

Parental Knowledge of HPV Infection, Cervical Cancer and the Acceptance of HPV Vaccination for their Children in Jos, Nigeria

Abstract

Background: Despite the high prevalence of human papillomavirus (HPV) infections and cervical cancer in Nigeria, the utilization of the HPV vaccine as a highly effective preventive measure remains low. The aim of this study was to find out if parental knowledge of HPV infection and cervical cancer influenced the acceptance of HPV vaccines for their 9–14-year-old children. **Materials and Methods:** This was a cross-sectional survey of 509 parents comprising 262 fathers and 247 mothers in 8 randomly selected communities in Jos, Plateau State Nigeria. A pretested semi-structured investigator-administered questionnaire, without identifiers, was used to collect information on parental knowledge of HPV, cervical cancer, HPV vaccine and its acceptance for their 9–14-year-old children. The data were analysed using SPSS version 23.0. Bivariate analysis was done using chi-square statistical test. Point estimates with corresponding 95% confidence interval (CI) were estimated with a value of $P \leq 0.05$ was considered as statistically significant. **Results:** Five hundred and nine parents were interviewed. The mean age of the respondents was 43.7 ± 9.43 years. Most of the participants (86.1%) had formal education from primary to tertiary level. Only 1.60%, 11.60% and 1.62% of respondents had knowledge of HPV, cervical cancer and HPV vaccines respectively, whereas 67.8% of parents were willing to pay for the cancer-preventing HPV vaccines out-of-pocket. There was no statistically significant associations between parental level of education ($P = 0.056$), parental knowledge of cancer of cervix ($P = 0.483$), religion of parents ($P = 0.324$) and the acceptance of HPV vaccination for their children. There was a statistically significant association between parental willingness to pay for HPV vaccines if not offered free ($P = 0.001$) with acceptance of vaccination. Vaccine acceptability was associated with positive attitude towards the vaccine (odds ratio [OR] = 4.178; 95% CI, 1.714–10.180; $P = 0.002$), whereas parental knowledge of HPV, cervical cancer and HPV vaccine did not show significant association with acceptability of HPV vaccination for their children. **Conclusion:** Despite poor parental knowledge of HPV infection and cervical cancer, there was high acceptability of HPV vaccination for their children. HPV vaccination was acceptable to parents regardless of educational level or religion. Parents in Jos communities seems to have much faith in preventive vaccines as advertised by the health authorities. Accordingly, efforts should be geared towards ensuring availability, affordability and the provision of basic information regarding HPV vaccination in Northern Nigeria.

Keywords: cervical cancer, Human papillomavirus, Jos Nigeria, Parental Knowledge, Vaccines acceptance

Introduction

Cervical cancer is a critical public health concern in sub-Saharan Africa.^[1,2] Every year approximately 528,000 women around the world are diagnosed with cervical cancer and approximately 266,000 women die from the disease.^[3] Nigeria contributes approximately 2.5% of the world's population but bears 10% of the global cervical cancer burden.^[4] In 2020, the global estimate was 604,000 new cases resulting in 342,000 mortalities.^[5] As of 2020, the age

specific incidence and mortality rate was 21.5 and 16 deaths per 100,000 females, respectively.^[6] Cervical cancer is the second most frequent cancer among women (after breast cancer) in Nigeria.^[7] Further, approximately 14,089 Nigerian women are diagnosed with cervical cancer and 8240 die from the disease yearly.^[5] Cervical cancer therefore constitutes a substantial health and economic burden to the country. Cervical cancer deaths tend to occur in relatively younger women at the prime of life, who are raising children, caring for families, and contributing to society.^[5]

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Evidence has emerged that human papillomavirus (HPV) infection is a critical causative factor in the pathogenesis of cervical cancer and HPV vaccination is an effective means of primary prevention. HPV vaccination programs have been introduced to great effect in many developed countries. With improved access from falling prices, HPV vaccination programs are becoming feasible in low and middle income countries like Nigeria.^[8,9]

The advent of HPV vaccination as an effective means of primary prevention of cervical cancer has radically injected optimism into the prospects of a cervical cancer-free future. There are three types of HPV vaccines that can prevent cervical cancer and they include Cervarix vaccine, Gardasil vaccine and Gardasil 9 vaccine. All are licensed in Nigeria.

