

RESEARCH ARTICLE

Knowledge and Attitudes Toward Cervical Cancer and Human Papilloma Virus Vaccination in *Rafiki* Area, *Rongai* Sub-County, Nakuru County, Kenya: A Cross-sectional Study

Mercy M. MICHIRA¹ , Dinah L. SANGURA¹ , Mercy K. JEPCHIRCHIR¹ , Nahashon G. AKUNGA² , Wairimu KARAIHIRA^{*1} , James O. MEROKA¹ & Jim AMISI² 

Author Affiliations

¹ Department of Clinical Pharmacy and Pharmacology, School of Pharmacy, Kabarak University, Nakuru, Kenya

² Department of Pre-Clinicals and Pharmacognosy, School of Pharmacy, Kabarak University, Nakuru, Kenya

*Corresponding Author: wkaraihira@kabarak.ac.ke



Submitted: 26th March 2026 | Accepted: 19th May 2026 | Published Online: 26th August 2026

ABSTRACT

The human papillomavirus (HPV) has been proven to be a primary driver in the development of cervical cancer. Despite increasing awareness efforts, Human Papillomavirus (HPV) vaccine uptake remains low in many low-resource settings. This study assessed knowledge and attitudes towards cervical cancer and human papillomavirus vaccination, and predictors of HPV vaccine uptake among individuals aged 15-49 years in *Rafiki* area, *Rongai* sub-county, Nakuru County, Kenya. A cross-sectional survey was conducted with 328 participants selected through convenience sampling. Structured interviewer-administered questionnaires were used to collect data on sociodemographic characteristics, cervical cancer and HPV vaccine awareness and attitudes, sources of information, and perceived barriers. Data were analysed using R version 4.2.2. Descriptive statistics such as mean, frequencies and proportions were used to summarise sociodemographic characteristics, knowledge, attitudes and barriers, and multivariable binary logistic regression was used to identify predictors of HPV vaccine uptake. The participants of this study were predominantly female (219, 66.8%), single (74.4%), unemployed (68.0%), had a tertiary level of education (74.1%) and a mean age of 25.9 $\pm$ 7.4 years. Although 240 (73.2%) of respondents were aware of the existence of the HPV vaccine and 306 (93.3%) had heard about cervical cancer before, only 37 (11.3%) had received it. Barriers to uptake included fear of adverse effects (32.0%), lack of awareness of vaccine availability (17.8%), cost (15.5%) and lack of access (13.1%). Positive predictors of HPV vaccine uptake identified through multivariable binary logistic regression included being female (aOR 2.9, 95% CI 1.2-8.4, p=0.031), being divorced (aOR 12.1, 95% CI 1.4, 81.1, p=0.011) and having heard about the vaccine before (aOR 10.5, 95% CI 3.2-50.0, p=0.001). While general awareness of the HPV vaccine is high, uptake remains alarmingly low due to structural, informational, and perceptual barriers. Targeted interventions should focus on improving vaccine availability, leveraging trusted information channels particularly healthcare providers and addressing misconceptions. The findings of the study can be used as a basis for more robust studies. Additionally, it serves as a starting point in the development of a useful tool with real-world value for guiding localised public health strategies aimed at increasing HPV vaccination coverage in similar settings.

Keywords: HPV vaccine, Cervical Cancer, Barriers, Predictors

How to Cite this Article: MICHIRA, M. M., SANGURA, D. L., JEPCHIRCHIR, M. K., AKUNGA, N. G., KARAIHIRA, W., MEROKA, J. O., & AMISI, J. (2026). Knowledge and Attitudes Toward Cervical Cancer and Human Papilloma Virus (HPV) Vaccination in *Rafiki* Area, *Rongai* Sub-County, Nakuru County, Kenya: A Cross-sectional Study. *African Journal of Pharmacy and Alternative Medicine*, 5(02), 327–336. <https://doi.org/10.58460/ajpam.v5i01.215>



INTRODUCTION

Cervical cancer is a malignant tumor that emerges and grows in the cervix of the female reproductive system (Kasi et al., 2021). There are two histological types of cervical cancer: adenocarcinoma and squamous cell carcinoma (SCC), with SCC being the most common subtype, accounting for up to 80% of all cases (Kasi et al., 2021). According to the Global Cancer (GLOBOCAN) statistics 2022, it is the fourth most prevalent cancer and a leading cause of mortality among women globally (Bray et al., 2024). In Kenya, it comes second after breast cancer in prevalence and mortality. According to Karanja-Chege (Karanja-Chege, 2022), over 5,000 incident cases and 3,000 deaths were reported in Kenya in 2020 as a result of cervical cancer.

