

Parental acceptance of human papillomavirus vaccination for adolescent girls in Lagos, Nigeria

Kabiru A. Rabiou¹, Taiwo G. Alausa², Fatimat M. Akinlusi¹, Nosimot O. Davies³,
Khadijah A. Shittu², Oluwarotimi Ireti Akinola¹

¹Department of Obstetrics and Gynaecology, Lagos State University College of Medicine, Ikeja, Lagos State, ²Department of Obstetrics and Gynaecology, Lagos State University Teaching Hospital, Ikeja, Lagos State, ³Department of Haematology and Blood Transfusion, Lagos University College of Medicine, Idi-Araba, Lagos State, Nigeria

ABSTRACT

Background and Aims: Human papillomavirus (HPV) vaccination is recommended for adolescent girls and would offer a long-term solution to cervical cancer especially in developing countries. However, parental perception and acceptance is a critical success factor. This study examined the degree of parental acceptance of HPV vaccination for adolescent secondary-school girls in Lagos, Nigeria. **Materials and Methods:** A descriptive cross-sectional survey of adolescent girls' parents was undertaken in two urban and two rural secondary schools in Lagos. Univariate and multivariate analysis were carried out using logistic regression to determine correlates of parental acceptance of HPV vaccine. **Results:** Of the 318 respondents, 45.9% had poor knowledge of cervical cancer and HPV infection, whereas 29.6% had good knowledge. Majority (54.7%) also had poor knowledge of HPV vaccine, whereas 26.7% had good knowledge. Most (72%) would vaccinate their daughters if vaccines were free, whereas only 35.5% would, if not free. Poor knowledge of cervical cancer and HPV infection significantly reduced the likelihood of vaccination even if free (adjusted odds ratio [OR] = 0.48; 95% confidence interval [CI] = 0.24–0.94; $P = 0.0325$), whereas good knowledge of HPV vaccines (adjusted OR = 6.11; 95% CI = 1.37–27.34; $P = 0.018$) and tertiary education in the mother (adjusted OR = 29.17; 95% CI = 3.98–214.08; $P = 0.0009$) increased the likelihood, if not free. **Conclusion:** HPV vaccination was acceptable to most parents only if offered free. Poor knowledge of cervical cancer, HPV infection, and vaccine may hinder acceptability. It is recommended that HPV vaccination is offered free through the National Programme on Immunization in Nigeria.

Keywords: Adolescents, cervical cancer, human papillomavirus vaccine, Nigeria, parental acceptance

Introduction

With an estimated 570,000 cases and 311,000 deaths in 2018 worldwide, cervical cancer ranks as the fourth most frequently diagnosed cancer and the fourth leading cause of cancer death in women worldwide.^[1] The highest regional incidences and mortality rates for cervical cancer are seen in Africa.^[1]

Address for correspondence: Dr. Kabiru A. Rabiou, Department of Obstetrics and Gynaecology, Lagos State University College of Medicine, Ikeja, Lagos State, Nigeria. E-mail: derabs@hotmail.com

Received: 16-01-2020

Revised: 12-03-2020

Accepted: 07-04-2020

Published: 30-06-2020

In Nigeria, cervical cancer is the most common female reproductive tract cancer and is only second to breast cancer as the most common cancer in women the country.^[2] In 2018, there were 14,983 new cases representing 21% of all female cancers and 10,403 died from the disease in the country.^[2]

Cervical cancer is caused by human papillomavirus (HPV) and HPV 16 and 18 are the high-risk strains, which are responsible for over 70% of cervical cancer.^[3-6] Besides cervical cancer, HPV can also lead to cancer of the vulvar, penis, anus and oropharynx as well as genital warts.^[7]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Rabiou KA, Alausa TG, Akinlusi FM, Davies NO, Shittu KA, Akinola OI. Parental acceptance of human papillomavirus vaccination for adolescent girls in Lagos, Nigeria. J Family Med Prim Care 2020;9:2950-7.

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_102_20

Approved HPV vaccines protect against cervical cancer and are recommended for adolescent girls before sexual debut.^[8] Three vaccines that prevent infection with diseases-causing are available: Cervarix, Gardasil, and Gardasil 9. All three vaccines prevent infection with HPV types 16 and 18. Gardasil also prevents infection with HPV types 6 and 11, which causes 90% of genital warts. Gardasil 9 prevents infection with the same four HPV types plus five additional cancer-causing types (31, 33, 45, 52, and 58) that together account for 10%–20% of cervical cancers.^[9] Developing countries that have high cervical rates yet lack comprehensive screening may benefit from the vaccines.^[10] In Nigeria, only Cervarix and Gardasil are available for the prevention of cervical cancer.

