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Effect of Educational Intervention on Parental Willingness to Vaccinate Their Adolescent's With Human Papilloma Virus Vaccine in Kano Metropolis, Nigeria

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ABSTRACT

Introduction: Human Papilloma Virus (HPV) is a sexually transmittable infection that infects approximately 70% of people during their lifetime. It can cause several types of cancers such as anal and penile cancer, cancer in the head and neck area as well as cervical cancer; the latter being the most frequently occurring HPV-related cancer and the second most common cancer in women in Nigeria though is preventable with the use of HPV vaccines.

Objectives: To determine the effect of educational intervention on parental willingness to vaccinate their adolescent's with human papilloma virus vaccine in Kano metropolis, Nigeria.

Methodology: A community based, quasi-experimental study was conducted among 440 respondents (220 each in the intervention and control groups, respectively), The respondents were selected by multi stage sampling technique. Data was collected at pre and post- intervention using a pre-tested, interviewer-administered questionnaire. Respondents in the intervention group received health education intervention and data were analysed with SPSS version 20.0 at 5% α level of significance.

Results: The mean ± (standard deviation) ages of the respondents in the intervention and control groups were 44.6 ± 11.46 and 44.7 ± 11.10 years, respectively. The respondents' willingness to vaccinate their adolescents with HPV vaccine in the intervention and control groups at baseline was 49.8% and 45.5% respectively. Post intervention, it increased to 91.2% in the intervention group ($p < 0.001$) and 48.5% in the control group. After adjusting for confounders the independent predictors of parental willingness to vaccinate their adolescents with HPV vaccine were gender, ethnicity, educational and occupational status. Considering the ethnicity, respondents that belong to Hausa/Fulani had 70% reduced likelihood [aOR=0.3, 95% CI(0.11-0.80)] of being willing to accept the vaccine ($p = 0.016$), respondents in the intervention group that were male had 60% reduced likelihood [aOR=0.4, 95% CI(0.13-0.94)] of being willing to accept the vaccine ($p = 0.038$). Respondents in the control group who had formal education had two fold increased likelihood of accepting the vaccine than their counterparts with no formal education ($p = 0.035$).

Conclusion: Health education intervention was found to be effective at improving the parental willingness to vaccinate their adolescents' with HPV vaccine in the intervention Community. A multipronged approach in educating the parents of adolescent about the benefit of HPV vaccine in reducing and preventing the infection and its effects.

Keywords: HPV, vaccine, willingness, educational intervention, Kano

INTRODUCTION

Human papillomavirus (HPV) causes sexually transmitted infection that affects approximately 90% of people during their reproductive lifetime,[1] It can cause several types of cancers such as anal and penile cancer, cancer in the head and neck area

as well as cervical cancer; the latter being the most frequently occurring HPV-related cancer.[1] Evidence from epidemiologic laboratory-based studies has documented the central aetiologic role of HPV in cervical cancer and other cancers in Nigeria. A quadrivalent vaccine was approved by the Food and Drug Administration (FDA) in 2006 for the prevention of cervical cancer, certain precancerous lesions, and genital warts in females and in 2009, for the prevention of genital warts in males. Also, a bivalent vaccine was also approved by the FDA in October 2009 for the prevention of cervical cancer and certain precancerous lesions caused by HPV infection.[2] the vaccines are effective if utilized before person infected with HPV, which mostly individuals infected immediately after sexual exposure.[3] There is considerable regional variation in global HPV prevalence with the highest figures in sub-Saharan Africa 24%, Eastern Europe 21%, Latin America 16% but the global prevalence of HPV infection is about 11-12% and Nigeria has reported overall HPV prevalence of up to 26.3.[2]

Cervical cancer ranks as the second most frequent cancer among women in Nigeria, with about 47 million women aged 15 years and older being reported to be at risk of developing cervical cancer, almost 14,089 Nigerian women are diagnosed with cervical cancer and 8240 die from the disease yearly.[4] Currently, one out of every three person will be diagnosed with cancer in their lifetime and morethan 14 million people will develop cancer every year, and this figure is projected to riseto over 21 million by 2030.[5] Currently, one out of every three persons will be diagnosed with cancer in their lifetime and more than 14 million people will develop cancer every year, and this figure is projected to rise to over 21 million by 2030.[6] The World Health Organisation (W.H.O.) latest data shows that worldwide, cancer is now responsible for almost 1 in 6 deaths globally. Each year 8.8 million people die from cancer sadly, about two-thirds of these deaths occur in developing countries like Nigeria. According to the WHO, over 100,000 Nigerians are diagnosed with cancer annually, and about 80,000 die from the disease; this comes to 240 Nigerians every day or 10 Nigerians every hour, dying from cancer.[6] The Centres for Disease Control and prevention (CDC) it recommended that 11 to 12 year old to receive two doses of HPV vaccine at least six months apart rather than the previously recommended three doses to protect against cancers caused by HPV infections. Teens and young adults who start the series of HPV vaccines later, at ages 15 through 26 years will still need three doses of HPV vaccine to protect against cancer-causing HPV infection. Two doses of HPV vaccine given at least six months apart at ages 11 and 12 years will provide safe, effective, and long-lasting protection against HPV related cancers.[3] Since April 2009, HPV vaccine was licensed in Nigeria not yet included in the routine National Immunization Scheduled but is available at some private and public hospitals with variable prices per dose.[7] Despite the efficacy that has been observed with the prophylactic HPV vaccines, the uptake is sub-optimal in Nigeria due to several reasons including availability and very low level of awareness even among health professionals. Other reason includes high cost, weak health system and cultural belief, leading to high burden of the infection in Nigeria (26.3%) and African sub-region(24%).[8] Educational instruction on HPV-related diseases has been demonstrated to effectively raise HPV knowledge and vaccine acceptability in many countries.[9] Adequate knowledge is a prerequisite for making informed decisions on willingness to accept the vaccine. For this reason, providing information (to improve knowledge) is essential.[3] education and effective communication are potentially crucial in achieving successful immunization programs especially with the current global shift from curative medicine to preventive medicine, more effort is required in improving parents' knowledge about HPV infection and vaccine which may improve their willingness to accept the vaccine.[10]

