

Knowledge and Attitude of Adolescent Females in Embakasi West Sub-County, Kenya towards HPV Vaccine and Cervical Cancer

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ABSTRACT

Background: The Human Papillomavirus (HPV) vaccine is recommended for adolescents and young adults to protect against HPV-related diseases such as cervical cancer. Knowledge and attitudes towards HPV and vaccine uptake influence decision making and subsequent uptake. However, no published data currently exists on these factors in Embakasi West Sub-County, Kenya.

Objective: To assess the knowledge and attitudes of adolescent schoolgirls in Embakasi West Sub-County, Kenya towards HPV and the HPV vaccine.

Methods: A cross-sectional analytical study was undertaken among school-going adolescent girls in Embakasi West Sub-County, Kenya using a self-administered questionnaire and Focus Group Discussions (FGDs). Quantitative data was analysed using IBM SPSS version 29, with statistical significance set at $\alpha = .05$. Qualitative data was digitally recorded, transcribed verbatim, and analysed thematically.

Results: The mean age of participants was 12.59 ± 1.15 years. School (56.9%), health workers (25.3%), and parents (12.9%) were the prominent sources of information about HPV and the vaccine. More than half of the participants (56.1%) had poor uptake of the HPV vaccine. Awareness of the HPV vaccine ($P < .001$), knowledge of HPV susceptibility ($P = .041$), Knowledge of virus transmission ($P = .03$), and beliefs regarding injection pain ($P = .008$) were significantly associated with vaccine uptake. Majority of the participants (74.7%) had good knowledge. Less than half (45.3%) had a positive attitude towards HPV and the vaccine. Girls without awareness were about 4.7 times more likely to have poor uptake compared to those with awareness (OR, 4.689 [95% CI, 1.905–11.543]; $P = .001$).

Conclusion: Adolescent girls in Embakasi West Sub-County demonstrated generally good knowledge but predominantly negative attitudes towards HPV and the HPV vaccine. Lack of awareness was a key predictor of poor vaccine uptake, highlighting the importance of sustained health education. Strengthening school-based health education and promoting parent-child and peer-to-peer communication may improve awareness, attitudes, and vaccine uptake.

BACKGROUND

Cervical cancer is the fourth most common cancer, and the fourth leading cause of cancer-related deaths among women globally, after breast, lung, and colorectal cancers.¹ It is reported to have an estimated incidence of 662,301 new cases and 348,874 deaths annually.² In Africa, cervical cancer ranks second in both incidence and mortality, with 125,699 and 80,614 annual cases respectively.² In Kenya, it is the second most common cancer among women, behind breast cancer.³ With approximately 16 new cases and 10 deaths every single day, cervical cancer is the leading cause of all cancer related deaths.⁴

At least 70% of cervical cancer cases are caused by persistent infections with high-risk strains (HPV 16 and 18) of Human Papillomavirus (HPV), which are sexually transmitted and result in abnormal,

uncontrolled growth of cells.⁵ HPV is a group of highly transmissible viruses that can infect different parts of the body. Low-risk strains cause mild, often asymptomatic and transient infections, while high-risk strains have been linked to cancers in both males and females.⁶ The HPV vaccine is recommended globally for adolescent and young adult males and females, and has shown considerable value in lowering the risk and incidence of cervical cancer.^{7–9} Coverage among adolescent females was 47.6% globally and 47.9% in sub-Saharan Africa in 2023.¹⁰ In Kenya, following the introduction of the vaccine in 2019 targeting 10 to 14 year old girls, national 2-dose coverage was 33%. Recent data indicated that uptake in Embakasi West Sub-County was 14.9% (Ministry of Health, unpublished data, 2024) against the global target of 90%.³

Knowledge and attitude are important determinants of vaccine acceptance and decision making.^{11–13} Individuals who are well informed about a vaccine, its indication and safety, as well as those with positive attitudes are more likely to make confident decisions to get vaccinated.^{12,14} However, no published data exist on the knowledge and attitudes among adolescent girls in Embakasi West. Understanding these cognitive and psychological aspects may be beneficial for strengthening the vaccination program. Therefore, given the low vaccine coverage and the positive association between knowledge, attitude, and vaccine uptake, this study sought to assess the knowledge and attitudes of adolescent schoolgirls in Embakasi West Sub-County- Nairobi, Kenya towards HPV and the vaccine.

