Knowledge and Attitude of Human Papillomavirus Vaccination and associated Factors Among Adolescent School Girls in Ambo Town, Oromia Region, Ethiopia, 2021

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Abstract

Background

Large-scale HPV vaccination offers a revolutionary new tool, especially in low- and middle-income countries, where 86% of cervical cancer cases and 88% of related deaths occur. There is little research done on knowledge and attitudes towards HPV vaccine in Ethiopia. Therefore, this study attempts to assess knowledge and attitudes regarding HPV vaccination and related factors among adolescent girls in Ambo town, Oromia, Ethiopia, in 2021.

Methods

A cross sectional study was conducted from May 01 to 30, 2021, at selected schools of Ambo town among 422 adolescent Girls. The collected data were coded, entered, and cleaned by using Epi-Info 7.2.3 and exported to Statistical package for social science version 25 for analysis. Descriptive statistics were used to compute summary statistics and proportion. Variables at a cut off value (0.25) on bivariate and (0.05) on multivariate logistic-regression were used to identify predictors that were associated to knowledge and attitude of HPV vaccine among Adolescent Girls

Result

Current study revealed that 24.9% (103) and 55.6% (230) of respondents had good knowledge and favorable attitude respectively. The factors like educational level (AOR=2.011 95% CI; (1.239, 3.265)), having health workers as a source of information (AOR=2.132, 95%CI; (1.304, 3.486)), and respondents who have heard about HPV vaccine at school (AOR=1.66, 95% CI (1.02, 2.71)) were significantly associated with respondent's knowledge of HPV vaccine. Moreover, perceived severity of the diseases (AOR=2.894, 95%CI; (1.607, 5.21)), and perceived benefit of the vaccine (AOR=4.263 95% CI; (2.431, 7.475)) were the two factors significantly associated with attitude of the respondents about HPV vaccine.

Conclusion

There was poor knowledge and unfavorable attitude of HPV vaccination among the school Adolescents of the study area. Several seemingly major deterrents of knowledge and attitude of the HPV vaccination were identified. Therefore, awareness creation and behavioral change education is mandatory.

Language Plain Summary

Human Papilloma Virus vaccination is the research priority part in Africa where most of the women seek the treatment for the cervical cancer caused by this virus at the late stage of the disease. Therefore, this study attempts to assess knowledge and attitudes regarding Human Papilloma Virus vaccination and related factors among adolescent girls in Ambo town, Ethiopia. A study was conducted from May 01 to 30, 2021, at selected schools of Ambo town among selected adolescent Girls. From 16 primary schools and 5 high schools in the

town of Ambo, 6 primary schools and 3 high schools were selected by lottery method. Study participants were selected from each school by simple random sampling method. A self-administered questionnaire was used to collect the data. This study revealed that 24.9% and 55.6% of respondents had overall good knowledge and favorable attitude towards Human Papilloma Virus vaccine respectively. Educational level, source of information from health workers and respondents who have heard about Human Papilloma Virus vaccine at school were significantly associated with respondent's knowledge of Human Papilloma Virus vaccine. Moreover, perceived severity of the diseases and perceived benefit of the vaccine were significantly associated with attitude of the respondents towards Human Papilloma Virus vaccine. There was poor knowledge and relatively favorable attitude of Human Papilloma Virus vaccination among the school Adolescents of the study area. Several determinants of knowledge and attitude of the Human Papilloma Virus vaccination were identified. Therefore, awareness creation and behavioral change education is mandatory.

Background

Human papillomavirus (HPV) vaccine is a prophylactic HPV vaccine developed to prevent the most common high-risk strains and low-risk infections of human papillomavirus (1). It meets an important public health need and was an important part of strategies to fight cervical cancer. Ensuring universal access to HPV vaccination was key to reducing the global burden of cervical cancer (2).

Several years ago, before this vaccine was developed, several new cases and deaths from cervical cancer occurred around the world. More than 85% of those affected are young, uneducated women living in the world's poorest countries. Many were also mothers of young children whose survival was later cut short by the untimely death of their mothers (3). In addition, the level of affection increases when access to pre-screening and treatment is limited, patients go to the doctor when complications are at an advanced stage, and most of them do not have access to emergency program service (2).