This is to assess the effect of educational intervention on parental willingness to vaccinate their adolescent's with human papilloma virus vaccine and the findings can help in addressing the identified gap in terms of willingness to accept the vaccine by the stakeholders.

METHODOLOGY

Study Area

Kano metropolis is a centre of commerce and the economic nerve centre of the north located in Kano State North-western geo-political zone of the country and the most populous state in Nigeria. Hausa/Fulani predominantly occupied the palce follwed by Igbo, Yoruba, Kanuri, Egbira, Igala and other many other tribes but Islam is the predominant religion then Christians and followers of other religions.[11]

The State has 44 Local Government Areas with a population of 9,383,682 million people, 4,844,128 (51%) males and 4,539,554 (49%) females, according to the 2006 census by the National Population Commission,[11] with majority of the populance living in the metropolitan LGAs.[12] However, Kano State has 16.5% vaccination coverage for routine immunization,[12] with the population of adolescents as 19.4% male and 18.8% female.[13]

Study Sites

The study was carried out in Kano metropolis. The metropolis is made of eight Local Government Areas (LGAs) consisting of Kano municipal, Dala, Fagge, Gwale, Kumbotso Nassarawa, Tarauni, and Ungoggo LGAs.[14] Tarauni and Gwale were selected by simple random sampling technique and assigned by toss of coin into intervention and control LGA respectively,

Tarauni and Gwale has a distance of about 15km apart.

Study Design
A community based quasi-experimental design with pre and post-intervention data collection was used.

Study Population
Parents of adolescent residing in the intervention and control LGAs for at least six months were included while parents who have already vaccinated their adolescent and those that were not around during the study were excluded

Sample Size Estimation
Sample size was calculated using formula for determining minimum sample size for comparing proportions,[15] with Z_α = 1.96, the probability of type II error (β) of Power at 80%=0.84. Possible attrition of 10% was factored into the estimated sample size. Hence, an estimated sample size of 220 was obtained per community.

Sampling Technique
A multi-stage sampling technique was used with five stages for this study.

Stage One: Selection of Intervention and Control LGA
Two metropolitan LGAs (25% of the LGAs) were randomly selected from the eight metropolitan LGAs in the state using simple random sampling by balloting and then using a simple toss of coin to assigned intervention and control LGA respectively. Tarauni and Gwale were selected and assigned by toss of coin into intervention and control LGA respectively.

Stage Two: Selection of Wards from the Selected LGAs
Three wards (25% of the wards) were selected from the list of Ten (10) wards in each Local Government Area (Tarauni intervention LGA and Gwale control LGA) using simple random sampling by balloting.

Stage Three: Selection of Settlements
One settlement (25% of the settlements) was selected using simple random sampling by balloting from the list of all settlements in each selected ward. The 3 selected wards in Tarauni LGA had 3, 4 and 3 settlements respectively. One settlement was randomly selected by balloting from each selected ward. The 3 selected wards in Gwale LGA each had 3 settlements. One settlement was randomly selected by balloting from each selected ward. (Three settlements were selected in the study and control communities respectively).

Stage Four: Selection of Houses
Systematic sampling method was used to determine the sampling interval by dividing the number of houses by the sample size allocated proportionately to each settlement.

After calculating the sampling interval, the first house (starting point) was identified by selecting a random number between one and the sampling interval (by balloting method). Subsequent houses were then identified by adding the sampling interval to the serial number of the first sampled house. When more than one household was found in a house, one was selected by balloting and when a compound or storey building was found only one household was randomly selected by balloting. In the sampled houses with no eligible respondent, the next house was selected.

Stage Five: Selection of the Respondents
In the household a parent of adolescent was approached to ascertain eligibility. When a parent of adolescent that satisfied the eligibility criteria, informed consent was obtained and interviewed. Where more than one parents of adolescent are eligible, one was selected using simple random sampling by balloting.

Data Collection Method
An interviewer–administered, pre-tested, questionnaire adapted from previous studies,[16, 17] was used to collect data from the eligible respondents pre-intervention and six months post intervention. Four research assistants were recruited and trained for this study (2 males and 2 females). They were trained four days which covered the objectives of the study, questionnaire administration, ethical issues in research, communication skills, health education and 25 purposively selected parents of adolescent were studied in pretesting the data collection tool outside the study area.

