AFRICAN JOURNAL OF HEALTH SCIENCES AND MEDICINE
AJHSM (2024)03:02
http://www.du.edu.et/duj

RESEARCH ARTICLE

Assessment of knowledge and attitude towards human papilloma virus vaccination and associated factors among high school female students in Gedeo Zone, Southern Ethiopia: Institution based cross-sectional study

Mebirat Ademassu[1*], Melkam Andargie[2], Wagaye Alemu[3], and Wondwosen Molla[4]

Received: 03 July 2024
Accepted: 07 October 2024
Published: 14 December 2024

DOI:10.20372/ajhsm.v03i02.02

Suggested Citation: Ademassu M., Andargie M., Alemu W., and Molla W. Assessment of knowledge and attitude towards human papilloma virus vaccination and associated factors among high school female students in Gedeo Zone, Southern Ethiopia: Institution based cross-sectional study. Afri. J. Heal. Sci. Med; 2024, 03(02).

Abstract

Introduction: Cervical cancer ranks as the fourth most common cancer among women globally and is primarily caused by the human papillomavirus (HPV). HPV is the most prevalent virus affecting the reproductive system. The peak period for infection occurs shortly after the onset of sexual activity for both men and women. Although penetrative intercourse is not necessary for HPV transmission, it is classified as a sexually transmitted infection. Genital contact between skin cells is a well-known mechanism for transmission.

Methodology: A quantitative cross-sectional study was conducted at an institution. Data were collected through a self-administered questionnaire. After verifying the consistency and completeness of the responses, the data were imported into Epi Data version 4.6.0.2 and then exported to SPSS Windows version 25. Descriptive statistics were used to calculate the frequency of dependent and independent variables. The original logistic model included all explanatory variables with a p-value of less than 0.25 in bivariate logistic regression analysis. In multivariate logistic regression, a p-value of less than 0.05 with a 95% confidence interval was considered significant. The statistical association between knowledge and attitudes regarding the HPV vaccine, along with both crude and adjusted odds ratios, were determined.

Results: A total of 350 respondents participated in the study, yielding a response rate of 92%. The findings indicated that 204 (58.3%) of the female high school students had good knowledge about HPV vaccination. In multivariate analyses, students whose fathers could read and write were approximately 3.45 times more likely to have good knowledge about HPV vaccination compared to those whose fathers could not read and write (AOR = 3.45, 95% CI: (1.26-9.47)). Regarding attitudes, 184 (52.6%) exhibited a favorable attitude toward HPV vaccination. Students who received health education on HPV vaccination were about 2.08 times more likely to have a positive attitude compared to those who did not receive such education (AOR = 2.08, 95% CI: (1.06-3.45)).

Conclusion: The study reveals a relatively high level of knowledge and an average level of attitude toward HPV vaccination among respondents. There remain opportunities for further education, advocacy, and support to enhance both knowledge and attitudes.

Keywords: Attitude, Gedeo Zone, Knowledge, Human papilloma virus, Vaccine

*Correspondence: mebirat2009@gmail.com
[1] Department of Midwifery, College of Medicine and Health Sciences, Dilla University, Dilla, Ethiopia.

1 Introduction

Globally, cervical cancer ranks as the fourth most common cancer among women and is caused by the human papillomavirus (HPV) [1]. In 2020, there were approximately 604,127 new cases and 341,831 deaths worldwide due to cervical cancer [2]. HPV strains 16 and 18 are associated with more than 99% of cervical cancer cases linked to genital infections [3]. HPV is the most prevalent virus affecting the reproductive system. The peak time for infection occurs shortly after the onset of sexual activity for both men and women. While penetrative sexual contact is not necessary for HPV transmission, it is classified as a sexually transmitted infection. Genital contact between skin cells is a well-known mechanism of transmission [4].

In low-income countries, cervical cancer is the primary cause of cancer-related illness and mortality. Women with HIV/AIDS are particularly vulnerable to cervical cancer due to an inadequate immune system. HPV is the main cause of nearly all cervical malignancies, with approximately one in twenty cervical cancers worldwide linked to HIV [5].

Providing the HPV vaccine to eligible individuals is crucial for prevention and reducing the burden of cervical cancer. HPV vaccines targeting high-risk HPV types (16 and 18) have shown the potential to prevent approximately 90% of invasive cervical cancers in women [6].

In Kenya and many sub-Saharan African nations, HPV infection is a leading cause of cervical cancer. High coverage of HPV vaccination is a priority for the World Health Organization to eliminate cervical cancer globally. However, the availability of vaccines and logistical challenges hinder the widespread implementation of the current two- or three-dose HPV vaccination schedule [7]. Study conducted in Hadiya , Southern Ethiopia shows that having parents of daughters of the male sex, having only one daughter, having daughter(s) who attended a government school, having poor knowledge, and having a negative attitude were shows significant relation with acceptance of the human papillomavirus vaccine [8].

Negative thoughts, attitudes, and a lack of understanding about HPV vaccination can reduce vaccine coverage. Therefore, this study aimed to address this gap by providing information on the level of awareness and attitudes toward HPV vaccination, as well as the associated factors among female high school students in the study area.