Large-scale HPV vaccination offers a revolutionary new tool, especially in low and middle-income countries, where 86% of cervical cancer cases and 88% of related deaths occur. Thus, the advent of vaccines has enabled effective primary prevention of the catastrophic consequences of cervical cancer. Even so, its use is high in countries that have an HPV vaccination program, integrate it into vaccination programs, and engage with different advertising systems while rates are low for those who have been vaccinated against HPV (4).

In an effort to explore these reasons, many important studies have looked at adolescent knowledge and attitudes towards vaccines, in which poor knowledge and negative attitudes significantly influence vaccine uptake (5–7). On the other hand, several studies have looked at the factors that hinder HPV vaccination and the challenges that limit progress in HPV and cancer prevention. Their results also suggest that common associated factors contribute to low HPV vaccine uptake; at the community level (e.g., social group values and norms, media coverage around HPV vaccines), at the organizational level (e.g., resources allocated, providing information, consent process, immunization settings and in the provincial program HPV vaccination)(8, 9).

Every two minutes a woman dies from cervical cancer. This worst and fourth leading cause of death continues to affect approximately 570,000 women with approximately 311,000 deaths worldwide. Of these, over 85% of deaths occur in less developed countries (3, 9). In East Africa, it is estimated that cervical cancer affects 42.7

cases per 100,000 women and causes the death of 35 per 100,000 women (3). As a result, cervical cancer is the second most common cancer among women in Ethiopia with an estimated annual death toll of 4,884(10).

One of these challenges is the lack of knowledge about the HPV vaccine. A study conducted in other parts of the world found that the majority of adolescents were unfamiliar with the HPV vaccine (this rate reaches 90.1% in Latvia), which is a major obstacle to receiving the HPV vaccine (6, 7). As with most teens, there is a misconception about the HPV vaccine, which makes it difficult to accept (7, 11). Even the successful implementation of a vaccination program is hampered by this key demographic factor (12). A school-based intervention study of adolescents found that vaccination readiness in the intervention group increased by 31.9 times the intervention each year to improve their knowledge (12).

On the other hand, the acceptability of the HPV vaccine is largely due to their attitudes and beliefs towards the vaccine (13). It was also shown that the reason for not vaccinating in all groups was delay and refusal was the attitude that there was no need for vaccines (14). These negative attitudes (hesitations) are not limited to those who refuse vaccination, but also to those who encourage others to refuse vaccination. So why, many healthcare professionals have reported increasing challenges in building trusting relationships with parents and adolescents of the recommended age(15, 16).

The influence of poor knowledge and negative attitudes is not limited to adolescents; it extends from the influence of those who play their important role. About 87.3% of adolescents do not have parental and family support to immunize due to a lack of knowledge and unfavorable attitudes (13). Over the past few years, the CDC has collected data that has found that lack of vaccine knowledge was the main reason parents chose not to give their children the HPV vaccine (17). Parents often delay the decision to get the HPV vaccine because they think their child is at low risk for HPV infection (13, 17). Even their negative perceptions and attitudes as well as a lack of knowledge about vaccination can gradually reduce HPV vaccination rates (18). Therefore, this study aimed to present detailed evidence and fill the gap by providing information regarding level of knowledge and attitude of human papilloma virus vaccination and its associated factors among Adolescent Girls at selected schools in the study area.

Methods

Study design, period and setting

The study was conducted in the town of Ambo, west Shewa area of Oromia Regional State in Ethiopia from May 1 to 30, 2021. The town of Ambo is located approximately 114 km away, west of Addis Ababa, the capital of Ethiopia. The city has six (6) administrative units (small administrative units) with an estimated total population of 2,381,079, of which 1,214,350 are women. It has sixteen (16) primary schools, including nine (9) public schools and seven (7) private schools, and a total of five (5) secondary schools, including four (4) public schools and one (1) private school. The number of adolescent girls enrolled by school among all public and private schools was 10,091. Based on a report from the Ambo City Health Unit, 2020, the first round of HPV vaccination began with a campaign in all primary schools for 14-year-old girls only since 2018. A cross-sectional study plan was carried out to conduct the study on 1418-year-old adolescent girls from randomly selected schools in the city of Ambo during the study period.

