

Knowledge and Attitudes towards Human Papillomavirus and HPV vaccination among girls aged 9-14 years in Lira City West, Northern Uganda: A cross-Sectional Study

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ABSTRACT

Background: Human papillomavirus (HPV) is the necessary cause of nearly all cervical cancers and remains an important public-health problem, particularly in low- and middle-income countries. Vaccination before exposure to HPV is an effective primary prevention strategy. This study assessed knowledge of HPV and HPV vaccination and attitudes towards HPV vaccination among girls aged 9–14 years attending selected primary schools in Lira City West Division, Northern Uganda.

Methods: A quantitative cross-sectional study was conducted among 398 girls aged 9–14 years from three high-enrolment primary schools. Participants were stratified by school and class and selected systematically within strata. Data were collected using an interviewer-administered structured questionnaire in English or Leb Lango. Sociodemographic characteristics, individual knowledge items and five-point Likert attitude items were analysed descriptively using frequencies and percentages in IBM SPSS Statistics version 27.

Results: Only 26.4% of participants had heard of HPV and 15.6% identified HPV as a virus associated with cervical cancer. When asked about transmission, 65.8% selected sexual contact and 14.6% selected skin-to-skin contact. Awareness of the HPV vaccine was higher, with 76.9% having heard of it and 86.7% indicating that it can prevent cervical cancer. Favourable attitudes were common: 77.9% intended to receive the vaccine, 79.4% perceived it as safe, 78.6% considered vaccination important and 77.9% would recommend it to friends. Parents or guardians influenced vaccination views among 75.1% of participants. However, 95.0% disagreed or strongly disagreed that sufficient HPV-vaccine information was available to them.

Conclusion: Girls in the selected schools were generally receptive to HPV vaccination but had limited understanding of HPV infection and its relationship with cervical cancer. The findings show a mismatch between relatively high vaccine awareness and favourable attitudes, and limited HPV knowledge alongside perceived insufficiency of information. School-based vaccination should be accompanied by repeated, age-appropriate education involving girls, parents and health workers.

Keywords: Human papillomavirus, HPV vaccine, adolescent girls, knowledge, attitudes, Uganda.

1. INTRODUCTION

The human papillomavirus (HPV) is one of the most common sexually transmitted infections worldwide and represents a major public health concern particularly in low and middle income countries (1). HPV is a double-stranded DNA virus belonging to the Papillomaviridae family (2). More than 200 genotypes have been identified, with persistent infection by high-risk types, particularly HPV 16 and 18, strongly associated with the development of cervical cancer (3).

Nearly all sexually active women are likely to acquire HPV infection at some point in their lifetime, often shortly after sexual debut (4). Although many HPV infections resolve spontaneously, persistent high-risk infection may result in precancerous cervical lesions and eventually invasive cervical cancer (5). Persistent infection with oncogenic HPV types can lead to cervical cancer through progressive cellular abnormalities in the cervical epithelium (6).

Globally, cervical cancer is the fourth most common cancer among women and a leading cause of cancer-related mortality (7). In 2022, approximately 660,000 new cases and 350,000 deaths were reported worldwide with the highest burden occurring in low- and middle-income countries (8). Sub-Saharan Africa in particular is a cervical cancer hotspot recording 35 cases and 23 deaths per 100,000 women yearly (9). In East Africa, cervical cancer is the leading cause of morbidity and mortality related to cancer, with the incidence rates above 40 cases per 100,000 women (10). Uganda has second-highest case rate in the region, with about 35.7% cases, three times higher than the global average (11). In Northern Uganda, cervical cancer accounts for 50.1% of all female cancers (12).

HPV vaccination is one of the most effective primary prevention strategies against cervical cancer (13). Vaccinating girls before exposure to HPV can substantially reduce their future risk of persistent infection with vaccine-targeted oncogenic HPV types (14). A study conducted in Sweden shows that HPV vaccination can lower the risk of cervical cancer by 88% (15). The World Health Organization (WHO) recommends two doses of the HPV vaccine to be given to girls aged between 9 and 14 years to prevent them from contracting the HPV infections (16).