Decision about children's treatment and preventive health care are largely made by their parents. In a study examining perception of the HPV vaccination among female university students in Hong Kong, parents are noted to be decisive in preventing young women from receiving the vaccination.^[11]

Acceptance of childhood vaccination by parents is critical. Although HPV vaccination is acceptable to most people surveyed, most acceptability data have emanated from North America and Europe, which may not be applicable elsewhere.^[12] There is paucity of data regarding parental acceptance of HPV vaccination in developing countries.

Since the introduction of Cervarix and Gardasil in Nigeria in 2011, the federal government is yet to adopt a national strategy that will ensure equitable access to HPV vaccination. Few studies in the country have assessed parental willingness toward HPV vaccination. No published studies however have used a representative sample of parents from a whole state. This study was therefore carried out to determine factors affecting parental acceptance of HPV vaccination for adolescent secondary-school girls in Lagos State, Nigeria.

We hope that the information obtained will drive public health response most especially at the primary care facilities, which are usually the first facilities visited by patients in the formal health sector and are responsible for implementation of immunization programs in the country. The public health department works with primary care providers at the local government levels to ensure adequate access to vaccines and provision of qualitative preventive health-care services to the community.

Subjects and Methods

Design

This was a descriptive cross-sectional survey.

Study area

The study was carried out in Lagos State, Nigeria with an estimated population of 22,883,047 inhabitants in 2013. The state has 20 local government areas (LGAs) or zones, 12 of

which are urban and 8 rural. The state has 328 public junior secondary schools and 313 public senior secondary schools as at 2013 and these are fairly evenly distributed across the local governments.^[13] The state also has many privately owned junior and senior secondary schools.

Sampling technique

The list of all secondary schools in Lagos State was obtained from the ministry of education. The 20 LGAs were divided into the urban group and the rural group. Two LGAs were then chosen from each group by simple random sampling (balloting). A school was then chosen from each of the four chosen LGAs by balloting. In total, two urban and two rural secondary schools were chosen.

Data collection

The instrument for data collection was a pretested questionnaire put together based on adaptation and literature review on the subject. The questionnaire included questions concerning the sociodemographic characteristics of the respondents, their knowledge of HPV, cervical cancer and HPV vaccines, and their willingness to vaccinate their daughters. The selected schools were visited during the parent–teachers association meetings. The purpose of the study was explained to the parents and those who gave their consent were given the questionnaire to study and fill.

After completing the questionnaire, the respondents were educated about cervical cancer, HPV infection, and its prevention by vaccination and the available vaccines. Confidentiality was maintained by not including their names in the questionnaire in order to elicit the correct responses. The questionnaires were retrieved on the same day.

Data processing and analysis

The authors appraised the responses and categorized the open-ended questions and answers. They were specifically assessed to determine their knowledge of cervical cancer, HPV infection, and HPV vaccination.

The data were entered into the computer and analyzed using the Epi-Info 3.5.3 statistical software of the Centre for Disease Control and Prevention, Atlanta, Georgia, USA to generate descriptive statistics. Crude odds ratio (cOR) and 95% confidence interval (CI) for hypothesized factors affecting willingness of parents to vaccinate their daughters were determined using logistic regression. Variables that were significant at P value <0.05 were then considered for the multivariate logistic regression mode to determine adjusted OR and independent factors determining willingness of parents to vaccinate their daughters.

Ethics

The Lagos State University Teaching Hospital Research and Ethics Committee gave approval for the study.

Results

The sociodemographic characteristics of the respondents are shown in Table 1. Of the 318 parents surveyed, 20.1% were males and 79.9% were females.

Parental knowledge of cervical cancer and HPV infection is depicted in Table 2. Approximately half (45.9%) had poor knowledge of cervical cancer and HPV infection, whereas 78 (24.5%) and 94 (29.6%) had fair and good knowledge, respectively.

Table 3 assesses the respondent's knowledge of HPV vaccine. The majority (54.7%) had poor knowledge, whereas 18.6% and 26.7% had fair and good knowledge, respectively.

Two hundred and twenty-nine (72%) expressed willingness to vaccinate their daughters if the vaccine were free, whereas 89 (28%) will not vaccinate their daughters even if the vaccines were offered free.