METHODS

Study Setting and Design

A cross-sectional analytical study using mixed methods was undertaken in Embakasi West Sub-County, Nairobi-Kenya. Quantitative data was collected using self-administered questionnaires was supported qualitatively through Focus Group Discussions (FGD). The study area is located at latitude -1.28333 and longitude 36.8167, is subdivided administratively into four wards, and has an estimated population of 282907, majority of whom are Christians.¹⁵

Population

All willing public-school-going adolescent girls aged 10 to 14 years with caregiver consent were eligible to participate in the study, notwithstanding any mental or physical condition. Public schools were selected due to their high student population, and alignment with government vaccination programs.

Sample Size Determination

A single population proportion formula was used to calculate the sample size based on the following assumptions: 65% proportion (MOH, unpublished data, 2024), 95% confidence interval and a 5% margin of error.

$$n = Z^2 P(1-P)/d^2 = (1.96^2) 0.65(1-0.65) / (0.05)^2 = 350$$

After adjusting for a 10% non-response rate, and rounding up, the final sample size was 390.

Sampling

Three hundred and ninety adolescent girls were invited to participate and were selected using a multi-stage sampling technique. Six of the 11 public primary and junior secondary schools in the area were selected using proportional random sampling across the four wards. In each school, Probability Proportional to Size (PPS) sampling was used to determine the number of girls to participate in the study per grade. Thereafter, girls were randomly selected from each selected grade in each chosen school. Guided by a public health officer, grades 5 to 8 were identified as appropriate for the age group of interest. Girls in grade five were aged 10 years and above, while grade 8 comprised of 13- and 14- year-olds. For the qualitative data, girls were purposively selected from the eligible grades. All selected girls were provided with a consent form for guardian approval prior to data collection and additionally provided individual assent.

Data Collection

A self-administered questionnaire was used to collect information on demographic characteristics, knowledge of HPV, and attitude towards HPV and the vaccine. Participants were encouraged to answer all items truthfully and instructed to hand in the questionnaire upon completion. The FGD guide consisted of open-ended questions focusing on the information required from participants. Two of the three planned adolescent FGDs (FGDG1 and FGDG2) were successfully conducted within school grounds with six and seven girls from grades 7 and 8 respectively.¹⁶ A third FGD involving girls from grade 5 was terminated due to limited discussion within the group. Topics explored included sources of information, depth of knowledge relating to HPV and the vaccine, as well as related perceptions, views and concerns.

Measurement of Variables

The primary outcomes were knowledge and attitude among the adolescent girls. The secondary outcome was HPV vaccine uptake and factors associated with knowledge and attitude. Based on vaccination guidelines, uptake was defined as the proportion of adolescent girls who had received two doses of the HPV vaccine.

Five knowledge questions were used to assess participant's level of knowledge. Participants who correctly answered questions on susceptibility to HPV, awareness of the vaccine, indication for vaccination; recommended number of doses; and virus transmission were given a score of 1 for each correct response, while incorrect responses were scored 0. Total and mean scores were calculated. From a maximum score of 5, participants scoring above the mean were classified as having good knowledge.^{12,13,17}

Attitude towards cervical cancer, HPV, and the vaccine was measured using nine attitude-related questions. Attitude was classified as positive if the participant considered the vaccine safe; was not concerned about cervical cancer; could get the vaccine independently; was not embarrassed by the topic; did not fear injections; did not believe injections to be painful; could discuss the topic with parents with ease; could visit a hospital independently; and wanted more information. For each question, a value of 1 was assigned for positive attitude while a negative or neutral attitude was scored as 0. Total and mean scores were calculated, and participants with scores above the mean were classified as having a positive attitude.^{18,19}

Data Quality Control

The questionnaire was developed from review of tools in existing literature and pretested on 10% of the sample size in a school not included in the main study, to assess validity and reliability. The tool was evaluated for clarity, simplicity and flow, and any unclear questions were revised. Two data collectors were trained for two days on data collection tools and procedures, study objectives, participants' rights, and informed consent. Completed questionnaires were checked intermittently during data collection by the principal investigator to ensure completeness and consistency. The principal investigator also entered the data to ensure accuracy. For qualitative data, discussions were audio-recorded, transcribed verbatim, and reviewed repeatedly before thematic coding and triangulation with quantitative findings.