Uganda introduced HPV vaccination into the national immunization program, using school-based vaccination and community outreach approaches to reach eligible girls (17). However, in Lira city only 19.6% of the girls aged 9-14 had received HPV vaccine by year 2023, indicating an important gap between availability of the vaccine and actual coverage (18).

According to research, knowledge and attitude have a substantial impact on uptake of health interventions such as HPV vaccination (19,20). A study conducted in Mali showed a relatively low knowledge levels regarding HPV and cervical cancer; only 2.0% of respondents understood that HPV is a transmitted through sexual intercourse, yet 100% expressed a willingness to get vaccinated against (21). In Indonesia, 64% of women had good understanding, 62% had a positive attitude towards cancer of the cervix and HPV vaccine, and 92% were willing to take HPV vaccination (22).

While various studies have examined global knowledge and attitudes on HPV vaccination, the majority have focused on women of reproductive age rather than adolescent girls attending school. Studies show that school attendance is positively linked to HPV vaccination status because it requires less effort to reach girls through school-based HPV vaccine delivery strategies (23). In Northern Uganda, particularly Lira city, the knowledge and attitude of adolescent girls towards HPV vaccination remains poorly understood. Given the vaccine's potential to reduce cervical cancer risks and related mortality, it is essential to understand these factors for developing targeted health education and vaccination programs that can improve vaccination uptake and health outcomes. Therefore, this study assessed the knowledge and attitudes of girls aged 9-14 towards HPV vaccine in Lira city West, Northern Uganda to assist in re-designing appropriate strategies meant to enhance the HPV vaccination uptake in Lira City and Uganda as a whole.

2. MATERIALS AND METHODS

Study design

A quantitative cross-sectional study was conducted to assess knowledge and attitudes towards HPV vaccination among girls aged 9–14 years. The design was considered appropriate because it allows for systematic collection and analysis of data at a single point in time (24). The approach enabled researchers to understand current levels of knowledge and attitude of adolescent girls towards HPV vaccine.

Study site and setting

The study was conducted among three primary schools in Lira City West Division, Lira City, Northern Uganda. Lira City is approximately 338 kilometers north of Kampala the capital city of Uganda, and southeast of Gulu City the largest city in northern Uganda. Lira City West Division has 54 primary schools, comprising 17 government and 37 private schools. The three study schools were selected because they had the highest enrolment of girls aged 9–14 years.

Study population

We included primary-school girls aged 9–14 years living and studying in Lira City West Division. This age group was chosen because it represents the target age group for the HPV vaccine and are less likely to have been sexually exposed (25). All girls aged 9-14 years who were available at the time of data collection studying in the selected schools and had assented were included in the study. The parents or guardians of the adolescent schoolgirls provided written informed consent. Girls who were ill, those whose parents did not consent, and girls who did not assent to participate were excluded from the sample frame before the participant-level sampling procedure.

Sample size

The sample size was estimated using the Kish Leslie formula for cross-sectional studies $n = \frac{z^2 p (p-1)}{q^2}$ with the assumptions, the confidence interval was taken at 95%, P was the estimated prevalence at 56% (Whitworth et al., 2021), q was the margin error at 0.05, The z-score (z) was 1.96, a margin of error (q) was 0.05. Therefore, the calculated the sample adjacent to 5% margin of error size was 398 participants.

Sampling and recruitment methods

Three primary schools in Lira City West Division with the highest enrolment of girls aged 9–14 years were included in the study. Permission to conduct the study was obtained from the head teachers before data collection. School authorities and teachers assisted in informing eligible girls about the study through appropriate school communication channels.

Eligible girls were stratified by school and class to ensure representation across the different classes attended by girls aged 9–14 years. The required sample from each class was allocated proportionately according to the number of eligible girls in that class. Within each class stratum, eligible girls were listed and assigned sequential identification numbers. A systematic sampling procedure was then applied using a sampling interval of five. The third eligible girl on each list was selected as the starting participant, after which every fifth eligible girl was selected until the required sample for that class was attained.

