Associated Factors to Uptake of Human Papiloma Virus Vaccine 2 Among Girls of Ages 9-14 Years in Igombe Sub-County Bugweri District.

Albert Olinga Micheal[a,1], Grace Nabaggala[a], Carol Karen[a]

[a] Health Tutors College Mulago, Makerere University

Abstract

Background:
Human papilloma virus (HPV) infection is a sexually transmitted infection and it's estimated that 75% of sexually active people are infected with HPV during their lifetime, HPV vaccines are being marketed in many countries throughout the world; and are highly efficacious in preventing 90% of infections due to HPV virus. Even though HPV vaccination is recommended and mostly carried out in schools, there are multiple challenges in implementing and increasing the vaccine's uptake.

Methodology:
The study employed a cross-sectional design and utilized a sample size of 424 respondents. Sampling was by systemic random sampling and data was collected using self-administered questionnaire. Thereafter, data analysis was done using SPSS version1.8.

Results:
Majority of respondents 77 (50.7%) did not receive HPV2 due to fear of needle prick pain, 51 (33.6%) due to discouragement by guardians, while minority 24 (15.8%) of the respondents were not given an appointment date. 127 (30%) of the respondents reported that previous experience such as painful needle pricks, other side effects such as headaches and fevers; would hinder HPV2 reception.

Recommendations :
Government of Uganda through ministry of health should ensure that there are national sensitization programs targeted at improving uptake of HPV vaccines among girls aged 9-14 years both those at schools and those out of schools.

Conclusion and recommendation:[a]
There was poor uptake of HPV2 vaccine among girls aged 9-14 years in Igombe sub county, this was mainly attributed to poor support by the parents/guardians to their girl children towards the vaccine, failure of health workers to issue return dates to the girls, distant health centers and fear of needle pricks and other side effects such as headaches and fevers; thus more sensitization of the communities and continuous medical education for the health workers is highly recommended to improve utilization of the vaccine.

[a]submitted: 18th/9/2021 accepted: 23/9/2021 email: Omichealalbert@gmail.com

1 Background

Human papillomavirus (HPV) infection is a sexually transmitted infection and it's estimated that 75% of sexually active people are infected with HPV during their lifetime (Petrosky, Bocchini, *et al.,* 2015). HPV vaccine since its first licensure in 2006, (bivalent, quadrivalent, and 9-valent) has proven to be safe, highly immunogenic, and induces strong direct and indirect protection against HPV and its sequelae. National programs with just 50% coverage (or more) of 2 or 3 dose schedules have demonstrated a dramatic impact on population-level HPV prevalence, persistent HPV infection, genital warts, and cervical intraepithelial neoplasia(Hopkins and Wood 2013)

Three HPV vaccines are being marketed in many countries throughout the world; a bivalent, a quadrivalent, and a nonavalent vaccine and are highly efficacious in preventing 90% 0f infections due to the HPV virus (Lehtinen, Luostarinen, et al. 2018). In 2006, the HPV vaccine was licensed and introduced in many countries(Riesen, Konstantinoudis, *et al.,* 2018) and since then remarkable progress in the global scale-up of HPV vaccinations has been reported with74 countries implementing HPV vaccination by the end of 2016(Scott and Batty 2016)

The primary target group for HPV vaccination in many countries is young adolescent girls, aged 9-14(Sauver, *et al.,* 2016). World Health Organization (WHO) recommends that a 2-dose schedule(at 0 and after 6 months) for females aged 9-14 years and females ≥15 years are given a 3-dose schedule (at 0, 2, and 6 months).

Global estimates for HPV vaccine coverage revealed that 33·6% of females aged 10-20 years who received the full course of vaccine were from developed countries and only 2·7% of females were from developing countries (Bruni, *et al.,* 2016). Though many women from high-income and upper-middle-income countries have been vaccinated against HPV, a big population remains largely unprotected with about 85% of the global burden of cervical cancer occurring in the less-developed regions with little or no access to HPV vaccination (Scott and Batty 2016).

Cervical cancer is a leading cause of mortality among women in Uganda. The availability of the human papillomavirus (HPV) vaccine presents an opportunity to prevent cervical cancer among women and girls aged 9-14 are the major target. (Mugisha, LaMontagne *et al.,* 2015)

In Uganda HPV vaccine coverage data showed that more girls (88%) were vaccinated using the grade-based strategy and completed all three doses compared to those (73%) vaccinated using the age-based strategy. Health workers and teachers indicated that determining vaccination eligibility was easier by the class you studies in, than by age and there were minor disruptions to health services and school programs during vaccinations, as reported by health workers and teachers using the grade-based strategy; thus HPV vaccine delivery at schools using grade eligibility is more feasible than selecting girls by age. (Mugisha, *et al., 2*015)

Even though HPV vaccination is recommended and mostly carried out in schools, a study by (Nanyunja, 2020) has reported an uptake of 9.2% among the in-school adolescents girls in the Wakiso district. There are multiple challenges in implementing and increasing the vaccine's uptake. Cost, logistic issues, and parental acceptance probably play a key role in the successful implementation of the new HPV vaccine, this study, therefore, seeks to identify the uptake associated factors and barriers to uptake of HPV-2 vaccine in Igombe Sub-County.