Cervical carcinoma is attributed to persistent high-risk Human Papillomavirus (HPV) infection, which may induce carcinogenesis (Kusakabe et al., 2023). HPV types 16 and 18 represent over 70% of serotypes (Karanja-Chege, 2022). Other risk factors predisposing to its development include contraceptive use, genetic predisposition, smoking, multiple sexual partners, some sexually transmitted illnesses, immunosuppression, low socioeconomic status, multiparity, previous history of vaginal, vulval, or cervical SCC, and early onset of sexual activity (Bray et al., 2024; Yang et al., 2022).

The Kenya National Cancer Control Strategy (KNCCS) 2023-2027 has an objective of preventing cervical cancer by using the HPV vaccine as the significant primary preventive approach, while also providing screening services for early detection as a secondary approach to prevention which is in line with the World Health organization 90-70-90 strategy to eliminate cervical cancer (Geneva: World Health Organisation, 2020; Kenya Ministry of Health, 2018). Women aged 25-49 years are the major targets for screening with the screening frequency interval recommended to be every 5 years (Kenya Ministry of Health, 2018). On the other hand, if a person is diagnosed with Human Immunodeficiency Virus (HIV), the screening is done every 2 years because of increased risk (Dreyer, 2018). Screening tests performed include a pap smear, a visual inspection of the cervix (VIA-VILI), and an HPV test (Kenya Ministry of Health, 2018).

The HPV vaccines are approved for use in individuals (both male and female) as young as 9 to 26 (Gezimu et al., 2024; Karanja-Chege, 2022). They can also be given up to age 45 to prevent HPV-caused diseases. The vaccination is also prophylactic against other HPV associated cancers such as penile and anorectal cancers, as well as, genital warts caused by other HPV strains (Ngoma & Ngoma, 2019).

In the year 2019, the Kenyan government initiated the HPV vaccination program (Karanja-Chege, 2022), which targeted girls aged between 10-14 as they are considered to be sexually inactive, hence unlikely to have been exposed to the virus. The vaccine is given in two doses 6 months apart (Karanja-Chege, 2022). The Kenya HPV vaccination program offers quadrivalent and bivalent HPV vaccines, which target HPV serotypes 6, 11, 16, and 18 and 16, 18, respectively (Zhu et al., 2022). A study conducted within Nakuru West and *Rongai* sub-counties showed that while increasing, the uptake of HPV vaccines still remains low, at 22% in *Rongai* sub-county in 2022 (Chepkemioi & Jerotich, 2023). While this study demonstrated a gap in uptake, no study has been done within the diverse population in *Rongai* sub-county, demonstrating knowledge and attitudes concerning cervical cancer and the HPV vaccines amongst individuals of childbearing age (15-49 years old), including men who are an understudied population, despite their status as carriers of the human papilloma virus (Zou et al., 2022).

This study aimed to determine the knowledge and attitudes regarding cervical cancer and HPV vaccines as well as predictors of HPV vaccine uptake among residents of *Rafiki* area, within *Rongai* Sub-county in Nakuru County, Kenya.

METHODS

Study Design, Site and Duration

The study used a cross-sectional study design to evaluate the knowledge and attitudes of individuals toward HPV vaccination and cervical cancer aged 15-49 years in *Rafiki* area, *Rongai* sub-county, Nakuru County, Kenya between March and June 2024.

Study Population

Inclusion criteria

1. Individuals (both male and female) aged between 15-49 years old
2. Individuals that resided within *Rafiki* area, *Rongai* sub-county

Exclusion criteria

1. Individuals unable to communicate in either English or Swahili
2. Individuals who were unwilling to provide consent

Sample Size Calculation and Sampling Technique

The sample size was determined using the single population proportion formula, yielding a sample of 328 participants, assuming a 30% baseline

knowledge level (p) based on prior studies, with a 95% confidence level ($z = 1.96$) and a 5% margin of error ($e = 0.05$). The initial calculation yielded 322 participants, adjusted to 328 after adding 2% to account for potential non-response, derived from an average of similar studies.

Participants were selected using convenience sampling, based on the ease of their accessibility and availability, provided they met the eligibility criteria.

Ethical and Logistical Considerations

Ethical approval was obtained from Kabarak University Research Ethics Committee (KUREC-320724) and NACOSTI (License No NACOSTI/P/24/38692), ensuring compliance with ethical standards. This was a compulsory requirement before data collection is done. Participants were fully informed about the study's purpose, risks, benefits, and their right to withdraw without consequences before signing consent forms. Confidentiality was maintained by anonymizing data, excluding personal identifiers, and storing records securely in a locked cabinet and password-protected Google Drive, accessible only to the researchers.