Sample size determination and Sampling Procedure

Sample size determination

The sample size was determined using the single population ratio formula by estimating knowledge and attitudes about HPV (P) at 50%, as no studies have been conducted in this area. To get the largest sample size, $Z =$ the 95% confidence normal distribution value is $Z \alpha / 2 = 1.96$, and the error (d) = 5% and the alpha value is 0, 05. Therefore, assuming 10% as the non-response rate, the final total sample size was 422 study participants. Of the sixteen (16) primary schools and five (5) high schools in the town of Ambo, six (6) primary schools and three (3) high schools were drawn by lot. For each school selected, the sample size was distributed in proportion to the number of adolescent girls aged 14-18 in each school. Study participants were selected from each school by simple random lottery sampling.

Operational Definition

Adolescence – The age between 10 to 19 years (2) .

Knowledgeable- There were three subsections of knowledge specific to cervical cancer, knowledge of HPV infection and knowledge of the HPV vaccine with a maximum possible score of 32. The three sections were; knowledge of cervical cancer, Cervical Cancer Knowledge of HPV Infection and Knowledge of HPV Vaccine will have 12, 13 and 7 knowledge related questions respectively. For knowledge of HPV vaccination, the knowledge scores was ranged from 0-7 depending on whether the respondents answered correctly or incorrectly, assigning 1 point for each correct answer and 0 for each incorrect answer. The total score was calculated and the average and below average can be considered ignorant (poor knowledge) while an above average score is displayed as Knowledgeable (good knowledge). The same approach was used for knowledge of cervical cancer, knowledge of sections on HPV infection and global knowledge (16).

Attitude- A total of seven items with a five-point scale were developed to measure attitudes towards the HPV vaccine. It was awarded 5 points for "totally agree" reduced to 1 point for "totally disagree". Therefore, all questions were coded in binary and coded as "1" for "agree" and "0" for the response "disagree". Then, attitude scores were calculated for each participant, ranging from 0 to 7. Finally, a composite attitude variable was generated from the score using the mean as the cutoff score when checking for normality of the score. Participants with above-average scores was classified as having "favorable attitudes", while those with average and below-average scores was classified as having "unfavorable attitudes" (19).

Perception- A total of 13 items were constructed for all sections of perception. Susceptibility of diseases, Severity of diseases, Benefits of HPV vaccine preventable, Barriers to HPV vaccination; each category has three items unless barriers to HPV vaccination which has 4 items. The available responses were noted on a liking scale; 1 = strongly disagree; 2 = Disagree; 3= neither agree nor disagree; 4= agree; 5= totally agree. Therefore, all questions were coded in binary and coded as "1" for "agree" and "0" for the response "disagree". Then, each perception score was calculated for each section using the mean as the cutoff score. For example, for participants whose severity is perceived with above-average scores were classified as having "highly perceived disease severity," while those with average and below-average scores were classified as having "low perceived severity of the disease". Finally, a composite perception was generated from all the variables using the mean

score as the cutoff score. Participants with above-average scores were classified as having "good perception" while those with average and lower than average scores were classified as having "poor perception". Therefore, a score below the average indicates a stronger belief in refusing vaccination and was labeled as "Poor Perception" while a score above the average was considered to be "Good Perception"(19).

Data Collection Tool and Procedure

The questionnaire was prepared in English language that was translated into Afan Oromo and then translated back into English to check its consistency. The questionnaires have been adapted through a review of different literature and similar previous studies. An eight-part questionnaire was developed to assess socio-demographic characteristics, knowledge about cervical cancer, HPV infection and vaccination, awareness and attitudes towards HPV vaccination, presence HPV vaccination advertisements and information resources. A self-administered Afan Oromo version questionnaire was used to collect the data. To administer the structured questionnaire, eight (8) teachers as data coordinators and eight (8) experienced data investigator nurses were appropriately selected and 3 master's degrees in health-related supervisory sciences were recruited and trained during a day on the objectives, the relevance of the study, confidentiality, information, respondent rights, informed consent and interview techniques.