2 METHODOLOGY

Study design and rationale

The study was cross-sectional in design and employed both quantitative and qualitative data collection methods.

Study setting and rationale

The study was conducted in the seven government-aided primary schools in Igombe sub-county, Bugweri; a new district recently paved from Iganga district, located in Eastern Uganda about 93km from Kampala city center. The sub-county has a flat topography, with small-scale agriculture as the main economic activity. The sub-county has a total population of about 9,000 people of different ethnicity and socio-economic backgrounds. Uganda Bureau of Statistics estimates that 49.9% of a given population in Uganda is children less than 15 years; thus Igombe sub-county has an estimated population 4491 of children less than 15 years; with a national ratio of 94.5 males to 100 females, Igombe sub-county has a girl child population of 2309 girls, giving the research a larger sample population. The 7 primary schools

upon which the study will be conducted include; Butalango primary school, Bulyansime church of Uganda primary school, Bulyansime Muslim primary school, Bubenge primary school, Mpitta primary school, Nawampendo primary school, and Walanga primary school.

It would be easy to obtain the required sample size for the study, it was also convenient, and accessible to the researcher.

Study population

The study included girls aged 9-14 years studying in the primary schools in Igombe sub-county Bugweri district; between January and April 2019 and consented to participate in the study.

Sample Size Determination

The sample size was determined using the formula (Kish Lesley 1965)

NH =z2pq

e2

Where,

NH = required sample size

P = prevalence value of the indicator 0.5% or 50% (Hopkins and Wood 2013)

q = 1-P

e = margin of error to be attained (0.05)

z = statistics that defines the level of confidence (1.96 for 95% level of confidence)

Therefore, sample size is calculated as below

nh = (1.96)2 (0.5)(1-0. 5)

(0.05)2

= (3.8416)(0.5)(0.5)

(0.0025)

= 0.9604

0.0025

nh =384.16approximated at 385

K = multiplier to account for non-response (10% of n)

K = 0.10 x 384.16

K = 38.5

Where

N= n + K

Therefore, N is

N = 385 + 38.5

N = 423.5 approximately 424

1. To identify factors associated with improved uptake of HPV2 vaccine among girls between the age of 9 and 14years in Igombe sub-county.

Sample size was determined by using the formula (Kish Lesley)

$Z\alpha/2\sqrt{p(1-p)}$ (1/q1+1/q2) + $Z\beta\sqrt{p1(1-P1)}$ 1/q1+P2(1-p2) 1/q22

Where

n =required sample size

$Z\alpha$ = 1.96

$Z\beta$ = 0.84

P1 = proportion of girls aged 9-14 years that received HPV2 and were fully immunized 96% (0.96)

P2 = proportion of girls between 9 and 14 that received HPV2 and were not fully immunized 4.5% (0.045)

Q1 = proportion of girls aged 9-14years that were fully immunized at infancy 93.8% (0.938).

Q2 = proportion of girls aged 9-14 years that were not fully immunized at infancy 6.2% (0.062).

P= P1/P2(fully immunized at infancy) = 0.96/0.045 =21.3

P1, P2, Q1, and Q2 adapted from a study by (Mabeya, Menon, et al. 2018) in a study on uptake of HPV2 among school girls in Eldoret, Kenya;

Therefore,

N= {$Z\alpha/2\sqrt{p(1-p)}$ (1/q1+1/q2) + $Z\beta\sqrt{p1(1-P1)}$ 1/q1+P2(1-p2) 1/q2 }2

N= {1.96/2 √ 0.46875(1-0.46875) (1/0.96 + 1/0.062) + 0.84√0.96(1-0.96) 1/0.938+1(1-0.045)1/0.062}2

N= -2.055+207.99

N=**205.935**

Note; the highest sample size that was obtained between objectives one and two were considered for the study thus the sample size used for the study was **424** respondents

Sampling procedure

All the government-aided primary schools in the Igombe sub-county were used to obtain the required respondents. Systematic random sampling was used to select respondents for the study.

The researcher introduced himself to the school administration, explained the purpose of his visit, handed in an introductory letter to the head-teacher(s), and seeking for permission to conduct the study using their students and school premises.

A schedule of a convenient time/period of accessing the pupils was made with the school administration because the school worked on a predesigned program and timetable. The researcher was then introduced to the pupils aged 9-14 years; by the teacher on duty. The researcher created rapport and explained his intentions to the students. The researcher requested the pupils to pick numbers from the enclosed box, and everybody who picked odd numbers was allowed to participate in the study while those who picked even numbers

did not participate in the study. The researcher asked for consent from the pupils who picked odd numbers to participate in the study.