Data Processing and Analysis

Data from completed questionnaires were cleaned, coded, checked for missing values, and analyzed using IBM SPSS version 29. Descriptive and inferential statistics were generated. Bivariate analysis was undertaken using Pearson's chi-square and Fishers's exact test to check for association between knowledge and attitude variables, and HPV vaccine uptake. Variables from the bivariate analysis with p -value $<.20$ were entered into a multivariable logistic regression model to identify independent predictors, while adjusting for potential confounders. Alpha was set at 0.05 for both levels of analysis. The final model demonstrated a significant improvement over the intercept-only model ($\chi^2 = 47.038$, $df = 10$, $p = .002$), suggesting that the explanatory variables meaningfully improved prediction of HPV vaccine uptake. The pseudo R-square statistics showed modest explanatory power, (Cox and Snell $R^2 = .119$)

Qualitative data from the FGD were coded thematically and analysed using thematic analysis. Findings were presented as narrative quotes of participant statements.

Ethical Considerations

Ethical clearance was provided by Maseno University Scientific and Ethics Review Committee (01348/24). A research permit from NACOSTI (P/24/37060) and administrative authorizations were also secured. Study subjects participated voluntarily. Guardians of minors provided informed consent while participants provided verbal assent. Participants were assured of confidentiality of information. All data were de-identified and coded prior to analysis. Discussions were conducted in a secluded area to ensure privacy.

RESULTS

Demographics

Three hundred and seventy-six (376) girls who obtained informed consent from their guardians and willingly assented participated in the survey. The mean age of the study participants was 12.59 ± 1.15 years, and 39.9% were in grade 8. Approximately 30.7% attended Pentecostal churches and 74.4% resided with both parents. Sixty-one girls (16.4%) were partially vaccinated against HPV while 39.6% had never received any dose of the vaccine (Table 1).

Source of Information

School was the most common source of information about HPV and the vaccine, supplying 56.9% of participants. Other important sources of information included health workers and parents (Figure 1).

Discussants in the FGD concurred that they had received information on HPV vaccine in school, and mentioned other sources of information such as mass media and the internet.

"We can get information from doctors, teachers in school, parents...some are fifty-fifty, they are not very digital. Others (parents) do not know, some know a little or don't understand." (Girl, FGDG1)

"We have heard of HPV from announcements on TV, news on TV, Facebook, from home. Someone came to school to tell us; we got a paper to take home. We can also get information...

search from Google, YouTube, even mentors." (Girl, FGDG2)

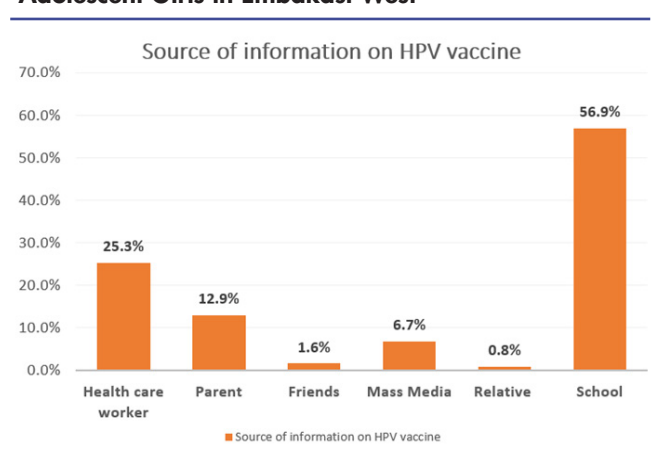
TABLE 1: Demographic Characteristics of Respondents

Demographic variable	n	%
Age in years		
10	17	4.6
11	38	10.2
12	118	31.8
13	120	32.3
14	78	21.0
Grade		
5	74	19.9
6	76	20.5
7	73	19.7
8	148	39.9
Religion		
Muslim	5	1.4
Catholic	59	15.9
Pentecostal	114	30.7
Other*	177	47.7
None	16	4.3
Live with both parents		
No**	95	25.6
Yes	276	74.4
Received HPV vaccine		
No	147	39.6
Yes- Once only	61	16.4
Yes- Twice	163	43.9

* Anglican, Baptist, Seventh Day Adventist, Independent churches

** Includes living with single parent (mother, father), or other guardian

FIGURE 1: Sources of HPV Vaccine Information for Adolescent Girls in Embakasi West