Only 113 (35.5%) of the respondents were willing to vaccinate their daughters if the vaccine comes at a cost, whereas 205 (64.5%) were not willing.

Table 4 shows univariate analysis of the factors affecting willingness to vaccinate daughters if the vaccine is offered free. Gender of parents, age of parents, educational status of father, occupational status of father, and location of school were not significant factors affecting willingness to vaccinate if free. Tertiary level of education in mother (cOR = 8.31; 95% CI = 3.39–20.38; $P = 0.0000$), skilled occupational status in the mother (cOR = 8.99; 95% CI = 3.20–25.22; $P = 0.0000$), good knowledge of cervical cancer and HPV (cOR = 6.14; 95% CI = 2.18–17.27; $P = 0.0006$) and good knowledge of HPV vaccine (cOR = 3.80; 95% CI = 1.44–10.02; $P = 0.0070$) significantly increased the likelihood to vaccinate if offered free. Poor Knowledge of cervical cancer and HPV (cOR = 0.44; 95% CI = 0.24–0.81; $P = 0.0081$) reduced the likelihood if offered free.

Table 5 shows the univariate analysis of factors affecting willingness to vaccinate daughters if vaccine is not free. Tertiary level of education in the mother (cOR = 67.41; 95% CI = 15.25–297.97; $P = 0.0000$), skilled occupation in the mother (cOR = 11.55; 95% CI = 5.55–24.04; $P = 0.0000$), skilled occupation in the father (cOR = 4.10; 95% CI = 2.31–7.28; $P = 0.0000$), Urban setting (cOR = 4.48; 95% CI = 2.73–7.37; $P = 0.0000$), good knowledge of cervical cancer and HPV (cOR = 19.82; 95% CI = 8.99–43.70; $P = 0.0000$) and good knowledge of HPV vaccine (cOR = 20.31; 95% CI = 7.18–57.2; $P = 0.0000$) increased the likelihood for vaccination. Factors that decreased the likelihood of vaccination if the vaccine is not free are poor knowledge of cervical cancer and HPV (cOR = 0.24; 95% CI = 0.11–0.53; $P = 0.0000$) and poor knowledge of the HPV vaccine (cOR = 0.05; 95% CI = 0.02–1.13; $P = 0.0000$). After entering the factors significant at a P value of <0.05 into a multiple

Table 1: Demographic characteristics of respondents

Characteristics	Frequency	Percentage
Gender of parents		
Female	254	79.1
Male	64	20.1
Age of parents in years		
30-39	242	76.1
40-49	57	17.9
50-59	19	6.0
Educational status of mother		
None	37	11.6
Primary	51	16.0
Secondary	99	31.1
Tertiary	131	41.2
Educational status of father		
None	4	1.3
Primary	22	7.1
Secondary	133	42.9
Tertiary	151	48.7
Occupational status of mother		
Skilled	101	31.8
Semi-skilled	69	21.7
Unskilled	148	46.5
Occupational status of father		
Skilled	75	24.1
Semi-skilled	172	55.3
Unskilled	64	20.6
Location of school		
Rural	210	66.0
Urban	108	34.0

Table 2: Parental knowledge of cervical cancer and HPV infection

Question	Yes (%)	No (%)
Able to explain what cervical cancer is	129 (40.5)	189 (59.5)
Knows that cervical cancer is the most common		
Female reproductive cancer	40 (12.5)	278 (87.5)
Knows that cervical cancer can be prevented by Pap smear	75 (23.6)	243 (76.4)
Knows that cervical cancer can be prevented by vaccination	75 (23.6)	243 (76.4)
Able to fairly explain what HPV is	119 (37.3)	199 (62.7)
Knows the mode of transmission of HPV	114 (35.9)	204 (64.1)
Knows the effects of HPV	103 (32.3)	215 (67.7)
Knows how HPV can be prevented	65 (20.1)	253 (79.9)
*Overall knowledge of cervical cancer and HPV infection		
Characteristics	Frequency	Percentage
Good	94	29.6
Fair	78	24.5
Poor	146	45.9