This sampling method was chosen because it gave all the pupils aged 9-14 years a fair chance of participating in the study as well as avoiding bias by the researcher.

Inclusion Criteria

The study included girls aged 9-14 years who were available on the day for data collection, and had received HPV1 (presented vaccination card as proof of having received HPV1) and, whose parents/guardians voluntarily consented (on behalf of the girls) to participate in the study.

Exclusion criteria

Girls whose parents/guardians did not sign the consent form and girls who failed to return the fully signed consent form.

Definitions of variables

Dependent variable

Uptake and utilization of HPV2

HPV vaccination was considered complete if a girl aged 9-14 years presents a filled card with both HPV1 and HPV2.

HPV vaccination was considered incomplete if; a girl aged 9-14 years got vaccinated with HPV1, appointment date given but did not turn up for HPV2, or HPV1 received but had no proof of HPV2 receipt.

Independent variables

Socio-demographic factors such as; the age of the girl child, distance from the health facility, family education levels, and family wealth

Associated factors such as; recommendation from a health care worker, high vaccine-related knowledge, availability of free vaccination opportunities, good history of childhood immunization, parental acceptance of the vaccine, political support especially at the policy level.

Barriers to utilization of HPV2, and among them were the following; parental and girl child's knowledge and attitude about the vaccine, vaccination cost, and needle prick pain.

Research instruments

To collect data, the study utilized a pretested questionnaire for girls aged 9-14 years which consisted of both open and closed-ended questions.

Data Collection Procedures

The researcher and the research assistant administered the questionnaire to girls aged 9-14 years in the primary schools in the Igombe sub-county. The questionnaire was used because it was easy for respondents to understand and it generated the information needed.

The research instrument was pre-tested for validity and reliability at Mulago primary school.

Validity and Reliability

The questionnaire was pre-tested to check for errors and appropriateness of the questions before the study. It was corrected and re-written in simple easy to read English for easier understanding

Data Management

At the end of each day of data collection, completed questionnaires were organized and kept in safe custody to avoid loss before entry into the computer.

Data from pre-coded and completed questionnaires were entered into SPSS. The data was then cleaned, checked for errors, and corrected. All the collected hard copy data was put in the file and kept under key and lock, and a soft copy was kept safely in a password-protected computer.

Data analysis

Data was compiled, processed, and analyzed electronically using computer statistical software SPSS (Statistical package for social scientists- Version 2010) and results were presented in charts and tables for easy interpretation. Frequency and percentages were used for the interpretation of variables.

Bi-variate; Chi-square tests for categorical variables and T-tests for continuous variables were used to assess for the independent association between the factors and uptake of HPV2. Factors with a P-value $\leq$of 0.2 were considered for multivariate analysis.

Multivariate analysis; the analysis between factors and uptake of HPV2 was done using a modified Poisson model since prevalence was greater than 10%. This was because uptake is a binary outcome.

Ethical considerations

The proposal was prepared under the supervision and presented to the research committee of Health Tutors' college Mulago for approval.

A Letter of introduction was issued by the Principal- Mulago Health Tutors' College which together with the research proposal was taken to the sub-county chief of Igombe; seeking permission to carry out the study; who later recommend me to be in charge of Igombe H/C II and the headteachers of the 7 government-aided primary schools that later permitted me to participate in the study.

Since the study targeted girls aged between the ages of 9-14 who by law are considered minors thus not allowed to consent for the study on their own; a consent letter was written both in English and Lusogah, addressed to the parents and guardians of the eligible respondents asking them to consent on behalf of their children, the fully signed consent letter was returned to the researcher for such a respondent to be allowed to participate in the study. Both parents/guardians and respondents were assured of confidentiality regarding the research information. Consent (verbal and written) was obtained from respondents after a thorough explanation of the topic and before administering the tools. The respondent had the right to accept, refuse, and withdraw participation at any stage without prejudice.

Dissemination of results

The findings of the study were disseminated through the library of Health Tutors College Mulago, Makerere University main library, Igombe sub-county, Igombe H/C III, Ministry of Health, and through publishing in local and international journals.

3 RESULTS AND DATA ANALYSIS

4 Socio-demographic characteristics of girls aged 9-14 in Igombe Sub County between January and April 2019

Results in the table show that; the majority of the respondents 87 (20.5%) were 14 years and similarly, the majority 146 (34.4%) were studying in primary 4.

The majority of the respondents' parents/guardians 236 (55.7%) were engaged in peasantry farming, 199 (46.9%) were married while minority 94 (22.2%) were divorced, and 158 (37.5%) stopped their education at the primary school level.