The vaccines are highly effective in preventing HPV infection and subsequent precancerous cervical lesions. Cervarix and Gardasil prevent infection with two types of HPV (types 16 and 18) that cause approximately 70% of cervical cancers, whereas Gardasil 9 prevents infection with 9 HPV types that cause 90% of cervical cancers worldwide.^[8-11] The World Health Organization (WHO) recommends vaccination against HPV in adolescent girls aged 9–13 years, combined with regular screening in women over the age of 30.^[12] The idea is to commence the vaccine before they become sexually active. Although this idea is encouraging, sadly HPV vaccination remains low in Nigeria as only 1.4% of adolescent girls have reportedly received the vaccine.^[13]

High prices have been a major barrier to introducing HPV vaccines in developing countries. Ekwunife and Lhachimi demonstrated that National HPV vaccination combined with opportunistic cervical cancer screening is cost-effective in Nigeria.^[11]

Availability and access are not the only determinants of HPV vaccination uptake because even in places where HPV vaccination is covered by health insurance, uptake is low compared to other vaccines.^[4] In south-eastern Nigeria, there is evidence to suggest a high demand for HPV vaccination by mothers of young girls and there is even a substantial willingness to pay by parents.^[14] The demand for HPV vaccination and the level of parental willingness to pay in Jos and some parts of northern Nigeria remains unknown.

Brown and Folayan reported that awareness and knowledge of HPV infection and HPV vaccine in Nigeria is low while also noting the deficiency of knowledge of the causal relationship between HPV and cervical cancer.^[4] Ignorance in these issues constitutes a major barrier to acceptance of HPV vaccination.^[15] As HPV vaccine becomes more affordable, given international support, inclusion of HPV vaccine in the national routine immunization is becoming more feasible in resource-constrained settings such as Nigeria.^[9] Stakeholders education and community sensitization would be required to generate demand for HPV vaccination and thereby success of a vaccination programme.

Since most HPV vaccination programs target mainly young adolescents, parents have the authority to take most decisions about vaccination. Therefore, the success of HPV vaccination programs will largely depend on parental decision-making.^[16]

The awareness and knowledge of the HPV infection, cervical cancer and the vaccines would positively enhance the demand and uptake of the vaccines.^[17] Increasing demand may strengthen the drive for the introduction of the vaccine into the national immunization schedule thereby making the vaccine more affordable and accessible to the overall benefit of all, especially the less privileged and poor in our society who are at risk for this cancer.

The aim of this study therefore, was to find out if parental knowledge of HPV infection and cervical cancer influenced the acceptability of HPV vaccination for their 9–14-year-old children.

Materials and Methods

Study design

We conducted cross-sectional surveys using investigator-administered questionnaires without identifiers in eight communities. The survey was among a sample of mothers and fathers with children in the 9–14 years age bracket.

Study population

The study population is parents living in the study area. Population estimates based on the 2006 population census indicate that the population of Jos North is currently 591, 300.^[18] Given the age distribution, adults (males and females) aged 30–69 years are 147,000 residing in all 20 Wards of Jos North Local Government Area.

Sample size

Given a source population of 147,000, a sample size of 463 was calculated using the Cochran formula z^2pq/d^2 .^[19] Using an acceptability rate of 95% for the HPV vaccine from a previous study^[14] at a confidence level of 95%, sampling error of 5%, the calculated minimum sample size was 463. An addition of 10% to correct for attrition and non-response was included to achieve a sample size of 509.

A total of 509 participants were recruited, comprising 247 mothers and 262 fathers. The proportion of participants recruited from each of the 8 wards were prorated based on the comparative populations of the wards from population estimates. The study assistants recruited and interviewed eligible participants that gave consent to take part in the study in the 8 selected wards.