*Total exceeds 100% due to option to select multiple sources

Level of Knowledge

Knowledge of HPV transmission, susceptibility, the vaccine, its indicated use, and recommended doses was assessed. Two hundred and twenty-five girls (60.6%)

correctly identified the mode of HPV transmission, but only 16.4% were aware that both boys and girls are susceptible to the HPV infection. As many as 79.5% of participants reported to have heard about the HPV vaccine; 72% correctly identified its role in preventing cervical cancer; and 62.3% correctly selected the recommended number of vaccine doses. Knowledge scores ranged from 0 to 5. Participants had a mean knowledge score of 2.97 ± 0.92 , hence a score of ≥ 3 was construed as good knowledge and a score of ≤ 2 was classified as poor knowledge. Overall, 74.7% of the participants demonstrated good knowledge (Table 2).

TABLE 2: HPV Related Knowledge of Adolescent girls in Embakasi West

Knowledge Item/Category	n	(%)
Who can get HPV infection		
Boys only	2	0.5
Boys and girls	61	16.4
Girls only	303	81.7
Adults only	5	1.3
Has heard about HPV vaccine		
Yes	295	79.5
I think so	25	6.7
I don't think so	9	2.4
No	42	11.3
HPV vaccine provides protection from		
Pregnant	20	5.4
Cervical cancer	267	72.0
HIV	47	12.7
I don't know	37	10.0
Number of recommended HPV vaccine doses		
One time	7	1.9
Two times	231	62.3
Three times	82	22.1
I don't know	51	13.7
How the HPV virus is spread		
Coughing/sneezing	10	2.7
Poor hygiene	49	13.2
Sex	225	60.6
I don't know	87	23.5
Overall knowledge score		
Good	277	74.7
Poor	94	25.3

Discussants in both adolescent FGD described acquiring information at school through brief encounters with healthcare workers who visited the school. The girls gave varied responses regarding virus transmission, including infection through touch and sharing of personal items. In addition to vaccination, some believed that infection could be prevented through healthy eating.

"We were not taught. They explained it to us, and we were told it is for preventing cancer. We were given a card to take home to our parents" (Girl, FGDG2)

Fischer's exact test was run to establish the association between knowledge and HPV vaccine uptake. Statistically significant association was found between knowledge on mode of virus transmission ($p=.03$), susceptibility ($p=.041$), awareness of the vaccine ($p=.001$), and uptake.

Knowledge of susceptibility was significantly associated with uptake ($p=.041$). Neither knowledge of the indication for HPV vaccination nor knowledge of the recommended number of doses was significantly associated with HPV vaccine uptake ($p>.05$). Overall knowledge level was also not significantly associated with uptake. (Table 3).

Respondent Attitudes

The vaccine was considered safe by 70.1% of participants. Two hundred and thirty-four girls (63.1%) reported that they did not worry about getting cervical cancer; 57.4% were not embarrassed by the topic; 79.2% felt they could easily discuss the vaccine with their parents; and 90.3% expressed interest in receiving more information about the vaccine. Only 42% believed they could get the vaccine on their own; 32.6% were not afraid of injections, 17.5% believed injections were not painful; and 22.6% felt they could visit a health facility alone to receive the vaccine. The mean attitude score for study participants was 4.3 ± 1.6 [0-9]. Less than half of the participants (45.3%) demonstrated a positive attitude towards HPV vaccination (Figure 2).

Most adolescent discussants described injections as painful and expressed negative perceptions, which they attributed to comments made by parents, relatives and friends, resulting in mistrust and fear.