Selected girls were subsequently approached by the research team, provided with age-appropriate information about the study, and assessed for eligibility before enrolment. Because all participants were minors, written informed consent was obtained from their parents or legal guardians, while assent was obtained from the participating girls before data collection. The study purpose, procedures, voluntary nature of participation, and the right to withdraw were explained in language appropriate to the participants' age and level of understanding. Where a participant or guardian was unable to sign, a thumbprint was used as appropriate. Only girls who met the eligibility criteria and for whom the required consent and assent had been obtained were enrolled in the study.

Data collection procedures

Following ethical approval from the Lira University Research Ethics Committee (LUREC), permission to conduct the study was obtained from the head teachers of the three selected primary schools in Lira City West Division. The head teachers introduced the research team to the relevant class teachers, who assisted in identifying and mobilising eligible girls.

Data were collected by five female fourth-year students pursuing a Bachelor of Science in Midwifery. Before data collection, the research assistants were oriented on the study objectives, participant recruitment procedures, administration of the questionnaire, ethical conduct, confidentiality, and appropriate communication with girls aged 9–14 years. Their training also covered consistent interpretation and administration of questionnaire items in both English and Leb Lango to minimise interviewer variation.

Selected participants were approached by the research team and assessed for eligibility. Because the participants were aged 9–14 years, written informed consent was obtained from their parents or legal guardians, while assent was obtained from the girls before participation. The purpose of the study, procedures involved, voluntary nature of participation, confidentiality of responses, and the right to withdraw at any time without penalty were explained in language appropriate to the participants' age and level of understanding.

Data were collected using an interviewer-administered structured questionnaire available in both English and Leb Lango. The questionnaire was adapted from a previously used HPV vaccination questionnaire (26) and modified to suit the local study context. It comprised three sections: sociodemographic characteristics; knowledge of HPV and HPV vaccination, including sources of vaccine information; and attitudes towards HPV vaccination.

Face-to-face interviews were conducted in a private and convenient location within the school environment to minimise interruptions and promote confidentiality. The research assistants read each question to the participant and recorded the responses directly on the questionnaire. Participants were encouraged to seek clarification whenever they did not understand a question. Data collection was done during break and lunch time to avoid inconveniences during class room hours. Each interview lasted approximately 15–20 minutes.

At the end of each interview, completed questionnaires were reviewed for completeness and consistency before the participant left the data collection area. Data collection was conducted over a period of approximately two weeks across the three selected schools.

Data management and analysis

Completed questionnaires were checked daily for completeness, consistency, and accuracy before data entry. Each questionnaire was assigned a unique identification number to facilitate data management while maintaining participant confidentiality. Data were coded and entered into Microsoft Excel and subsequently exported to the statistical program for social sciences (SPSS) (version 27) for cleaning and analysis. Data cleaning involved checking for missing values, duplicate entries, inconsistencies, and out-of-range responses. Where discrepancies were identified, the original questionnaires were reviewed and corrections made where appropriate.

Descriptive statistics were used to analyse the data. Sociodemographic characteristics, knowledge of HPV and HPV vaccination, and sources of information were summarised using frequencies and percentages. Knowledge was analysed based on responses to the individual knowledge items rather than as a composite score.

Attitudes towards HPV vaccination was assessed using five-point Likert-scale response categories ranging from strongly agree to strongly disagree. Frequencies and percentages were calculated for each response category. For descriptive interpretation in the narrative, strongly agree and agree responses were combined to indicate agreement with positively worded statements, while disagree and strongly disagree responses were combined where appropriate.

Responses to the open-ended question on participants' thoughts and experiences regarding HPV vaccination were reviewed and summarized descriptively. Results were presented using tables. All statistical analyses were performed using SPSS Statistics version 27.