Sampling method

We used multistage sampling technique. We randomly sampled 8 of the 20 Wards as our study sites. As a result of recent ethno-religious crisis, Jos is now broadly segregated along religious lines so; all 20 wards were first

stratified into three groups: (1) predominantly Muslims, (2) predominantly Christians, and (3) mixed. Three ward each from predominantly Muslims and Christian, whereas two wards from mixed were selected making 8.

Subsequently within each ward, study sites were randomly selected by balloting. The proportion of participants to be recruited from each ward was prorated based on the comparative populations of the wards from population estimates. The study assistants recruited and interviewed eligible participants who gave consent to take part in the study in the 8 selected wards in Jos metropolis.

Inclusion criteria

Mothers and fathers of children aged 9–14 years from eight randomly selected wards in Jos metropolis,

Exclusion criteria

Mothers and fathers in Jos area who did not have children aged 9–14 years.

Sources and collection of data

Questionnaire was pre-tested in Jos University Teaching Hospital (JUTH) and revised. Completed investigator-administered questionnaires which were de-identified for confidentiality were the main data source. The appended questionnaire was adapted from a previous study.^[14] Two trained field research assistants were engaged for this project. They were charged with the responsibility to administer the questionnaires. Data entry was directly entered into the e-questionnaires that were loaded on the project laptops.

Data analysis strategies

Key variables included awareness of cervical cancer and cervical screening; awareness and knowledge of HPV/HPV vaccine, potential acceptability of HPV vaccination for children. The dependent variable of the study was acceptability of HPV vaccination which was assessed by using the questions “Will you allow your child take HPV vaccine? And will you be willing to pay for HPV vaccination if not free? The independent variables assessed in the study includes marital status, educational status of the parents, religion of parents, knowledge of HPV, knowledge on cervical cancer, knowledge of vaccine and attitude towards the vaccine.

Knowledge of HPV was assessed by four closed ended questions. Knowledge of cancer of the cervix was also assessed by four closed ended questions, whereas knowledge of HPV vaccines was assessed by five closed ended questions.

Correct answer to each item of HPV/HPV vaccine knowledge was assigned with 1 point; 0 point was given if the question was incorrectly answered or not answered. The possible range of the total knowledge score was 0 to 13. All respondents divided into three groups based on

their total knowledge scores: no knowledge (score = 0), low knowledge (score = 1–6) and high knowledge (score = 7–13).^[20,21]

Attitude was tested on a 5-point Likert scale Positive answers were scored from 4 to 0 for each respective option, whereas negative statements were scored from 0 to 4. The possible scores thus ranged from 0 to 16. The mean and median scores, score range and SD were calculated. Furthermore, attitude scores were converted to categorical data using cut-offs. Attitude categories were negative (score: 0–7), neutral (score: 8) and positive (score: 9–16).^[20,21]

The data were entered into a database developed using File Maker Pro 13. SPSS version 23 was used to analyse the data. The general characteristics of the study population were determined using descriptive statistics. Chi-square test was used for analysing the relationship between parental knowledge of (HPV cancer of the cervix) with acceptance of HPV vaccination to their eligible children at significance level of 0.05.

Ethics and human subject's issues

The study proposal including the questionnaire and consent form was submitted to the JUTH Ethics. The project was completed in 12 calendar months between January 2019 and December 2019.

Results

Table 1 shows that approximately two-fifth of parents within the age group of 36–45 years constitute the most, whereas those within 76–85 years (0.4%) make up the least. The mean age is 43.7 ± 9.43 years. Male parents (51.3%) constitute most of the respondents. Married respondents (95.1%) make up the highest. Majority of the respondents (54.2%) are Muslims. Majority of the respondents (57.9%) are engaged in trading/business.

Table 2 shows that the knowledge of HPV seems to be very poor with 1.6%; however, the awareness of cancer of the cervix seems better with 11.4%. The awareness of HPV vaccines is equally poor with 1.6%; however, majority of the women (95.1%) are willing to allow their children have the vaccines regardless of their poor knowledge of HPV vaccines and significant others (67.8%) are willing to pay for the vaccines even if it is not free.