Data Quality Assurance

To maintain data quality, interviewers and supervisors were trained in data collection procedures. Prior to the actual data collection, the questionnaire (instrument) was pre-tested for simplicity, fluidity, consistency, validity and reliability on 5% of samples in schools that were not covered there by adjustment or modification which may have been considered / at the time of the offer and minor corrections to some of the issues which were included. Principal investigators and supervisors carried out on-site checks and reviews of all completed questionnaires to ensure the completeness and consistency of the information collected. The investigators were supervised by three supervisors. The principal investigator performed the data entry to maintain the accuracy of the data.

Data processing and analysis

After data collection, each questionnaire was checked for completeness, and entered in to Epiinfo version 7.2.2.6. Then data were exported to SPSS version 25 for cleaning, editing and analysis. The data were checked for missed values and outliers. Descriptive analysis (like frequencies, tables, percentages, means, and standard deviation) was done to describe the required variable. Then all variables having P-value of less than 0.25 were considered as candidates for multivariable logistic regression models. Multivariable logistic regression at the 95% confidence level was used to identify the predictors. A significance level of 0.05 was taken as a cutoff value for all statistical significance tests. Multi-collinearity was checked between predictors using variance inflation factor for each variable. Accordingly, two variables were removed on Multivariable logistic analyses (VIF= 9.95 & 11.5). Hosmer and Lemeshow goodness of fit test was done to check model fitness Goodness of fit.

Results

Social demographic characteristics of respondents

A total of 414 respondents participated in the study with a response rate of 98.1%. The majority of respondents 71.5% (296) live with their parents. More than half of the respondents, 53.4% (221) were born in Urban. Regarding the level of education of their parents about a quarter reported that the father (25.8%) and mother (27.1%) have a primary education. By profession, the majority of respondents were born to fathers (47.8%) and mothers (36.2%) who were active farmers (**Table 1**).

Respondent's level of knowledge about cervical cancer, HPV infection and HPV vaccine

More than three-fourth of girls had heard about cervical cancer and HPV vaccine 77.3% (320) and 78.7% (326) respectively. On the other hand, about 71.7% (297) know the method of prevention of cervical cancer. However, comparing to this 57.2% (237) hadn't heard about HPV infection. Nearly three-fourth (73.9%) of respondents doesn't know recommended doses of HPV Vaccine. Overall, the knowledge score towards cervical cancer, HPV infection and HPV vaccine is found to be very low (11.4%) (**Table2**).

Level of Attitude of respondents toward HPV vaccination

Two third (75.4%) have the view that HPV vaccine helps to prevent HPV infection. The majority (72.7%) of the respondents agreed that cervical cancer is a deadly disease. A large portion (72.9%) of a respondents agreed that HPV vaccination begin to minimize cervical cancer. Similarly, 72.9% of the participants were confirmed their own believes as the vaccine could save life and improve health. Though, up-to 69.1% stated their concern as having the HPV Vaccine would possibly leads to sexually promiscuous. On the other hand, about 44.7% had parental concern about having the vaccine. More than half (55.6%) of the respondents have favorable attitude towards HPV vaccinations (**Table 3**).

Perception of respondents toward cervical cancer, HPV infection and HPV vaccination

The study revealed that 54% of the respondents were found to have poor perceived susceptibility; while 40% has poor perceived severity of the diseases. However, those who have good perceived benefit of HPV vaccine were about 66.5%. Specially, those who perceived getting vaccination can reduce the risk of cervical cancer were about 77%.Concerns about possible side effects (66.9%), needle phobia (61.6%) and miss understanding about HPV vaccine (57.2%) were the main factors stated to make less intention to the vaccine (**Table 4**).

Existence of promotion and pre-information on HPV Vaccination

Many participants (80%) responded that there was no incentive to educate the community about the HPV vaccine. Even around 36.2% of service providers responded that they did not provide enough information before vaccination. About half (48.6%) of those surveyed said that HPV vaccine promotion and health education are available in school. Most participants (68.4%) reported that HPV vaccine promotions were available in their area.