Data Collection and Analysis

Data collection instruments included structured interviewer-administered questionnaires and an interview guide, initially prepared in English, translated to Swahili, and back-translated to ensure consistency. The questionnaire was pretested on a 10% sample (33 participants) to assess clarity, relevance, and reliability, with refinements made before full deployment. Three trained research assistants conducted face-to-face interviews and administered the questionnaires. Data was entered into Microsoft Excel 2019 and analysis was performed using R Version 4.2.2 focusing on quantifying responses, and fitting a binary logistic model to predict the likelihood of HPV vaccination.

RESULTS

Sociodemographic Characteristics

A majority of respondents were female (219, 66.8%), while males constituted 33.2% of the sample. Most participants were single (74.4%) and unemployed (68.0%), as shown in Table 1.

The mean age of participants was 25.9 ± 7.4 years, with the majority between 15 and 24 years old. Chi square tests of independence (Table 1) were conducted for each sociodemographic characteristic. Results showed significant gender differences in education ($p = 0.02$). No significant differences were observed for the other sociodemographic characteristics (all $p > 0.05$).

Table 1:
Mean $\pm$ SD of Full Blood Count Parameters by Group

Variable	Males (n=109)n (%)	Females (n=219)n (%)	Total (N=328)n (%)	Mean ($\pm$ SD)& P Value
Age (years) Mean $\pm$ SD	25.74 $\pm$ 7.06	25.95 $\pm$ 7.54	(N=328)	
15-24	59 (54.1)	130 (59.4)	189 (57.6)	25.9 $\pm$ 7.4 $p = 0.169$
25-34	36 (33.0)	49 (22.4)	85 (25.9)	
35-44	12 (11.0)	36 (16.4)	48 (14.6)	
≥ 45	2 (1.8)	4 (1.8)	6 (1.8)	
Highest level of education				$p = 0.02$
Primary	5 (4.6)	1 (0.5)	6 (1.8)	
Secondary	22 (20.2)	57 (26.0)	79 (24.1)	
Tertiary	82 (75.2)	161 (73.5)	243 (74.1)	
Marital status				$p = 0.408$
Single	86 (78.9)	158 (72.1)	244 (74.4)	
Married	21 (19.3)	57 (26.0)	78 (23.8)	
Divorced	2 (1.8)	4 (1.8)	6 (1.8)	
Employment status				$p = 0.978$
Employed	35 (32.1)	70 (32.0)	105 (32.0)	
Unemployed	74 (67.9)	149 (68.0)	223 (68.0)	

Knowledge on Cervical Cancer and HPV Vaccine

The knowledge on cervical cancer and HPV-related issues varied among participants. Each question was analysed independently. As shown in Table 2, nearly all participants (93.3%) had heard about cervical cancer before, but less than half were aware of its risk factors (39.3%) or its symptoms (43.6%). A substantial majority (79.9%) reported awareness of the availability of cervical cancer screening services; however, 66.5% lacked knowledge regarding the recommended age and frequency for screening. Awareness of the HPV vaccine was relatively high, with 73.2% reporting knowledge of its availability. Nonetheless, only 60.7% were aware of the minimum age for HPV vaccine administration.

Table 2:

Knowledge on Cervical Cancer and HPV Vaccine

Question	Response	Male (n=109)	Female (n=219)	Total (n=328)	p-value
1. Have you heard about cervical cancer before?	Yes	94 (86.2)	212 (96.8)	306 (93.3)	P<0.001
	No	15 (13.8)	7(3.2)	22(6.7)	
2. Do you know the risk factors for cervical cancer?	Yes	42 (38.5)	87 (39.7)	129 (39.3)	P=0.84
	No	67 (61.5)	132 (60.3)	199 (60.7)	
3. Can you list at least three risk factors for cervical cancer?	Yes	46 (42.2)	96 (43.8)	142 (43.3)	P = 0.76
	No	63 (57.8)	123 (56.2)	186 (56.7)	
4. Are you aware of the symptoms of cervical cancer?	Yes	48 (44.0)	95 (43.4)	143 (43.6)	P = 0.92
	No	61 (56.0)	124 (56.6)	185 (56.4)	
5. Are you aware that cervical cancer screening is available?	Yes	82 (75.2)	180 (82.2)	262 (79.9)	P = 0.14
	No	27 (24.8)	39 (17.8)	66 (20.1)	
6. Do you know the age and frequency of cervical cancer screening?	Yes	31 (28.4)	79 (36.1)	110 (33.5)	P = 0.15
	No	78 (71.6)	140 (63.9)	218 (66.5)	
7. Have you heard about the HPV vaccine before?	Yes	69 (63.3)	171 (78.1)	240 (73.2)	P<0.01
	No	40 (36.7)	48 (21.9)	88 (26.8)	
8. Do you know what the minimum age for administration of the HPV vaccine is?	Yes	36 (33.0)	93 (42.5)	129 (39.3)	P = 0.11
	No	73 (67.0)	126 (57.5)	199 (60.7)	
9. Have you ever seen or heard about awareness campaigns related to cervical cancer and HPV vaccine in <i>Rafiki</i> Area?	Yes	31 (28.4)	63 (28.8)	94 (28.7)	P = 0.92
	No	78 (71.6)	156 (71.2)	234 (71.3)	
10. Have you ever attended a medical camp with free cervical cancer screening?	Yes	31 (28.4)	82 (37.4)	113 (34.5)	P = 0.12
	No	78 (71.6)	137 (62.6)	215 (65.5)	