*A total of nine effects were scored. Knowledge of 0-3=poor knowledge; 4-6=fair knowledge; 7-9=good knowledge

logistic regression model for multivariate analysis [Table 6], the only factor that remained that remained significant as an independent determinant of willingness to vaccinate when vaccine is free is poor knowledge of cervical cancer and HPV

which reduced the likelihood of accepting vaccination by almost half (aOR = 0.47; 95% CI = 0.24–0.94; *P* = 0.0325). Concerning willingness to vaccinate if the vaccine comes at a cost, tertiary level of education in the mother increased the likelihood about 29 fold (aOR = 29.17; 95% CI = 3.98–214.08;

P = 0.0009), whereas good knowledge of HPV vaccine increased the likelihood of acceptance about 6 fold (aOR = 6.11; 95% CI = 1.36–27.43; *P* = 0.0180). Poor knowledge of HPV vaccine decreased the likelihood of vaccination if the vaccine comes at a cost (aOR = 0.13; 95% CI = 0.03–0.48; *P* = 0.0022).

Table 3: Knowledge of HPV vaccine

Question	Yes (%)	No (%)
Knows at least one type of HPV vaccine	80 (25.1)	238 (74.9)
Knows the recommended age for vaccination	94 (29.6)	224 (70.4)
Knows when HPV vaccine is most effective	99 (31.1)	219 (68.9)
*Overall knowledge of HPV vaccine		
Characteristic	Frequency	Percentage
Good	85	26.7
Fair	59	18.6
Poor	174	54.7

*Knowledge of 0=1=poor knowledge; knowledge of 2=fair knowledge; knowledge of 3=good knowledge

Discussion

To better understand how HPV vaccination may be implemented in Nigeria, we wanted to investigate parental acceptance toward HPV vaccination and as HPV vaccine was not included in the national vaccination program when the study was conducted, we wanted to explore not only the willingness to vaccinate, but also the willingness to pay for the vaccine.

Nigeria has one of the highest cervical cancer incidences worldwide.^[14] A study in Ghana, Nigeria, and South Africa

Table 4: Univariate analysis of factors affecting willingness to vaccinate daughters if vaccine is free

Characteristics	Yes n (%)	No n (%)	cOR	95% CI	P
Gender of parent					
Female	182 (71.7)	72 (28.3)	1.00	Reference	
Male	47 (73.4)	17 (26.6)	1.09	0.59-2.03	0.7763
Age of parent					
30-39	178 (73.6)	64 (26.4)	1.00	Reference	
40-39	40 (70.2)	17 (29.8)	0.85	0.45-1.60	0.6059
50-59	11 (57.9)	8 (42.1)	0.50	0.19-1.28	0.1480
Educational level of mother					
None	21 (56.8)	16 (43.2)	1.00	Reference	
Primary	29 (56.9)	22 (43.1)	1.00	0.42-2.36	0.9921
Secondary	59 (59.6)	40 (40.4)	1.12	0.52-2.41	0.7647
Tertiary	120 (91.6)	11 (8.4)	8.31	3.39-20.38	0.0000
Educational level of father					
None	2 (50.0)	2 (50.0)	1.00	Reference	
Primary	12 (54.5)	10 (45.5)	1.20	0.14-10.12	0.8669
Secondary	88 (66.2)	45 (33.8)	1.96	0.27-14.34	0.5095
Tertiary	199 (78.8)	32 (21.2)	3.72	0.50-27.44	0.1977
Occupational status of mother					
Skilled	96 (95.0)	5 (5.0)	8.99	3.20-25.22	0.0000
Semi-skilled	47 (68.1)	22 (31.9)	1.00	Reference	
Unskilled	86 (58.1)	62 (41.9)	0.65	0.36-1.19	0.1600
Occupational status of father					
Skilled	57 (76.0)	18 (24.0)	1.45	0.78-2.70	0.2410
Semi-skilled	118 (68.6)	54 (31.4)	1.00	Reference	
Unskilled	47 (73.4)	17 (26.6)	1.27	0.67-2.40	0.4723
Location of school					
Rural	149 (71.0)	61 (29.0)	1.00	Reference	
Urban	80 (74.1)	28 (25.9)	1.17	0.69-1.97	0.4723
Knowledge of cervical cancer and HPV					
Good	89 (94.7)	5 (5.3)	6.14	2.18-17.27	0.0006
Fair	58 (74.4)	20 (25.6)	1.00	Reference	
Poor	82 (56.2)	64 (43.8)	0.44	0.24-0.81	0.0081
Knowledge of HPV vaccine					
Good	78 (91.8)	7 (8.2)	3.80	1.44-10.02	0.0070
Fair	44 (74.6)	15 (25.4)	1.00	Reference	
Poor	107 (61.5)	67 (38.5)	0.54	0.28-1.05	0.0713

