Original Research Article

Factors Associated with the Uptake of Human Papilloma Virus Vaccine Among Girls Aged 9-14 years in Buikwe District, Central Uganda

ABSTRACT

Aim: Cervical cancer is one of the leading global public health concerns. Our study aimed at determining factors associated with the uptake of the HPV vaccine among girls aged 9-14 years.

Study design and Area: We conducted a cross-sectional study and was carried out in Buikwe district, central Uganda.

Methods: The study was conducted using mixed methods. Quantitative data were entered using the Epidata software and exported to Stata 14 for cleaning and analysis. Atlasti 6 software was used in thematic qualitative data analysis.

Results: The level of HPV vaccine uptake was 30%. Girls whose mothers/caretakers accessed health information through the health workers (*P* = 0.004, AOR = 2.68(1.36-5.26), CI = 95%) were most likely to uptake the HPV vaccine than any other in the study population. Mothers/caretakers who are civil servants were more likely to receive the HPV vaccine (*P* = 0.049, AOR=1.78 (1.00-3.18), CI=95%). Girls whose mothers/caretakers had never heard about HPV vaccines and thought getting vaccinated is not important were less likely to uptake the HPV vaccine (*P* = 0.000, AOD = 0.31 (0.10-0.89), CI=95%) and (*P* = 0.000, AOD = 0.12 (0.05-0.28), CI=95%) respectively.

Conclusion: The level of HPV vaccine uptake among girls aged 9-14 years remains significantly low at 30%. Vaccine uptake was severely affected by level health education - awareness among the mothers/caretakers. There is need for strategies to improve vaccine awareness and update among the key stakeholders.

Keywords: Cancer, cervical cancer, human papillomavirus vaccine, vaccine uptake mothers, caretakers.

1. INTRODUCTION

Worldwide, an estimated of over 18 million new cancer cases and 9 million deaths occurred [1]. In addition, an estimated 604 127 cervical cancer cases and 341 831 deaths occurred). Nevertheless, the incidence and mortality are higher in low- and middle-income countries than in high-income countries. In as much, the trend cervical cancer is projected to continue to increase, rising to 700 000 cases and 400 000 deaths in 2030, though, the burden will be more in low- and middle-income countries[2]. Previous reports show that 33.6% of females aged 10–20 years received the full course of vaccine in the more developed countries compared with only 2.7% in less developed countries. Nevertheless, the incidence and mortality are higher in low- and middle-income countries than in high-income countries[3]. Unfortunately, the World Health Organization (WHO) targets of 90% of girls fully vaccinated with HPV vaccine by age 15 years - by 2023[4]have not been realized. The pooled prevalence of HPV vaccine uptake in Sub Saharan - Africa has been reported at 28.53%. While subgroup analysis revealed the highest uptake was 62.52% from Kenya and the lowest was 3.77% in Nigeria[5-7]. Pooled prevalence of HPV vaccine uptake in East Africa has been reported at 35%[8]. In Uganda, the cervical cancer incidence has been previously reported as, 30/100,000 with the annual cases at 6959 and death of 4607[9]. Numerous studies on the uptake and associated factors have be conducted in different regions of the country with varying results[10-15]. Therefore, our study at aimed at determining the level of uptake of the HPV vaccine and associated factors among girls 9-14 years Buikwe district central Uganda.

2. METHODOLOGY

2.1 Study design and Area

We conducted a cross-sectional study using mixed methods. It was carried out in Buikwe district, located in the central Uganda. The quantitative design was used to determine the level of HPV vaccine uptake and the factors associated with HPV vaccine uptake, while the qualitative design was used to assess challenges that limit uptake of the vaccine.

2.1.1 Study population

The study enrolled girls aged between 9-14 years; whose mothers/caretakers were the respondents for the quantitative method; while key informants included nurses, clinical officers and midwives for the qualitative method.

2.1.1.1 Procedures

Sampling was done using multi-stage systematic random sampling. For quantitative data, four sub-counties were selected randomly from eight sub-counties of the district. Folded papers were randomly picked from a box to select the sub-counties to include in the study. The sub-counties selected included Nkokonjeru town council, Nyenga sub-county, Njeru town council and Najja sub-county. Three villages were then randomly selected from each of the selected sub-counties. Systematic random sampling was used to select the households from which the participants were selected using a calculated interval (n) for each village. The village LCIs for each village led the research assistant to the first household and the first household to be included in the study was determined by choosing a random number from the sampling interval n.