Factors associated with uptake of HPV2 among girls aged 9-14 in Igombe Sub County between January and April, 2019

Results in the table below show that; the majority of the respondents 365 (86.1%) were fully immunized during infancy; 135 (31.8%) of the respondents took HPV1 as a result of encouragement from health workers while 44 (10.4%) took up HPV1 due to other reasons such as fear of cancer of the cervix.

The majority of the respondents 247 (58.3%) received HPV1 at school while a minority 80 (18.9%) of the respondents received HPV1 shot at community outreach, and 306 (72.2%) reported not to have been given a return date for HPV2

The majority of the respondents 254 (59.9%) preferred to be vaccinated at school, while 75 (17.7%) preferred hospital/health facility.

Uptake of HPV2 among girls aged 9-14 in Igombe sub county between January and April, 2019.

Findings in table3 below show that 159 (51.13%) respondents had received both HPV1 and HPV2.

Bivariate analysis of the association between uptake of HPV2 and socio-demographic characteristics of girls aged 9-14 in Igombe sub county between January and April, 2019

As seen in table below 4, factors with a p-value more than 0.2 shall be considered for multivariate analysis.

Bivariate analysis of the association between facilitators and uptake of HPV2 among girls aged 9-14 in Igombe Sub County between January and April, 2019

As seen in table 5 below; factors with a p-value more than 0.2 shall be considered for multivariate analysis.

5 Barriers to utilization of HPV2

124 (29.2%) respondents reported that their parents/guardians discouraged them from finishing up the vaccine. When asked for their experience with HPV1, 290 (68.4%) reported a very painful needle prick, while 16 (3.8%) of the respondents report other side effects that according to them are negligible; with 297 (70%) reporting that previous HPV1 would not hinder the reception of HPV2.

The majority of the respondents 417 (98.3%) reported that other factors could stop them from receiving HPV2; 122 (28.8%) reported outreach dates colliding with school days as a factor that could prevent reception of HPV2 and 45 (10.6%) reported tough parents as a factor that could prevent reception of HPV2

Table 1. showing the socio-demographic characteristics of girls aged 9-14 in Igombe Sub County between January and April, 2019

Variable	n/%
Age 9 years 10 years 11 years 12 years 13 years 14 years	74 (17.45) 82 (19.34) 47 (11.08) 56 (13.21) 78 (18.40) 87 (20.5)
Religion Catholics Protestants Muslims others	138(32.5) 113(26.6) 141(33.25) 32 (7.55)
Class Primary 4 Primary 5 Primary 6 Primary 7	57(13.44) 146 (34.43) 131(30.9) 90 (21.23)
Parent's/guardian's occupation Self employed Civil servant/ professional Peasant/ farmer others	73(17.2) 49 (11.56) 236(55.66) 66 (15.57)
Parent/ guardian's marital status Married Divorced Single	199(46.93) 94(22.17) 131(30.90)
Parent/ guardian's education level Informal education Primary education Secondary education Tertiary education	106(25.0) 158(37.26) 80 (18.87) 80 (18.87)

Table 2. Distribution of the facilitators to uptake of HPV2 among girls aged 9-14 in Igombe sub county between January and April, 2019

Variable	n/%
Fully immunized Yes No	365 (86.08) 59 (13.92)
Reason for no full immunization Distant health facility Parental negligence Infant illnesses Don't know	0(0.0) 0(0.0) 0(0.0) 59(100.0)
Reason for agreeing to receive HPV1 Encouragement from parent Encouragement from peers Encouragement from health worker Others	121(28.54) 124(29.25) 135(31.84) 44 (10.38)
Place for receiving HPV1 Hospital School Community outreach	97(22.88) 247(58.25) 80(18.87)
Date for next visit given Yes No	118(27.83) 306 (72.17)
Preferred place for HPV2 Hospital School Community outreach	75(17.69) 254 (59.91) 95 (22.41)

Table 3. Uptake of HPV2 among girls aged 9-14 in Igombe sub county between January and April, 2019

Variable	N/%	95% CI
Overall uptake of HPV2	159 (51.13)	45.5- 56.7

6 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

7 Uptake of HPV2

The uptake of HPV2 in Igombe Sub County stands at 51.13% (CI 45.5- 56.7), this uptake rate is slightly higher compared to the USA national rate of 50% for girls aged 13-15 years as reported in a study conducted by Barlett and Peterson (2011); it is, however, lower compare to a rate of 68.5% as reported by Brabin, Roberts, et al. 2008) in a study on uptake of HPV2 among adolescent girls in Manchester.

As of December 2017, the national annualized coverage of HPV1 was at 85% and HPV2 was at 41% according to the District Health Information System (DHIS 2), its thus safe to note that uptake of HPV2 in the Igombe sub-county is high as compared to national uptake rate.

Associated factors to the uptake of HPV2

Age of respondents: The majority of the respondents 87 (20.5%) (P-value 0.055) were in the age bracket of 14 years, and 78 (18.4%) of the respondents (P-value 0.001) were 13 years.

