

INFLUENCE OF HEALTH EDUCATION INTERVENTION ON WILLINGNESS TO ACCEPT HUMAN PAPILLOMA VIRUS VACCINATION AMONG PARENTS OF ADOLESCENTS IN KANO METROPOLIS, NIGERIA: A QUALITATIVE STUDY

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ABSTRACT

Background: Human papillomavirus (HPV) causes sexually transmitted infection that affects approximately 90% of people during their reproductive 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 but there are still gaps in the knowledge of HPV and willingness to accept the vaccine. **Objectives:** To determine the impact of health education intervention on knowledge of and willingness to accept HPV vaccination among parents of adolescent in Kano Metropolis, Nigeria. **Methodology:** A quasi-experimental design with pre and post-intervention data collection using qualitative method was conducted among sixteen (16) purposely selected participants from Tarauni the intervention and Gwale the control LGAs, respectively. Data for this study were collected through focus group discussions and the data was analysed using thematic analysis. **Result:** The participants had poor knowledge of HPV and were unwilling to accept the vaccine for their adolescents' because they were afraid of side effects, complained about cost of vaccine and had misconceptions in both groups before the intervention but there were marked variations of responses in the intervention group after the intervention. **Conclusion:** The health education intervention showed an influence on parental knowledge of HPV and willingness to accept HPV vaccine in the intervention group. Hence there is need to sustain it which eventually will reduce the infection and its consequences.

Keywords: HPV, vaccine, knowledge, willingness, health education, Kano

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INTRODUCTION

Human Papilloma Virus (HPV) is a sexually transmittable infection that infects approximately 70% of people during their 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 Globally the commonest oncogenic serotypes of HPV are 16 and 18, while others serotypes such as 31, 33, 35, 45, 52, 57, 58, 66, 67, 69, 70, 73 and 82 have also been implicated.²

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.³

Two HPV vaccines are available worldwide: a bivalent vaccine, against HPV types 16 and 18 (these two types cause 70% of cervical cancers in most part of the world) and a quadrivalent vaccine, against HPV 16 and 18 as well as HPV 6 and 11 (6 and 11 are responsible for benign ano-genital warts and recurrent respiratory papillomatosis), a disease where recurrent growths occur in the airways, frequently on the vocal cords. Neither vaccine contains a live virus therefore they don't act by causing an infection. Both vaccines are prophylactic and are most effective when administered prior to infection with HPV, which is acquired by most individuals shortly after sexual debut. The vaccines are not therapeutic, nor do they have any effect on progression to disease in persons who have HPV infection at the time of vaccination.⁴

HPV vaccines offer the best protection to women and men who receive all three doses in the

appropriate sequence and have time to develop an immune response before becoming sexually active. Initiation of HPV vaccination is recommended for girls and boys beginning when they are aged 9 to 13 years.⁵ A recent review by 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.⁶

HPV vaccine was licensed in Nigeria since April 2009, The vaccine is available at some private and public hospitals in Nigeria at a cost ranging between nine thousand naira to fifteen thousand naira (₦9,000:00 - ₦15,000:00) per dose, however, very few have been immunised against HPV since its introduction but National Primary Health Care Development Agency is working hard to introduce it into the routine national immunization schedule by 2020 after demonstration project in the country.⁸

Public HPV vaccine and cervical cancer education can take place at schools, workplaces, churches, mosques, traditional leaders' palace, market places and durbars for good coverage to be achieved as indicated that majority of the women preferred educational programmes at such venues.⁹ The global prevalence of HPV infection is about 11-12%. The five most prevalent HPV types worldwide were HPV16 (3.2%), HPV18 (1.4%), HPV52 (0.9%), HPV31 (0.8%) and HPV58 (0.7%), There is considerable regional variation in global HPV prevalence with the highest figures in sub-Saharan Africa (24%),

Eastern Europe (21%) and Latin America (16%). Particularly high prevalence is seen in Eastern Africa and the Caribbean, where rates exceed 30% and Nigeria has reported overall HPV prevalence of 26.3%.¹⁰

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.⁷ About 23.7% of women and 73% of men in the general population in Nigeria carry HPV genital infection which can lead to different malignant lesion.¹¹ 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.¹⁰

Health 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 uptake the vaccine.