Chi square tests of independence (Table 2) were conducted for each knowledge item. Results showed significant gender differences in awareness of cervical cancer, χ^2 (1, N = 328) = 11.52, $p < 0.001$, and HPV vaccine awareness, χ^2 (1, N = 328) = 7.21, $p = 0.01$. No significant differences were observed for all the other knowledge items (all $p > .05$).

Sources of Information on Cervical Cancer and HPV Vaccine

Overall, 74.4% of participants reported having access to information about cervical cancer and the HPV vaccine and 85.1% deemed these sources reliable as shown in Table 3. A chi square test of independence (Table 3) showed that access to information about cervical cancer and HPV vaccines was significantly associated with gender, χ^2 (1, N = 328) = 10.56, $p < 0.001$. Perceptions of source reliability did not differ significantly by gender, χ^2 (1, N = 328) = 0.33, $p = .57$.

Table 3:**Access to Sources of Information on Cervical Cancer and HPV Vaccine**

Question	Response	Male (n=109)	Female (n=219)	Total (n=328)	p-value
1. Do you have access to information about Cervical cancer and HPV vaccines?	Yes	69 (63.3)	175 (79.9)	244 (74.4)	P <0.001
	No	40 (36.7)	44 (20.1)	84 (25.6)	
2. Do you think these sources are reliable?	Yes	91 (83.5)	188 (85.8)	279 (85.1)	p = 0.57
	No	18 (16.5)	31 (14.2)	49 (14.9)	

The most frequently cited sources of information were the internet (27.7%), medical practitioners (17.8%) and awareness campaigns (13.2%), as shown in Table 4. Participants obtained their information from multiple sources.

Table 4:**Sources of Information on Cervical Cancer and HPV Vaccines**

Source of Information	Male (n=217)	Female (n=458)	Total (n=675)	P - value
1. Web (internet) search	56 (25.8)	131 (28.6)	187 (27.7)	p = 0.46
2. Medical Practitioners	32 (14.7)	88 (19.2)	120 (17.8)	p = 0.14
3. Awareness Campaigns	26 (12.0)	63 (13.8)	89 (13.2)	p = 0.53
4. Friends	33 (15.2)	55 (12.0)	88 (13.0)	p = 0.25
5. School	28 (12.9)	56 (12.2)	84 (12.4)	p = 0.78
6. Media (TV and/or Radio)	27 (12.4)	35 (7.6)	62 (9.2)	p = 0.024
7. Content creators/ Influencers	15 (6.9)	30 (6.6)	45 (6.7)	p = 0.82

n= 675 reflects the total number of responses with multiple responses from each participant

Chi square tests of independence (Table 4) were conducted to compare male and female proportions across sources of information. Results indicated a significant gender difference for media (TV/Radio), $\chi^2 (1, N = 675) = 5.08$, $p = .024$. No significant differences were observed for web search, medical practitioners, awareness campaigns, friends, school, or influencers (all $p > .05$).

Attitudes Towards Cervical Cancer and HPV Vaccines

The study also sought to evaluate the attitudes of *Rafiki* residents towards the adoption of HPV vaccines and awareness of cervical cancer. The findings are summarized in Table 5 below.

Chi square tests of independence (Table 5) were conducted to compare attitudes towards cervical cancer and HPV vaccine between males and females. Results indicated no significant differences (all $p > .05$).

Table 5:**Attitudes Towards Cervical Cancer and HPV Vaccines**

Question	Response	Male (n=109)	Female (n=219)	Total (n=328)	P - Value
1. On a scale of 1-5, How important do you think it is for individuals to be aware of cervical cancer?	5	81 (74.3)	171 (78.1)	252 (76.8)	P = 0.513
	4	19 (17.4)	32 (14.6)	51 (15.5)	
	3	4 (3.7)	9 (4.1)	13 (4.0)	
	2	4 (3.7)	3 (1.4)	7 (3.2)	
	1	1 (0.9)	4 (1.8)	5 (2.3)	
2. Do you think it is important for people to know about the vaccine?	Yes	105 (96.3)	215 (98.2)	320 (97.6)	P = 0.386
	No	4 (3.7)	4 (1.8)	8 (2.4)	