2 Materials and methods

2.1 Study setting and design

A school-based cross-sectional study was conducted among female students in selected high schools in the Gedeo zone from April 2023 to June 2023. This zone is named after the Gedeo people, whose homelands are located within it. Dilla serves as the administrative center, situated 362 km south of Addis Ababa (the capital city of Ethiopia), with the main road from Addis Ababa to Nairobi, Kenya, passing through the town. Dilla is also 100 km from Hawassa, the capital city of the Sidama region [9]. The Gedeo zone is part of the southern regional state and encompasses 10 districts (four towns and eight woredas) and 148 kebeles. According to the 2007 Census conducted by the Ethiopian Central Statistical Agency, the total population of the zone is 847,434, consisting of 424,742 men and 422,692 women, including 239,053 women of reproductive age (15–49).

2.2 Source populations

All selected female students in selected high schools for academic year of 2022/23 during the study period were the participants of the study.

2.3 Study populations

Female students who were available at the day of data collection at selected high schools were included in the study.

2.4 Inclusion criteria

Female students who were present on the day of data collection at the selected high schools were included in the study.

2.5 Exclusion criteria

Female students who were seriously ill and unable to give consent were not included.

2.6 Sample size determination

Using data from a study conducted in Jimma, Ethiopia, the sample size was calculated with the statistical program Open Epi version 3, based on the following assumptions: an α level of significance of 0.05 and a prevalence of knowledge of 52.7% [10]. After accounting for a 10% nonresponse rate, the total sample size was determined to be 363.

2.7 Sampling technique

Study participants were selected using a systematic random sampling technique. First, six schools were randomly chosen from a total of 26 high schools, including one private school. The total sample size was then distributed to the selected schools proportional to their population sizes. Next, the systematic random sampling technique was applied to select individual participants in each high school using intervals (K). The interval (K) was calculated for each school by dividing the total number of eligible students. The first participant was chosen using the lottery method, selecting a number between 1 and K. Finally, the value of K was added sequentially until the proposed sample size was reached.

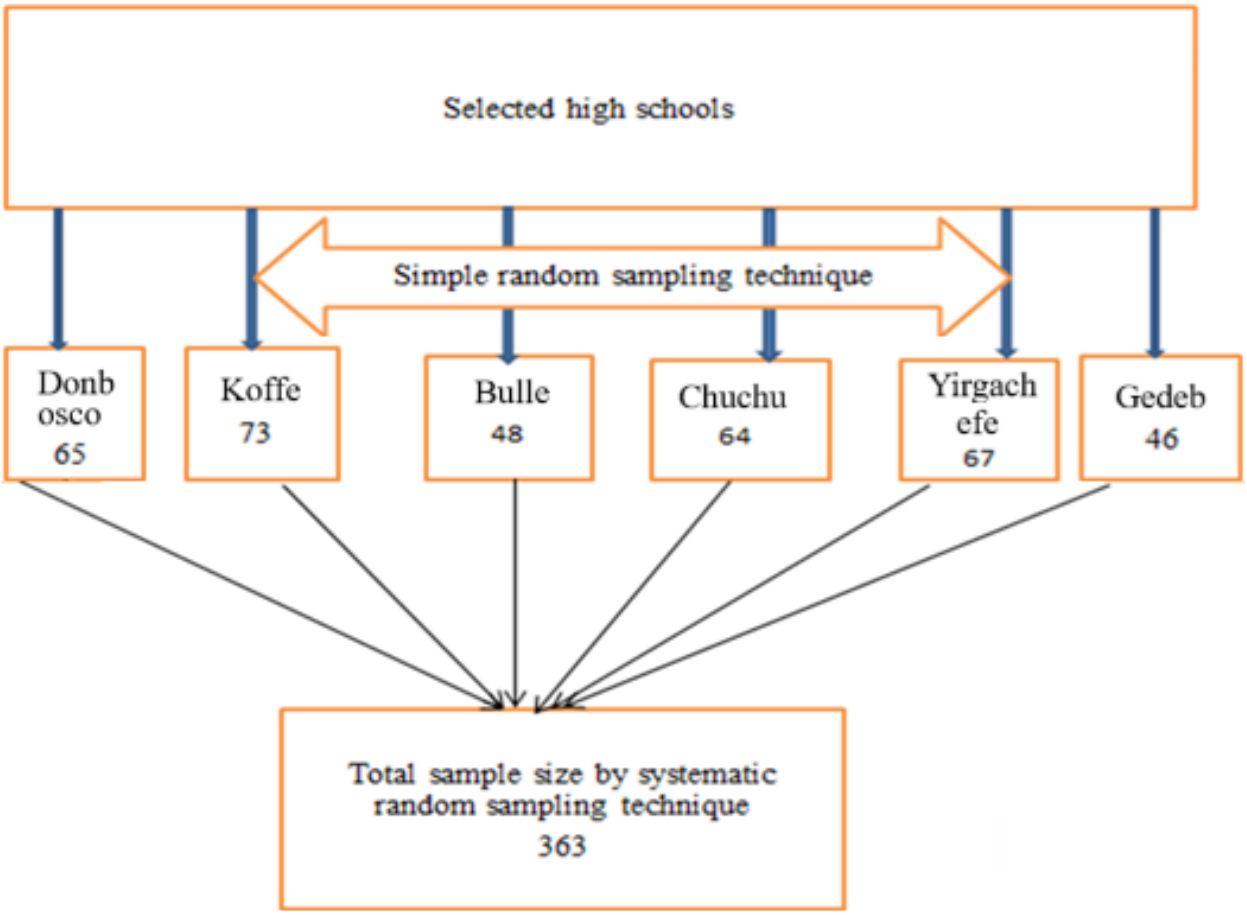

Figure 1 Schematic presentation of sampling procedure towards knowledge and attitude towards human papilloma virus vaccination and associated factors among high school students in Gedeo zone, southern Ethiopia, 2023