Quality control

Several measures were implemented to ensure the quality, consistency, and accuracy of the data collected. The questionnaire was adapted from a previously used HPV vaccination questionnaire and modified to suit the study objectives and local context. Prior to the main study, the questionnaire was reviewed for clarity and relevance and subsequently pre-tested among participants with characteristics similar to those of the intended study population but who were not included in the main study.

Five research assistants who were fluent in English and Leb Lango were trained on the study objectives, questionnaire administration, participant recruitment, ethical conduct, and procedures for ensuring completeness and consistency of responses. During data collection, completed questionnaires were reviewed for completeness and consistency before data entry. Data were also checked and cleaned before analysis to identify and correct data-entry errors, missing values, and inconsistencies.

The questionnaire was pre-tested among 10 girls aged 9–14 years at Public School in Lira City East Division. This school was outside the main study area, and participants involved in the pre-test were not included in the final study. The purpose of the pre-test was to assess the clarity, relevance, appropriateness, sequence, and comprehensibility of the questionnaire items, as well as to identify potential difficulties in questionnaire administration. The pre-test was conducted over one day. Feedback from the participants and observations made during administration were used to revise ambiguous or unclear questions and improve the questionnaire before commencement of the main data collection.

Ethical considerations

Ethical approval for the study was obtained from the Lira University Research Ethics Committee (LUREC-2024-13). before commencement of data collection. Administrative permission was also obtained from the relevant education authorities and the head teachers of the participating primary schools.

Since all study participants were below 18 years of age, written informed consent was obtained from their parents or legal guardians before the girls were approached for participation in the study. Parents or guardians were provided with information regarding the purpose of the study, study procedures, potential benefits and inconveniences, confidentiality of information, voluntary participation, and the right of their child to withdraw from the study at any time without penalty. Parents or guardians who agreed for their child to participate documented their consent by signing or providing a thumbprint on the informed consent form, as applicable. Only girls whose parents or legal guardians provided informed consent were considered eligible to proceed to the assent process.

In addition to parental or guardian consent, assent was obtained from each girl before participation. The study was explained to the participants in simple, age-appropriate language, including what they would be asked to do, the voluntary nature of participation, and their right to refuse to answer any question or to stop participating at any time. Girls who understood the information and voluntarily agreed to participate documented their assent by signing or providing a thumbprint on the assent form, as appropriate. A girl was not enrolled in the study if she declined to participate, even where parental or guardian consent had already been provided.

Data collection was conducted in the class rooms during break and lunch time to allow participants to respond freely in the usual environment. Questionnaires did not contain direct participants' identifiers. Instead, unique study identification codes were used. Completed questionnaires and other study records were kept securely and were accessible only to the research team. Information obtained from participants was used solely for research purposes and was reported in aggregate form so that individual participants could not be identified.

Participation in the study was voluntary. Participants were informed that they could decline to answer any question or withdraw from the study at any stage without giving a reason and without any negative consequences. Participation or refusal to participate did not affect the participants' schooling, access to school services, or relationship with teachers or school administrators.

The study involved minimal risk because participants were required only to respond to questionnaire items concerning HPV and HPV vaccination. However, some questions could potentially cause embarrassment or discomfort because of the sensitive nature of reproductive health topics. Participants were therefore allowed to skip any question they did not wish to answer and could discontinue the interview at any time. Interviews were conducted respectfully and in a manner appropriate to the participants' age.

3. RESULTS

Characteristics of the study participants

A total of 398 girls aged 9–14 years participated in the study. Of the 398 participants, 239 (60.1%) were aged 12–14 years and 159 (39.9%) were aged 9–11 years. More than half, 238 (59.8%), were in Primary 6–7, while 160 (40.2%) were in Primary 3–5. All participants were enrolled in government schools. Most parents or guardians had attained secondary education (72.6%), followed by tertiary education (24.1%), while 3.3% had attained primary education. Regarding occupation, 68.6% of parents or guardians were engaged in business, 23.6% were civil servants, and 7.8% were farmers. Most participants, 354 (88.9%), resided in urban areas. The sociodemographic characteristics of the study Participant are presented in table 1.