3. How important do you think it is for individuals to receive the HPV vaccine for cervical cancer prevention?	5	79 (72.5)	158 (72.1)	237 (72.3)	P = 0.386
	4	17 (15.6)	35 (16.0)	52 (15.9)	
	3	6 (5.5)	15 (6.8)	21 (6.4)	
	2	6 (5.5)	5 (2.3)	11 (3.4)	
	1	1 (0.9)	6 (2.7)	7 (3.2)	
4. Do you believe the HPV vaccine is safe and effective?	Yes	94 (86.2)	184 (84.0)	278 (84.8)	P = 0.639
	No	15 (13.8)	35 (16.0)	50 (15.2)	

Barriers to HPV Vaccine Uptake

Of the 328 participants, only 37 (11.3%) had received the HPV vaccine, with 6 (1.8%) being male and 31 (9.5%) females. Several reasons were given for not receiving the vaccine, as illustrated in Table 6. The most common reason across both genders was the fear of adverse effects from the vaccine (32.0%).

Table 6:

Vaccine-Related Barriers to HPV Vaccine Uptake

	Male (n=205)	Female (n=267)	Total (n=472)	P - value
1. Fear of adverse effects	48 (23.4)	103 (38.6)	151 (32.0)	p < 0.001
2. Not aware that the vaccine is available	43 (21.0)	41 (15.4)	84 (17.8)	p = 0.11
3. Cost	25 (12.2)	48 (18.0)	73 (15.5)	p = 0.08
4. Lack of access to the vaccine	31 (15.1)	31 (11.6)	62 (13.1)	p = 0.29
5. Lack of interest	37 (18.0)	19 (7.1)	56 (11.9)	p < 0.001
6. Assumptions of being too old to receive the vaccine	21 (10.2)	25 (9.4)	46 (9.7)	p = 0.75

n = 472 reflects the total number of responses with multiple responses from each participant

Chi square tests of independence (Table 6) revealed significant gender differences for fear of adverse effects, χ^2 (1, N = 472) = 11.2, $p < 0.001$, and lack of interest, χ^2 (1, N = 472) = 13.0, $p < .001$. No significant differences were observed for awareness of vaccine availability, cost, lack of access, or assumptions of being too old (all $p > .05$).

Predictors of HPV Vaccine Uptake

Multivariable logistic regression analysis with forward stepwise model building was used to come up with the best model to identify the predictors of HPV vaccine uptake within this population. As shown in Table 7, participants of the female sex had 2.9 times the odds (95% CI 1.2-8.4, $p = 0.031$)

of taking the vaccine compared to males. Similarly, being divorced (aOR 12.1, 95% CI 1.4-81.1, $p = 0.011$) and having heard about the vaccine (aOR 10.5, 95% CI 3.2-50.0, $p = 0.001$) increased the odds of taking the vaccine. Conversely, the assumption that one was too old to receive the vaccine (aOR 0.2, 95% CI 0.04-0.4, $p = 0.001$) and having a lack of access reduced the odds of receiving the vaccine. Participants who had access to information on cervical cancer had 3.1 times the odds (95% CI 1.2-10.7, $p = 0.037$) of getting the vaccine than those without access to information. However, this variable lost significance on multivariable analysis.

Table 5:

Predictors of HPV Vaccine Uptake

Variable	Bivariable analysis		Multivariable analysis	
	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Age category (years)				
15-24				
25-34	0.6 (0.2, 1.4)	0.284		
35-44	0.8 (0.3, 2.1)	0.667		
≥45	1.4 (0.1, 9.0)	0.776		

Gender				
• Male				
• Female	2.8 (1.2, 7.7)	0.025	2.9 (1.2, 8.4)	0.031
Marital status				
• Single				
• Married	1.1 (0.5, 2.4)	0.827	2.0 (0.8, 5.0)	0.154
• Divorced	4.2 (0.6, 22.6)	0.108	12.1 (1.4, 81.1)	0.011
Employment status				
• Unemployed				
• Employed	0.8 (0.3, 1.6)	0.491		
Awareness of cervical cancer				
• No				
• Yes	2.8 (0.6, 50.9)	0.322		
Awareness of the risk factors of cervical cancer				
• No				
• Yes	0.7 (0.3, 1.4)	0.363		
Awareness of cervical cancer screening				
• No				
• Yes	1.7 (0.7, 5.1)	0.292		
Heard about HPV vaccine				
• No				
• Yes	4.7 (1.6, 19.8)	0.012	10.5 (3.2, 50.0)	0.001
Access to information on cervical cancer and HPV vaccines				
• No				
• Yes	3.1 (1.2, 10.7)	0.037		
Cost as a barrier to uptake				
• No				
• Yes	1.6 (0.8, 3.2)	0.173		
Fear of adverse effects as a barrier to uptake				
• No				
• Yes	1.1 (0.5, 2.3)	0.739		
Being too old to receive the vaccine as a barrier to uptake				
• No				
• Yes	0.3 (0.1, 0.8)	0.029	0.2 (0.04, 0.4)	0.001
Lack of interest in the vaccine as a barrier to uptake				
• No				
• Yes	1.0 (0.3, 2.3)	0.924		
Lack of access as a barrier to uptake				
• No				
• Yes	0.4 (0.2, 1.0)	0.071	0.4 (0.1, 0.9)	0.044