2.8 Data collection tools and procedures

A structured questionnaire was used to collect data, which included socio-demographic variables and information-related factors. The questionnaire was adapted through a review of various literature and similar previous studies [9, 11-13]. It was initially prepared in English and then translated into Amharic and Gedeofa by an expert fluent in both languages. To ensure consistency and accuracy, it was back-translated into English by another expert.

Data collection took place at Donbosco, Koffe, Bule, Yirgachefe, Gedeb, and Chuchu high schools. An interviewer-administered questionnaire was utilized for data collection. The data were collected by 12 graduated BSc midwives, with six supervisors appointed to continuously monitor the data collection alongside the principal investigator. Training was provided to both data collectors and supervisors on the research objectives, data collection tools and techniques, and the interview methods employed during the data collection process.

2.9 Variables

2.10 Dependent variable

Knowledge and attitude towards human papilloma virus vaccination

2.11 Independent variables

- **Sociodemographic variables:** age, religion, residence, family income, grade level, type of school, *etc.*;
- **Information related factors:** Presence of TV or Radio, having mobile phone, participation in minimedia club, knowing about HPV vaccine, source of information;
- **Social interaction:** relation with friends, substance addiction, family marital status.

2.12 Operational definition

Knowledge: A woman was considered to have good knowledge about the human papillomavirus vaccination if she answered 'yes' to knowledge questions above the mean score. Otherwise, she was classified as having poor knowledge [13].

Attitude: A woman was deemed to have a favorable attitude toward the human papillomavirus vaccination if she responded 'yes' to attitude questions above the mean score. Otherwise, she was classified as having an unfavorable attitude [13].

Substance Use: Substance use refers to the continued use of any of the following substances (alcohol, tobacco, heroin, marijuana, *etc.*) despite negative health consequences [9].

2.13 Data Processing and Analysis

The pre-coded responses were entered into Epi Info version 3.1 software and then exported to SPSS for Windows version 25 for statistical analysis. Descriptive data were presented using frequencies, tables, figures, means, and standard deviations. A binary logistic regression was employed to identify the associations between independent and dependent variables. Variables with a p-value of less than 0.25 were included in the final model to control confounders. In the final model, variables with a p-value of less than 0.05 and a 95% confidence interval were considered statistically significant based on multivariate logistic regression.

3 Results

3.1 Socio-demographic characteristics

A total of 350 respondents participated in this study, resulting in a response rate of 92%. The mean age of the respondents was 17.19 years, with a standard deviation of 1.93. Among the participants, 179 (51.1%) identified as Protestant, followed by 99 (28.3%) who were Orthodox. Regarding the participants' place of residence, 181 (51.7%) lived in urban areas (Table 1).

Table 1 Socio Demographic characteristics of participants for assessment of knowledge and attitude towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

Variables		Frequency (n)	Percentage (%)
Age	14-15	22	6.3
	16-18	260	74.3
	>18	68	19.4
Religion	Orthodox	99	28.3
	Muslim	54	15.4
	Protestant	179	51.1
	Catholic	18	5.2
Mother's educational level	Unable to read and write	81	23.2
	Able to read and write	106	30.3
	Primary(1-8)	61	17.4
	Secondary(9-12)	53	15.1
	Higher education	49	14.0
Father's educational level	Unable to read and write	74	21.1
	Able to read and write	61	17.4
	Primary (1-8)	51	14.6
	Secondary (9-12)	36	10.3
	College and above	128	36.6
Mother's occupation	Government employee	56	16
	Nongovernment employee	28	8
	Farmer	101	28.9
	Merchant	102	29.1
	Daily laborer	26	7.4
	House wife	37	10.6
Father's occupation	Government employee	134	38.3
	Nongovernment employee	10	2.9
	Farmer	112	32
	Merchant	75	21.4
	Daily laborer	12	3.4
	Have no work	7	2
Marital status of student	Single	325	92.9
	Married	25	7.1
Residence	Rural	104	29.71
	Urban	246	70.29

3.2 Information-related factors

Out of the 350 participants in our study, 196 (or 56%) were getting health education regarding the human papilloma virus vaccination (Table 2).