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 place followed by Igbo, Yoruba, Kanuri, Egbira, Igala and other many other tribes but Islam is the predominant religion then Christians and followers of other religions.¹²

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,¹² with majority of the populace living in the metropolitan

LGAs.¹³ 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.¹⁴

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 purposively selected as intervention and control LGA respectively, Tarauni and Gwale has a distance of about 15km apart.

Study design

A community based qualitative 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

Sixteen (16) participants were used as the sample size for this qualitative study, eight in Tarauni the intervention and eight in Gwale the control LGAs, four FGDs were conducted pre and post intervention in each LGAs respectively.

Sampling technique

The participants were purposively selected according to their ages, educational qualification and sex to ensure homogeneity in each community.

Study Instruments

Focus group discussions (FGD) was used in collecting qualitative data using the FGD guide adapted from a previous study.¹⁵ The FGD guide was translated to Hausa because it was used in that language and back translated to English.

Data collection methods

The FGD guide adapted from a previous study.¹⁵ was used to collect data from the respondents pre-intervention by conducting four interviews and six months post intervention by conducting another four interviews in both intervention and control LGAs after pretesting the FGD guide. Four research assistants were recruited and trained for this study (2 males and 2 females). They were trained for four days which covered the objectives of the study.

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 and free medical check-up including checking of blood pressure, weighing and sugar level was done for each participant free of charge.

Data Management

Tape recordings from the FGDs of both groups in each component of the study (pre- and post-intervention) were transcribed verbatim including pauses and interruptions, then put together with the field notes and analysed. Transcribed material was including gestures and other non-verbal responses. Information obtained from the FGDs were transcribed verbatim and translated into English. The transcripts were coded and analysed using thematic analysis.

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 Helsinki declaration was respected throughout the research.¹⁶

FOCUS GROUP DISCUSSION FINDINGS

Comparison between Pre-and Post- Intervention Focus Group Discussions in the intervention group

The major themes that emerged from the FGD were:

1. Respondents' Knowledge of Sexually transmitted Infections

Before the intervention, knowledge of the common sexually transmitted diseases, among majority of the participants was scanty. A few of them mentioned some; "*I know of few of the sexual transmitted diseases like HIV and gonorrhoea*" (FGD, Female civil servants, trader and artisan. Tarauni, Kano.). However, post-intervention, majority were able to list most of the diseases "...*now we know other forms of sexually transmitted diseases like PID, syphilis and vaginal candidiasis*"

Another discussant added "*I know of gonorrhoea and HIV*" (FGD, Male trader, artisan and civil servant Tarauni, Kano) but after the intervention "*I know HIV, syphilis, gonorrhoea, PID and vaginal candidiasis*" were added.

2. Respondents' Knowledge of Genital malignancies

Regarding genital malignancies, most of the participants expressed complete lack of awareness "*we are not aware but we know breast cancer that affects women*" (FGD, Female civil servants, artisan and farmer Tarauni, Kano). Post-intervention, majority of the discussants could name several forms of genital malignancies like "*cervical cancer, penile cancer and vulval cancer*". However, other participants said that "*We know prostate cancer*" (FGD, Male trader, civil servants and farmer Tarauni, Kano). But after the intervention "*cervical cancer, penile cancer and other genital lesion*" were added and the participants laughed "*thank God for your coming now we have an insight about sexually transmitted diseases*"

3. Respondents' Knowledge of HPV Infection

Participants were asked what they knew about HPV Infection, their responses demonstrate lack of knowledge about the infection