DISCUSSION

The study highlighted key insights into the knowledge, attitudes, and barriers and predictors related to HPV vaccination and the subsequent prevention of cervical cancer among residents of *Rafiki* area, Nakuru County.

The demographic breakdown of the participants revealed a population skewed towards younger individuals, with 189 (57.6%) of respondents aged between 15 and 24 years. This age group was particularly critical in discussions surrounding HPV vaccination, as they were most likely to benefit from early intervention. The importance of targeting this younger age group is further highlighted by global studies showing that early vaccination significantly reduces the incidence of HPV-related diseases (Bruni et al., 2022). This population was also predominantly female (66.8%), single (74.4%), unemployed (68.0%) and had a tertiary level of education (74.1%). Despite the high educational levels, gaps in specific knowledge about HPV and cervical cancer were still observed, indicating that education alone may not be sufficient to promote health literacy on these topics. Previous studies (Gitonga et al., 2022; Omar et al., 2023) also reported similar findings where higher education did not correspond to adequate knowledge of HPV or cervical cancer screening.

While 306 (93.3%) of participants reported having heard of cervical cancer, and 240 (73.2%) were aware of the existence of a HPV vaccine, the depth of their knowledge was often superficial. Only 129 (39.3%) of respondents knew the minimum age for HPV vaccination, and only 129 (39.3%) expressed a familiarity with the risk factors of cervical cancer. Similar knowledge gaps were reported in other studies, including Omar et al. (2023), where most participants were aware of cervical cancer but lacked knowledge about HPV and vaccination. In a study by Mengesha et al. (2020) in Ethiopia, 65.1% of participants had heard of cervical cancer, yet over 80% were unaware that HPV was the primary causative agent. These findings aligned with this study's findings, emphasizing the need for targeted health education initiatives to improve specific knowledge on HPV and cervical cancer. These findings underscored the distinction between general awareness and specific, actionable knowledge.

Gender differences in knowledge were evident, with females showing higher levels of awareness, particularly concerning screening services. For instance, 82% of females were aware of screening services compared to 75% of males. This disparity suggested that cervical cancer was still predominantly perceived as a women's issue,

despite the role that men play in HPV transmission. Zou et al. (2022) highlighted the importance of including men in cervical cancer prevention efforts, as they contributed to the transmission and re-infection of HPV, thereby increasing the risk for their female partners. A more gender-inclusive approach to health education is needed to ensure that men are equally informed and motivated to participate in prevention efforts.

The internet (187, 27.7%) and medical practitioners (120, 17.8%) were the most commonly reported sources of information on cervical cancer and the HPV vaccine. While the internet can enhance health education, its reliability is variable, and dependence on informal sources may lead to misinformation (Levinson et al., 2010).

Despite the gaps in knowledge, participants generally exhibited positive attitudes toward HPV vaccination and cervical cancer awareness. About 320 (97.6%) of the participants agreed that it was important for people to know about the HPV vaccine, and 278 (84.8%) believed that the vaccine was safe and effective. These findings suggested that there was a strong foundation of positive health attitudes on which to build future interventions. However, these positive attitudes did not necessarily translate into action, as only 37 (11.3%) of participants reported having received the HPV vaccine. This discrepancy between attitude and action was consistent with findings from other studies (Gitonga et al., 2022; Omar et al., 2023), where fear of side effects, lack of access, and misconceptions prevented participants from taking preventive measures. Misunderstandings or incomplete knowledge about vaccine eligibility and risk factors can undermine prevention efforts, even among individuals with generally favorable attitudes toward the vaccine (Soheili et al., 2021).

This study identified several barriers that may contribute to the low uptake of HPV vaccination and utilization of cervical cancer screening services in *Rafiki* area. Fear of vaccine adverse effects was the most commonly identified barrier to vaccine uptake (151, 32.0%). Vaccine hesitancy, often fueled by rumours and unverified claims about side effects, remains a persistent challenge in public health (Guillaume et al., 2024). This concern was consistent with findings by Kutz et al. (2023), where fear of side effects and misinformation were significant factors influencing vaccine hesitancy. The fear of adverse effects highlighted the need for clear and consistent communication from healthcare professionals to dispel myths and provide reliable,

evidence-based information on the safety of the HPV vaccine.