Table 2 Information related factors of participants for assessment of knowledge and attitude towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

Variable		Frequency (n)	Percentage (%)
Have you Tv or radio	Yes	182	52
	No	168	48
Have you mobile phone	Yes	303	86.6
	No	47	13.4
Do you use social media	Yes	194	55.4
	No	156	44.6
Do you have information on HPV vaccine?	Yes	233	66.6
	No	117	33.4
Do you get health education on HPV vaccine?	Yes	196	56
	No	154	44
Do you participate in your school minemedia club?	Yes	180	51.4
	No	170	48.6

3.3 Social life

In this study Out of the 350 participants 81.4 % of students had good relationship with their friends (Table 3).

Table 3 Social life characteristics towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

Variable		Frequency(n)	Percentage(%)
Do you have good relation with your friends	Yes	285	81.4
	No	65	18.6
Do you have used substance	Yes	27	7.7
	No	323	92.3
Family's substance use status	Yes	34	9.7
	No	316	90.3

3.4 Knowledge characteristics

Approximately 68.9% (241) of the participants had heard about the human papillomavirus vaccination. Among the sampled population, 204 (58.3%) demonstrated good knowledge of the human papillomavirus vaccination based on nine knowledge-assessing questions (Table 4).

Table 4 Knowledge characteristics towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

	Variables	Category	Frequency	Percentage
1.	Did you hear about HPV vaccine?	Yes	241	68.9
		No	109	31.1
2.	Why HPV vaccine given?	Prevent cervical cancer	286	78.8
		Other	77	21.2
3.	Did you know about use of HPV vaccine?	Yes	193	55.1
		No	157	44.9
4.	Who should get HPV vaccine?	Female	305	87.1
		Male	45	12.9
5.	Did you know at what age should HPV vaccine started?	Yes	165	47.1
		No	185	52.9
6.	Did you know how many times HPV vaccine given?	Yes	170	48.6
		No	180	51.4
7.	Did you know HPV vaccine given in Ethiopia?	Yes	193	55.1
		No	157	44.9
8.	Did you know HPV vaccine given freely for female students	Yes	205	58.6
		No	145	41.4
9.	Did you know HPV vaccine given better for not started sex?	Yes	221	63.1
		No	129	36.9
	The composite score of knowledge on HPV vaccine	Good knowledge	204	58.3
		Poor knowledge	146	41.7

3.5 Attitude characteristics

Among the sampled population, considering seven attitude-assessing questions, 184 (52.6%) had a favorable attitude toward the human papillomavirus vaccination among female high school students. Many students, 232 (66.3%), believed that the HPV vaccine reduces the risk of cervical cancer (Table 5).

Table 5 Attitude characteristics towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

	Variables	Category	Frequency	Percentage
1.	Do you think the vaccination is given to minimize cervical cancer?	No	118	33.7
		Yes	232	66.3
2.	Do you think vaccination helps to prevent HPV infection?	No	174	49.7
		Yes	176	50.3
3.	Do you think HPV vaccine saves life and improve health?	No	160	45.7
		Yes	190	54.3
4.	Do think you recommend the vaccine to others or not?	No	185	52.9
		Yes	165	47.1
5.	Do you think having the HPV Vaccine may become sexually Promiscuous?	No	263	75.1
		Yes	87	24.9
6.	Do you think your family should decide whether you take the vaccine or not	No	192	54.9
		Yes	158	45.1
7.	Do think you take HPV vaccine if it will be started given in your school	No	123	35.1
		Yes	227	64.9
	The composite score of attitude on HPV vaccine	Unfavorable	166	47.4
		Favorable	184	52.6

3.6 Factors associated with knowledge

Both bivariate and multivariate logistic regression analyses were conducted to examine the effects of selected characteristics on knowledge levels regarding the human papillomavirus vaccination among female high school students. Factors such as the students' age, mothers' educational level, fathers' educational level, and social media usage were found to be associated with knowledge levels in the bivariate analyses, with p-values less than 0.25.

In the multivariate analyses, factors including students' residence, fathers' education, having information about the HPV vaccine, receiving health education on the HPV vaccine, and students' substance addiction status were significantly associated with knowledge of the HPV vaccination. Students whose fathers could read and write were approximately 3.45 times more likely to have good knowledge about the human papillomavirus vaccination compared to those whose fathers were unable to read and write (AOR = 3.45, 95% CI: (1.26-9.47)) (Table 6).

Table 6 Bivariate and multivariate analysis of knowledge towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