Table 5: Univariate analysis of factors affecting willingness to vaccinate daughters if vaccine is not free

Characteristics	Yes n (%)	No n (%)	cOR	95% CI	P
Gender of parent					
Female	94 (37.0)	160 (63.0)	1.00	Reference	
Male	19 (29.7)	17 (26.6)	0.72	0.40-1.30	0.2754
Age of parent					
30-39	83 (34.3)	159 (65.7)	1.00	Reference	
40-39	26 (45.6)	31 (54.4)	1.6	0.90-2.88	0.1121
50-59	14 (21.1)	15 (78.9)	0.51	0.16-1.59	0.2455
Educational level of mother					
None	2 (5.4)	35 (94.6)	1.00	Reference	
Primary	2 (3.9)	49 (96.1)	0.71	0.10-5.51	0.7423
Secondary	5 (5.1)	94 (94.9)	0.93	0.17-5.02	0.9336
Tertiary	104 (79.4)	27 (20.6)	67.41	15.25-297	0.0000
Educational level of father					
None	1 (25.0)	3 (75.0)	1.00	Reference	
Primary	4 (18.2)	18 (81.8)	0.67	0.06-6.30	0.7515
Secondary	23 (17.3)	110 (82.7)	0.63	0.06-6.30	0.6920
Tertiary	77 (51.0)	74 (49.0)	3.12	0.32-30.69	0.3290
Occupational status of mother					
Skilled	77 (76.2)	24 (23.8)	11.55	5.55-24.04	0.0000
Semi-skilled	15 (21.7)	54 (78.3)	1.00	Reference	
Unskilled	21 (14.2)	127 (85.8)	0.60	0.29-1.24	0.1666
Occupational status of father					
Skilled	48 (64.0)	27 (36.0)	4.10	2.31-7.28	0.0000
Semi-skilled	52 (30.2)	120 (69.8)	1.00	Reference	
Unskilled	6 (9.4)	58 (90.6)	0.24	0.10-0.59	0.0018
Location of school					
Rural	50 (23.8)	160 (76.2)	1.00	Reference	
Urban	63 (58.3)	45 (41.7)	4.48	2.73-7.37	0.0000
Knowledge of cervical cancer and HPV					
Good	82 (87.2)	12 (12.8)	19.82	8.99-43.70	0.0000
Fair	20 (50.0)	20 (50.0)	1.00	Reference	
Poor	11 (7.5)	135 (92.5)	0.24	0.11-0.53	0.0004
Knowledge of HPV vaccine					
Good	80 (94.1)	5 (5.9)	20.31	7.18-54.42	0.0000
Fair	26 (44.1)	33 (55.9)	1.00	Reference	
Poor	7 (4.0)	167 (96.0)	0.05	0.02-1.13	0.0000

isolated HPV types 16 and 18 in 68.4% of women with invasive cervical cancer suggesting that HPV vaccine could have a large impact.^[15]

Many prior effects at cervical cancer screening in Nigeria have largely been ineffective due to limited cytology and treatment services, lack of knowledge about cervical cancer and its screening and implementation and cost barriers. However, successful universal immunization programs do exist using various strategies such as the Expanded Programme for Immunization (EPI). HPV vaccination may thus be a uniquely effective intervention for the prevention of cervical cancer in the country.

Our study revealed that almost half of the participants had poor knowledge of cervical cancer and HPV, its causative agent with only 29.6% showing good knowledge. A study assessing mothers papillomavirus knowledge and willingness to vaccinate

their adolescent daughters in Shomolu LGA of Lagos State, Nigeria reported that majority of the mothers were aware of cervical cancer, but only few were aware of HPV and had little knowledge of its link to cervical cancer.^[16] This poor knowledge of cervical cancer and its causative agent HPV is not surprising as most previous studies in the country have reported poor knowledge of cervical cancer. Only 25.3% of women attending anti-retroviral clinic in Lagos, Nigeria in 2011 had ever heard of cervical cancer.^[17] In 2004, also in Lagos, Nigeria, 81.7% of 139 patients with advanced cervical cancer had never heard of the disease.^[18]

A study evaluating HPV vaccine acceptability among women in a semi-urban region of Kisumu, Kenya also reported that only 15% of the women had heard of cervical cancer.^[19] In Sakarya Province, Turkey, 88.1% of mothers had no information about HPV and 73.3% did not know how the infection was