“We are not aware of HPV infection but we thought majority of the people with infection in their private part are infected through the use of unhygienic toilet” (FGD, Female trader, farmer and artisan Tarauni, Kano.) another woman said *“Gonorrhoea if become chronic will transform to HPV infection”* (FGD, Female trader Tarauni, Kano.). At post- intervention, the participants were able to know *“HPV infection which cause genital wart, cervical cancer, penile cancer and cancer in the respiratory tract”* similarly they know *“ how is the person get and transmit the infection”* Another participant said *“I know about HPV infection when i attended one adolescents health programme and it is very common but because the disease it goes unnoticed that’s why many peoples didn’t bother about it”* (FGD, Male civil servant Tarauni, Kano.) but now after the intervention *“I understand that HPV infection can lead to different lesion in the private part and other part of the body”*

4. Respondents' Knowledge of HPV Vaccine

Participants were asked what they knew about HPV vaccine, most of the participants they know nothing about the vaccine as they mentioned *“We don’t know anything about HPV vaccine”* (FGD, Female trader, civil servants and artisan Tarauni, Kano.) but one of the participant said that *“I heard about HPV vaccine in the radio”* (FGD, Female civil servants Tarauni, Kano.). At post-intervention, the participants appreciate what HPV vaccine is all about *“HPV vaccine is given to both adolescents boys and girls in order to prevent them from HPV infection which subsequently lead to different forms of genital lesion”* However, some of the participants mentioned that *“three doses of HPV vaccine can be given to adolescents preferably before sexual exposure”*

Other participants said that *“We don’t know about HPV vaccine”* (FGD, Male Artisan, trader and farmer Tarauni, Kano.) then one of the participant said that *“I know about HPV vaccine when i attended one adolescents health programme and is given to adolescent girl but I don’t know how, where is being giving”* (FGD, Male civil servant Tarauni, Kano.) After the intervention *“I knew that HPV vaccine can also be given to adolescent boys, three doses for both sex which can prevent*

HPV infection that cause genital lesion for both sex, penile cancer for male and cervical cancer for female” also other participants happily said that *“now we are aware of HPV vaccine, it uses, the group of peoples that are supposed to be giving and the number of doses”*

5. Assuming there is Vaccine to protect HPV infection how can it help

Most of the participants mentioned that since we are not aware of HPV vaccine, how can we know it uses *“we don’t know about it talk less of it uses”* (FGD, Female trader, artisan and farmer Tarauni, Kano.). At post- intervention the participant were delighted *“yes it will really help in curtailing the spread of the infection especially among adolescents”* some participants mentioned that *“if HPV vaccine is available it will definitely help in reducing the rate of HPV infection and development of cervical and penile cancers”*

Interestingly one of the participant said *“though no any vaccine can give 100% protection but am sure HPV vaccine can help in reducing the chances of contracting HPV infection”* (FGD, Male civil servants Tarauni Kano.).

6. What concern do you have about the vaccine

Participants were asked if they have concern over HPV Vaccine of course vehemently they mentioned *“We are doubting about the vaccine, it side effect in feature”* while other mentioned *“Our concern is cost of the vaccine and fear of our children they may engage in pre-marital sexual activities thinking that the vaccine is going to protect them from contracting STDs”* and some said *“If the vaccine has any side effects after use who will be held responsible”* (FGD, Female farmer, trader, civil servants and artisan Tarauni, Kano.) after the intervention participants understand that the side effect of the vaccine is not as they think from the beginning *“ we will use the vaccine for our adolescents boys and girls since you explain to us about the efficacy and less site effect”* then other participants cheerfully said that *“now we know that HPV vaccine is available and if adolescents use it is going to be beneficial to them”*

Participants also mentioned *“Cost of the vaccine is our concern considering the economic*

situation of the country then some vaccines are wisely used for family planning" (FGD, Male farmer, civil servants and artisan Tarauni, Kano) at post- intervention participants joyfully said that "you clear the air about the vaccine concerning its importance, efficacy and availability but we want government to make it a routine immunization" other participant said "yes now we don't have much concern about side effect, efficacy, disguising as family planning methods but many peoples cannot afford the vaccine since the infection is going unnoticed"