These ages of 13 and 14 years suit the age ranges as targeted by the vaccine; as recommended by the ministry of health and WHO. The age of 13-14

Table 4. Bivariate analysis of theassociation between uptake of HPV2 and socio-demographic characteristics ofgirls aged 9-14 in Igombe sub county between January and April, 2019

Variable	PR	95%CI	P-value
Age 9 years 10 years 11 years 12 years 13 years 14 years	ref 0.21 2.27 1.03 1.9 1.5	ref 0.08- 0.53 1.51- 3.41 0.60- 1.76 1.33- 2.98 0.99- 2.34	ref 0.001 <0.001 0.893 0.001 0.055
Religion Catholics Protestants Muslims others	ref 1.63 2.07 2.19	ref 1.13- 2.37 1.51- 2.82 1.51- 3.17	ref 0.009 <0.001 <0.001
Class Primary 4 Primary 5 Primary 6 Primary 7	Ref 0.58 0.23 0.66	Ref 0.49- 0.68 0.16- 0.32 0.56- 0.78	Ref <0.001 <0.001 <0.001
Parent's/guardian's occupation Self employed Civil servant/ professional Peasant/ farmer others	Ref 0.66 0.49 0.30	Ref 0.49-0.89 0.41-0.58 0.20- 0.46	Ref 0.007 <0.001 <0.001
Parent/ guardian's marital status Married Divorced Single	Ref 1.64 0.27	Ref 1.44- 1.87 0.16- 0.44	Ref <0.001 <0.001
Parent/ guardian's education level Informal education Primary education Secondary education Tertiary education	Ref 0.67 0.78 1.12	Ref 0.50- 0.90 0.57-1.07 0.85- 1.48	Ref 0.009 0.132 0.404

Table 5. factors with a p-value more than 0.2 shall be considered for multivariate analysis.

Variable	PR	95%CI	P-value
Fully immunized Yes No	Ref 1.38	Ref 1.08- 1.77	Ref 0.010
Reason for agreeing to receive HPV1 Encouragement from parent Encouragement from peers Encouragement from health worker Others	Ref 0.65 0.66 0.90	Ref 0.49- 0.85 0.51- 0.85 62- 1.31	Ref 0.002 0.001 0.615
Date for next visit given Yes No	Ref 1.09	Ref 0.86- 1.38	Ref 0.451
Preferred place for HPV2 Hospital School Community outreach	Ref 0.92 2.26e-08	Ref 0.78- 1.08 1.78e-08 -2.86e-08	Ref 0.351 <0.001

Table 6. Multivariate analysis of the factors associated with uptake of HPV2 among girls aged 9-14 in Igombe sub county between January and April, 2019

Variable	PR	95%CI	P-value
Age 9 years 10 years 11 years 12 years 13 years 14 years	Ref 0.88 1.62 0.85 2.40 2.43	Ref 0.32- 2.38 0.78- 3.36 0.39- 1.83 1.21- 4.77 1.20- 4.93	Ref 0.809 0.191 0.683 0.012 0.014
Religion Catholics Protestants Muslims Others	Ref 1.77 1.12 1.59	Ref 1.25- 2.52 0.80-1.56 1.13- 2.23	Ref 0.001 0.499 0.007
Class Primary 4 Primary 5 Primary 6 Primary 7	Ref 1.40 0.79 1.13	Ref 1.07-1.81 0.55- 1.12 0.76- 1.67	Ref 0.012 0.199 0.539
Parent's/guardian's occupation Self employed Civil servant/ professional Peasant/ farmer Others	Ref 1.27 0.64 1.35	Ref 0.69- 2.32 0.47- 0.88 0.94- 1.94	Ref 0.430 0.007 0.097
Parent/ guardian's marital status Married Divorced Single	Ref 2.29 0.70	Ref 1.17-4.47 0.52- 0.92	Ref 0.015 0.014
Fully immunized Yes No	Ref 1.38	Ref 1.01- 1.87	Ref 0.038
Reason for agreeing to receive HPV1 Encouragement from parent Encouragement from peers Encouragement from health worker Others	Ref 0.55 0.41 0.67	Ref 0.26- 1.17 0.20- 0.82 0.27- 1.68	Ref 0.123 0.012 0.401
Preferred place for HPV2 Hospital School Community outreach	Ref 0.41 1.32e-08	Ref 0.23-0.74 9.10e-09 -1.92e-08	Ref 0.003 <0.001

Table 7. Analysis of the barriers to uptake of HPV2 among girls aged 9-14 in Igombe sub county between January and April, 2019