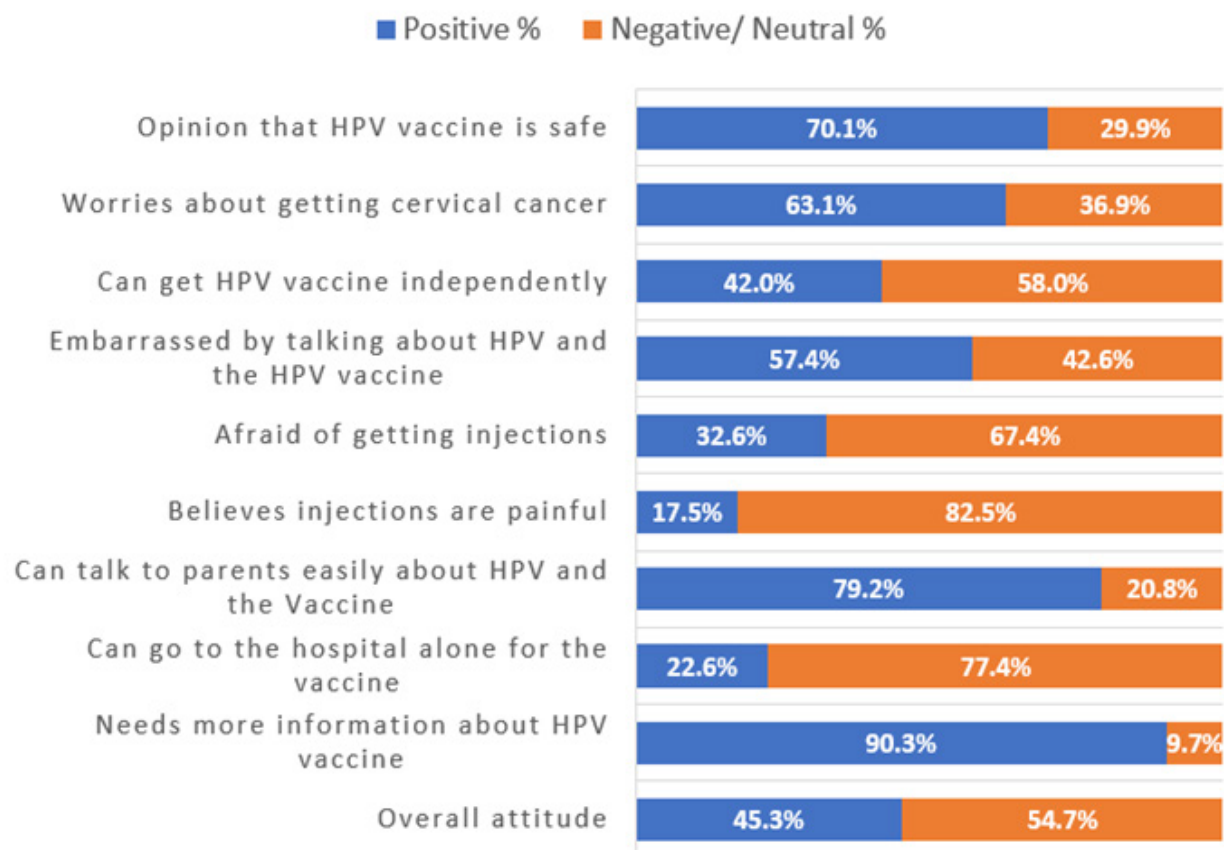
"Am very afraid. The pain may be bad, the needle can break inside, it can affect you like headache, vomiting, swelling of the breast. It can bring another disease more than what you had" Girl, FGDG1

"Our parents... some have refused. My parent says if you get injected and you get sick you are on your own. When you hear this, you fear. You believe it's true. It is someone who is older than you, so they have ever experienced" Girl, FGDG2

A statistically significant association was found between attitudes towards discussing the HPV vaccine and vaccine uptake, χ^2 (3, N = 371) = 7.9, $p = .048$, as well as between beliefs about injection pain and vaccine uptake, χ^2 (3, N = 371) = 11.7, $p = .008$. However, no significant associations were observed between vaccine uptake and perceptions of vaccine safety or the ability to discuss the vaccine with parents. Similarly, attitudes towards cervical cancer, obtaining the vaccine independently, fear of injections, and the ability to access a health facility independently were not significantly associated with uptake. (Table 4).

Logistic Regression of the Association Between Knowledge, Attitude and Uptake

Girls who had not heard about the HPV vaccine had a significantly higher odds of poor vaccine uptake compared with those who had heard about it (OR= 4.689, 95% CI: 1.905–11.543; $p=.001$). Although not statistically significant, girls who reported embarrassment when discussing HPV-related topics had increased odds of poor vaccine uptake compared to those who did not report such embarrassment (OR 1.577, 95% CI: 0.944-2.635; $p=.082$). Overall knowledge and attitude scores were not significantly associated with HPV vaccine uptake in the adjusted model (Table 5).