7. Decision for the uptake of HPV Vaccine and the preferred place for immunization

Participants were asked who decided for children to uptake the vaccine and the preferred place for immunization their responses seems the same "Parents are the one to decide for their children to uptake the vaccine, we preferred our children to be immunized at home because of the cost of transportation" (FGD, Female artisan, trader, civil servants and farmer Tarauni, Kano) other

participant unanimously said "Parents and government should decide for the uptake of the vaccine, be it hospital, school and home is ok but we prefer at home for conveniences and reduce the suffering of waiting in the hospital and cost of transportation" At post- intervention responses seems nothing much was added the participants said "Parents are the one to decide for their children to uptake the vaccine, we preferred our children to be immunized at home but after interacting with you we discovered that is good to receive the vaccine in the hospital in case of any eventuality the health care provider can handle it"

Similarly participants also mentioned that "Parents are the ones responsible to decide but if parents are not around adolescents can decide on their behalf, any place for immunization is ok so long as there will be no suffering" but others said "Government and community leaders are the ones to decide for the uptake of the vaccine since is new vaccine to us, like the way they used to do for polio vaccine so that many people will not miss it, be it home, school or hospital is the same but we prefer it at home to avoid suffering of going to hospital" one of the participants lamenting wasting of time in the hospital "I prefer

it at home" because of misconception and rumour that may be going round like polio vaccine "Authority and community leaders have to key in" (FGD, Male civil servants, farmer, artisan and trader Tarauni, Kano) after the intervention most of the participants said "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" but "is responsibility of the government and the community leaders to make sure there is compliance like the way they did during polio round" However, for place to receive the vaccine participants consentaneously said "hospital is the best place but if authority can make it to be house to house or in school is a welcome development"

Comparison between Pre- and Post- Intervention Focus Group Discussions in the control group

1. Respondents' Knowledge of Sexually transmitted Infections

The knowledge of the common sexually transmitted diseases, among majority of the participants was scanty. A few of them mentioned some; "the sexual transmitted diseases we know are HIV virus and gonorrhoea" (FGD, Female trader, civil servants and artisan. Gwale, Kano.). However, at the end of the study the responses were almost similar but one of the participant added "vaginal infection"

2. Respondents' Knowledge of Genital malignancies

Regarding knowledge of genital malignancies, most of the participants expressed complete lack of awareness "we are not aware of it but we know breast cancer" (FGD, Female artisans, trader and farmer Gwale, Kano.). At end of the survey, majority of the participants their knowledge about genital malignancies remain the same, other participants said "apart from breast cancer, there is cancer of the stomach". Similarly, most of the participants said that "We know bladder cancer" (FGD, Male farmer, civil servants and trader Gwale, Kano). But at the end of the study "prostate cancer"

3. Respondents' Knowledge of HPV Infection

Participants were asked what they knew about HPV Infection, their responses demonstrate lack of knowledge about the infection

“We are not aware of HPV infection” (FGD, Female farmer, trader and artisan Gwale, Kano.) other participants said *“we know vaginal infection especially the one with purulent discharge can transformed to HPV infection”* (FGD, Female artisan and trader Gwale, Kano.). At the end of the study, the participants virtually their knowledge about HPV infection remain the same. However, other participants said *“we don’t know anything about HPV infection unless if you are going to educate us now”* (FGD, Male civil servant, farmer and artisan Gwale, Kano.) but one of the participant said that *“I knew genital wart because there was a time patient presented with it in the hospital then our in charge showed me”*.

4. Respondents’ Knowledge of HPV Vaccine
 Regarding knowledge of HPV vaccine Participants, most of the participants express their ignorance *“We don’t know HPV vaccine”* (FGD, Female farmer, civil servants and artisan Gwale, Kano.) other participants said that *“we are not aware of this vaccine but we know vaccine that are given routinely to the children”* (FGD, Female artisan, civil servants and trader Gwale, Kano.). Likewise at the end of the study, the responses remain the same except that one participant said *“I asked my daughter to check internet about this vaccine that is new in our setting”* (FGD, Female civil servants Gwale, Kano.)