Factors associated with Knowledge of HPV vaccination

Binary logistic regression was performed to assess the association between the dependent and independent variable. Factors that showed a P-value of <0.25 were included in the multivariable regression model. Multiple

logistic regression analysis showed that, educational level of the respondent and existences of source of information were associated with knowledge of HPV vaccination. Adolescents of Secondary education level were 2 times more knowledgeable about HPV vaccination as compared to Adolescents of primary education level (AOR=2.011 95% CI; 1.239, 3.265). Respondents who have had Health workers as their main source of information had 2 times more awareness about HPV vaccine than those who didn't heard from health providers (AOR=2.132 95% CI; 1.304, 3.486). Additionally, respondents who have heard about HPV vaccine at school was 1.6 times more likely to have awareness about HPV vaccine than those who didn't heard at school (AOR=1.66, 95% CI(1.02, 2.71)) (**Table 5**).

Factors associated with attitude of HPV vaccination

Adolescents who have heard about HPV vaccine prior to vaccination had 3.4 times more favorable attitude for the vaccine than those who had never heard about it (AOR=3.425, 95% CI; 1.341, 8.742). In addition, the odds of the students who highly perceived the severity of the diseases were 2.9 times more likely to have favorable attitude for the vaccine than those who had unfavorable attitude for the vaccine (AOR=2.894 95% CI; 1.607, 5.211). Likewise, Perceived benefit of the vaccine were 4.26 higher among Adolescents who have favorable attitude for the vaccine as compared to those who had unfavorable attitude for the vaccine (AOR=4.263, 95% CI; 2.431, 7.475). On the other hand, respondents whom strongly perceived the expected barriers were 50% less likely have favorable attitude as compared to those who less likely perceived the barriers (AOR=0.5, 95% CI; 0.298, 0.838). Concerning availability of promotion, adolescents who had available awareness creation at their schools were 1.9 times more likely have positive attitude than those respondents who have not awareness creation promotion at their schools(AOR=1.927, 95% CI; 1.057, 3.512) (**Table 6**).

Discussion

In this study, the proportion of Adolescent school girls who were knowledgeable about HPV vaccination was found to be only 24.9%. This was higher than two previous studies conducted on adolescent Girls of Latvia (9.9%) and Niger (11.4%) (7, 20). However, the results from other studies in Puducherry (43.3%) and Uganda (47.7%)revealed better knowledge of HPV vaccination compared to the present study(21, 22). The variation observed can be explained by the differences in socio-economic status, study settings, cultural norms and access to information. This may be due to greater exposure to information about the HPV vaccine after the introduction of national HPV immunization as well as numerous campaigns by both public and private sectors.

The finding indicated that about 44.4% of Adolescents had unfavorable attitude for HPV vaccination, which is almost comparable to study conducted in Lagos, Nigeria (44.2%) (23). In Contrast to our findings, another study from developed country (Italy) showed that there were lower rates of unfavorable attitude towards HPV vaccination (20%)(24). The difference might be explained due to different in socio-economic status, educational level and low coverage of focused educational campaigns (low access of information) to target group.

Beyond assessing the prevalence rate the study also pointed out factors that were associated with Adolescent's knowledge and attitude of HPV vaccine. Having source of information from health workers and at school was found to increase Adolescent's knowledge of HPV vaccine by about two times more than their

counter partner. This finding is in line with other similar study from USA, where Adolescents alternate school and health workers as their main source of information(25). The reason might be because school were very close to them for every information and health professionals in which they belief because they expect as health professionals were knowledgeable enough about the vaccine than any other occupation. This might be due to ethical consideration of health professionals was along with the objective of Vaccination.

This study also found that one of the factors associated with the knowledge of HPV vaccination was adolescent's level of education. The finding was consistent with a finding from similar study conducted on Mozambican and Nepali adolescents(26, 27). The reason might be because the students in high school have read about cancer. Cancer education is included in the Grade 10 curriculum.

In another direction the finding of the study indicated that Adolescents who have heard about HPV vaccine (who have exposure of information) before vaccination had more positive attitude for the vaccine. The result of this study was in line with study conducted in Italy(24). This may be explained by the fact that, having pre-information about the vaccine helps in recognizing the benefits of the vaccine which in turn helps to develop positive outlook for a vaccine.