Health education intervention were carried out in batches in the intervention community only and same health education was given to the control community after data collection so that they would also benefit from the information given to the

intervention community. Methods employed in the health education include lectures (power point presentation on topics that covered HPV infection and HPV vaccine, diseases associated with HPV infection, vaccine recommendations, dosage schedule, vaccine efficacy, safety, myths and misconceptions). Pamphlets were distributed to the participants and monthly SMS reminder was sent on the content of health education.) an incentive of free medical check-up including checking of blood pressure, weighing and sugar level was done for each participant.

Data Management
Question used to assess willingness to uptake HPV vaccine was dichotomised as "Yes or "No".[16, 17] Respondents were then categorized as they are willing to uptake HPV vaccination or not based on their responses.

Statistical Analysis
All data collected were entered into excel spread sheet and subsequently checked for errors and consistencies then analysed using the IBM SPSS version 20.0.

Means (and standard deviations), medians (and interquartile range) and proportions of the socio-demographic variables of parents of adolescent in the intervention and control communities were calculated and compared. At bivariate level, Chi square test was used to find difference in categorical variables between the intervention and control communities at baseline, while independent t-test and Mann Whitney -U test were used to test for differences in quantitative variables. After the intervention, only differences for willingness to uptake HPV vaccine were tested. Furthermore, Chi square test was used to identify factors associated with willingness to uptake HPV vaccine in both intervention and control communities pre-intervention and post-intervention. McNemar's test was used to compare the respondents' willingness to uptake HPV vaccine at baseline and end line in each community. In all test of significance, $p<0.05$ was considered statistically significant.

At multivariate level, variables that were statistically significant at bivariate analysis and $p<0.10$ were subjected to binary logistic regression analysis to obtain adjusted odds ratio with 95% confidence intervals for predictors of willingness to uptake HPV vaccine.

Ethical Considerations
Ethical approval for the study was obtained from Aminu Kano Teaching Hospital and Kano State Health Research-Ethics Committee (NHREC/21/08/2008/AKTH/EC/2564 and MOH/off/797/T.I/1741). The written informed consent was obtained from all the respondents that participated in the study using consent forms and was given to those who can read to sign before the questionnaire was administered. For those who cannot read and write, details of the consent form was explained to them so that they append their thumbprint to the form to indicate consent. The Helsinki declaration was respected throughout the research.[18]

RESULTS

The response rates among the respondents were 96.8% and 96.0% for intervention and control community, respectively. At post-intervention survey, the attrition rates were 6.8% and 8.2% for intervention and control community respectively.

Socio-Demographic Characteristics
The mean ages (± Standard Deviation, SD) of the respondents in the intervention and control community were 44.6±11.46 and 44.7±11.10 years, respectively. More than half of the respondents were males. In terms of educational status (31.0% and 33.6% in the intervention and control community) had secondary level of education. A high proportion of the respondents in the intervention and control communities (46.5% and 46.4%) were artisans. However, (61.0% and 57.8%) of the respondents in the intervention and control groups had income below minimum wage with their medians of: ₦22,000 (interquartile range ₦40000) and ₦20,000 (interquartile range ₦42000) respectively (Mann-Whitney U; $p = 0.067$). There was no statistically significant difference in the socio-demographic characteristics of respondents in both communities as shown in Table 1.

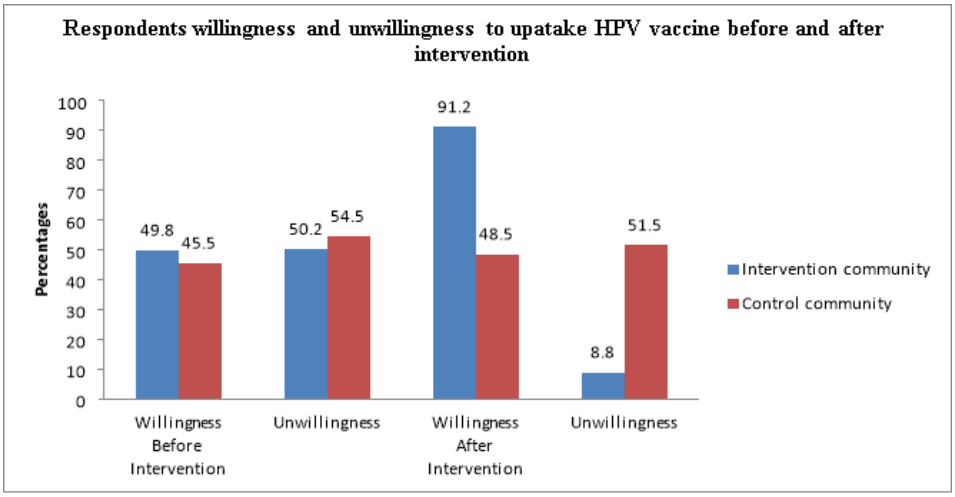
Parental Willingness to Vaccinate their Adolescent's with Human Papilloma Virus Vaccine
At baseline, 49.8% and 45.5% of the respondents in the intervention and control communities were willing to have their children vaccinated with HPV vaccine. There was no statistically significant difference between in the respondents' willingness to uptake HPV vaccine for their adolescent's children in both communities at baseline but after the intervention, 91.2% and 48.5% of the respondents in the intervention and control communities were willing to have their children vaccinated with HPV vaccine. There was statistically significant difference of the respondents' willingness to uptake HPV

vaccine for their adolescent's children in intervention community when compared to the control community (p<0.001) as shown in Figure 1.