Moreover, other participants said that *“we don’t know about HPV vaccine, sincerely we are hearing for first time”* (FGD, Male farmer, artisan, trader and civil servant Gwale, Kano.) still it was the same at end of the study *“HPV vaccine eh we don’t knew anything about it”* but jokingly one of the participant said *“is good to organised an awareness campaign for this vaccine”*.

5. Assuming there is Vaccine to protect HPV infection how can it help

At both beginning and end of the study most of the participants mentioned that *“HPV vaccine we are ignorant about it”* some body that is ignorance

“how can he know it uses” (FGD, Female trader, civil servants, artisan and farmer Gwale, Kano).

6. What concern do you have about the vaccine

At both beginning and end of the study participants alleged that HPV vaccine is another way of stagnating their population *“family planning method, it side effect in feature”* while others mentioned *“cost of the vaccine”* (FGD, Female artisan, farmer, trader and artisan Gwale, Kano).

7. Decision for the uptake of HPV Vaccine and the preferred place for immunization

Most of the participants were in the opinion *“government and community leaders should decide for the peoples to receive the vaccine in case anything happened they are liable to it”* others mentioned *“parents should decide, but community leaders should also ensure there is compliance as in polio and other immunization programme”* for the prefer place to receive the vaccine majority said *“at home”* some of them said *“in the PHC which is located close to our houses”* but few among them mentioned *“school and hospital”* (FGD, Female trader, civil servants and farmer Gwale, Kano) at the end of the study the responses remain unchanged except some participants said *“community leaders along can handle this issue since they are close to masses”* Another participants unanimously said *“Parents and government should decide for the uptake of the vaccine”* preferably *“we want it at home for conveniences and to reduce the cost of transportation”* others said *“no problem be it at hospital, school or home but we prefer it at home”* (FGD, Male civil servants, trader and artisan Gwale, Kano) At the end of the study almost all the participants their responses remain the same, but one among them said *“Parents are the one to decide everything for their children not even uptake of the vaccine, i prefer my children to be immunized at home in order to have peace of mind laugh follows immediately”*.

DISCUSSION

Despite the vaccine being available in Nigeria since 2009, Before the intervention there was high proportion of the respondents with poor knowledge of HPV infection and vaccine in the intervention and control group respectively, this concurs with the finding reported from Kano State, Nigeria.¹⁷ but is poor than the figure obtained from Lagos State, Nigeria who also reported poor knowledge of HPV infection and vaccine.¹⁸ The variation may be due to differences in educational level.

Few participants were ever heard about HPV infection and its vaccine in both groups. This corresponded to the studies done in Nigeria and Ghana.^{19,18} that reported poor knowledge of HPV infection and vaccine. This study also observed that little proportion of the respondents that knew the risk of having HPV infection like multiple sexual partners, early age at first intercourse and unprotected sex in the both groups respectively. These findings concur with those reported from Lagos and Ibadan, Nigeria.^{20,21} but do not conform to finding of another study in Lagos, Nigeria.¹¹ The disparity may be explained by differences in educational attainment, for recommended number of doses to be given and the category of people to get the vaccine correspond with the finding of a study in Nigeria.⁸ Most 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 Edo²² 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.

Reasons reported by parents for willingness to uptake the vaccine for their adolescents in the intervention and control groups as is effective, safe and recommended by health care worker respectively which conforms with the finding reported in other studies^{75,79,93,101} few mentioned that is affordable which is not similar to studies in our setting but corresponded with findings in developed countries^{23,24} but the study have implicated fear of site effect, cost of the vaccine, cultural and religious belief as causes for unwilling to uptake the HPV vaccine the findings concur with the findings of other studies in

different countries.^{21,22,25,26,27} 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^{28,29} and almost half of the respondents they would support HPV vaccine for adolescent boys and girls and as well recommended it to children of their friends or relatives which conforms with study in Ethiopia³⁰ 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 Nigeria²⁷ and South-Africa.³¹ Parents are the one autonomously decided for the uptake of the vaccine in this study particularly fathers because they were the decisions maker probably because of our cultural background as most of the decisions are taken by family head the findings is in keeping with studies in Mali³² and Ghana³³ but contrary to studies in South-Africa were adolescents exercised a high level of autonomy and decision making to take the vaccine.^{31,34}