For qualitative data, key informants were selected using purposive sampling, basing on their experience in immunization. A total of five key informants were interviewed; where health workers who were available were recruited to participate in the study. Quantitative data was collected using a semi-structured questionnaire from mothers or caretakers of the children; and key informant guide was used to collect qualitative data from the key informants. Girls aged 9-14 years whose parents/caretakers had consented to the study were included from the study. The study excluded girls who were not available in homesteads at the time of data collection. It excluded girls whose care takers were ill and weak to take part in the study. It also excluded girls between 9-14 years whose care takers had not consented to the study, as well as those below nine years and above 14 years.

2.1.1.1.1 Data collection

Quantitative data was collected from mothers or caretakers of the children using a semi-structured questionnaire. The questionnaire was part of the protocol reviewed and approved by the REC.

2.1.1.1.1.1 Socio-demographic and family factors

Age of the girl participant, level of education, level of education of the mother/care taker, mother's/ care taker's occupation, family type, number of people in household, marital status of mother/caretaker were considered

2.1.1.1.1.1.1 Health-facility (HF) factors

Level of HF included; health information access, facilitation of HWs, funding, availability of vaccine and government policy on HPV vaccination.

2.1.1.1.1.1.1.1 Statistical analysis

Quantitative data was entered into Epidata software using a predesigned entry form. The data entered was exported to Stata for cleaning and data analysis. Using Stata 14, quantitative data was cleaned and checked for completeness and consistence. Out of 475 responses, 451 entries were deemed clean and analyzed. At univariate analysis, quantitative data was summarized using tables and graphs in form of frequencies and percentages. Binary logistic regression was employed at bivariate analysis to establish factors associated with HPV vaccine uptake among girls aged 9-14 years at 95% confidence interval (CI) and p value of 0.05% was considered significant. At multivariate logistic regression was employed to eliminate confounding factors and establish factors associated with HPV vaccine uptake.

For qualitative data, audio recordings were transcribed saved on a computer. Atlas.ti 6 software was used in the analysis of qualitative data. The transcripts were sorted and checked for spellings, consistence and incompleteness. The transcripts were coded using initial codes. Here all new ideas and thoughts were coded after which they were grouped to form themes.

3. RESULTS AND DISCUSSION

3.1 Socio-demographic factors of the respondent

Table 1 shows that more than one third of the respondents (43.48%, n=451) recruited into the study were aged 12-14 years and majority of the girls (59.46%, n=451) were still in primary level of education. Most of the girls were Catholics (51.22%, n=451) and almost all girls lived within 5Km from the town (99.33%, n=451).

Table 1: The socio-demographics of the study population

Variable	Frequency	Percentage
Age group		
9-10	155	34.37
11-12	100	22.17
12-14	196	43.46
Education level		
Never/Uneducated	4	0.89
Primary	268	59.42
Secondary	179	39.69
Household distance from town		
Up to 5 km	448	99.33
Less than 5k	3	0.6%
Religion of the respondent		
Catholic	231	51.22
Anglican	89	19.73
Muslim	86	19.07
SDA	21	4.66
Pentecostal/saved	24	5.32
Total	**451**	**100**

3.1.1 The sociodemographic of the parent/caretaker

Out of the 451 mothers/caretakers interviewed, 69.40% were aged 30-44 years, 47.45%, had attained secondary level of education, and more than one third (35.48%) of them were peasants. Two third of the respondents (66.96%, n=451) were either married or cohabiting, and most household (67.63%, n=451) were headed by fathers as shown in table 2

Table 2: The socio-demographics of the mother/caretaker

Variable	Frequency	Percentage (%)
Mothers age group		
15-29	67	14.86
30-44	313	69.40
45-60	71	15.74
Mothers level of education		
Never/Uneducated	12	2.66

Primary	82	18.18
Secondary	214	47.45
Tertiary	109	24.17
University	34	7.54
Mothers occupation		
Peasant	160	35.48
Business lady	118	26.16
Hair dresser	10	2.22
Civil servant	125	27.72
Housewife	38	8.43
Marital status of respondent		
Single	72	15.96
Married/cohabiting	302	66.96
Divorced/separated	54	11.97
Widowed	23	5.10
The household head		
Father	305	67.63
Mother	104	23.06
Guardian	35	7.76
Brother/sister	7	1.55
Household population		
1-5	176	39.02
6-10	231	51.22
11-15	44	9.76
Family type		
Extended	189	41.91
Nuclear	262	58.09
Total	**451**	**100**

3.1.1.1 Vaccination information

Figure 1 shows that less than one third (30%, n=451) of the girls were vaccinated against HPV with at least one dose of HPV vaccine.