Table 3 shows that approximately 79.9% of parents are favourably disposed to protecting their children from cervical cancer by vaccinating them moreso approximately 70.7% of them believe in the safety and effectiveness of the vaccine in prevention of cervical cancer. However, only 34.6% of the parents expressed concern about side-effect like infertility.

Parents displayed poor knowledge of HPV (98.8%), cervical cancer (88.6%), and HPV vaccine (98.6%) [Table 4].

Table 1: Sociodemographic characteristics of the respondents

Age of parent range (years)	Frequency	%
16–25	8	1.6
26–35	86	16.8
36–45	208	40.7
46–55	158	30.9
56–65	41	8.0
66–75	6	1.2
76–85	2	0.4
Total	509	100.0
Sex of parents		
Male	262	51.3
Female	247	48.3
Total	509	100.0
Religion of parents		
Christian	232	45.4
Moslem	277	54.2
Total	509	100.0
Marital status		
Single	5	1.0
Married	486	95.1
Widow	14	2.7
Divorced	4	0.8
Total	509	100.0
Highest level of education		
None	71	13.9
Primary	151	29.5
Secondary	192	37.6
Tertiary	95	18.6
Total	509	100.0
Occupation		
House wife	36	7.0
Trader/business	296	57.9
Security official	21	4.1
Civil servant	89	17.5
Banker/accountant	1	0.2
Driver	25	4.9
Healthcare worker	6	1.2
Others	35	6.8
Total	509	100.0

However their attitudes towards accepting HPV (89.9%) vaccines for their children was good.

Table 5 shows that there is no statistical significant association between parental level of education and awareness of HPV vaccines ($P = 0.507$). There was no statistically significant associations between parental level of education ($P = 0.056$), knowledge of cancer of cervix ($P = 0.542$), religion of parents ($P = 0.324$) and acceptance of HPV vaccination. There is a statistical significant association between parental willingness to pay for vaccines if not free ($P = 0.001$) with acceptance of vaccination. It also shows that 28.7% of parents who accepted the vaccine are not willing to pay if not free.

Table 6 shows that vaccine acceptability was associated with positive attitude towards the vaccine (odds ratio [OR] = 4.178; 95% confidence interval [CI], 1.714–10.180; $P = 0.002$), whereas knowledge of HPV, cancer of cervix and HPV vaccine all did not seem to influence acceptability of the vaccine

Discussion

It was observed from our study that many of the participants had formal education. The finding that 86.1% of the respondents had primary to tertiary level of education signifies a commendable literacy level. However despite this, awareness of HPV as the cause of cancer of cervix amongst them was low with 98.8% of the respondents having poor knowledge of HPV. This finding is similar to findings by other authors in Nigeria, where it was noted that knowledge of the disease was low despite high levels of literacy.^[22,23]

This poor knowledge of HPV may be because it is not part of routine health talks seen at our ante-natal clinics or immunization clinics. These are the common avenues where most mothers get health information and counselling in our community. More so other potential sources like the media and internet may not be so accessible to those in the rural areas and may not be of interest to those without formal education. The low level of knowledge of HPV as a sexually transmitted infection (STI) associated with cervical cancer found among the respondents despite most of them having up to secondary level education gives room for concern. This may have deleterious consequences on the ability of parents specifically the mothers to share information with their children especially their daughters on sexual practices that are imperative on prevention of HPV infection.

This low level of awareness among the educated implies that a lot of information, communication and health education strategies have to be engaged to enlighten the public on a prevalent disease like cervical cancer. Health promotion strategies to educate the public about prevention of STIs of public health significance can be effective in preventing genital HPV infection and by extension cervical cancer.^[24]

Our study also showed that there was no significant association between knowledge of HPV or cancer of the cervix and acceptance of HPV vaccination. So the parents were ready to have vaccination for their children regardless of knowledge of HPV or cancer of the cervix. The above findings are consistent with other Nigerian studies.^[25,26] Studies in an Indian and Chinese community also showed that majority of the parents surveyed were willing to allow their daughters and sons receive the HPV vaccine.^[27,28]