Variable	n/%
Parents aware about HPV2 Yes No	424(100.0) 0(0.0)
Parents reaction about receiving HPV2 Encouraged to finish up all vaccine doses Discouraged and asked to abandon the remaining doses They were not concerned	161(37.9) 124 (29.2) 139(32.8)
Experience with HPV1 Nothing significant to report Very painful needle prick Got other side effects though negligible	118 (27.8) 290 (68.4) 16 (3.8)
Previous experience stop from getting HPV2 Yes No	127(29.9) 297(70.1)
Any other factor that can stop from getting HPV2 Yes No	417(98.4) 7(1.6)

years is the primary age advocated for HPV vaccination because it's the age that has been universally thought of when girls are still virgins and thus not yet exposed to the Human papillomavirus (the causative agent of cervical cancer). It is not medically recommended to vaccinate a person who is already infected with a given pathogen, as the vaccine may trigger a poor outcome of the infection. Study findings from a study conducted by (Black & Richmond, 2018) who revealed that an average Ugandan virgin range between the ages of 9-14 years; this is so because the vaccine is targeted for virgin girls.

However, In a study conducted on the Uptake of HPV among adolescent girls in the USA, findings revealed that HPV in the USA is targeted for girls aged 11–12 years (P-value 0.005), even when an average virgin girl in the USA is 17 years old, HPV vaccines work best if administered before exposure to HPV. Therefore, WHO (2015) recommends vaccinating girls, aged between 9 and 14 years, when most have not started sexual activity

Class of study: Majority of the respondents 146 (34.4%) (P-value 0.001) were studying in primary 5, 131 (30.9%) were in primary 6, 90 (21.2%)(P-value 0.001) were in primary 6, while minority 57 (13.4%) (P-value 0.001)were studying in primary 4. The distribution of the respondents was such due to the age targeted by the vaccine, who according to expectation as projected by the Ugandan ministry of education; lies in the classes from primary 4 to 7, these findings share a barring with those from a study by (Devries et al., 2015) that revealed that the ages commonly found the classes from primary 4-7 were 9-15 years.

Full immunization at infancy: The majority of the respondents 365 (86.1%) were fully immunized during infancy, full immunization during infancy is associated with parents'/guardians' level of education and awareness of the importance of given vaccines; thus respondents who were fully immunized during infancy were associated with full vaccination with HPV-vaccine.

This finding is in agreement with (Harvey, Reissland, & Mason, 2015) who stated that parents/guardians whose children were fully immunized at infancy were most likely to encourage their daughters to take up HPV vaccine; this because they always attach a great benefit to vaccination and strongly believe that vaccines help prevent infections.

In a similar study conducted on uptake of HPV among adolescent girls in Manchester, findings revealed that there was no association between full immunizations at infancy to the uptake of the HPV vaccine. The study revealed an uptake rate of 68.5% but only 46% of the respondents reporting to have been fully immunized at infancy, (Brabin, *et al.,* 2008). These findings could be so because some respondents did not know if they were immunized at infancy or not, also, respondents did not have direct control on infancy immunization; but as for HPV, one had a chance to decide whether to get vaccinated or not.

Encouragement by health workers, peers, and parents/guardians: The majority of the respondents 135 (31.8%) took HPV as a result of encouragement from health workers while; 121 (28.5%) were encouraged by parents/guardians, and 124 (29.2%) were encouraged by peers.

These findings are similar to a study conducted by Bruni, L., *et al.,* (2016) who in his study on global estimates of HPV coverage reported that there was a great association between encouragement by health workers, peers, and parents and uptake of HPV among adolescent girls (P-value 0.005), because most human beings rely on others for advice before making up a decision as pertains their health.

Encouragement from health workers, peers and parents roots majorly from the impact of health education campaigns that have been conducted on mass media and at health facilities; these health campaigns have been majorly championed by health service providers that include MoH, NGOs, and various health facilities, Rockliffe, Chorley, McBride, Waller, & Forster, (2018)also noted that through health education talks, health workers, parents/guardians, and peers have accessed information that they have been able to share with those who care to know and thus has led to improved uptake of HPV vaccine generally.

Black, E. and R. J. V. Richmond (2018), in their study on prevention of cervical cancer however were not in agreement with the assertion that the girl children based their uptake of HPV on encouragement from others; using the Health Belief Model, they explain that the adolescents decided to take up the vaccine particularly based on their perceived susceptibility to and perceived severity of cancer of the cervix.

The preferred venue for the reception of HPV2: The majority of the respondents 254 (59.9%) (P-value 0.003) preferred to be vaccinated at school.

This study finding is in agreement with a study conducted by (Audrey et al., 2018) who noted that there was a great association between vaccination at school with the uptake of HPV vaccine (P-value 0.005), this could be so because vaccination at schools was preferred by most respondents probably due to the peer relationship in that a majority of the same age, same characteristics, and friends get vaccinated at the same setting, this encourages the uptake of the vaccine.