Figure 1: The vaccination status of the girls whose respondents were interviewed

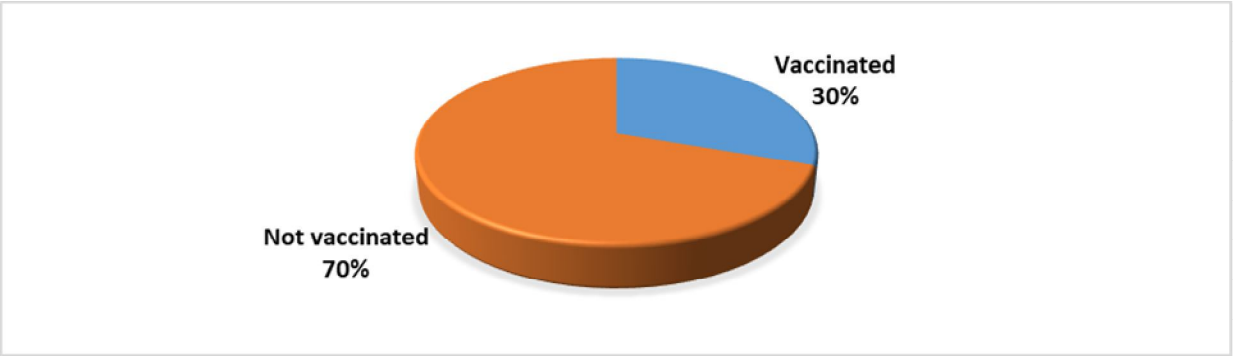


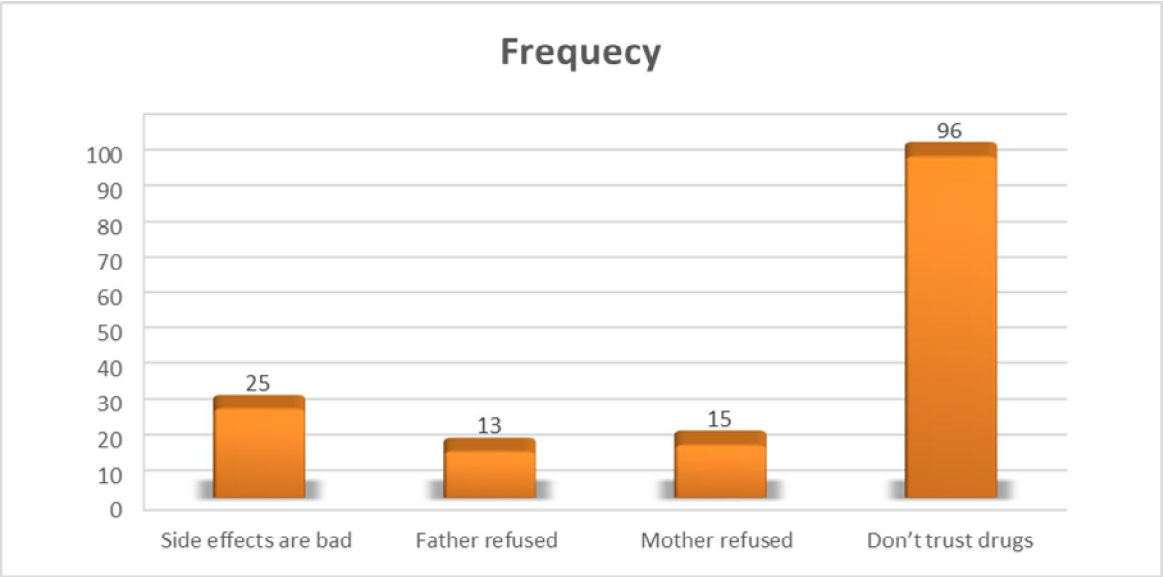
Table 3 shows that 72.06% (n=451) of the mothers/caretakers had heard about HPV vaccination and most of them mentioned radio (38.15%, n=325) and TV (23.69%, n=325) as their source of information about HPV vaccination. Out of 30 % (137/451) who received the HPV vaccines, 53% (72/137) received two doses; and 47% (65/137) received single doses of the vaccine.