Variable		Frequency		COR(95%CI)	AOR(95%CI)
		Good kge	Poor kge		
Age(in years)	14-15	13	9	1^{st}	1^{st}
	16-18	168	92	0.79(0.33-1.92)	0.61(0.18-2.03)
	>18	23	45	2.83(1.05-7.59)	0.39(0.1-1.57)
Place residence	Urban	170	76	1^{st}	1^{st}
	Rural	34	70	4.61(2.82-7.52) *	3.59(1.67-7.74) **
Grade level	9^{th}	98	51	1^{st}	1^{st}
	10^{th}	106	95	1.72(1.11-2.67)	1.56(0.81-3.01)
Mother's educational level	Unable to read and write	38	43	1^{st}	1^{st}
	Able to read and write	50	56	1(0.55-1.77)	1.14(0.51-2.58)
	Primary school (1-8)	34	27	0.7(0.36-1.37)	1.85(0.71-4.85)
	Secondary school (9-12)	42	11	0.23(0.11-0.51)	0.52(0.18,-.47)
	College and above	40	9	0.2(0.09-0.46)	0.49(0.16-1.51)
Father's educational level	Unable to read and write	35	39	1^{st}	1^{st}
	Able to read and write	29	32	0.99(0.5-1.95) *	3.45(1.26-9.47) **
	Primary school (1-8)	21	30	1.28(0.62-2.64)	1.6(0.61-4.25)
	Secondary school (9-12)	20	16	0.72(0.32-1.6)	2.5(0.79-7.93)
	College and above	99	29	0.26(0.14-0.49)	0.92(0.35-2.44)
Students boyfriend status	Yes	122	71	1^{st}	1^{st}
	No	82	75	1.57(1.02-2.4)	1(0.54-1.87)
Do you have TV or radio?	Yes	117	65	1^{st}	1^{st}
	No	87	81	1.68(1.09-2.57)	0.97(0.54-1.75)
Do you have mobile phone?	Yes	184	119	1^{st}	1^{st}
	No	20	27	2.09(1.12-3.89)	0.96(0.39-2.36)
Have you used social media?	Yes	124	70	1^{st}	1^{st}
	No	80	76	1.68(1.1-2.59)	1.38(0.74-2.58)
Have you participate in school minemedia club?	Yes	112	68	1^{st}	1^{st}
	No	92	78	1.4(0.9-2.14)	1.11(0.61-2.02)
	Yes	165	68	1^{st}	1^{st}
Have you information on HPV vaccine?	No	39	78	4.85(3.02-7.54)***	3.78(2.08-6.85) ***
Do you have good relation with friends?	Yes	179	106	1^{st}	1^{st}
	No	25	40	2.7(1.55-4.7)	1.75(0.84-3.65)
Did you receive health education on HPV vaccine?	Yes	144	50	1^{st}	1^{st}
	No	58	96	4.77(3.02-7.54)*	4.43(2.4-8.2) ***
Substance use status of student	Yes	10	17	1^{st}	1^{st}
	No	194	129	0.39(0.17-0.88)*	1.32(1.45-12.5) **

1^{st} = Reference category, *= PV<0.25, **=PV<0.05, ***= PV<0.0001,
COR= Cruds Odds Ratio, AOR=Adjusted Odds Ratio, CI=confidence interval

3.7 Factors associated with attitude

Both bivariate and multivariate logistic regression analyses were conducted to examine the relationship between selected characteristics and attitude levels toward the human papillomavirus vaccination among female high school students. Factors such as age, students' grade level, place of residence, mothers' occupation, and receiving health education on the HPV vaccine were found to be associated with attitudes in the bivariate analyses, with p-values less than 0.25.

Table 7 Bivariate and multivariate analysis of attitude towards human papilloma virus vaccination among female high school students in Gedeo Zone, 2023

Variable		Frequency		COR(95%CI)	AOR(95%CI)
		Unfavorable attitude	Favorable attitude		
Age (in years)	14-15	9	13	1^{st}	1^{st}
	16-18	114	146	0.89(0.37-2.15)	0.81(0.27-2.41)
	>18	43	25	0.4(0.15-1.08)	0.94(0.26-3.41)
Students grade level	9^{th}	64	85	1^{st}	1^{st}
	10^{th}	102	99	0.73(0.48-1.12)	1(0.56-1.76)
School type	Private	24	41	1^{st}	1^{st}
	Government	142	143	0.59(0.34-1.03)	0.89(0.42-1.88)
Place of residence	Urban	110	136	1^{st}	1^{st}
	Rural	56	48	0.69(0.44-1.1)	1.16(0.58-2.33)
Mother's educational level	Unable to read and write	42	39	1^{st}	1^{st}
	Able to read and write	60	46	0.83(0.46-1.48)	0.78(0.37-1.65)
	Primary school (1-8)	27	34	1.36(0.7-2.64)	0.83(0.34-2.04)
	Secondary school (9-12)	13	40	3.31(1.55-7.1)	1.91(0.71-5.1)
	College and above	24	25	1.12(0.55-2.78)	0.35(0.1-1.24)
Mother's occupation	Government employee	20	36	1^{st}	1^{st}
	Nongovernment employee	16	12	0.42(0.17-1.05) *	1.18(1.54-25) **
	Farmer	61	40	0.36(0.19-0.72) *	1.3(1.12-14.29) **
	Merchant	46	56	0.68(0.35-1.32)	0.46(0.13-1.59)
	Daily laborer	8	18	1.25(0.46-3.39)	0.47(0.11-2.0)
	Housewife	15	22	0.82(0.35-1.91)	0.38(0.1-1.48)
Father's educational level	Unable to read and write	40	34	1^{st}	1^{st}
	Able to read and write	39	22	0.66(0.33-1.33)	0.7(0.28-1.74)
	Primary school (1-8)	28	23	0.97(0.47-1.98)	1.11(0.45-2.71)
	Secondary school (9-12)	10	26	3.06(1.29-7.23)	2.49(0.78-7.94)
	College and above	49	79	1.9(1.06-3.39)	1.41(0.61-3.27)
From whom you live now?	Single	34	23	1^{st}	1^{st}
	Family	126	152	1.78(1.0-3.18)	0.95(0.46-1.95)
	Friends	6	9	2.22(0.70-7.08)	2.25(0.57-8.86)
Did you receive health education about hpv?	Yes	80	85	1^{st}	1^{st}
	No	114	69	0.57(0.37-0.87) *	2.08(1.06-3.45) **
Students boyfriend status	Yes	103	90	1^{st}	1^{st}
	No	63	94	1.71(1.12-2.62) *	2.55(1.43-4.56) **
Do you have mobile phone	Yes	137	166	1^{st}	1^{st}
	No	29	18	0.51(0.27-0.96)	0.7(0.31-1.6)
Do you use social media	Yes	78	116	1^{st}	1^{st}
	No	88	68	0.52(0.34-0.80)	0.67(0.38-1.17)
Do you participate in school minimedia club	Yes	79	101	1^{st}	1^{st}
	No	87	83	0.75(0.49-1.14)	0.88(0.51-1.51)
Do you have good relation with friends	Yes	123	162	1^{st}	1^{st}
	No	43	22	0.39(0.22-0.68) *	1.79(1.12-4.55) **
Substance use of student	Yes	17	10	1^{st}	1^{st}
	No	149	174	1.99(0.88-4.47)	1.67(0.61-4.54)