Lack of access to the vaccine also emerged as a barrier, for 62 (13.1%) of responses. These highlighted issues related to healthcare infrastructure and availability. Similarly, 73 (15%) of responses mentioned cost as a barrier, suggesting that financial constraints were preventing some individuals from receiving the vaccine. Similar observations were highlighted in a review done on barriers to HPV vaccination (Zheng et al., 2021). Additionally, 9.7% of responses indicated that participants felt they were too old to receive the vaccine, suggesting a misconception about the vaccine's age eligibility. Similar misconceptions were reported in studies conducted in Kenya and Ethiopia, where participants were unaware of the appropriate age range for vaccination (Gitonga et al., 2022; Mengesha et al., 2020).

Despite the majority of participants (84.8%) believing the HPV vaccine is safe and effective, only 11.3% had received it. Logistic regression analysis was used to determine the predictors of HPV vaccine uptake. Having prior knowledge of the vaccine (aOR 10.5, 95% CI 3.2-50.0, $p=0.001$) was a positive predictor of HPV vaccine uptake. This is similar to a study conducted in Nigeria by Okonkwo et al., (2021) and underscores the importance of increased awareness campaigns and education. A review on the determinants of HPV vaccine uptake in Africa also found that prior knowledge of the vaccine increased its uptake (Mengistie et al., 2025). Being female (aOR 2.9, 95% CI 1.2-8.4, $p=0.031$) and being divorced (aOR 12.1, 95%CI 1.4-81.1, $p=0.011$) also increased the odds of getting the vaccine. This may be due to the fact that women are primarily the target of HPV and cervical cancer awareness campaigns. While divorced status was found to be a statistically significant predictor of vaccine uptake, the small number and wide confidence interval reflect statistical instability. On the flip side, the misconception that one is too old to receive the vaccine ($p=0.001$) and lack of access to the vaccine ($p=0.044$) were found to be negative predictors of HPV vaccine uptake. This was also identified in the review conducted by Zheng et al., 2021).

Limitations of study

This study relied on self-reported data, which may introduce recall and social desirability biases. Additionally, the cross-sectional design did not allow for causal inference. The sample may also not have been representative of all subpopulations, given the use of a non-probability sampling method, particularly rural or older age groups, limiting generalizability.

Conclusion

While awareness of cervical cancer and HPV vaccination is relatively high, uptake remains critically low due to factors such as unavailability, fear of side effects, and lack of access to accurate information. Future strategies should focus on reducing logistical barriers, improving information dissemination through trusted channels such as healthcare providers, and correcting misconceptions about vaccine eligibility. These efforts are vital in reducing cervical cancer incidence and improving women's health outcomes in resource-limited settings.

Conflict of Interest

Authors declare no conflict of interest.

Funding

Authors received no funding for this study.

REFERENCES

- Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 74(3), 229-263. <https://doi.org/10.3322/caac.21834>
- Bruni, L., Serrano, B., Roura, E., Alemany, L., Cowan, M., Herrero, R., Poljak, M., Murillo, R., Broutet, N., Riley, L. M., & de Sanjose, S. (2022). Cervical cancer screening programmes and age-specific coverage estimates for 202 countries and territories worldwide: A review and synthetic analysis. *The Lancet. Global Health*, 10(8), e1115-e1127. [https://doi.org/10.1016/S2214-109X\(22\)00241-8](https://doi.org/10.1016/S2214-109X(22)00241-8)
- Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 74(3), 229-263. <https://doi.org/10.3322/caac.21834>
- Chepkemai, T., & Jerotich, P. (2023). Uptake of Two Doses of HPV Vaccines in Nakuru County, Kenya: A Case of Rongai and Nakuru West Sub-Counties. *Journal of Biosciences and Medicines*, 11(01), 1-7. <https://doi.org/10.4236/jbm.2023.111001>