Table 3: HPV vaccination information of the study population

Variable	Frequency	Percentage
Heard about HPV vaccination		
Yes	325	72.06
No	126	27.94
Source of information (n=325)		
Radio	127	38.15
TV	77	23.69
Health worker	63	19.38
School	51	18.77
Thought if getting vaccinated is important		
Yes	315	69.84
No	136	30.16
Number of HPV doses received by the girls (n=137)		
One dose	65	47.45
Two doses	72	52.55
Total	**451**	**100**

Lack of trust for government drugs was the most mentioned reason for not considering vaccination as an important aspect. Mothers and fathers refusing their children to get vaccinated were the least mentioned reasons for not considering vaccination as an important aspect as shown in figure 2.

Figure 2: Reasons why respondents thought that getting vaccinated is not important



3.1.1.1.1.1 Mother/caretaker socio-demographic

Table 4 indicates that the occupation of the mothers/caretakers and the household population were significantly associated with HPV vaccine uptake among girls aged 9-14 years. Girls whose mothers were civil servants (*P* = 0.001, COR = 2.36 (1.42-3.91), CI=95%) were 2.36 times more likely to uptake HPV vaccines than any other girls in the reference category. On the other hand, girls living in the households with a population of 11-15 members (*P* = 0.005, COR = 0.24 (0.09-0.64), CI = 95%) were less likely to uptake HPV vaccine compared to any other girl in the reference category.

Table 4: Mothers/caretaker factors associated with HPV vaccine uptake

factors	**HPV vaccine uptake**				**Crude Odds Ratios (COR) at 95% Confidence Interval (CI)**	***P*-values**
	Yes (137)		**No (314)**			
	F	**%**	**F**	**%**		
Mothers age groups						
15-29	24	17.52	43	13.69		
30-44	95	69.34	218	69.43	0.78(0.45-1.36)	0.382
45-60	18	13.14	53	16.88	0.61(0.29-1.26)	0.183
Mothers level of education						
Never/Uneducated	4	2.92	8	2.55		
Primary	20	14.60	62	19.75	0.65(0.18-2.37)	0.509
Secondary	53	38.69	161	51.27	0.66(0.19-2.27)	0.509
Tertiary	47	34.31	62	19.75	1.529(0.43-5.34)	0.517
University	13	9.49	21	6.69	1.24(0.31-4.95)	0.763
Mothers occupation						

Peasant	39	28.47	121	38.54		
Business lady	36	26.28	82	26.11	1.26(0.78-2.32)	0.256
Hair dresser	2	1.46	8	2.55	0.78(0.16-3.81)	0.754
Civil servant	54	39.42	71	22.61	2.36(1.42-3.91)	**0.001***
Housewife	6	4.38	32	10.19	0.58(0.23-1.49)	0.261
Marital status of respondent						
Single	22	16.06	50	15.92		
Married/cohabiting	94	68.61	208	66.24	1.03(0.579-1.79)	0.925
Divorced/separated	13	9.49	41	13.06	0.72(0.32-1.60)	0.422
Widowed	8	5.84	15	4.78	1.21(0.45-3.27)	0.704
The household head						
Father	95	69.34	210	66.88		
Mother	30	21.90	74	23.57	0.90(0.54-1.46)	0.660
Guardian	11	8.03	24	7.64	1.01(0.48-2.15)	0.973
Brother/sister	1	0.73	6	1.91	0.37(0.44-3.10)	0.358
Household population						
1-5	61	44.53	115	36.62		
6-10	71	51.85	160	50.96	0.84(0.55-1.27)	0.402
11-15	5	3.65	39	12.42	0.24(0.09-0.64)	**0.005***

3.1.1.1.1.1.1.1 HPV vaccine information

Table 5 indicates that mothers/caretakers being informed about HPV vaccination and the thought if getting vaccinated is important or not were significantly associated with HPV vaccine uptake among girls aged 9-14 years. Girls whose mothers had not heard about HPV vaccination (*P* = 0.000, COR = 0.07 (0.03-1.17), CI = 95%) and those whose mothers/caretakers did not think that getting vaccinated is important (*P* = 0.000, COR = 0.21(0.12-0.38), CI = 95%) were less likely to uptake HPV vaccine compared to any others girls in the reference category.