Table 1. Sociodemographic characteristics of study participants (N = 398)

Variables	Frequency (n)	Percentage (%)
Age (years)		
9–11	159	39.9
12–14	239	60.1
Class		
P3–P5	160	40.2
P6–P7	238	59.8
School type		
Government	398	100.0

Parent/guardian level of education

Primary	13	3.3
Secondary	289	72.6
Tertiary	96	24.1

Parent/guardian occupation

Farmer	31	7.8
Business	273	68.6
Civil servant	94	23.6

Residence

Urban	354	88.9
Rural	44	11.1

Knowledge of HPV and HPV vaccination

Only 105 (26.4%) participants reported having previously heard of human papillomavirus (HPV). When asked about HPV, 62 (15.6%) identified HPV as a virus associated with cervical cancer. Other responses included that HPV affects or damages the womb (7.3%) and that it causes suffering and death (3.5%), while 73.6% did not know what HPV was.

Regarding transmission, 262 (65.8%) participants identified sexual contact as a mode of HPV transmission, while 58 (14.6%) reported skin-to-skin contact. 53 (13.3%) indicated airborne transmission and 25 (6.3%) reported other modes of transmission.

Awareness of the HPV vaccine was considerably higher than awareness of HPV itself: 306 (76.9%) participants reported having heard of the HPV vaccine. School was the most frequently reported source of HPV vaccine information (62.8%), followed by media such as radio and television (20.1%), parents or guardians (14.8%), and friends or peers (2.3%). Most participants, 345 (86.7%), indicated that the HPV vaccine could prevent cervical cancer. Table 2 summarizes the knowledge of HPV and HPV vaccination among participants.

Table 2. Knowledge of HPV and HPV vaccination among participants (N = 398)

Variables	Frequency (n)	Percentage (%)
Familiarity with human papillomavirus		
Yes	105	26.4
No	293	73.6
Understanding of human papillomavirus		
Did not know	293	73.6
Virus associated with cervical cancer	62	15.6

Affects/damages the womb	29	7.3
Causes suffering and death	14	3.5
Reported mode of HPV transmission		
Sexual contact	262	65.8
Skin-to-skin contact	58	14.6
Airborne	53	13.3
Other	25	6.3
Previously heard about HPV vaccine		
Yes	306	76.9
No	92	23.1
Source of HPV vaccine information		
School	250	62.8
Parents/guardians	59	14.8
Friends/peers	9	2.3
Media (radio/television)	80	20.1
HPV vaccine can prevent cervical cancer		
True	345	86.7
False	53	13.3

Attitudes towards HPV vaccination

Most participants expressed favorable views towards HPV vaccination across several individual attitude items. Regarding intention to receive the vaccine, 293 (73.6%) strongly agreed and 17 (4.3%) agreed, giving a combined 77.9% who expressed an intention to receive the HPV vaccine. In contrast, 47 (11.8%) disagreed or strongly disagreed, while 41 (10.3%) were neutral.

Similarly, 296 (74.4%) participants strongly agreed and 20 (5.0%) agreed that the HPV vaccine was safe, representing 79.4% with favorable perceptions of vaccine safety. Forty-six (11.6%) were neutral, while 36 (9.1%) disagreed or strongly disagreed.

Regarding the perceived importance of HPV vaccination, 285 (71.6%) strongly agreed and 28 (7.0%) agreed that receiving the vaccine was important. Forty-five (11.3%) were neutral, while 40 (10.0%) disagreed or strongly disagreed.

Parental influence was also evident. A total of 275 (69.1%) participants strongly agreed and 24 (6.0%) agreed that their parents influenced their views about HPV vaccination. Fifty-four (13.6%) were neutral, while 45 (11.3%) disagreed or strongly disagreed.

Regarding willingness to recommend HPV vaccination to peers, 290 (72.9%) strongly agreed and 20 (5.0%) agreed that they would recommend the vaccine to their friends. Forty-eight (12.1%) were neutral, whereas 40 (10.1%) disagreed or strongly disagreed.

