado- lescents: a national study. 2020.
- [27] Di Giuseppe G, Abbate R, Liguori G, Albano L, Angelillo IF. Human papillomavirus and vaccination: knowledge, attitudes, and behavior intention in adolescents and young women in It- aly. *British journal of cancer*. 2008; 99(2): 225-9.

- [28] Yu C, Chen L. Evaluation of knowledge and attitude towards HPV and vaccination among medical staff, medical students, and community members in Fujian Province. 2020; 13: 989-97.
- [29] De Groot, AS, Tounkara, K, Rochas, M, Beseme, S, Yekta, S, Diallo, FS et al. Knowledge, attitudes, practices and willingness to vaccinate in preparation for the introduction of HPV vaccines in Bamako, Mali. *PLoS One*. 2017; 12(2): e0171631.
- [30] Zhenwei Dai MS, Xiaoyou Su, Wenjun Wang, Xi Zhang, Xiaofen Gu, Li Ma, Jing Li, Shaokai Zhang, Zefang Ren, Youlin Qiao,. Willingness to vaccination with human papillomavirus (HPV) and factors influencing among male and female university students in China.
- [31] Zewdie A, Kasahun AW, Adane HA, Mose A. Willingness to vaccinate their daughters against human papillomavirus among parents of Ethiopian adolescents: a systematic review and meta-analysis. *Journal of Pharmaceutical Policy and Practice*. 2023; 16(1): 126.
- [32] Rabiou KA, Alausa TG, Akinlusi FM, Davies NO, Shittu KA, Akinola OI. Parental acceptance of human papillomavirus vaccination for adolescents in Lagos, Nigeria. *Journal of Family Medicine and Primary Care*. 2020; 9(6).
- [33] Wong CKH, Man KKC, Ip P, Kwan M, McGhee SM. Mothers' Preferences and Willingness to Pay for Human Papillomavirus Vaccination for Their Daughters: A discrete choice experiment in Hong Kong. *Value in health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*. 2018; 21(5): 622-9.
- [34] Lin Y, Su Z, Chen F, Zhao Q, Zimet GD, Alias H et al. Chinese mothers' intention to vaccinate daughters against human papillomavirus (HPV) and their vaccine preferences: a study in Fujian Province. *Human Vaccines & Immunotherapeutics*. 2021; 17(1): 304-15.
- [35] Geoghegan S, O'Callaghan KP, Offit PA. Vaccine Safety: Myths and misinformation. *Frontiers in microbiology*. 2020; 11: 372.
- [36] Sallam M, Al-Mahzoum K, Eid H, Assaf AM. Attitude towards HPV Vaccination and the Intention to Get Vaccinated among Female University Students in Health Schools in Jordan. 2021; 9(12).
- [37] Human papillomavirus vaccines: WHO position paper, October 2014-Recommendations. *Vaccine*. 2015; 33(36): 4383-4.
- [38] Mihretie GN, Liyeh TM, Ayele AD, Belay HG, Yimer TS, Miskr AD. Knowledge and willingness of parents towards the vaccination of child girl HPV in Debre Tabor, Ethiopia: a community-based cross-sectional study. *Reproductive health*. 2022; 19(1): 136.
- [39] Banik R, Naher S, Rahman M, Gozal D. Investigating Bangladeshi Rural Women's Awareness and Knowledge of Cervical Cancer and Attitude towards HPV Vaccination: A Community-Based Cross-Sectional Analysis. *Journal of Cancer Education*. 2022; 37(2): 449-60.
- [40] Alhusayn KO, Alkhenizan A, Abdulkarim A, Sultana H, Alsulaiman T, Alendijani Y. Attitude and hesitancy of human papillomavirus vaccine among Saudi parents. *Journal of family medicine and primary care*. 2022; 11(6): 2909-16.