Table 5: Association between HPV vaccine uptake by girls and the HPV vaccine information known by the caretakers

Factors	**HPV vaccine uptake**				**Crude Odds Ratios (COR) at 95% Confidence Interval (CI)**	***P*-values**
	Yes (137)		**No (314)**			
	F	**%**	**F**	**%**		
Heard about HPV vaccination						
Yes	131	95.62	194	61.78		
No	6	4.38	120	38.22	0.07 (0.03-1.17)	**0.000***
Thought if getting vaccinated is important						
Yes	121	88.32	194	61.32		

No	**16**	**11.68**	**120**	**38.22**	**0.21(0.12-0.38)**	**0.000***

3.1.1.1.1.1.1.1.1 Socio-economic factors
Table 6 shows that health information access means by the mother/care taker and the food source of the mother/care takers were associated with the uptake of the vaccines among girls aged 9-14 years. Girls whose mothers/caretakers accessed health information through health workers (*P* = 0.000, COR = 3.01(1.66-5.46), CI = 95%) more likely to uptake HPV vaccine.

Table 6: Association between socio-economic factors of the caretaker/mothers and the HPV vaccine uptake

Factors	**HPV vaccine uptake**				**Crude Odds Ratios (COR) at 95% Confidence Interval (CI)**	***P*-values**
	Yes (137)		**No (314)**			
	F	**%**	**F**	**%**		
Health information access means by the respondent						
Radio	57	41.61	184	58.60		
TV	46	33.58	94	29.94	1.58(1.00-2.51)	0.052
Health worker	28	20.44	30	9.55	3.01(1.66-5.46)	**0.000***
Newspapers	1	0.73	4	1.27	0.81(1.52-7.37)	0.849
Health facility farness from the respondent household						
≤1km	60	43.80	136	43.31		
2-3km	54	39.42	147	46.82	0.83(0.54-1.29)	0.410
≥4km	23	16.79	31	9.81	1.68(0.91-3.12)	0.100

3.1.1.1.1.1.1.1.1.1 Factors associated with HPV uptake at multivariate analysis
Multi logistic regression analysis was employed to establish factors associated with the uptake of the HPV vaccine among girls aged 9-14 years. From the table below, mother's occupation, household population, thought if getting vaccinated or not, having heard about HPV vaccination, and health information access means by the respondents statistically determined HPV vaccine among the participants. Girls whose mothers/caretakers were civil servants were 1.78 times more like to uptake the HPV vaccine than any other girls in the reference category (*P* = 0.049, AOD=1.78(1.00-3.18), CI=95%).

Girls from households with a population of 11-15 were 0.321 less likely to uptake HPV vaccines any other girls in the reference category (P = 0.030, AOR = 0.31 (0.10-0.89), CI=95%). Girls whose mother/caretakers had never heard about HPV vaccines were 0.12 less likely to uptake HPV vaccine than any other girls in the reference in the study population (*P* = 000, AOR = 0.12 (0.05-0.28), CI=95%). Girls whose mothers/caretakers thought that getting vaccinated is not important (*P* = 0.001, AOR = 0.34(0.19-0.28) were 0.34 times less likely to uptake the HPV vaccine than any others girls in the reference category. Girls whose mothers/caretakers accessed health information through the health workers (*P* = 0.004, AOR = 2.68(1.36-5.26), CI = 95%) were 2.68 times more likely to uptake the HPV vaccine than any other girls in reference category.

Table 7: Factors associated with HPV uptake by girls at multivariate analysis

Factors	**HPV vaccine uptake**				**Adjusted Odds Ratios (COR) at 95% Confidence Interval (CI)**	***P*-values**
	Yes (137)		**No (314)**			
	F	**%**	**F**	**%**		

Mothers occupation						
Peasant	39	28.47	121	38.54		
Business lady	36	26.28	82	26.11	1.35(0.73-2.47)	0.329
Hair dresser	2	1.46	8	2.55	0.81(0.15-4.31)	0.803
Civil servant	54	39.42	71	22.61	1.78(1.00-3.18)	**0.049***
Housewife	6	4.38	32	10.19	0.99(0.34-2.93)	0.992
Household population						
1-5	61	44.53	115	36.62		
6-10	71	51.85	160	50.96	0.80(0.50-1.31)	0.379
11-15	5	3.65	39	12.42	0.31(0.10-0.89)	**0.030***
Heard about HPV vaccination						
Yes	131	95.62	194	61.78		
No	6	4.38	120	38.22	0.12 (0.05-0.28)	**0.000***
Thought if getting vaccinated is important						
Yes	121	88.32	194	61.32		
No	16	11.68	120	38.22	0.34(0.19-0.28)	**0.001***
Health information access means by the respondent						
Radio	57	41.61	184	58.60		
TV	46	33.58	94	29.94	1.66(0.98-2.82)	0.057
Health worker	28	20.44	30	9.55	2.68(1.36-5.26)	**0.004***
School	5	3.65	2	0.64	5.07(0.90-28.51)	0.066*
Newspapers	1	0.73	4	1.27	0.68(0.07-7.01)	0.743
Source of food for the respondent						
Garden	107	78.10	272	86.62		
Market	30	21.90	42	13.38	1.44(0.78-0.89)	0.242