Despite these generally favourable views, participants reported limited access to information about HPV vaccination. Only 17 (4.3%) agreed or strongly agreed that sufficient HPV vaccine information was available to them, whereas 378 (95.0%) disagreed or strongly disagreed. Three participants (0.8%) were neutral. Participants' responses to the individual attitude items are Presented in table 3.

Table 3. Attitudes towards HPV vaccination among participants (N = 398)

Attitude item	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
Intention to receive HPV vaccine	293 (73.6)	17 (4.3)	41 (10.3)	29 (7.3)	18 (4.5)
Perceived safety of HPV vaccine	296 (74.4)	20 (5.0)	46 (11.6)	27 (6.8)	9 (2.3)
Perceived importance of HPV vaccination	285 (71.6)	28 (7.0)	45 (11.3)	30 (7.5)	10 (2.5)
Parental influence on HPV vaccine views	275 (69.1)	24 (6.0)	54 (13.6)	33 (8.3)	12 (3.0)
Willingness to recommend HPV vaccine to friends	290 (72.9)	20 (5.0)	48 (12.1)	29 (7.3)	11 (2.8)
Perceived availability of HPV vaccine information	15 (3.8)	2 (0.5)	3 (0.8)	2 (0.5)	376 (94.5)

Participants' thoughts and experiences regarding HPV

Most participants, 389 (97.7%), did not provide a response to the open-ended question on their thoughts or experiences regarding HPV vaccination. Among the nine participants who responded, three (0.8% of the total sample) stated that the vaccine was painful, three (0.8%) indicated that they could share information about the vaccine with their friends, two (0.5%) stated that the vaccine could prevent cervical cancer, and one (0.3%) indicated that she thought she should receive the vaccine as shown in table 4.

Table 4. Participants' thoughts and experiences regarding HPV vaccination (N = 398)

Variables	Frequency (n)	Percentage (%)
Thoughts/experiences about HPV vaccine		
Did not answer	389	97.7
I think I should receive the vaccine	1	0.3
It is painful	3	0.8

I think the vaccine can prevent cervical cancer	2	0.5
I think I can share with my friends	3	0.8

4. DISCUSSION

This study assessed knowledge of human papillomavirus (HPV) and HPV vaccination, and attitudes towards HPV vaccination, among girls aged 9–14 years in Lira City West Division. The findings show a marked contrast between knowledge of HPV infection and awareness and acceptance of HPV vaccination. Only 26.4% of participants had heard of HPV and only 15.6% identified HPV as a virus associated with cervical cancer, yet 76.9% had heard of the HPV vaccine and 86.7% recognized that the vaccine could prevent cervical cancer. Attitudes towards vaccination were generally favorable, although most participants perceived the available HPV vaccine information as insufficient. Taken together, the findings suggest that HPV vaccination messages are reaching girls in this setting, particularly through schools, but that these messages may not be accompanied by sufficiently comprehensive education about HPV infection, its transmission, and its relationship with cervical cancer.

Knowledge of HPV and HPV vaccination

Awareness of HPV was low, with only 26.4% of participants reporting that they had previously heard of the virus. This finding is comparable with recent evidence from rural Oyo State, Nigeria, where only 28.8% of adolescent girls were aware of HPV during the national vaccine rollout (27). It is also consistent with studies from Ethiopia, where HPV vaccine knowledge among adolescent schoolgirls has remained limited. For example, a study done in Ambo town reported that only 24.9% of schoolgirls had good knowledge of HPV vaccination (28). Although these studies used different knowledge measures, they collectively suggest that low HPV-related knowledge among adolescents is common across several low- and middle-income settings.

The level of awareness observed in Lira was also higher than that reported in a nationwide Chinese adolescent study, where only 17.1% had heard of the HPV vaccine, although 67.3% expressed willingness to receive it (29). This contrast is important because it demonstrates that limited awareness does not always translate into low vaccine acceptability. Differences between countries may reflect the timing of national vaccine introduction, the organization of school-based health programs, exposure to public health campaigns, and differences in how HPV education is integrated into school curricula.