Another finding of this study indicated that Adolescents those who perceived the severity of the diseases well have had more positive attitude for the vaccine. The result of this study has also in line with an evidence from the study conducted on adolescent daughters in Hong Kong and Kenya, in which perceived severity was strongly associated with positive attitude towards the HPV vaccine (7, 28). This may due to the reason behind the belief of diseases severity has merit because perception of illness can influence patients' emotional response to the illness and their copying behaviors, including preventive health behaviors. In addition to this, perceived benefit of the vaccine could make to have more positive attitude to the vaccine than those who do not belief in the benefit of the vaccine. The result of this study was similar with study conducted in Kenya in which perceived health benefits was strongly associated with positive attitude towards the HPV vaccine (28). This is due to recognizing the benefit of the vaccine may help to develop positive perception for a vaccine.

Another individual level factor was perceived barrier in which those who strongly perceived different barriers as it retain them from vaccination were less likely have positive belief for the vaccine. It might be explained as misunderstanding like needle phobia as well as infertility concern highly affects their views to the vaccine. This may be explained by the fact that, individual barriers to the vaccine acceptance such as fear of needle injection, side effects as well as broader socio-cultural context can negatively affect one belief toward the HPV vaccination. Other possible reason might be due to little existence of promotion and availability of information.

The current study didn't address all components of perception which might literarily well addressed by health belief model. Since the study was limited to school facilities, it was difficult to generalize to all Adolescents of similar age group living in the same district. Thus, to minimize the effect of the aforementioned limitations scholars with similar interest are recommended to conduct a community-based study.

Conclusion And Recommendation

This study revealed that the magnitude of knowledge and attitude of HPV vaccination was significantly found to be low. Adolescents of secondary education level and respondents who have had health workers as their

main source of information were found to be statistically significant with knowledge of HPV vaccine. Adolescents who have heard about HPV vaccine prior to vaccination, students who highly perceived the severity of the diseases, perceived benefit of the vaccine, adolescents who had available awareness creation at their schools were significantly associated with favorable attitude towards HPV vaccine. On the other hand, respondents whom strongly perceived the expected barriers were less likely to have favorable attitude. Striving for the program coverage and access of HPV vaccine will not be enough unless all eligible Girls have adequate knowledge and favorable attitude for correctly and consistently taking the vaccine as per needed. Therefore, increasing awareness/knowledge and favorable attitude for HPV vaccination activities at all levels of eligible Adolescents are mandatory.

Abbreviations

HPV: Human Papilloma Virus, MCH: Maternal and Child Health, WHO: World Health Organization

Declarations

Ethical approval and consent to participate

The ethics check was obtained from the Institutional Review Board (IRB) of Ambo University, College of Medicine and Health Sciences with ID number of CMHS/R/MIDW/08/2021. Informed Oral and written informed consent was obtained from each respondent and their parents and necessarily after explaining the purpose and procedure of the study. In addition, written informed consent in a separate form of consent has been obtained separately from parents to ensure their legal preparation on behalf of their minor (for adolescents and young adults aged 18 and over). This means obtaining the written consent of the parents as a prerequisite for carrying out research on their daughter (before the start of data collection). In order to maintain the confidentiality of information provided by research subjects, the data collection process is anonymous. Participation on a voluntary basis and withdrawal from the study at any time from data collection was taken into account. No name or other identifying information was included in the questionnaire. We are confirming all the information for involving the participants was in accordance to guidelines of institutional review board of Ambo University, college of medicine and health sciences.

Consent for publication: Not applicable

Data Sharing Statement: The datasets used and/or analyzed during the current study are available from the corresponding author upon request.