FIGURE 2: Attitude of Adolescent Girls Towards HPV and the Vaccine**TABLE 3: Association Between Adolescent Knowledge and Uptake of HPV Vaccine in Embakasi West**

Knowledge Item/ Category	Uptake n (%)	No uptake n (%)	χ^2 (DF)	p value
Who can get HPV infection				
Boys only	2 (100.0)	0 (0.0)	Fisher's exact	.041*
Boys and girls	23 (37.7)	38 (62.3)		
Girls only	138 (45.5)	165 (54.5)		
Adults only	0.0 (0)	5 (100.0)		
Has heard about HPV vaccine				
Yes	147 (49.8)	148 (50.2)	Fisher's exact	.001*
I think so	7 (28.0)	18 (72.0)		
I don't think so	1 (11.1)	8 (88.9)		
No	8 (19.0)	34 (81.0)		
HPV vaccine provides protection from				
Pregnant	10 (50.0)	10 (50.0)	1.627 (3)	.658
Cervical cancer	118 (44.2)	149 (55.8)		
HIV	22 (46.8)	25 (53.2)		
I don't know	13 (35.1)	24 (64.9)		
Number of recommended HPV vaccine doses				

Continue

TABLE 3: Continued

Knowledge Item/ Category	Uptake n (%)	No uptake n (%)	χ^2 (DF)	<i>p</i> value
One time	3 (42.9)	4 (57.1)	Fisher's exact	.22
Two times	109 (47.2)	122 (52.8)		
Three times	35 (42.7)	47 (57.3)		
I don't know	16 (31.4)	35 (68.6)		
How the HPV virus is spread			Fisher's exact	.03*
Cough/sneeze	8 (80.0)	2 (20.0)		
Poor hygiene	20 (40.8)	29 (59.2)		
Sex	90 (40.0)	135 (60.0)		
I don't know	45 (51.7)	42 (48.3)		
Overall knowledge			0.630 (1)	.427
Good	125 (45.1)	152 (54.9)		
Poor	38 (40.4)	56 (59.6)		

χ^2 =chi-square, DF=Degrees of Freedom, *=*P* value significant below .05

TABLE 4: Association Between Adolescent Attitude and Uptake of the HPV Vaccine in Embakasi West

Attitude Item/ Category	Uptake n (%)	No uptake n (%)	χ^2 (DF)	<i>p</i> value
Opinion that HPV vaccine is safe			3.942 (3)	.271
Yes	121 (46.5)	139 (53.5)		
I think so	21 (44.7)	26 (55.3)		
I don't think so	5 (33.3)	10 (66.7)		
No	16 (32.7)	33 (67.3)		
Worries about getting cervical cancer			4.486 (3)	.215
Yes	29 (41.4)	41 (58.6)		
A little	18 (60.0)	12 (40.0)		
Not so much	13 (35.1)	24 (64.9)		
No	103 (44)	131 (56)		
Can get HPV vaccine independently			5.663 (3)	.128
Yes	79 (50.6)	77 (49.4)		
I think so	32 (42.7)	43 (57.3)		
I don't think so	17 (39.5)	26 (60.5)		
No	35 (36.1)	62 (63.9)		
Embarrassed by talking about HPV and the HPV vaccine			7.892 (3)	.048
Yes	18 (31.0)	40 (69.0)		
A little	22 (52.4)	20 (47.6)		
Not so much	21 (36.2)	37 (63.8)		
No	102 (47.9)	111 (52.1)		
Afraid of injections			0.058 (3)	.997
Yes	71 (43.6)	92 (56.4)		
A little	20 (44.4)	25 (55.6)		
Not so much	18 (42.9)	24 (57.1)		
No	54 (44.6)	67 (55.4)		
Believes injections are painful			11.739 (3)	.008
Yes	76 (37.3)	128 (62.7)		
A little	35 (58.3)	25 (41.7)		
Not so much	24 (57.1)	18 (42.9)		
No	28 (43.1)	37 (56.9)		
Can talk to parents easily about HPV and the vaccine			Fisher's exact	.053
Yes	128 (43.5)	166 (56.5)		
I think so	18 (48.6)	19 (51.4)		
I don't think so	9 (75.0)	3 (25.0)		