Knowledge of the relationship between HPV and cervical cancer was particularly limited in the present study, with only 15.6% of participants identifying HPV as a virus associated with cervical cancer. This suggests that many girls may know about the vaccine without understanding the infection that it prevents. Similar knowledge gaps have been reported in Uganda and elsewhere. A study conducted in rural northern Uganda, similarly reported that only 7% of secondary-school girls recognized HPV infection as a risk factor for cervical cancer (30). These findings suggest that limited understanding of HPV among adolescent girls is not unique to Lira City West Division and may reflect broader gaps in adolescent cervical cancer prevention education in Uganda.

The finding that 86.7% of participants knew that HPV vaccination could prevent cervical cancer, despite low awareness of HPV itself, is therefore particularly noteworthy. It suggests that girls may be receiving

a simplified prevention message focused on the benefit of vaccination rather than a more complete explanation of HPV infection, transmission, and carcinogenesis. This type of knowledge pattern is plausible in school-based vaccination programs, where the immediate public health objective is to achieve vaccination coverage. However, incomplete understanding may leave room for misconceptions and may weaken informed decision-making over time.

Knowledge of transmission was comparatively better, with 65.8% identifying sexual contact as a mode of HPV transmission. Nevertheless, 13.3% incorrectly reported airborne transmission. The 14.6% who reported skin-to-skin contact should not be classified as incorrect because HPV can be transmitted through intimate skin-to-skin contact. These findings indicate partial rather than complete understanding and reinforce the need for age-appropriate education that clearly explains how HPV is transmitted without stigmatizing young adolescents.

School was the leading source of HPV vaccine information, reported by 62.8% of participants. This finding is consistent with evidence from other countries. A study done in Switzerland, identified schools and healthcare professionals as important sources of HPV vaccine information among young people (31). While a school-based intervention study in China demonstrated that structured education substantially improved HPV knowledge and willingness to be vaccinated (29). In Ethiopia, hearing about the vaccine at school was also associated with better HPV vaccine knowledge among adolescent girls (28). Together, these findings support the role of schools as a strategic setting for improving both vaccine awareness and deeper understanding of HPV.

The comparatively low proportion of participants identifying parents or guardians as a source of information is also important. Only 14.8% reported parents or guardians as a source, even though parental influence on vaccine views was high. This disconnect suggests that parents may shape attitudes and decisions without necessarily providing detailed HPV information. A nationwide Chinese study found that adolescents were more willing to receive HPV vaccination when parents communicated with them about reproductive health and recognized the benefits of HPV vaccination (32). This reinforces the importance of involving parents in educational strategies rather than relying on schools alone.

Attitudes towards HPV vaccination

Attitudes towards HPV vaccination were generally favorable. Overall, 77.9% of participants agreed or strongly agreed that they intended to receive the HPV vaccine, 79.4% perceived the vaccine as safe, and 78.6% considered HPV vaccination important. These findings indicate a substantial level of receptiveness to vaccination despite the limited knowledge of HPV itself. A similar pattern has been reported in China, where willingness to receive HPV vaccination was considerably higher than awareness of the vaccine (29). This suggests that adolescents may be willing to accept vaccination even when their technical knowledge of HPV is incomplete.

The favorable attitudes observed in Lira were higher than those reported among adolescent schoolgirls in Ambo town, Ethiopia, where 55.6% had a favorable attitude towards HPV vaccination (28). They also contrast with findings from Kampala, Uganda, where slightly more than half of adolescent girls had negative perceptions towards HPV vaccination (33). Differences may be related to variations in exposure to vaccination campaigns, local beliefs, parental attitudes, school health activities, and the wording used

to measure attitudes. Because attitude measures differ between studies, these comparisons should be interpreted cautiously.