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Competing of interests: Not applicable

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Author Contributions

MWB and GAB made substantial contributions to conception and design, EEC contributed for acquisition of data, EYR and BTD play great role of data analysis and interpretation. On top of that, TLT and MME took part in drafting the article or revising it critically for important intellectual content. All Authors agreed to submit to the current journal and gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Tables

Table 1
Socio-demographic characteristics, of Adolescent school Girls in Ambo town,
Ethiopia, 2021 (n= 414)

Socio-demographic characteristics		Frequency	Percent
Age	14-15 years	199	48.1%
	16-18 years	215	51.9%
Students educational level	Primary Education	264	63.8%
	Secondary Education	150	36.2%
Fathers education level	Unable to read and write	73	17.6%
	Able to read and write	82	19.8%
	Primary education	107	25.9%
	Secondary education	62	15.0%
	College Diploma and above	90	21.7%
Mothers education level	Unable to read and write	101	24.3%
	Able to read and write	82	19.8%
	Primary education	112	27.1%
	Secondary education	76	18.4%
	College diploma and above	43	10.4%
Fathers' Occupation'	Merchant	42	10.1%
	Government employee	118	28.6%
	Private employee	38	9.2%
	Farmer	198	47.8%
	Other	18	4.3%
Mothers' occupation	Merchant	58	14.0%
	Government employee	58	14.0%
	Private employee	44	10.6%
	Farmer	150	36.2%
	House wife	102	24.6%
	Other	2	0.5%
Place of birth	Urban	221	53.4%
	Rural	193	46.6%
<i>Others* Muslim, Waqefata, Catholic religion, Prophetier (for Occupation)</i>			

Table 2
Cervical cancer, HPV infection and HPV vaccination related knowledge of Adolescent school Girls in Ambo town, Ethiopia, 2021 (n= 414)

Variable		Category	Frequency	Percent
Knowledge towards Cervical cancer				
Have you ever heard cervical cancer		No	94	22.7%
		Yes	320	77.3%
Risk factor of Cervical cancer		Don't know	386	93.2%
		Know	28	6.8%
Mode of transmission	Sexual transmission	No	248	59.9%
		Yes	166	40.1%
	Vertical transmission	No	398	96.1%
		Yes	16	3.9%
Sign and symptom of cervical cancer		Don't know	325	78.5%
		Know	89	21.5%
Over all knowledge score of Cervical cancer		Poor	350	84.5%
		Good	64	15.5%
Knowledge towards HPV infection				
Have you ever heard of HPV infection		No	237	57.2%
		Yes	177	42.8%
Who can contract HPV infection		Don't know	147	83.8%
		Know	67	16.2%
Diseases caused by HPV infection		Don't know	405	97.8%
		Know	9	2.2%
Risk factors for HPV infection		Don't know	353	85.3%
		Know	61	14.7%
Method of prevention of HPV infection		Don't know	392	94.7%
		Know	22	5.3%
Overall knowledge score towards HPV infection		Poor	377	91.1%

Variable	Category	Frequency	Percent
	Good	37	8.9%
Knowledge towards HPV Vaccine			
Have you ever heard about HPV vaccine before	No	88	21.3%
	Yes	326	78.7%
The benefit of HPV Vaccine	Don't know	146	35.3%
	Know	268	64.7%
Who should get the HPV vaccination	Don't know	291	70.3%
	Know	123	29.7%
Recommended doses of HPV Vaccine	Don't know	306	73.9%
	Know	108	26.1%
The ideal time HPV Vaccine best recommended	Don't know	331	80.0%
	Know	83	20.0%
Over all knowledge score of HPV vaccine	Poor	311	75.1%
	Good	103	24.9%
Overall knowledge score towards Cervical cancer, HPV infection and HPV vaccine	Poor	367	88.6%
	Good	47	11.4%

Table 3

Attitude towards HPV vaccination of Adolescent school Girls in Ambo town, Ethiopia, 2021 (n= 414)

Variables	Attitude toward HPV vaccine			
	Unfavorable attitude		Favorable attitude	
	Frequency	Percent	Frequency	Percent
Cervical cancer is a deadly disease	113	27.3%	301	72.7%
The vaccination was began to minimize cervical cancer	112	27.1%	302	72.9%
Thinks vaccination helps to prevent HPV infection	102	24.6%	312	75.4%
Parental concern about having the vaccine	185	44.7%	229	55.3%
HPV vaccine saves life and improve health	112	27.1%	302	72.9%
Whether you recommend the vaccine to others ornot	75	18.1%	339	81.9%
Having the HPV Vaccine may become sexually promiscuous	128	30.9%	286	69.1%
Over all Attitude	184	44.4%	230	55.6%