Table 1: Respondents' socio-demographic characteristics

Variables	Intervention Group n=213 n (%)	Control Group n=211 n (%)	p- value
Age group (years)			
25-34	34 (16.0)	31 (14.7)	
35-44	77 (36.2)	81 (38.4)	
45-54	54 (25.4)	54 (25.6)	
55-64	38 (17.8)	34 (16.1)	0.98
65-74	10 (4.7)	11 (5.2)	
Mean ± SD	44.62 ± 11.46	44.73 ± 11.10	0.93
Gender			
Male	109 (51.2)	111 (52.6)	0.77
Female	104 (48.8)	100 (47.4)	
Ethnicity			
Hausa		146 (69.2)	
Fulani	145 (68.1)	26 (12.3)	0.99
Igbo	25 (11.7)	17 (8.1)	
Yoruba	18 (8.5)	13 (6.2)	
Others	14 (6.6)	9 (4.3)	
Religion	11 (5.2)		
Islam		197 (93.4)	0.37
Christianity	193 (90.6)	14 (6.6)	
	20 (9.4)		
Marital status			
Married	193 (90.6)	195 (92.4)	0.83
Divorced	13 (6.1)	10 (4.7)	
Widowed	7 (3.3)	6 (2.8)	
Educational status			
Non-Formal	54 (25.4)	64 (30.3)	0.18
Primary level	19 (8.9)	23 (10.9)	
Secondary level	66 (31.0)	71 (33.6)	
Tertiary level	74(34.7)	53 (25.1)	
Occupation			0.97
Civil servant	37 (17.4)	35 (16.6)	
Trader	50 (23.5)	53 (25.1)	
Farmer	27 (12.7)	25 (11.8)	
Artisan	99 (46.5)	98 (46.4)	0.55
Monthly Income			
< Minimum wage	130 (61.0)	122 (57.8)	
>Minimum wage	83 (39.0)	89 (42.2)	
Median (interquartile range)	22000 (40000)	20000 (42000)	0.067†

† Mann-Whitney U, Minimum wage ₦18,000

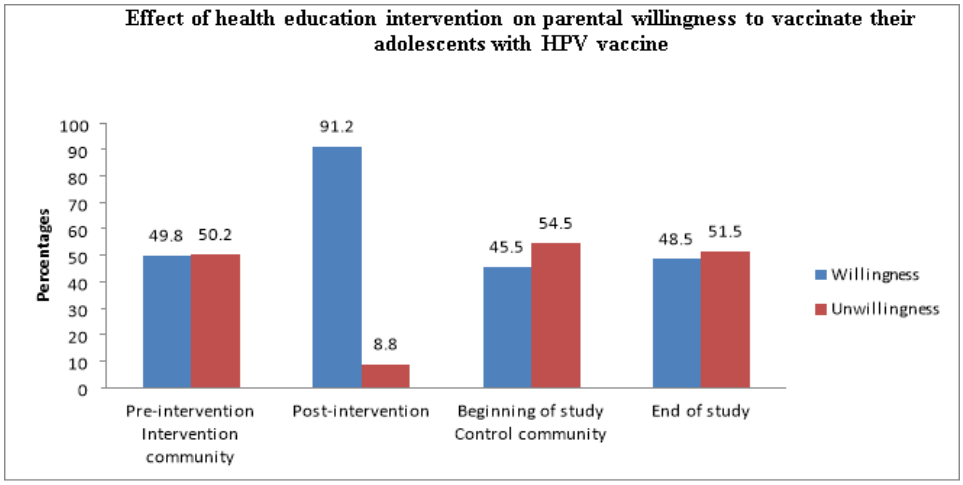


p = 0.68 p < 0.001

Figure 1: Respondents willingness and unwillingness to uptake HPV vaccine before and after intervention

Effect of educational intervention on parental willingness to vaccinate their adolescent's with human papilloma virus vaccine

There was an increase of 41.4% in the willingness to uptake HPV vaccine post intervention among respondents in the intervention community and the increase was statistically significant (p< 0.001). There was an increase of 3% in the proportion that are willing to uptake HPV vaccine in the control community post-intervention but the increase was not statistically significant (p = 0.12) as shown in Figure 2.



*McNemar's chi-square test

Figure 2: Effect of health education intervention on parental willingness to vaccinate their adolescents with HPV vaccine

Educational status (p = 0.003), occupation (p = 0.002) and monthly income (p = 0.001) of the respondents in both communities were significantly association with willingness to uptake HPV vaccine and there was also a significant association between willingness to uptake HPV vaccine with gender (p = 0.001) and ethnicity (p = 0.040) of the respondents in the intervention community. Ethnicity was a significant predictor of willingness to uptake HPV vaccine among respondents in both communities, gender in the intervention community and educational status in the control community. Respondents that are belong to Hausa/Fulani were 70% reduced likelihood [aOR=0.3, 95% CI (0.11 – 0.80)] of being willing to uptake the vaccine (p = 0.016). Similarly respondent in the intervention community that were male had 60% reduced likelihood [aOR=0.4, 95% CI (0.13 – 0.94)] of being willing to uptake the vaccine (p =0.038). Respondents in the control group who had formal education were two fold likelihood of being willing to uptake the vaccine than their counterpart (p = 0.035) as shown in Table 2/3.