1^{st} = Reference category, *= PV<0.25, **=PV<0.05, ***= PV<0.0001,

COR= Cruds Odds Ratio, AOR=Adjusted Odds Ratio, CI=confidence interval

In the multivariate analyses, mothers' occupation, students' boyfriend status, receiving health education on the HPV vaccine, and students' relationships with friends were significantly associated with attitudes toward the HPV vaccination. The study revealed that students who received health education on the human papillomavirus vaccination were approximately 2.08 times more likely to have a positive attitude compared to those who did not receive health education (AOR = 2.08, 95% CI: (1.06-3.45)) (Table 7).

4 Discussions

A cross-sectional study was conducted in institutions to assess the knowledge and attitudes of female high school students in the Gedeo zone regarding human papillomavirus vaccination and related issues. The study found significant associations between several factors and knowledge levels about the human papillomavirus vaccination among female high school students, including students' place of residence, fathers' education, having information about the HPV vaccine, receiving health education on the HPV vaccine, and students' substance use status. Additionally, mothers' occupation, students' boyfriend status, receiving health education on the HPV vaccine, and students' relationships with friends were significantly associated with attitudes toward the human papillomavirus vaccination among female high school students.

This study found that 58.3% of participants had good knowledge of the human papillomavirus vaccination among female high school students (95% CI: (36-48)). This result is consistent with a study conducted in southwest Ethiopia, which reported a knowledge level of 43.8% [14]. However, it is higher than findings from studies in Ambo, Ethiopia (24.6%) [15], and Nigeria (21.1%) [16]. These differences may be attributed to variations in study areas or geographical accessibility to information about the HPV vaccine.

Conversely, the finding is lower than studies conducted in Bahirdar (58.1%) (9), Jimma (52.7%) (10), and Arbaminch (71.7%) [17], as well as in Thailand (60%) [18], Romania (85.8%) [19], and Italy (69.9%) (20). The variation in results may stem from differences in study settings, populations, time frames, and the availability and distribution of the HPV vaccine in various countries.

From the current study, 52.6% of female participants had a positive attitude regarding the human papillomavirus vaccination (95% CI: (47-59)). This result is consistent with studies conducted in Ambo town (55.6%) [15] and Minjar Shenkora, Ethiopia (50.8%) [21]. It is higher than findings from studies in Bahirdar (16%) [9] southwest Ethiopia (44.4%) [14], Jimma (31.4%) [10], and Iran (43%) [22]. However, it is lower than results from studies in Nigeria (61.8%) [23] and Italy (20%) [24]. These variations may be attributed to differences in socio-demographic factors, educational levels, and limited coverage of targeted educational initiatives, as well as low access to information in low-income countries.

The current study indicated that students living in urban areas were 3.59 times more likely to have good knowledge about the human papillomavirus vaccination compared to those living in rural areas (AOR: 3.59, 95% CI: (1.67-7.74)). This is likely due to urban students having relatively easier access to information through social and mass media. Participants whose fathers could read and write were 3.45 times more likely to have good knowledge about the human papillomavirus vaccination than those whose fathers were unable to read and write (AOR: 3.45, 95% CI: (1.29-9.47)). This finding is supported by a study conducted in Malaysia (25), suggesting that parents who are literate are more likely to learn about the HPV vaccine through various media.

Having information about the human papillomavirus vaccination increased the likelihood of possessing good knowledge about the vaccine by 3.78 times compared to those without such information (AOR: 3.78, 95% CI: (2.08-6.85)). This result aligns with a study conducted in Debretabor, Ethiopia [26]. This may be explained by students having better access to information from health extension personnel. Students who

received health education about the human papillomavirus vaccination were 4.43 times more likely to have good knowledge about it than those who did not (AOR: 4.43, 95% CI: (2.4-8.2)). Additionally, participants who were not substance addicted were 1.32 times more likely to have good knowledge about the human papillomavirus vaccination compared to those who were addicted (AOR: 1.32, 95% CI: (1.45-12.5)).