The most common source of information about HPV vaccination cited by the participants in this study before the intervention was radio and television rather than family members and friends, newspaper, healthcare provider or the internet as in study in Malaysia³⁵ perhaps not like study in Singapore.³⁶ This large knowledge-information gap shows that much can and should be done in terms of public health education.

The educational intervention in this study has effectively raised knowledge of HPV infection and vaccine in the intervention group. After the intervention, there was marked increase of good knowledge among respondents in the intervention group. The proportion of respondents with good knowledge increased in the intervention group and this increase. Though an increase of good knowledge was seen in the control group, it was not statistically significant. This finding conforms with studies in Nigeria,⁹ Egypt,³⁹ India,³⁷ and China.³⁸ These findings further buttresses the importance of health education intervention in improving the

knowledge of HPV infection and vaccine of the respondents in the intervention group.

At the end of the study, there were an increase proportion of the respondents that ever heard about HPV infection and its vaccine in the intervention group and this increase was statistically significant. Though an increased among the respondents that ever heard about HPV infection and its vaccine was seen in the control group. Also studies on knowledge and acceptance of HPV vaccine in Nigeria, revealed that the intervention group had significant increase in proportion of the respondents that ever heard of HPV infection and it vaccine than the control group post-intervention indicating that, there was a marked improvement in the respondents knowledge after an educational intervention^{9,40}

However, there was an increase in the numbers of the respondents that knew HPV is sexually transmitted infection and person being infected without knowing in the intervention group with slighted increase seen in the control group which is consonance with other studies^{11,38,41}

After the intervention, there was an increase of the respondents that knew the benefit of HPV vaccine such as prevention of HPV infection; genital wart; cervical cancer and penile cancer respectively in the intervention group which corresponded with results reported in Cameroon and Mali^{42,29} probably because we have almost the same culture and tradition with them, for the recommended number of doses and the category of peoples to get the vaccine^{43,30}

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. An increase was seen in the intervention group among the respondents who were willing to receive the vaccine for their adolescents 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 after an intervention.²⁰ It was also found in other studies conducted in China and India where the willingness to vaccinate their children increased following an intervention.^{38,37}

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 improved in the intervention group the findings concurred with other studies in Nigeria^{17,44,22,26} but it is impressive 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^{25,26}. 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.³¹ 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 which conforms with study in Kenya.⁴⁵

There improvement were significant in terms of what influenced the parents to uptake the vaccine for their adolescents as it prevent STDs; fear of genital warts and cancer the findings corresponded to a study in China.¹² 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^{31,34} and Thailand²⁸ This shows that the educational intervention was beneficial.

Interestingly, there was an increase about the sources of information on HPV vaccination cited by the participants after the intervention was health care provider followed by radio, family members, newspaper and internet respectively as in study in China.⁴⁷

CONCLUSION

Poor parental knowledge of HPVvaccine and low parental willingness to vaccinate their adolescents' with HPV vaccine was observed before intervention in both communities but following the intervention, there was increase in the parental awareness of HPV vaccine and 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 awareness of and 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.