Table 6: Multivariate logistic regression analysis of significant factors affecting willingness to vaccinate daughters

Characteristics	aOR	95% CI	P
Willingness to vaccinate if free			
Tertiary level of education in mother	2.40	0.69-8.34	0.1679
Skilled occupation in mother	2.83	0.76-10.51	0.1204
Good knowledge of cervical cancer and HPV	2.97	0.81-10.81	0.0995
Poor knowledge of cervical cancer and HPV	0.47	0.24-0.94	0.0325*
Good knowledge of HPV vaccine	0.53	0.13-2.17	0.3824
Willingness to vaccinate if not free			
Tertiary level of education in mother	29.17	3.98-214.08	0.0009*
Skilled occupation in mother	0.30	0.05-1.71	0.1743
Skilled occupation in father	2.76	0.87-8.69	0.0838
Urban location of school	0.42	0.11-1.65	0.2144
Good knowledge of cervical cancer and HPV	4.66	0.97-22.41	0.0545
Poor knowledge of cervical cancer and HPV	0.89	0.21-3.80	0.8698
Good knowledge of HPV vaccine	6.11	1.36-27.34	0.0180*
Poor knowledge of the HPV vaccine	0.13	0.03-0.48	0.0022*

*Significant factors

transmitted.^[20] A recent study assessing parental knowledge and perception of HPV and cervical cancer prevention in Rural Central Java, Indonesia also reported that most parents had no knowledge of HPV or the causal link between HPV and cervical cancer.^[21]

Our study also showed that most of the respondents had poor knowledge of the HPV vaccine. Most studies from developing countries also showed poor knowledge of HPV vaccines among parents.^[16,19,20]

In Nigeria, the HPV vaccine was launched and inaugurated by the federal government in 2011 and since then, has been administered by private facilities. The relatively poor knowledge of the vaccine in Nigeria since its inauguration shows that little has been carried out to create awareness about it and much work is needed in this area. Awareness can be created with the development of health promotion and educational strategies for the public especially through the primary health care facilities which are closer to the people in the community. Considering the high burden of cervical cancer in Nigeria, creating awareness on HPV vaccination will be a step in the right direction. Successful education of the general populace will require continued education about the preventable nature of cervical cancer, the need for continued screening despite vaccination, cost of vaccines and details of vaccine efficacy and its effects.

Despite the poor knowledge of cervical cancer, HPV, and HPV vaccine, 72% of the parents were willing to vaccinate their daughters if the vaccine is offered free. This figure is less than those reported in some local studies. In Shomolu local government in Lagos, Nigeria, 88.9% of mothers were willing

to vaccinate their adolescent daughters, whereas 88.6% of reproductive aged women in Ibadan, Southwestern Nigeria were willing to vaccinate their daughters.^[16,22] A recent study from Abakaliki South-eastern Nigeria also reported that 89.1% of mothers were willing to vaccinate their adolescent daughters.^[23] It is however worthy of note that higher acceptance rates were reported in some other African countries. A much higher rate of 94% was reported from Ghana, whereas 95% was reported from Kenya.^[19,24] The observed difference may not be unconnected with the fact that these countries have better routine immunization coverage rates than Nigeria according to the Global Alliance for Vaccines and Immunization (GAVI) assessment indicators. The 2011 World Health Organization/UNICEF estimates for Diphtheria, Pertusis, and Tetanus-3 (DPT3) vaccination coverage showed that Ghana had a national coverage of 91%, whereas Kenya had a coverage of 88%. The reported coverage for Nigeria was 66%.^[25]

It is imperative to note that that only 35.5% of the parents were willing to vaccinate their daughters if the vaccine came at a cost. This finding is similar to what was reported in Kenya, another developing country where only 25% of the parents were willing to pay more than 1.32 US dollar for the complete series.^[19] In Sweden, up to 63% of parents were willing to vaccinate their Children even if the vaccine comes at a cost.^[26] Also, in rural Central Java, Indonesia, most parents were supportive of vaccinating their children against HPV even at a fee.^[21] This lack of willingness of most parents in Lagos, Nigeria to pay for the vaccine highlights the importance of international agencies in assisting with the cost of HPV vaccine in developing countries so that if possible, the vaccine can be offered free because sustaining free HPV vaccination by the governments might be a difficult policy to implement due to competing health challenges.^[10]

Recently, the GAVI Alliance has offered a subsidy for developing countries that meets its eligibility criteria.^[27] The GAVI Alliance uses two criteria to determine eligibility for vaccination support, including HPV vaccination: (1) a DPT3 threshold of 70% national coverage and (2) a pilot demonstration of the ability to deliver a complete multi-dose series of vaccines to at least 50% of the target vaccination cohort in an average sized district in a county.^[28] Nigeria does not meet the DPT3 threshold of 70% national coverage.^[25] It is therefore important that policy makers and stake holders come together to fashion out feasible and sustainable policy to fund the vaccination program in the country.