The current study shows that students whose mothers are government employees are 1.18 times more likely to have a favorable attitude toward the human papillomavirus vaccination compared to those whose mothers are non-government employees (AOR: 1.18, 95% CI: (1.54-25)), and 1.3 times more likely compared to those whose mothers are farmers (AOR: 1.3, 95% CI: (1.12-14.29)).

Participants who received health education about the human papillomavirus vaccination were two times more likely to have a favorable attitude than those who did not receive health education (AOR: 2.08, 95% CI: (1.06-3.45)). This result aligns with a study conducted in Ambo, Ethiopia [13].

Participants who had a boyfriend were 2.55 times more likely to have a favorable attitude toward the human papillomavirus vaccination compared to those who did not (AOR: 2.55, 95% CI: (1.43-4.56)). This may be due to discussions about the risks of HPV and the importance of vaccination.

Participants who had good relationships with their friends were 1.79 times more likely to have a favorable attitude toward the human papillomavirus vaccination compared to those who did not (AOR: 1.79, 95% CI: (1.12-4.55)). This suggests that discussions about reproductive health issues may occur among friends.

Limitation of the study

The main limitation of this study is that male students were not included as participants. Another drawback is that some students may have been biased, as they were older than the target population regarding receiving the human papillomavirus vaccination.

5 Conclusion

To assess the knowledge and attitudes of female high school students in the Gedeo zone regarding human papillomavirus vaccination and related issues, a cross-sectional survey was conducted. The results showed that 58.3% of female high school students had good knowledge, while 52.6% demonstrated positive attitudes toward the vaccination. These findings indicate a relatively high level of knowledge and an average level of attitude among the respondents. However, there are still opportunities for further education, advocacy, and support to enhance both knowledge and attitudes.

Recommendation

- Implement comprehensive education and awareness programmes targeting students.
- Health facilities need to improve their approach to delivering messages and raise student's level of knowledge.
- Applying behavioral change communication tactics and HPV vaccination activities can help students develop a positive attitude.

Declaration

Abbreviations

CC	Cervical cancer
CI	Confidence interval
ETB	Ethiopian birr
HEPI	Health Professionals Education Partnership Initiative
HPVV	Human papilloma virus vaccine
NGO	Nongovernmental organizations
WHO	World health organization

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board (IRB) of Dilla University College of Medicine and Health Sciences. A formal letter of permission and support was provided to the Gedeo Zone Educational Office. Participants were informed about the aims, objectives, benefits, and risks of the study. Informed, voluntary, written, and signed consent was obtained from each respondent. Participants were assured of their confidentiality and their right to refuse to answer any questions, as well as their ability to stop or withdraw from the study

at any time during data collection. Confidentiality was maintained at all levels of the study through anonymous data collection.

Data sharing statement

The corresponding author can provide the data sets created during this work upon reasonable email request.

Acknowledgments

Firstly, we would like to acknowledge the Health Professionals Education Partnership Initiative (HEPI) Program to provide us with this opportunity. Secondly, we extend our gratitude to Dilla University for facilitating this initiative, and to the staff of the Department of Midwifery for their valuable suggestions and comments during the development of this work. Lastly, we would like to thank our friends and colleagues who contributed their irreplaceable support, both directly and indirectly, during the preparation of this research.

Author contribution

Mebirat Ademassu and Melkam Andargie were involved in designed the research, data collection, analysis, and interpretation of the result and drafted the paper, and participated in preparing all versions of the manuscript. Wagaye Alemu have assisted in the design, and the proposal development, monitored data collection, assisted during analysis, and revised subsequent drafts of the paper. All authors read and approved the final manuscript.