Continue

TABLE 4: Continued

Attitude Item/ Category	Uptake n (%)	No uptake n (%)	χ^2 (DF)	<i>p</i> value
No	8 (28.6)	20 (71.4)		
Can go to hospital alone for the vaccine				
Yes	39 (46.4)	45 (53.6)	6.037 (3)	.111
I think so	20 (57.1)	15 (42.9)		
I don't think so	23 (52.3)	21 (47.7)		
No	81 (38.9)	127 (61.1)		
Needs more information about HPV vaccine				
Yes	147 (43.9)	188 (56.1)	Fisher's exact	.221
I think so	12 (60.0)	8 (40.0)		
I don't think so	1 (25.0)	3 (75.0)		
no	3 (25.0)	9 (75.0)		

χ^2 =chi square, DF=Degrees of Freedom, *=*P* value significant below .05

TABLE 5: Logistic Regression for Knowledge and Attitude on Uptake of HPV Vaccine Among Girls Aged 10-14 Years in Embakasi West

Variables	<i>P</i> - value	OR	95% CI
Intercept	.639	-	-
Boy and girls can get HPV infection			
No	.858	.938	.464- 1.893
Yes	-	-	-
Has heard about HPV vaccine			
No	.001	4.689	1.905- 11.543
Yes	-	-	-
The HPV virus is spread by sex			
No	.460	.815	.474- 1.401
Yes	-	-	-
Knowledge overall scores			
poor	.251	.581	.230- 1.468
Good	-	-	-
Opines can get vaccine independently			
Negative	.104	1.536	.916- 2.576
Positive	-	-	-
Embarrassed by topic of HPV			
Negative	.082	1.577	.944- 2.635
Positive	-	-	-
Belief that injections are painful			
Negative	.404	.745	.374- 1.486
Positive	-	-	-
Can talk to caregivers about HPV			
Negative	.667	.878	.486- 1.586
Positive	-	-	-
Opines can go to hospital independently			
Negative	.263	1.405	.775- 2.545
Positive	-	-	-
Overall Attitude			
Negative	.191	.592	.270- 1.300
Positive	-	-	-

OR, Odds Ratio; CI, Confidence Interval

DISCUSSION

This study assessed adolescent girls' knowledge and attitude towards HPV and HPV vaccine.

Source of Information

More than half of the participants obtained information about HPV from school and remembered receiving health talks prior to school-based vaccination programs. The vaccination program was delivered in schools twice yearly, during which health worker engaged the girls, and provided consent forms for their parents. Similar findings have been reported in studies conducted in Nairobi and the Amazon, where school was also identified as the primary source of information.^{18,19} However, the brief and infrequent interaction with health workers may explain why some girls (11.3%) reported not being aware of the vaccine. This finding highlights the importance of regular educational interactions. Health workers, parents, teachers and mass media were also identified as sources of information during the FGDs.

Knowledge Pertaining to HPV and the Vaccine

Majority (74.7%) of study participants demonstrated good knowledge regarding HPV transmission, awareness of the vaccine, its indication, and the recommended number of doses. This finding was higher than the proportion reported in similar studies where 59.2% and 50.8% of participants respectively had good knowledge.^{20,21} The finding may partly be explained by the urban study setting. In comparison to rural populations, urban residents often have higher knowledge due to better access to healthcare, health practitioners and sources of information such as media, as well as higher knowledge level among parents.^{13,21,22} Nevertheless, FGDs revealed persistent knowledge gaps regarding HPV and the vaccine, which could be attributed to forgetfulness, or the narrow scope of knowledge items explored in the questionnaire. Additionally, most of the study participants believed that only girls were susceptible to the virus. This perception may be linked to the fact that HPV vaccination programmes in Kenya primarily target girls and provide vaccination to them free of charge.