Our study went on to explore factors influencing willingness of parents to vaccinate their daughters if the vaccine is offered free and also when it comes at a cost. Most previous studies did not investigate association between cervical cancer and HPV knowledge and parental acceptance for HPV vaccination. Our study however showed that knowledge of cervical cancer and HPV is a significant correlate for HPV vaccine acceptance with poor knowledge reducing the probability of vaccine acceptance by almost 50%. Also, in Ibadan, South West Nigeria, knowing

that cervical cancer is preventable is significantly associated with willingness to allow HPV vaccination to children.^[22]

Our study also revealed that tertiary level of education in the mother increased the probability of vaccine acceptance almost 30-fold. It is likely that these women with tertiary level of education have better knowledge of cervical cancer and its prevention than those who are less well educated. A study in Israel showed that the more aware an individual is about the dangers in contracting HPV, the higher the interest shown in preventive measures.^[29]

Several studies have also shown that parents who knew that vaccination was a safe and effective way to prevent disease were more likely to vaccinate their children against HPV.^[26,30] It was therefore not surprising that this study showed that parents who had good knowledge of HPV vaccine were more likely to vaccinate their daughters even when they have to pay for it, whereas poor knowledge decreased the probability.

The study was limited by the fact that there might have been some recall bias in answering some of the questions by the respondents. The study however showed that HPV vaccination for adolescent secondary school girls was acceptable to most parents in Lagos, Nigeria only if offered free as majority were not willing to pay for the vaccine and this is not likely to be different in other parts of the country.

Poor knowledge of cervical cancer, HPV infection and HPV vaccines may hinder acceptability. Educational programs to improve parental knowledge are required. It is imperative that policy makers and stake holders in the country come together to fashion out feasible and sustainable policy to fund HPV vaccination in the country so that it can be incorporated free into the National Programme on Immunization.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Bray F, Ferley J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global Cancer Statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2018;68:394-424.
2. Internal Agency for Research on Cancer. World Health Organization. Cancer fact sheets. Available from: <https://go.iarc.fr/today/fact-sheets-cancers>. [Last accessed on 2020 Mar 27].
3. Tristram A, Finander A. Human papillomavirus (including vaccines). *Obstet Gynaecol Reprod Med* 2007;17:324-9.
4. Walboomers JMM, Jacobs MV, Manos MM, Bosch FX, Kummer JA, Shah KV, *et al.* Human papillary virus is a necessary cause of invasive cervical cancer worldwide. *J Pathol* 1999;189:12-9.
5. Lowly DR, Schiller JT. Reducing HPV associated cancer globally. *Cancer Prev Res (Phila)* 2012;5:18-23.
6. Waheed MT, Gottschamel J, Hassan SW, Lossi AG. Plant-derived vaccines: An approach for affordable vaccines against cervical cancer. *Hum Vaccines Immunother* 2012;8:403-6.
7. Center for Disease Control and Prevention: Sexually transmitted diseases (STDs): Genital HPV infection -fact sheet. Available from: <http://www.cdc.gov/STD/HPV/STDfact-HPV.htm>. [Last accessed on 2020 Jan 02].
8. Meites E, Szilagyi PG, Chesson HW, Unger ER, Romero JR, Markowitz LE. Human papillomavirus vaccination for adults: Updated recommendations of the Advisory Committee on Immunization Practice. *MMWR Morb Mortal Wkly Rep* 2019;68:698-702.
9. National Cancer Institute. Human Papillomavirus (HPV) Vaccines. Available from: <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet>. [Last accessed on 2020 Mar 27].
10. Bello FA, Enabor OO, Adewole IF. Human papilloma virus vaccination for control of cervical cancer: A challenge for developing countries. *Afr J Reprod Health* 2011;15:25-30.
11. Siu JY. Perceptions of barrier to vaccinating daughter against human papillomavirus (HPV) among mothers in Hong Kong. *BMC Womens Health* 2014;14:73.
12. Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: A theory-informed systematic review. *Prev Med* 2007;45:107-14.
13. Lagos State Government. Basic Statistical Hotline. 2014 Edition. Available from: <http://mepb.lagosstate.gov.ng/lbs-publication/>. [Last accessed on 2019 Sep 27].
14. Jedy-Agba E, Curado MP, Ogunbiyi O, Oga E, Fabowale T, Igbino F, *et al.* Cancer incidence in Nigeria: A report from population-based cancer registries. *Cancer Epidemiol* 2012;36:e271-8.
15. Denny L, Adewole I, Anorlu R, Dreyer G, Moodley M, Smith T, *et al.* Human papillomavirus prevalence and type distribution in invasive cervical cancer in sub-saharan Africa. *Int J Cancer* 2014;134:1389-98.
16. Ezenwa BN, Balogun MR, Okafor JP. Mothers human papilloma virus knowledge and willingness to vaccinate their adolescent daughters in Lagos, Nigeria. *Int J Womens Health* 2013;5:371-7.
17. Rabiu KA, Akinbami AA, Adewunmi AA, Akinola OI, Wright KO. The need to incorporate routine cervical cancer counselling and screening in the management of HIV positive patient in Nigeria. *Asian Pac J Cancer Prev* 2011;12:1211-4.
18. Anorlu RI, Orakwue CO, Oyenehin L, Abudu OO. Late presentation of patients with cervical cancer to a tertiary hospital in Lagos: What is responsible? *Eur J Gynaecol Oncol* 2004;25:729-32.
19. Becker-Dreps S, Otieno WA, Brewer NT, Agot K, Smith JS. HPV vaccine acceptability among Kenyan women. *Vaccine* 2010;28:4864-7.
20. Kose D, Erkorkmaz U, Cinar N, Altinkaynak S. Mothers knowledge and attitude about HPV vaccination to prevent cervical cancer. *Asian Pac J Cancer Prev* 2014;15:7236-66.
21. Spagnoletti BRM, Bennett LR, Wahdi AE, Wilopo SA, Keenan CA. A qualitative study of parental knowledge and