Disclosure

Regarding this paper, the authors disclose no conflicts of interest

References

1. 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.
2. Singh D, Vignat J, Lorenzoni V, Eslahi M, Ginsburg O, Lauby-Secretan B, et al. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. The lancet global health. 2023;11(2):e197-e206.
3. Mattiuzzi C, Lippi G. Cancer statistics: a comparison between World Health Organization (WHO) and Global Burden of Disease (GBD). Eur J Public Health. 2020;30(5):1026-7.
4. World Health Organization. Human papillomavirus (HPV) and cervical cancer Fact sheet 2016 [updated June 2016. Available from: http://www.who.int/mediacentre/factsheets/fs380/en.
5. Castle PE, Einstein MH, Sahasrabuddhe VV. Cervical cancer prevention and control in women living with human immunodeficiency virus. CA Cancer J Clin. 2021;71(6):505-26.
6. Biyazin T, Yilma A, Yetwale A, Fenta B, Dagnaw Y. Knowledge and attitude about human papillomavirus vaccine among female high school students at Jimma town, Ethiopia. Hum Vaccin Immunother. 2022;18(1):2036522.
7. Barnabas RV, Brown ER, Onono M, Bukusi EA, Njoroge B, Winer RL, et al. Single-dose HPV vaccination efficacy among adolescent girls and young women in Kenya (the KEN SHE Study): study protocol for a randomized controlled trial. Trials. 2021;22(1):661.
8. Larebo YM, Elilo LT, Abame DE, Akiso DE, Bawore SG, Anshebo AA, et al. Awareness, acceptance, and associated factors of human papillomavirus vaccine among parents of daughters in Hadiya Zone, Southern Ethiopia: a cross-sectional study. Vaccines. 2022;10(12):1988.
9. Medlineplus. Substance use 17 July 2024 [Available from: https://medlineplus.gov/ency/article/001945.htm.
10. Biyazin T, Yilma A, Yetwale A, Fenta B, Dagnaw Y. Knowledge and attitude about human papillomavirus vaccine among female high school students at Jimma town, Ethiopia. Human Vaccines & Immunotherapeutics. 2022;18(1):2036522.
11. Endale S., Delelegn K., Negash Z. Knowledge, attitude, practices, and associated factors toward cervical cancer among female health sciences students of Addis Ababa University, Addis Ababa, Ethiopia. *Therapeutic Advances in Vaccines and Immunotherapy.* 2025;13:25151355251314733.
12. Sinshaw MT, Berhe S, Ayele SG. Knowledge and attitude towards human papillomavirus vaccine and associated factors among mothers who have eligible daughters in Debre Markos Town, Northwest Ethiopia. Infection and drug resistance. 2022:781-93.
13. Yohannes E, Beyen MW, Bulto GA, Chaka EE, Debelo BT, Erena MM, et al. Knowledge and attitude toward human papillomavirus vaccination and associated factors among adolescent school girls in Ambo town, Ethiopia, 2021: A multicenter cross-sectional study. Health Science Reports. 2023;6(6):e1305.
14. Geneti HB, Hailu DA, Muleta G. Assessment of the knowledge, attitude and acceptability towards human papillomavirus and its vaccine among undergraduate female medical students. Gynecol Obstet (Sunnyvale). 2016;6(11):1-9.
15. Bulto GA, Chaka EE, Roga EY, Debelo BT, Erena MM, Tefu TL. Knowledge and Attitude of Human Papillomavirus Vaccination and associated Factors Among Adolescent School Girls in Ambo Town, Oromia Region, Ethiopia, 2021. 2021.

16. Adejuyigbe FF, Balogun BR, Sekoni AO, Adegbola AA. Cervical cancer and human papilloma virus knowledge and acceptance of vaccination among medical students in Southwest Nigeria. African journal of reproductive health. 2015;19(1):140-8.

17. Ukumo EY, Woldehawariat FG, Dessalegn SA, Minamo DM, Ukke GG. Assessment of knowledge about human papillomavirus vaccination among primary school girls in Arba Minch Town, South Ethiopia, 2020 an institution-based cross-sectional study. Cancer Management and Research. 2022:2205-14.

18. Songthap A, Pitisuttithum P, Kaewkungwal J, Fungladda W, Bussaratid V. Knowledge, attitudes, and acceptability of a human papilloma virus vaccine among students, parents and teachers in Thailand. Southeast Asian J Trop Med Public Health. 2012;43(2):340-53.

19. Voidăzan S, Tarcea M, Morariu S-H, Grigore A, Dobreanu M. Human papillomavirus vaccine-knowledge and attitudes among parents of children aged 10-14 years: a cross-sectional study, Tîrgu mureş, Romania. Central European journal of public health. 2016;24(1):29-38.

20. Cocchio S, Bertoncello C, Baldovin T, Fonzo M, Bennici SE, Buja A, et al. Awareness of HPV and drivers of HPV vaccine uptake among university students: a quantitative, cross-sectional study. Health & social care in the community. 2020;28(5):1514-24.

21. Kassa HN, Bilchut AH, Mekuria AD, Lewetie EM. 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. 2021:6999-7008.

22. Najafi-Sharjabad F, Rayani M. The relationship between knowledge, attitude and acceptance of Human Papilloma Virus (HPV) vaccination for cervical cancer prevention among students at Bushehr University of Medical Sciences, Iran. Journal of Research Development in Nursing and Midwifery. 2019;16(2):19-29.

23. Onowhakpor A, Omuemu V, Osagie O, Odili C. Human Papilloma Virus vaccination: knowledge, attitude and uptake among female medical and dental students in a tertiary institution in Benin-City, Nigeria. Journal of Community Medicine and Primary Health Care. 2016;28(2):101-8.

24. Trucchi C, Amicizia D, Tafuri S, Sticchi L, Durando P, Costantino C, et al. Assessment of knowledge, attitudes, and propensity towards HPV vaccine of young adult students in Italy. Vaccines. 2020;8(1):74.

25. Rashwan H, Lubis SH, Ni KA. Knowledge of cervical cancer and acceptance of HPV vaccination among secondary school students in Sarawak, Malaysia. Asian Pac J Cancer Prev. 2011;12(7):1837-41.

26. Mihretie GN, Liyeh TM, Ayele AD, Belay HG, Yimer TS, Miskr AD, et al. Female adolescents' knowledge and acceptability of human papillomavirus vaccine in Debre Tabor Town, Ethiopia: a cross-sectional study. BMJ open. 2023;13(3):e061813.