Table 2: Socio-demographic factors associated with willingness to uptake HPV vaccine among the respondents

Variables		Group				
	Intervention			Control		
	Willing n = 213 n (%)	Unwilling n (%)	p - value	Willing n = 211 n (%)	Unwilling n (%)	p - value
Age group (years)						
≤ 40 years	49 (51.6)	46 (48.4)		41 (44.6)	51 (55.4)	
> 40 years	57 (48.3)	61 (51.7)	0.68	55 (46.2)	64 (53.8)	0.89
Gender						
Male	69 (63.3)	40 (36.7)		57 (51.4)	54 (48.6)	
Female	37 (35.6)	67 (64.4)	**0.001***	39 (39.0)	61 (61.0)	0.096
Ethnicity						
Hausa/Fulani	91 (53.5)	79 (46.5)		83 (48.3)	89 (51.7)	
Others	15 (34.9)	28 (65.1)	**0.040***	13 (33.3)	26 (66.7)	0.11
Religion						
Islam	97 (50.3)	96 (49.7)		89 (45.2)	108 (54.8)	
Christianity	9 (45.0)	11 (55.0)	0.82	7 (50.0)	7 (50.0)	0.79
Marital status						
Married	100 (51.8)	93 (48.2)		91 (46.7)	104 (53.3)	
Unmarried	6 (30.0)	14 (70.0)	0.098	5 (31.2)	11 (68.8)	0.30
Educational status						
Informal	20 (37.0)	34 (63.0)		19 (29.7)	45 (70.3)	
Formal	86 (54.1)	73 (45.9)	**0.040***	77 (52.4)	70 (47.6)	**0.003***
Occupation						
Employed	27 (73.0)	10 (27.0)		22 (62.9)	13 (37.1)	
Unemployed	79 (44.9)	97 (55.1)	**0.002***	74 (42.0)	102 (58.0)	**0.027***
Monthly Income						
< Minimum wage	33 (35.9)	59 (64.1)		35 (36.5)	61 (63.5)	
> Minimum wage	73 (60.3)	48 (39.7)	**0.001***	61 (53.0)	54 (47.0)	**0.019***
***Statistically significant, Minimum wage ₦18,000**						

Table 3: Predictors of parental willingness to uptake HPV vaccine

Predictor	Intervention group		Control group	
	Adjusted OR (95% CI)	p - value	Adjusted OR (95% CI)	p - value
Gender				
Male	0.4 (0.13 – 0.94)	**0.038***	0.8 (0.36 – 1.66)	0.50
Female	1			
Ethnicity				
Hausa/Fulani	0.3 (0.11 – 0.80)	**0.016***	0.3 (0.12 – 0.87)	**0.026***
Others	1			
Educational status				
Informal	1.3 (0.61 – 2.65)	0.53	2.1 (1.05 – 4.10)	**0.035***
Formal	1			
Occupation				
Employed	0.4 (0.17 – 1.05)	0.063	0.6 (0.24 – 1.35)	0.20
Unemployed	1			
Monthly Income				
< Minimum wage	0.9 (0.34 – 2.39)	0.83	1.1 (0.49 – 2.62)	0.78
> Minimum wage	1			

***Statistically significant, Minimum wage ₦18,000**

DISCUSSION

Less than half of the parents were willing to vaccinate their adolescents despite they recorded low knowledge on HPV infection and vaccine before the intervention, This is supported by study in Edo[27] who reported that most of the parents showed high acceptability of HPV vaccine despite low awareness reported regarding this vaccine and this can be attributed to parents attitude in accepting positive health actions that will promote and maintain their child's health.

The main parental reasons for willingness to uptake the vaccine for their adolescents were vaccine effectiveness, safety and recommendation by healthcare workers which conforms with the finding reported in other studies[29,30,37,43] However, few respondents mentioned affordability as the main reason for the vaccine acceptance which is not similar to studies in our setting but corresponded with findings in developed countries[19,21] Our study found that fear of side effects, cost of the vaccine, cultural and religious belief as causes for non-willingness to uptake the HPV vaccine and this agrees to the findings of other studies in different countries. [27,28,34,36,44] For the preferred place to receive the vaccine are health facility, school and home in the intervention and control groups respectively. This is correlated with the studies in Mali and China [23,45] and almost half of the respondents agreed to support provision of HPV vaccine for adolescent boys and girls and as well recommended it to children of their friends or relatives which conforms with study in Ethopia.[24] More so, the willingness to support the vaccine among parents of adolescents may be is a reflection of the societal response to the introduction of the new vaccine.