Kessels, S. J., *et al.,* (2012) in their study on associated factors to the uptake of HPV vaccine noted that a significant number of adolescents reported preferring vaccination at health facility (P-value 0.001) because they would have ample time to discuss with the health workers and also be able to access other services offered in the health facility as opposed to school vaccination drives.

Parents/guardians reaction following HPV1 reception: All the respondents (100%) reported to have told their parents/guardians about their reception of HPV1 when further asked how their parents/guardians reacted; the majority of the respondents 161 (38%) reported that their parents/guardians encouraged them to finish up the vaccine. Findings by a study by Mabeya, H., *et al.,* (2018), who conducted a similar study in Eldoret Kenya shared a similar view in that there was a great association between parental support and uptake of HPV vaccine (P-value 0.005).

There is a link between parents/guardians knowledge of HPV-vaccine and the disease it prevents and uptake of HPV vaccine among their daughters, parents/guardians who were exposed to knowledge pertaining cancer of the cervix; easily encourage their daughters to take up the HPV vaccine as opposed to those without knowledge on cervical cancer; these findings are in agreement with (Rockliffe *et al.,* 2018) who noted that parent acceptance of the HPV utilization is directly proportional to their level of knowledge as pertains the disease the vaccine controlled.

However, Mrklas, *et al.*, (2018) in their study on "Barriers, supports, and effective interventions for uptake of human papillomavirus vaccines within Canadian Indigenous people, noted that it required more than parent support for the adolescents to take up HPV vaccine; they noted that the girls themselves had an attitudinal compartment which played a key role on the acceptability of the vaccine, despite parent support of the decision to take up the vaccine, the girls themselves had the decision to either get vaccinated or not.

Barriers to uptake of HPV2

Respondents experience following HPV1:

The majority of respondents 77 (50.7%) did not receive HPV2 due to fear of needle prick pain. These findings were similar to a study conducted by (Noel et al., 2015) whose findings revealed that respondents blamed fear of needle prick pain and side effects of the HPV vaccine as reasons for failure to get the subsequent doses of the same vaccine. The HPV vaccine is prepared for parenteral administration and thus no oral or any other routes of administration are available other than injection.

It is, however, a known fact that the female gender has been associated to fear of needle prick

compared to the males; a fact shared with (Ekore & Behaviour, 2016) who in their study on preference for injection among sexes noted that the female sex feared injections even when not very invasive and less painful.

Ekore, *et al.,* (2016), in their study on "Exploring Needle Anxiety among Students Attending a Nigerian University Health Centre, reported that more than half of their respondents reported fear of the needle prick as a less likely factor to hinder them from getting vaccinated (P-value 0.005) as they were aware that almost all vaccines are prepared for injection; and thus despite the fear, they were always expectant of injection as a means of vaccination.

The return date for HPV2: The majority of the respondents 306 (72.2%) reported not to have been given a return date, and without a return date; one would not know when the next vaccine is to be received. McComb, E., et al. (2018), in their study on "Knowledge, Attitudes, and barriers to Human Papillomavirus (HPV) vaccine uptake among an immigrant, agrees with these findings; they noted that immigrants were never given an appointment date for the next vaccine date for fear that they would not turn up for the vaccine.

Ministry of Health Uganda encourages health workers to always give return dates whenever a vaccine is given to a client. According to MoH without a return date, then vaccination is considered not given at all, however, return dates were not given in this case due to the unique form of HPV-vaccine provision; in that the vaccine is majorly provided at schools; so health workers simply inform the school of the next date of the second shot without necessarily informing the clients as they too might not turn up to school on that particular date for fear of the previous encounter. This finding is in agreement with a study conducted by (Moodley *et al.,* 2019), who reported that since the HPV vaccine was preferred to be given at schools, most health workers omitted to issue a return date to the adolescent girls but rather made appointments with the school authorities for the next date of issuing out the vaccine; thus girls were most likely to miss out on the HPV2 should they for one reason or another fail to attend school on such a day when the second dose of the vaccine is being issued out.

Other barriers to reception of HPV2: The majority of the respondents 417 (98.3%) report that other factors could stop them from receiving HPV2 and when asked to list such factors; the majority of the respondents 122 (28.8%) reported outreach dates colliding with school programs; a collision of community outreach with school days. These findings were in agreement with a study done by Vercruysse *et al.,* (2016) who advocated for the provision of HPV at schools but was quick to note that; the service providers ought to be calculative enough to avoid collision of the HPV vaccination of the other ongoing school programs.

Other factors reported that could stop reception of HPV2 included; reported tough parents (10.6%), long distance to health facility 90(21.6%), painful needle prick 80(19.2%), and unknown side effects 83(19.9%) that according to them are negligible; these side effects are similar to those listed by (Brinth, *et al.,* 2015) in their study on common side effects associated with HPV-vaccine that included; headaches, generalized body weakness and painful site of the injection over days.