- perceptions of human papillomavirus and cervical cancer prevention in rural central Java, Indonesia: Understanding community readiness for prevention interventions. *Asian Pac J Cancer Prev* 2019;20:2429-34.
22. Morhason-Bello IO, Wallis S, Adedokun BO, Adewole IF. Willingness of reproductive-aged women in a Nigerian community to accept human papillomavirus vaccination for their children. *J Obstet Gynaecol Res* 2015;41:1621-9.
 23. Azuogu BN, Umeokonkwo CD, Azuogu VC, Onwe OE, Okedo-Alex IN, Egbuji CC. Appraisal of willingness to vaccinate daughters with human papilloma virus vaccine and cervical cancer screening uptake among mothers of adolescent students in Abakaliki, Nigeria. *Niger J Clin Pract* 2019;22:1286-91.
 24. Coleman MA, Levison J, Sangi-Haghpeyker H. HPV vaccine acceptability in Ghana, West Africa. *Vaccine* 2011;29:3945-50.
 25. Perlman S, Wamai RG, Bain PA, Welty T, Welty E, Ogembo JG. Knowledge and awareness of HP vaccine and acceptability to vaccinate in sub-Saharan Africa: A systematic review. *PLoS One* 2014;9:e90912.
 26. Dahlstrom LA, Tran TN, Lundholm C, Young C, Sundstrom K, Sparen P. Attitudes to HPV vaccination among parents of children aged 12-15 years- A population based survey in Sweden. *Int J Cancer* 2010;126:500-7.
 27. GAVI injects new life into HPV vaccine rollout. *Lancet* 2013;381:1688.
 28. Wigle J, Coast E, Watson-Jones D. Human papillomavirus (HPV) vaccine implementation in low and middle income countries (LMICs): Health system experiences and prospects. *Vaccine* 2013;31:3811-7.
 29. Ben Natan M, Aharon O, Palickshvili S, Gurman V. Attitude of Israeli mothers with vaccination of their daughters against human papilloma virus. *J Paediatr Nurs* 2011;26:70-7.
 30. Marlow LA, Waller J, Wardle J. Parental attitudes to pre-pubertal HPV vaccination. *Vaccine* 2007;25:1945-52.