This study observed that parents were influenced to uptake the vaccine for their adolescents because it prevent STDs, fear of genital warts and cancer there is strong linked with fear of genital lesion and studies conducted in Nigeria[44] and South-Africa.[25] Parents autonomously decided for the uptake of the vaccine in this study particularly fathers because they were the decision makers probably because of our cultural background as most of the decisions are taken by head of the family, the findings is in keeping with studies in Mali[46] and Ghana[42] but contrary to studies in South-Africa where adolescents exercised a high level of autonomy and decision making to take the vaccine.[25,40]

It is worthy of note that there was marked improvement in the parents willingness to receive the vaccine for their adolescents in the intervention group after the intervention unlike in the control group where there was minimal improvement. A 41.4% increase was seen in the intervention group among the respondents who were willing to receive the vaccine for their adolescents ($p<0.001$) after the intervention. This is in line with a study conducted in Abuja where the willingness to accept the vaccine was found to have increased from (73.9% to 93.8%) after an intervention.[20] It was also found in other studies conducted in China and India where the willingness to vaccinate their children increased from (44% to 81% and 11.6% to 73.1%) following an intervention.[22,33]

The reason given by the parents for their willingness to uptake the vaccine for their children is effective, safe, affordable and recommended by health care worker respectively significantly improved ($p< 0.001$) in the intervention group the findings concurred with other studies in Nigeria[23,26,27,36] but it is encouraging that the intervention dispose respondents attitude towards the myth and misconception they have about the vaccine like fear of side effect, cost of the vaccine, cultural and religious belief as causes for unwillingness to uptake the HPV vaccine the findings concur with the findings of other studies in different countries[33,34,36,] This could have been due to the reinforcement of the messages during the interventions. From the focus group discussion, the respondents affirmed their reasons for unwilling to receive the vaccine as:*"Cost of the vaccine is our concern considering the economic situation of the country then some vaccines are wisely used for family planning."*

Morethan half of the respondents preferred to obtained the vaccine in the health facility after the intervention followed by at home and school similar to study in South-Africa.[25] However, the parents that would support HPV vaccine for adolescent boys and girls and as well recommend it to the children of their friends or relatives markedly improved ($p<0.001$) which conforms with study in Kenya.[39]

The improvement were significant in terms of what influenced the parents to uptake the vaccine for their adolescents as it prevent STDs from (52.1% to 69.3%); fear of genital warts (27.2% to 56.1%) and cancer (39.5% to 85.9%) the findings corresponded to a study in China.[36] However, after the intervention there was noticeable change in who decided for the children to uptake the vaccine, parents are the one autonomously decided for the uptake of the vaccine, also female adolescents were not left behind probably the consequences of the infection is on them than their counterpart the findings correlate with studies in South-Africa[25,40] and Thailand[47] This shows that the educational intervention was beneficial. This is reiterated by FGDs finding: "*is responsibility of the parents to be in charge of the affairs at home*" sometime adolescents

may play a role in the absence of their parents *"you know we may not be available all the times, so adolescents can take over.*"

At base line, this study observed on bivariate analysis that ethnicity and gender were among the factors that determine willingness to uptake the vaccine in the intervention community, respondents that belong to predominant ethnic group and female were more willing to receive the vaccine for their adolescents than their counterparts the findings corresponded with other studies[35,39] Educational status, occupational status and income in both communities were also among the socio-demographic factors that were associated with willingness to uptake HPV vaccine for adolescents like seen in many studies in developed and developing countries[34,35,36,41,44]

On multivariate logistic regression educational status of the respondents influenced their willingness to uptake the vaccine in control community. In keeping with many studies [19,31,32,38,39,40,42] those with formal education were significantly more willing to uptake the vaccine than those who had no formal education. The possible explanations might be educated respondents have better access to health service information, improved perceptions about the infection and the vaccine. In addition, educated respondent have greater autonomy to make decisions and have greater ability to use the vaccine. This relationship persisted even after controlling for confounding. Lack of formal education among the respondents as well as strict socio-cultural beliefs are critical challenges; provision of formal education should be intensified as emphasized in the sustainable development goal. Gender and ethnicity were among the predictors of willingness to uptake the vaccine. Female respondents were more likely to uptake the vaccine than their male counterparts. A possible explanation may be the consequences of the infection are more on female than male. These corresponded with the results of an Ethiopian study.[24]

CONCLUSION

Low parental willingness to vaccinate their adolescents' with HPV vaccine was observed before intervention in both communities but following the intervention, there was a statistically significant increase in the parental willingness to vaccinate their adolescents' with HPV vaccine in the intervention community only. Health education intervention was found to be effective at improving the parental willingness to vaccinate their adolescents' with HPV vaccine; there is need for multipronged approach in educating the parents of adolescent about the benefit of HPV vaccine in reducing and preventing the infection and its effects.

What is already known on this topic
Study on effect of educational intervention on parental willingness to vaccinate their adolescent's with human papilloma virus vaccine was previously studies in Nigeria.

What this study adds
It provides data on effect of educational intervention on parental willingness to vaccinate their adolescent's with human papilloma virus vaccine in Kano metropolis, Nigeria.

Competing interests: Nil

Authors' contributions: Contributed equally

REFERENCES

[1] Stafne T. Human Papilloma Virus Awareness , Knowledge and Vaccine Acceptance among Norwegian Adolescents. 2014;71. (accessed on 22/12/2017).
[2] Ashaka O, Omore AA, Nasir AI, Agbede OO. The Burden of Human Papillomavirus Infections Among Women in Nigeria: a Review Update. Journal of Appl. Virol. 2016;5(2):3–13.
[3] World Health Organization. Chapter 4: HPV Vaccination Comprehensive Cervical Cancer Draft. 2013;1–30. Available from: http://www.who.int/immunization/hpv/plan/hpv_vaccine_intro_guide_c4gep_who_2013.pdf (accessed on 08/01/2018).
[4] Umeh IB, Nduka SO, Ekwunife OI. Mothers' willingness to pay for HPV vaccines in Anambra State, Nigeria: A cross sectional contingent valuation study. Cost Effectiveness and Resour Alloc. 2016;14(8):1–8.
[5] Adejuyigbe FF, Balogun BR, Sekoni AO, Adebukola AA. Cervical cancer and Human Papillomavirus knowledge and acceptance of vaccination among medical students in south west Nigeria. Afr J Reprod Heal. 2015;19(1):140–8.
[6] Chung V, Chiang L, Wong HT, Chun P, Yeung A, Choi YK. Attitude , Acceptability and Knowledge of HPV Vaccination among Local University Students in Hong Kong. Int J Environ Res Public Heal. 2016;13(486):2–16.