Table 4

Perception towards the disease and the vaccine among Adolescent school Girls in Ambo town, Ethiopia, 2021
(n= 414)

Perceived Susceptibility	Poor perception		Good perception	
	Frequency	Percent	Frequency	Percent
Any women are susceptible to face cervical cancer	209	50.5%	205	49.5%
How much are you worried of contracting HPV infection	182	44%	232	56%
If you don't get vaccinated how likely is it that you'll become infected	280	67.6%	134	32.4%
Perceived Severity				
Being infected with HPV would have major consequences on life	183	44.2%	231	55.8%
Being infected with HPV would be devastating	149	36%	265	64%
It would be very serious if someone became infected with HPV	167	40.3%	247	59.7%
Perceived benefit				
If you get vaccinated you can reduce your risk of cervical cancer	95	23%	319	77%
If you get vaccinated for HPV you can reduce the risk of vaginal cancer	113	27.3%	301	72.7%
Getting vaccinated will decrease your chances of getting genital warts	208	50.2%	206	49.8%
Perceived barriers				
Concerns about possible side effects	277	66.9%	137	33.1%
Needle phobia	255	61.6%	159	38.4%
Miss understanding about HPV vaccine	237	57.2%	177	42.8%
Lack of information	171	41.3%	243	58.7%
Overall perception	175	42.3%	239	57.7%

Table 5

Factors associated with Knowledge of respondents towards HPV vaccination among Adolescent school Girls in Ambo town, Ethiopia, 2021 (n= 414)

Variable			Level of Knowledge		COR(95% CI)	AOR(95%CI)	P Value
			Good	Poor			
Educational level		Secondary Education	48(11.6)	102(24.6)	1.79(1.14, 2.82)	2.01(1.24, 3.26)*	0.005
		Primary Education	55(13.3)	209(50.5)	1.0	1.0	
Source of information	Health providers	Yes	59(14.3)	111(18.8)	2.42(1.54,3.80)	2.13(1.30, 3.48)*	0.003
		No	44(10.6)	200(48.3)	1.0	1.0	
	School	Yes	46(11.1)	91(21)	1.95(1.23, 3.08)	1.66(1.02, 2.71)*	0.042
		No	57(13.8)	220(53.1)	1.0	1.0	
	Internet	Yes	11(2.7)	14(3.4)	2.54(1.12, 5.78)	2.21(0.92, 5.31)	0.076
		No	92(22.2)	297(71.7)	1.0	1.0	
*statistically significant at $p < 0.05$ with COR: crude odds ratio AOR, adjusted odds ratio *HPV- human papillomavirus							

Table 6

Factors associated with Attitude of respondents towards HPV vaccination among Adolescent school Girls in Ambo town, Ethiopia, 2021 (n= 414)

Variable		Attitude of the respondents		COR(95% CI)	AOR(95%CI)	P Value
		Favorable	Unfavorable			
Ever heard about HPV vaccine	Yes	273(65.9)	53(22.8)	8.15(4.64, 14.4)	3.43(1.341, 8.74)*	0.01
	No	32(7.7)	56(13.5)	1.0	1.0	
Perceived Susceptibility	Good	167(40.3)	32(7.7)	2.16(1.45, 3.22)	1.07(0.6, 1.9)	0.826
	Poor	138(33.3)	77(18.6)	1.0	1.0	
Perceived Severity	Good	215(51.9)	31(7.5)	4.19(2.76, 6.36)	2.89(1.61, 5.21)*	<0.001
	Poor	90(21.7)	78(18.8)	1.0	1.0	
Perceived Barrier	Good	101(24.4)	116(28)	0.46(0.31, 0.68)	0.5(0.3, 0.84)*	0.009
	Poor	129(31.2)	68(16.4)	1.0	1.0	
Availability of awareness creation	Yes	173(41.7)	28(6.7)	3.28(2.17,4.94)	1.93(1.06, 3.51)*	0.032
	No	132(31.8)	81(19.5)	1.0	1.0	
*statistically significant at p< 0.05 with COR: crude odds ratio AOR, adjusted odds ratio						
*HPV- human papilloma virus						