This desire by parents to have their children vaccinated is of crucial importance especially as they will be directly responsible for the financial aspect. Our study also showed that there was willingness by parents to pay for the vaccines for their children even if it is not free of charge. This is

Table 2: Parental knowledge of HPV, cervical cancer and HPV vaccines

	No	%	Yes	%	Total
Ever heard of HPV	501	98.4	8	1.6	509
Aware of hazard of HPV in female/male	508	99.8	1	0.2	509
Is HPV sexually transmitted	508	99.8	1	0.2	509
Aware that HPV can cause cancer	508	99.8	1	0.2	509
Ever heard of cervical cancer	429	88.6	55	11.4	509
Do you know of any woman with cancer	398	78.2	111	21.8	509
Is Cancer of cervix common in Nigeria	388	76.2	121	23.8	509
Can Cancer of cervix be prevented	403	79.2	106	20.8	509
Ever heard of HPV vaccines	501	98.4	8	1.6	509
Can HPV vaccine prevent cancer	507	99.6	2	0.4	509
Can HPV vaccine prevent genital warts in males	507	99.6	2	0.4	509
What is the Injection period/best time for HPV vaccines	508	99.8	1	0.2	509
Is HPV vaccine effective on HPV infected person	508	99.8	1	0.2	509
Will you allow your child take HPV vaccine	25	4.9	484	95.1	509
Will you be willing to pay for HPV vaccination if not free	164	32.2	345	67.8	509

Table 3: Attitudes of parents toward HPV vaccination (n = 509)

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	n (%)	n (%)	n (%)	n (%)	n (%)
I care about my daughter/son's future health by vaccinating him/her	41 (8.1)	105 (20.7)	63(12.3)	121(23.8)	179 (35.2)
I intend my daughter/son to be protected against cervical cancer by being vaccinated against HPV	23 (4.5)	38 (7.5)	41 (8.1)	133 (26.1)	274 (53.8)
I believe that the HPV vaccine is safe and effective for the prevention of cervical cancer	42 (8.3)	48 (9.4)	59 (11.6)	142 (27.9)	218 (42.8)
Concerns about future fertility	104 (20.4)	180 (35.4)	49 (9.6)	92 (18.1)	84 (16.5)

noted as HPV immunization is not part of the protocol on National immunization.^[14] Parental willingness (particularly the mothers) to support their adolescent daughter's vaccination in this context is important not only because the girls need their parents for vaccination decisions but also because they need their financial support. This is particularly important in Nigeria where HPV vaccine is not yet among the vaccines given free of charge in the National Programme on Immunization.^[14] Our study also shows that 28.7% of parents who accepted the vaccine are not willing to pay if not offered free. So the issue of affordability must be resolved by deploying resources effectively to make the vaccines affordable to the general population so that cost will not be an encumbrance to desiring parents.

Cultural norms, moral values, and religious beliefs are other factors associated with the decision on whether or not to get the HPV vaccination.^[29,30] Our study found out that there was no significant association between religion and acceptance of vaccines, as majority of both Muslim and Christian parents were willing to have their children vaccinated. This finding is consistent with an Indonesian study which found that religion of parents did not influence attitudes toward HPV vaccination for their children regardless of their religious persuasion whether Christian, Hindu, or Muslim.^[30] Similar results have been found in studies undertaken in Canada and Sweden.^[31,32]

In this study, more than 70.7% of parents (a) agree or strongly agree about the safety and effectiveness of HPV vaccine in preventing cancer of the cervix (b) approximately 55% disagree or strongly disagree about reports of side effects like infertility associated with the vaccine. The knowledge and attitude of recipients of a health intervention had been shown to be directly related to the acceptability of the intervention. Positive attitudes of parents/caregivers toward HPV vaccination is a strong predictor of HPV vaccination uptake by their children as reported by some authors.^[33-35] Thus effective interventions to improve attitudes are considered vital for increasing HPV vaccination uptake.

From our study, knowledge and attitude towards HPV vaccine were found to be determinant factors of the parents' acceptance of HPV vaccination for their children.