[7] Odetola TD, Ekpo K. Nigerian Women ' s Perceptions about Human Papilloma Virus Immunisations. J Community Med Health Educ. 2012;2(11):1-5.
[8] Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gomez D, et al. ICO Information Centre on HPV and cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Nigeria. Summary Report 2017. (accessed on 08/01/2018).
[9] Rosenthal SL, Weiss TW, Zimet GD, Ma L, Good MB, Vichnin MD. Predictors of HPV vaccine uptake among women aged 19 – 26: Importance of a physician ' s recommendation. Vaccine. 2011;29:890–5.
[10] Mroz S, Zhang X, Williams M, Conlon A, LoConte NK. Working to Increase Vaccination for Human Papillomavirus: A Survey of Wisconsin Stakeholders, 2015. Prev Chronic Dis 2017;14:160610. doi: http://dx.doi.org/10.5888/pcd14.160610. (accessed on 08/01/2018).
[11] Nigerian C. Nigerian population commission. Fed Repub Niger off Gaz. 2009;96(2):B31-2.
[12] Health EA. Kano State master list of settlement. 2015;(May):25–44.
[13] Bhavya AR, Jyothi GS, Chethana T. Impact of Health Education on HPV Vaccination Acknowledgements Compliance with Ethical Standards Conflict of interest. Indian J Gynaecol Oncol. 2017;15(9):1–4.
[14] Lawan UM, Abubakar IS, Jibo AM, Rufai A. Pattern, awareness and perceptions of health hazards associated with self medication among adult residents of kano metropolis, northwestern Nigeria. Indian J Community Med. 2013;38(3):144-51.
[15] Magnani R. Sampling guide. Washington DC: Academy for Educational development 1997. p. 38.
[16] Poole DN, Tracy JK, Levitz L, Sangare K, Yekta S, Tounkara K, et al. A Cross-Sectional Study to Assess HPV Knowledge and HPV Vaccine Acceptability in Mali. PLoS One. 2013;8(2):e56402.
[17] Makwe CC, Anorlu RI, Odeyemi KA. Human papillomavirus (HPV) infection and vaccines: Knowledge, attitude and perception among female students at the University of Lagos, Lagos, Nigeria. J Epidemiol Glob Health. 2012;2(4):199–206.
[18] World Medical Association. World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. J Am Med Assoc. 2013;310(20):2191–4.
[19] Balogun MR. Mothers ' human papilloma virus knowledge and willingness to vaccinate their adolescent daughters in Lagos , Nigeria. Int J Womens Health. 2013;5:371–7.
[20] Odunyemi FT, Ndikom CM, Oluwatosin OA. Effect of Nursing Intervention on Mothers' Knowledge of Cervical Cancer and Acceptance of Human Papillomavirus Vaccination for their Adolescent Daughters in Abuja – Nigeria. Asia Pac J Oncol Nurse. 2018;5(1):223–30.
[21] Jones M, Cook R. Intent to Receive an HPV Vaccine Among University Men and Women and Implications for Vaccine Administration. J Am Coll Heal. 2010;57(1):23–32.
[22] Chang IJ, Huang R, He W, Zhang S, Wang S, Zhao F, et al. Effect of an educational intervention on HPV knowledge and vaccine attitudes among urban employed women and female undergraduate students in China : a cross-sectional study. BMC Public Health. 2013;13(1):916.
[23] Iliyasu Z, Abubakar IS, Aliyu MH, Galadanci HS. Cervical cancer risk perception and predictors of human papilloma virus vaccine acceptance among female university students in Northern Nigeria. Journal of Obstetrics and Gynaecology. 2010;30(8):857–62.
[24] Geneti HB, Asefa Hailu D, Muleta G. Assessment of the Knowledge, Attitude and Acceptability towards Human Papilloma Virus and its Vaccine among Undergraduate Female Medical Students, South-West Ethiopia. Gynecol Obstet. 2016;6(11):1–9.
[25] Hoque ME. Acceptability of human papillomavirus vaccination among academics at the University of KwaZulu-Acceptability of human papillomavirus vaccination among academics at the University of KwaZulu-Natal , South Africa. South African Fam Pract. 2015;57(5):318–21.
[26] Ugwu EO, Obi SN, Ezechukwu PC, Okafor II, Ugwu AO. Acceptability of human papilloma virus vaccine and cervical cancer screening among female health-care workers in Enugu, Southeast Nigeria. Niger J Clin Pract. 2013;16(2):249–52.
[27] Ezeanochie C, Olagbuji BN. Human Papilloma Virus Vaccine: Determinants of Acceptability by Mothers for Adolescents in Nigeria. Afr J Reprod Heal. 2014;18(3):154–8.
[28] Morhason-Bello IO, Wallis S, Adedokun BO, AI. Willingness of reproductive-aged women in a Nigerian community to accept human papilloma virus vaccination for their children. J Obstet Gynaecol. 2015;41(10):1621–9.
[29] Owonikoko M K, Afolabi AF, Adebusoye LA, Atanda OO, Akintola L. Human Papilloma Virus Vaccine: Knowledge, Attitude and Perception of Parents in Southwest. Med Sci Public Health. 2013;1(1):13–9.
[30] Woon S, Lim C, Ying A, Boo Y, Tan WC, Png ES, et al. A cohort survey of the effect of an educational intervention on human papillomavirus vaccine-related knowledge and attitudes among pre-university female students in Singapore. Proceeding Singapore Healthc. 2017;26(1):5–10.
[31] Batista Ferrer H, Trotter CL, Hickman M, Audrey S. Barriers and facilitators to uptake of the school-based HPV