Perceived vaccine safety was particularly favorable, with nearly four in five participants agreeing that the HPV vaccine was safe. This is encouraging because concerns about vaccine safety are a recognized barrier to HPV vaccination in many settings. In Sweden, where HPV vaccination coverage is high, it was found that vaccine hesitancy remained linked to trust in information sources and perceptions of healthcare and vaccination (34). These findings underscore the importance of maintaining clear and credible safety communication even in settings where attitudes are generally positive.

Willingness to recommend HPV vaccination to peers was also high, with 77.9% agreeing or strongly agreeing that they would recommend the vaccine to friends. This suggests that adolescents themselves may be useful partners in disseminating accurate HPV vaccine information. Evidence from Kampala supports this possibility. A study done in the urban poor settings of Kisenyi demonstrated that peer-to-peer education among adolescent girls was feasible and could improve willingness to receive HPV vaccination (35). Peer education may therefore complement school-based teaching and health-worker communication, particularly when trained peers are provided with accurate and age-appropriate information.

Parental influence was strong, with 75.1% of participants agreeing or strongly agreeing that their parents influenced their views about HPV vaccination. This aligns with international evidence that parents play a central role in adolescent vaccine decision-making. In China, parental recognition of HPV risk and communication about reproductive health were associated with greater adolescent willingness to be vaccinated (36). The findings from Lira therefore suggest that programs aimed only at girls may be insufficient; parents and guardians should also receive clear information about vaccine safety, eligibility, benefits, and recommended vaccination schedules.

The most striking finding was the perceived inadequacy of information. Although most participants had heard of the HPV vaccine and expressed favorable attitudes towards it, 95.0% disagreed or strongly disagreed that sufficient information was available to them. This distinction between awareness and information sufficiency is critical. Adolescents may know that a vaccine exists and may even be willing to receive it, yet still feel poorly informed about how it works, why it is given at a young age, how safe it is, and how it relates to HPV and cervical cancer.

This information gap is consistent with findings from other countries. In rural Nigeria, lack of information was the most frequently reported reason for non-vaccination among unvaccinated adolescent girls during national vaccine rollout (27). A study In Switzerland also demonstrated the importance of reliable information sources in vaccine decision-making among youth (31). Together, these findings suggest that sustained, repeated, and age-appropriate communication is more likely to be effective than brief campaign messages alone.

5. CONCLUSION

The findings indicate that girls in Lira City West Division are generally receptive to HPV vaccination but remain incompletely informed about HPV and the vaccine. The principal challenge identified is therefore not simply negative attitudes or vaccine hesitancy. Rather, there is a mismatch between relatively high

vaccine awareness and favorable attitudes on one hand, and limited knowledge of HPV and a strong perception of insufficient information on the other. Strengthening school-based education, involving parents and health workers, and providing repeated, age-appropriate messages may help convert vaccine awareness into informed and sustained acceptance.

6. ABBREVIATIONS

HPV	Human Papilloma Virus.
LUREC	Lira University Research Ethical Committee
PI	Principal Invigilator
SPSS	Statistical Package for Social Science
STI	Sexually Transmitted Infections
UNEPI	Uganda National Expanded Program on Immunization
WHO	World Health Organization

7. DECLARATIONS

Ethics approval and consent to participate

Ethical approval for the study was obtained from the LUREC (LUREC-2024-13). Administrative permission was also obtained from the head teachers of the participating primary schools. Written informed consent was obtained from their parents or legal guardians. In addition to parental or guardian consent, assent was obtained from each girl before participation in the study. The declaration of Helsinki, institutional and national regulations on human subject protection and privacy protection were strictly followed throughout the study process.

Consent for publication

Written informed consent for publication of anonymized data was obtained from their parents or legal guardians. In addition to parental or guardian consent, assent was obtained from all girls.

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due to privacy and confidentiality considerations related to the participants. However, anonymized data may be made available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' information

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Authors contribution

BN Participated in protocol development, data analysis, manuscript drafting, and manuscript review.

NA conceived the study, participated in protocol development, data collection and data analysis, and manuscript review.

CKN, DAN, VCA, EM, SM, and GE participated in protocol development, manuscript writing, and manuscript review.

All authors read and approved the final manuscript.

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