127 (30%) of the respondents reported that previous experience with HPV1 would hinder HPV2 reception. Experiences such as painful needle pricks, other side effects such as headaches and fevers, instill fear in clients and thus make them hesitant to consider taking the second shot of HPV, this finding is in unison with a study by McComb, Ramsden, Olatunbosun, Williams-Roberts, & health, (2018) who reported that side effects experienced by clients in the previous vaccination greatly reduce utilization of a second and subsequent shot of the same vaccine.

Conclusion:

Uptake of HPV2 in Igombe sub-county, Bugweri district is higher compared to the national uptake of the same vaccine.

Multiple factors were associated with uptake of HPV2 vaccine among girls are 9-14 years in the Igombe sub-county, are they include; the age of the respondents where ages 13 and 14 are the most associated with uptake of the vaccine; class of the study of the respondents; infancy immunization, where it was noted that adolescents who were fully immunized at infancy tended to take up the vaccine compared to those who were not fully immunized at infancy; encouragement from health workers, parents and peers improved uptake of HPV2 vaccine, vaccination at school equally improved utilization of HPV2 vaccine and lastly parental reaction following news from their daughters about being vaccinated with HPV vaccine determined if the girls

would turn up for HPV2 or not, those whose parents were supportive were associated with uptake of HPV2.

As for barriers to utilization of HPV2, the following factors were identified as the major barriers; previous experience with HPV1 particularly needle prick pain, headaches, generalized weakness prolonged pain on site of injection; issuing of an appointment date, as without it the girls would not know when they were to receive the next dose (HPV2); and lastly, other factors such; distant health facilities, the collision of the outreach day with school days and school programs, in cases when the vaccine is offered at school.

Recommendations

To the ministry of health/government

The government of Uganda through the ministry of health should ensure that there are national sensitization programs targeted at improving uptake of HPV vaccines among girls aged 9-14 years both those at schools and those out of schools.

The Ministry of Health should ensure that the number of health facilities and schools offering HPV vaccine increase to capture more clients; MoH should also aim at reducing stockouts of the vaccine at the facilities providing the vaccine.

The ministry should also conduct continuous training of health workers particularly on the new vaccines made available in the immunization schedule to promote the prompt and correct use of the vaccine such as HPV.

The ministry through inter-ministerial committees should write circulars to the various primary school headteachers instructing them to liaise with the various health centers in their catchment areas to ensure that all the eligible girls are vaccinated with the HPV vaccine.

To health facilities offering HPV vaccine

All health facilities should ensure outreaches are conducted to the various schools, mobile clinics, homes, and hostels in their catchment areas to encourage HPV- vaccine uptake.

Return dates should be given to clients after every vaccine is given to them, the return dates should not just be mention but written down for the client to as have a reference of it.

Health facilities in charge should timely order for HPV- vaccine to avoid stockouts and eventually promote uptake of the vaccine.

Health workers should conduct mass campaigns and health education talks in their catchment areas aimed at encouraging parents/guardians and their daughters to take up the vaccine.

To girl children aged 9-14 years

Should weigh the benefits versus detrimental effects of the vaccines and thus take up the vaccines to prevent contraction of cervical cancer.

Should encourage their peers to pick interest in the vaccine and turn up for the vaccine, both those at schools and out of schools since the vaccine is offered at schools, outreaches, and health facilities.

Implications to the nursing practices

The implications of these findings to the nursing practice include the following:

Health workers whose catchment areas these schools belong to should make take every opportunity to make sure that every girl child aged 9-14 years receives the two shots of the HPV vaccines to ensure complete protection against cervical cancer.

There is a further need for mass media campaigns not just targeting the girl child but the entire community to encourage utilization of the vaccine

Limitations of the study

Due to the busy schedules of the schools that lasted longer till break time and lunch, a lot of time was spent during data collection than anticipated, however, the researcher had to target break and lunchtime to engage the respondents equitably.

The researcher met challenges of funds since a lot of paperwork was involved, this was solved by early lobbying for financial support from friends and relatives. There was a challenge of uncooperative respondents; this was solved by obtaining proper consent from respondents. Also, time for collecting information was limited but was solved by recruiting more research assistants.

The researcher encountered financial constraints in gathering information from the internet and libraries, drafting questionnaires, printing, typing, and transport costs. The researcher had to overcome this limitation by adjusting the budget, reducing the number of research assistants, working hard with the headteachers of the various schools to obtain the data with a short period to reduce transport costs.

The researcher faced challenges obtaining all the respondents from the planned schools versus the allocated number of respondents per school. These were overcome by adjusting the numbers of the respondents earlier on allocated and redistribute the numbers to the highly populated schools.

Areas for further research

There is a need for further research on knowledge, attitudes, and practices of health workers on the provision of HPV vaccine to girls aged 9-14. More research is equally needed to find out and suggest ways to improve parents/guardians' knowledge and attitudes towards immunization of their children.

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