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REFERENCES

1. Stafne T. Human Papilloma Virus Awareness , Knowledge and Vaccine Acceptance among Norwegian Adolescents. 2014;71. (accessed on 22/12/2017).
2. Nyengidiki T, Durugbo I, Oranu E. Human Papilloma Virus Awareness and Uptake of HPV Vaccination among Human Immunodeficiency Virus Positive Women in Nigeria. *Int J Trop Dis Health.* 2016;15(2):1–7.
3. 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.
4. 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).
5. 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).
6. Michael JB, Michael Bell, John TB, Inger KD, Debra EH, Daniel BJ, et al. CDC Newsroom. 2016.(accessed on 11/01/2018).
7. 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.
8. Odetola TD, Ekpo K. Nigerian Women ' s Perceptions about Human Papilloma Virus Immunisations. *J Community Med Health Educ.* 2012;2(11):1-5.
9. 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.
10. 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.
11. 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.
12. Nigerian C. Nigerian population commission. *Fed Repub Niger off Gaz.* 2009;96(2):B31-2.
13. Health EA. Kano State master list of settlement. 2015;(May):25–44.
14. UNFPA. Adolescents and Youth Dashboard - Nigeria. 2017;1–3. Available from: <http://www.unfpa.org/data/adolescent-youth/NE>. (accessed on 17/03/2018).
15. Turiho AK, Okello ES, Muhwezi WW, Katahoire AR. Perceptions of human papillomavirus vaccination of adolescent schoolgirls in western Uganda and their implications for acceptability of HPV vaccination: A qualitative study. *BMC Res Notes.* 2017;10(1):1–16.
16. 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.

17. 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.
18. 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.
19. Coleman MA, Levison J, Sangi-Haghpeykar H. HPV vaccine acceptability in Ghana, West Africa. *Vaccine*. 2011;29(23):3945–50.
20. Makwe CC, Anorlu RI. Knowledge of and attitude toward human papillomavirus infection and vaccines among female nurses at a tertiary hospital in Nigeria. *Int J Womens Health*. 2011;3:313–7.
21. 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.
22. 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.
23. 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).
24. 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.
25. 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.
26. 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.
27. 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.
28. 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.
29. 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.
30. 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.
31. 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.

32. 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.

33. Coleman MA, Levison J, Sangi-haghpeykar H. HPV vaccine acceptability in Ghana, West Africa. *Vaccine.* 2011;29(23):3945–50.

34. 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.

35. Shafei MN, Zainon N, Zulkifli NF, Ibrahim MI. Knowledge and perception on human papilloma virus infection and vaccination among medical students of a university in Malaysia. *Procedia - Soc Behav Sci.* 2014;116:2707–10.

36. 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.

37. 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.

38. 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.

39. Latifa MF, Entisar Abo EE. The Impact of an Educational Intervention on Women's Knowledge and Perception Regarding Cervical Cancer and Human Papillomavirus Vaccines in Tanta City: Applying Health Belief Mode. *Life Sci J.* 2013;10(12s):997–1005.

40. Ndikom CM, Ofi BA, Omokodion FO, Adedokun BA. Effects of educational intervention on women 's knowledge and uptake of cervical cancer screening in selected hospitals in Ibadan ,. *Int J Heal Promot Educ.* 2017;55(5):1–3.

41. Pelucchi C, Esposito S, Galeone C, Semino M, Sabatini C, Picciolli I, et al. Knowledge of human papillomavirus infection and its prevention among adolescents and parents in the greater Milan area , Northern Italy. *BMC Public Health.* 2010;10(378):1–12.

42. Ayissi CA, Wamai G, Oduwo GO, Welty E, Welty T, Manga S, et al. Awareness, Acceptability and Uptake of Human Papilloma Virus Vaccine Among Cameroonian School-Attending Female Adolescents. *J Community Health.* 2012. doi 10.1007/s10900-012-9554-z

43. Cunningham MS, Skrastins E, Fitzpatrick R, Jindal P, Oneko O, Yeates K, et al. Cervical cancer screening and HPV vaccine acceptability among rural and urban women in Kilimanjaro Region , Tanzania. *BMJ Open.* 2015;5:e005828.

44. 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.

45. 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.
46. 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.
47. Li J, Kang L, Li B, Pang Y, Huang R, Qiao Y. Effect of a group educational intervention on rural Chinese women ' s knowledge and attitudes about human papillomavirus (HPV) and HPV vaccines. BMC Cancer. 2015;15(691):1– 11.
48. 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.