- Dreyer, G. (2018). Clinical implications of the interaction between HPV and HIV infections. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 47, 95-106. <https://www.sciencedirect.com/science/article/abs/pii/S1521693417301293>
- Geneva: World Health Organisation. (2020). Global strategy to accelerate the elimination of cervical cancer as a public health problem. World Health Organization. <https://www.who.int/publications/i/item/9789240014107>
- Gezimu, W., Bekele, F., Bekana, T., & Demeke, A. (2024). Males' Access to Human Papillomavirus Vaccination in Resource-Limited Settings. In *ImmunoTargets and Therapy* (Vol. 13, pp. 95-98). Dove Medical Press Ltd. <https://doi.org/10.2147/ITT.S451659>
- Gitonga, E., Iseme, R., Mutisya, R., & Kodhiambo, M. (2022). Cervical cancer knowledge, awareness and related health behaviours amongst women of reproductive age in Kiambu County, Kenya: a cross-sectional study. *Health Psychology and Behavioral Medicine*, 10(1), 1056-1070. <https://doi.org/10.1080/21642850.2022.2136184>
- Guillaume, D., Waheed, D. E. N., Schleiff, M., Muralidharan, K. K., Vorsters, A., & Limaye, R. J. (2024). Global perspectives of determinants influencing HPV vaccine introduction and scale-up in low- and middle-income countries. *PLoS ONE*, 19(1 January). <https://doi.org/10.1371/journal.pone.0291990>
- Karanja-Chege, C. M. (2022). HPV Vaccination in Kenya: The Challenges Faced and Strategies to Increase Uptake. In *Frontiers in Public Health* (Vol. 10). Frontiers Media S.A. <https://doi.org/10.3389/fpubh.2022.802947>
- Kasi, D., R, A. H., Putankar, P. R., & Humera Sayeeda MBBS, N. (2021). Cervical Cancer: An Overview. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* e-ISSN, 20, 11-21. <https://doi.org/10.9790/0853-2005101121>
- Kenya Ministry of Health. (n.d.). National Cancer Control Strategy 2017-2022. In Ministry of Health, Kenya. Retrieved <http://www.health.go.ke/wp-content/uploads/2017/10/NATIONAL-CANCER-CONTROL-STRATEGY-2017-2022-KENYA-.pdf>
- Kenya Ministry of Health. (2018). Kenya National Cancer Screening Guidelines. www.health.go.ke
- Kusakabe, M., Taguchi, A., Sone, K., Mori, M., & Osuga, Y. (2023). Carcinogenesis and management of human papillomavirus-associated cervical cancer. In *International Journal of Clinical Oncology* (Vol. 28, Number 8, pp. 965-974). Springer. <https://doi.org/10.1007/s10147-023-02337-7>
- Kutz, J. M., Rausche, P., Gheit, T., Puradiredja, D. I., & Fusco, D. (2023). Barriers and facilitators of HPV vaccination in sub-saharan Africa: a systematic review. *BMC Public Health*, 23(1). <https://doi.org/10.1186/s12889-023-15842-1>
- Mengesha, A., Messele, A., & Beletew, B. (2020). Knowledge and attitude towards cervical cancer among reproductive age group women in Gondar town, North West Ethiopia. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-8229-4>
- Mengistie, B. A., Yirsaw, A. N., Lakew, G., Mekonnen, G. B., Shibabaw, A. A., Chereka, A. A., Kitil, G. W., Wondie, W. T., Abuhay, A. E., & Getachew, E. (2025). Human papillomavirus vaccine uptake and its determinants among women in Africa: an umbrella review. In *Frontiers in Public Health* (Vol. 13). Frontiers Media SA. <https://doi.org/10.3389/fpubh.2025.1537250>
- Mohamed Athman Omar, A., Mohamed Ahmed, Z., Sheikh, R., Abud Mohamed, A., & Omar Amoody, F. (2023). e22515 Publication Only Cervical cancer risk factors, knowledge and attitudes towards HPV vaccine among coastal Kenyan women: A prospective cross-sectional survey. https://ascopubs.org/doi/10.1200/JCO.2023.41.16_suppl.e22515
- Okunowo, A. A., Ugwu, A. O., Kuku, J. O., Soibi-Harry, A. P., Okunowo, B. O., Ani-Ugwu, N. K., Osunwusi, B. O., & Adenekan, M. A. (2021). Predictors, barriers and motivating factors for human papillomavirus vaccination and testing as preventive measures for cervical cancer: A study of urban women in Lagos, Nigeria. *Preventive Medicine Reports*, 24. <https://doi.org/10.1016/j.pmedr.2021.101643>
- Yang, D., Zhang, J., Cui, X., Ma, J., Wang, C., & Piao, H. (2022). Risk Factors Associated With Human Papillomavirus Infection, Cervical Cancer, and Precancerous Lesions in Large-Scale Population Screening. *Frontiers in Microbiology*, 13. <https://doi.org/10.3389/fmicb.2022.914516>

Zheng, L., Wu, J., & Zheng, M. (2021). Barriers to and Facilitators of Human Papillomavirus Vaccination among People Aged 9 to 26 Years: A Systematic Review. *Sexually Transmitted Diseases*, 48(12), E255-E262. <https://doi.org/10.1097/OLQ.0000000000001407>

Zou, K., Huang, Y., & Li, Z. (2022). Prevention and treatment of human papillomavirus in men benefits both men and women. In *Frontiers in Cellular and Infection Microbiology* (Vol. 12). Frontiers Media S.A. <https://doi.org/10.3389/fcimb.2022.1077651>