Conclusion

Despite literacy level noted to be relatively high, the level of awareness of HPV and cervical cancer was poor from our study; however, the acceptance of HPV vaccination by parents for their children was high. HPV vaccination was acceptable to parents regardless of educational level or religion. Parents in Jos communities seem to have much faith in preventive vaccines as advertised by the health authorities. Accordingly, efforts should be geared towards

ensuring availability, affordability and the provision of basic information regarding HPV vaccination in Northern Nigeria if HPV vaccination is to take hold in this region.

Strengths and weaknesses of the study

- Investigator-administered questionnaires improves data completeness
- Community-based data collection enhances the validity of the study

- The non-anonymity of the interview process may impact expressed perception and views of respondents
- There is few if any study in this area coming from Northern Nigeria where economic disposition of the people is a challenge.

Table 4: Knowledge and attitude towards acceptance of vaccines by parents

Variables	Acceptance of vaccine	
	Yes (%)	No (%)
Knowledge of HPV		
Good	6 (1.2)	23 (92.0)
Poor	478(98.8)	2 (8.0)
Knowledge of cervical of cancer		
Good	55(11.4)	4 (16.0)
Poor	429(88.6)	21(84)
Knowledge of HPV vaccine		
Good	7 (1.4)	1 (4.0)
Poor	477(98.6)	24 (96.0)
Attitude towards vaccine		
Positive	435 (89.9)	17 (68.0)
Negative	49 (10.1)	8 (32.0)

Table 6: Factors associated with parental vaccine acceptability

Variables	Acceptance of vaccine		OR	95%CI	P Value
	Yes (%)	No (%)			
Knowledge of HPV					
Good	6 (1.2)	23 (92.0)	0.101	0.043-1.614	0.061
Poor	478(98.8)	2 (8.0)			
Knowledge of cervical cancer					
Good	55 (11.4)	4 (16.0)	0.673	0.223-2.033	0.483
Poor	429(88.6)	21(84)			
Knowledge of HPV vaccine					
Good	7 (1.4)	1 (4.0)	0.352	0.042-2.979	0.338
Poor	477(98.6)	24 (96.0)			
Attitude towards vaccine					
Positive	435 (89.9)	17 (68.0)	4.178	1.714-10.180	0.002
Negative	49 (10.1)	8 (32.0)			

Table 5: Sociodemographic characteristics and awareness/acceptability of HPV vaccines

Variable	Awareness of HPV vaccines		Chi-square	df	P
	Yes	No			
Level of education					
None	1(12.5)	70(13.9)	2.325	3	0.507
Primary	1(12.5)	151(30.1)			
Secondary	2(25.0)	190(37.9)			
Tertiary	4(50.0)	91(18.1)			
Level of education	Acceptance of HPV vaccines for 9–14-year-old child				
	Yes	No			
None	63(13.0)	8(32.0)	7.587	3	0.056
Primary	144(29.8)	7(28.0)			
Secondary	186(38.4)	6(24.0)			
Tertiary	91(18.8)	4(16.0)			
Parental knowledge of cancer of cervix	Acceptance of HPV vaccines for 9–14-year-old child				
	Yes	No			
Good knowledge	55(11.4)	4(16.0)	0.371	1	0.483
Poor knowledge	429(88.6)	21(84.0)			
Willingness to pay for vaccines if not free	Acceptance of HPV vaccines for 9–14-year-old child				
	Yes	No			
Yes	345(71.3)	0(0.0)	55.308	1	0.001
No	139 (28.7)	25(100.0)			
Religion of parents	Acceptance of HPV vaccines for 9–14-year-old child				
	Yes	No			
Muslims	261(53.9)	16(64.0)	0.973	1	0.324
Christians	223(46.1)	9(36.0)			

A public health approach to the prevention of cervical cancer requires broad based population participation. Addressing parental hesitancy to approve vaccination of their eligible children is a critical issue on the demand side which this study seeks to address.

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Conflicts of interest

There are no conflicts of interest.

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