3.2 Discussion

Cervical cancer is one of the commonest cancers that affect majority of women in Uganda and approximately 3.6% of women are carriers of HPV. It is established that the primary prevention cervical cancer is vaccinating girls aged 9—14 years before exposure and recognized as a crucial approach in the prevention of cervical cancer[9]. Our study reports 30% (n=451) of the girls received at least one dose of the vaccine; while only 53% of those vaccinated received two doses. This is, however, significantly lower than Uganda's HPV vaccination target of 80% coverage as recommended by the 2011-2020 Global Vaccine Action Plan. From these results, 43.48%, (n=451) of the girls were 12-14 years. While this age group covered the largest number of the participants, less than 30%, (n=451) were vaccinated with at least one dose of the vaccine. This was significantly below the country's target of 80% vaccination coverage by the age of 10 years[9]. Our results,

though, are higher than reported elsewhere in central and Northern Uganda[10-13, 15]. This could due to motivation, the different facilities and implementation strategies by the respective carders.

3.2.2 Factors associated with the uptake vaccine uptake

Results from this study show a number of factors associated with HPV vaccine uptake. These include; the mother's occupation, household population, whether getting vaccinated is important or not, being aware of HPV vaccination, and health information access. We report that girls whose mothers/caretakers were civil servants were 1.78 (P = 0.049) times more likely to uptake the HPV vaccine than any other girls in the reference category. Interestingly our report is in phase with other reports from more developed countries[16-18] and a previous report from Wakiso, central Uganda[13]. In this we study we report that girls from households with a population of 11-15 were 0.31 times less likely to uptake HPV vaccines any other girls in the reference category (P = 0.030). This finding agreed with a study elsewhere in Ethiopia and Uganda[14, 19-22]. Family size perhaps gives false health security in this regard but also could be a justification for the fears of the safely of the vaccines. Results of this study show that girls whose mothers/caretakers had never had about HPV vaccines were 0.1 times less likely to uptake HPV vaccine (P = 0.000). This is consistent with the finding previously reported from study in Kampala[11]. However, in studies where mothers/caretakers were knowledgeable about HPV vaccination, the likelihood to their girls to be vaccinated was definitely higher. This finding is consistent with results from previous studies globally[5, 8, 16-18, 23]. Evidence in Central Uganda has suggested the need for creating awareness among parents/caretakers in regards to HPV vaccination to be able to improve the uptake of HPV vaccination in Uganda. In the same vein, more awareness is needed enhance knowledge and promote vaccine acceptance among mothers/caretakers. Girls whose mothers/caretakers thought that getting vaccinated is not important were 0.34 times less likely to uptake the HPV vaccine than any others girls in the reference category (P = 0.001). Previous studies show that good attitude towards the vaccine was positively associated with vaccine uptake[5, 12, 15-18, 20-23] It is said that knowledge is power. Thus, knowledge and awareness change the attitude and positively influences vaccine uptake. This study established that girls whose mothers/caretakers accessed health information through the health workers were 2.68 times more likely to uptake the HPV vaccine than any other girls in the reference category (P = 0.004). This is consistent with the previous reports elsewhere and in Uganda[11, 12, 15, 23]. This global agreement shows that health information is more effective the integrated approach.

CONCLUSION

The vaccine uptake of 30% we report is significantly lower than the international and National targets of over 80%. Knowledge and awareness about the HPV vaccine were statistically significant factors associated with HPV vaccine uptake; in as much the mother's occupation, household population, strongly influenced uptake of the vaccine. The district, regional authorities and Ministry of Health should therefore strengthen integrated strategies to create more awareness about the HPV vaccine among the stakeholders.

ETHICAL APPROVAL

The study was reviewed and approved by Uganda Christian University Research Ethics Committee, REC Number: UG-REC-026

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