Awareness of the HPV vaccine emerged as a critical determinant of vaccine uptake among girls aged 10 to 14 years. The significantly higher odds of poor vaccine uptake among girls who had never heard about the HPV vaccine underscores the importance of health education and communication interventions. In contrast, the overall knowledge scores were not associated with vaccine uptake, differing from studies that reported positive associations between good knowledge and vaccine uptake.^{12,23–25} Educational interventions that improve communication and access to information have been shown to increase uptake.²⁶ Moreover, as adolescents mature, their capacity to process increasingly complex information improves, highlighting the importance of providing age-appropriate and accurate health information to support informed decision making.²⁷

Attitude Towards HPV and the Vaccine

Majority of the participants reported fear of injections and injection-related pain. Fear of pain and adverse effects has previously been documented as a barrier to vaccine

uptake.²⁸ As reflected in the FGDs, participants also expressed concerns about adverse reactions and long-term effects. However, fear-related attitudes did not predict uptake, suggesting that informational barriers may play a more important role than procedural fears. Providing counselling, encouraging open communication, and addressing misconceptions may help reduce hesitancy and alleviate fears.²⁹

Discussants in the FGD also demonstrated limited confidence in health-related decision making, which they linked to negative comments from caregivers, relatives and peers, as well as mistrust of the health workers. Previous studies have shown that parental support and open discussion can enhance adolescents' understanding, acceptance and confidence in health decisions.³⁰ While majority (79.2%) of the participants reported being comfortable discussing HPV and vaccine related issues with their caregivers, only 12% learned about the vaccine from a parent. This may suggest limited parental knowledge or confidence regarding the topic. Consequently, adolescents may be more vulnerable to misinformation and vaccine hesitancy.

The study found that over half of the participating girls had a negative attitude towards the HPV vaccine. Similar findings have been reported elsewhere, although positive attitudes have also been documented.^{12,17,21,24} Knowledge has been reported to improve attitude and positively associated with vaccine acceptance.^{13,17,23} However, despite relatively high knowledge levels in the present study, this did not translate into positive attitudes. This finding may reflect insufficient information, misinformation or persistent myths about the vaccine, several of which emerged during the group discussions. Additionally, negative press and social media messages also have the potential to adversely affect population attitudes.³¹ Interventions should therefore focus not only on increasing knowledge but also on addressing societal norms, misconceptions, and community perceptions surrounding HPV vaccination.

Uptake of HPV Vaccine

More than half of the participants (56.1%) demonstrated poor vaccine uptake. While a large number of those who believed injections were painful had not been vaccinated against HPV, pain related beliefs did not predict poor uptake in the adjusted model. Study participants' good knowledge and negative attitude did not appear to impede uptake, contrary to findings by previous studies.^{19,21,32,33} This may be explained by the fact that parents had sole authority to consent to the vaccination of their adolescent daughters. Most HPV vaccine-promotion efforts target parents and health care workers, leaving adolescents who are the intended recipients of the HPV vaccine feeling marginalised. Nevertheless, adolescents have shown interest in knowing more about the vaccine, being advocates among their peers, and being involved in the decision-making process.^{34,35} Awareness campaigns targeting adolescents may therefore improve vaccine acceptancy, especially among hesitant individuals.

Limitations

The study was carried out in a single Sub-County and included only participants from public schools. This limits

the generalisability of the findings to adolescents out of school or those in private schools. Vaccination status of participants was self-stated, and not verified through registries, introducing the possibility of reporting bias. In addition, the two FGDs may only offer limited perspectives and may have missed unique insights attainable with more discussions. Finally, the cross-sectional design of the study cannot establish causal relationships between independent and dependent variables.

CONCLUSIONS

Adolescent girls in Embakasi West Sub-County demonstrated generally good knowledge but predominantly negative attitudes towards HPV and the vaccine. Lack of awareness was a major determinant of poor HPV vaccine uptake, underscoring the critical role of awareness in shaping behaviour. The limited duration of health worker engagement in schools, coupled with the long intervals between information sessions, likely reduced the effectiveness of health education delivery and hindered sustained knowledge retention among students. Targeted health education programs that incorporate parents-child interaction as well as peer-to-peer information sharing should be introduced. These will ensure that adolescent girls receive regular, and accurate information, thereby supporting informed decision-making and improving vaccine uptake.

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Peer Reviewed

Acknowledgements: We sincerely thank all participants and interviewees for their time and insights.

Competing Interests: Authors declare no competing interest.

Funding: The study did not receive any funding.

Received: 05 September 2025 ; **Accepted:** 30 May 2026

Cite this article as Ng'ang'a SW, Omemo P; Maima OA, Cheboi KS. Knowledge and Attitude of Adolescent Females in Embakasi West Sub-County, Kenya towards HPV Vaccine and Cervical Cancer. *East Afr Health Res J*. 2026;10(1):70-79. <https://doi.org/10.24248/eahrj.v10i1.871>

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