vaccination programme in an ethnically diverse group of young women. rnal Public Heal. 2016;38(3):569–77.
[32] Marlow LAV, Waller J, Wardle J. Trust and experience as predictors of HPV vaccine acceptance. Hum Vaccine. 2007;3(4):171–5.
[33] Hansen CE, Credle M, Shapiro ED, Linda M. "It all depends": A qualitative study of parents' views of human papillomavirus vaccine for their adolescents at ages 11-12 years. J Cancer Educ. 2017;31(1):147–52.
[34] Johnson KL, Lin M, Cabral O, Lewis E, Kazis IT. Variation in Human Papillomavirus Vaccine Uptake and Acceptability Between Female and Male Adolescents and Their caregivers. J Community Health. 2017;42(3):522–32.
[35] Wymann MN, Spaar A, Ekkehardt Z. Human papillomavirus vaccine uptake in adolescence and adherence to cervical cancer screening in Switzerland : a national cross-sectional survey. Int J Public Health. 2018;63:105–14.
[36] Loke AY, Chiu A, Chan O, Wong YT. Facilitators and barriers to the acceptance of human papillomavirus (HPV) vaccination among adolescent girls : a comparison between mothers and their adolescent daughters in Hong Kong. BMC Res Notes. 2017;10(390):1–13.
[37] Mehmood T, Allah M, Ur I, Saleem A. Knowledge, attitudes, and perception towards human papillomavirus among university students in Pakistan. Papillomavirus Res. 2016;2:122–7.
[38] Farzaneh F, Shirvani HE, Barouti E, Salehpour S. Knowledge and Attitude of Women Regarding the Human Papillomavirus (HPV) Infection , Its Relationship to Cervical. Med J Malaysia. 2011;66(5):468–73.
[39] Masika MM, Ogembo JG. Knowledge on HPV Vaccine and Cervical Cancer Facilitates Vaccine Acceptability among School Teachers in Kitui County , Kenya Knowledge on HPV Vaccine and Cervical Cancer Facilitates Vaccine. PLoS One. 2015;10(8):e0135563.
[40] Wallace M, Katz IT, Nkala B, Dietrich J, Wallace M, Bekker L, et al. A Qualitative Analysis of Factors Influencing HPV Vaccine Uptake in Soweto , South Africa among Adolescents and Their Caregivers. PLoS One. 2013;8(8):e72094.
[41] Turiho AK, Okello ES, Muhwezi WW, Harvey S, Meya D, Katahoire AR. Effect of School-based Human Papillomavirus (HPV) Vaccination on Adolescent Girls' Knowledge and Acceptability of the HPV Vaccine in Ibanda District in Ugand a. African J Reprod Heal December. 2014;189(1):45–53.
[42] Coleman MA, Levison J, Sangi-haghpeykar H. HPV vaccine acceptability in Ghana, West Africa. Vaccine. 2011;29(23):3945–50.
[43] Abiodun O, Sotunsa J, Ani F, Olu-Abiodun O. Knowledge and Acceptability of Human Papillomavirus (HPV) Vaccine among University Students in South West, Nigeria. Int J Adv Res. 2015;3(11):101–12.
[44] Agwu UM, Obuna JA, Ezeonu PO, Ezeonu CT, Onyire NB, Onoh RC, et al. Willingness to Continue Human Papilloma Vaccination by Self , Following a Free First Dose Vaccination Program in Low Resource Community. J Med Sci Clin Res. 2014;2(5):929–35.
[45] Poole DN, Tracy JK, Levitz L, Sangare K, Yekta S, Tounkara K, et al. A Cross-Sectional Study to Assess HPV Knowledge and HPV Vaccine Acceptability in Mali. PLoS One. 2013;8(2):e56402.
[46] Groot AS, Tounkara K, Beseme S, Yekta S, Diallo FS, Tracy JK, et al. Knowledge, attitudes, practices and willingness to vaccinate in preparation for the introduction of HPV vaccines in Bamako, Mali. PLoS One. 2017;12(2):e0171631.
[47] Kruiroongroj S, Thavorncharoensap M. Knowledge , Acceptance , and Willingness to Pay for Human Papilloma Virus (HPV) Vaccination among Female Parents in Thailand. Asian Pacific J Cancer Prev. 2014;15(13):5469–74.