

# Knowledge, perceptions, and attitude of nursing students on human papillomavirus infection and vaccine in Nigeria: a mixed methods design

O Lawal<sup>1</sup>, O Akpoghene-Adaiah<sup>2</sup>, O Afolaranmi<sup>2</sup>, O Arowojolu<sup>2</sup>, O Opeyemi<sup>3</sup>  
YO Kareem<sup>4,5</sup>, A Badejo<sup>1</sup>, F Kowe<sup>2</sup>, J Igwe<sup>2</sup>, T Egbeyemi<sup>2</sup>, M Savage<sup>2</sup>, P Arinzechi<sup>2</sup>,  
G Nwachukwu<sup>2</sup>, D Obisesan<sup>2</sup>, O Omoniyi<sup>2</sup> and I Morhason-Bello<sup>1,5</sup>

*Departments of Obstetrics and Gynaecology, Faculty of Clinical Sciences,  
Group F 2015 Medical Student, Health Promotion and Education, African Regional  
Health Education, Centre, Faculty of Public Health, Epidemiology and Medical Statistics,  
Faculty of Public Health and Institute of Advanced Medical Research and Training,  
College of Medicine, University of Ibadan, Ibadan, Nigeria.*

## Abstract

**Objective:** Human papillomavirus (HPV) vaccination is an efficient primary prevention of HPV infections and associated lesions. Nursing trainees are expected to be knowledgeable on public health related diseases and preventive methods including HPV vaccination. This study assessed knowledge and attitude about HPV vaccination in Nigeria among Nursing students in Ibadan.

**Methods:** It was a mixed methods study that involved - two focus group discussions (FGD) and a cross-sectional survey among nursing students in two institutions in Ibadan Nigeria. FGD data were analysed using thematic content analysis technique. A Spearman rank-order correlation and Kruskal Wallis were used to test association between the knowledge score of HPV infection and vaccine and participant characteristics. Statistical analyses were performed with STATA 15.0 software.

**Results:** The median age of students was 19 (IQR 20-21) years. In the FGDs, participants had good knowledge of HPV infection, but little or no knowledge about HPV vaccines. Only two participants knew the correct name and dosages of the available HPV vaccines. The median knowledge score about HPV vaccine was 6 (4-8) and 53% of the participant had a score  $\geq 50\%$  (6 and above). There was strong evidence that age of participants and level of year in the nursing school were associated with good knowledge of HPV infection and vaccine ( $p < 0.05$ ).

**Conclusion:** The knowledge of HPV infection, related morbidities and vaccine was poor in this study. We recommend increase in awareness of cervical cancer including primary prevention of HPV infection

through vaccination. We also recommend early introduction of HPV and related morbidities in nursing curriculum as a subject to improve their knowledge and better prepare them for public health intervention role in the community.

**Keywords:** Human papillomavirus, HPV, nursing students, HPV vaccine

## Résumé

**Objectif :** La vaccination contre le papillomavirus humain (VPH) est une prévention primaire efficace des infections à HPV et des lésions associées. Les stagiaires en soins infirmiers doivent connaître les maladies liées à la santé publique et les méthodes de prévention, y compris la vaccination contre le VPH. Cette étude a évalué les connaissances et l'attitude à l'égard de la vaccination contre le VPH au Nigeria chez les étudiants en infirmerie à Ibadan.

**Méthodes :** Il s'agissait d'une étude à méthodes mixtes qui impliquait - deux discussions de groupe focus (FGDs) et une enquête transversale parmi les étudiants en infirmerie dans deux institutions à Ibadan au Nigeria. Les données des discussions de groupe ont été analysées à l'aide de la technique d'analyse de contenu thématique. Une corrélation de classement Spearman et Kruskal Wallis ont été utilisées pour tester l'association entre le score de connaissance de l'infection par le VPH et le vaccin et les caractéristiques des participants. Les analyses statistiques ont été réalisées avec le logiciel STATA 15.0.

**Résultats :** L'âge médian des étudiants était de 19 ans (IQR 20-21). Dans les groupes de discussion focus, les participants avaient une bonne connaissance de l'infection par le VPH, mais peu ou pas de connaissances sur les vaccins contre le VPH. Seuls deux participants connaissaient le nom et les dosages corrects des vaccins contre le VPH disponibles. Le score médian de connaissances sur le vaccin contre le VPH était de 6 (4-8) et 53 % des participants

avaient un score e" 50 % (6 et plus). Il y avait des preuves solides que l'âge des participants et le niveau de l'année à l'école d'infirmier étaient associés à une bonne connaissance de l'infection au VPH et du vaccin ( $p < 0,05$ ).

**Conclusion:** La connaissance de l'infection par le VPH, des morbidités associées et du vaccin était faible dans cette étude. Nous recommandons une sensibilisation accrue au cancer du col de l'utérus, y compris la prévention primaire de l'infection par le VPH par la vaccination. Nous recommandons également l'introduction précoce du VPH et des morbidités associées dans le programme d'infirmier en tant qu'une matière afin d'améliorer leurs connaissances et de mieux les préparer au rôle d'intervention de santé publique dans la communauté.

**Mots-clés :** *Papillomavirus humain, VPH, Étudiants en infirmerie, Vaccin contre le VPH*

### Introduction

Cervical cancer remains a major public health challenge, particularly, in the low- and middle-income countries in Africa and South East Asia [1,2]. It is estimated that about 90% of deaths from cervical cancer occur in low- and middle-income countries [1]. Cervical cancer is the fourth most common cancer in women worldwide accounting for nearly

6.6% of all female cancers [3]. In Nigeria, cervical cancer is the most common cancer of the female reproductive tract and a significant proportion of global cervical cancer deaths occur in Nigerian women [3-5].

Human papillomavirus (HPV) is a necessary cause of cervical cancer [6]. Globally, approximately 70% of cervical cancer cases are caused by HPV 16 or 18 while the rest of cervical cancers are caused by other high-risk HPV genotypes [6]. Persistence of HPV infections is also associated with cancers of mouth, head and neck, other genital sites and anal cavity in men and women (6). HPV vaccination is an efficient preventive strategy to reduce the incidence of cervical cancer and other HPV-associated cancers [7]. The three HPV vaccines were Cervarix (HPV 16 and 18), Gardasil (HPV 6, 11, -16 and -18) and Gardasil 9 (HPV 6, -11, -16, -18, -31, -33, -45, -52 and -58) are available in Nigeria. However, despite the non-availability of HPV vaccines in the public health facilities in Nigeria, studies have shown that parent were willing to vaccinate their children [8,9].

Assessment of knowledge, awareness and attitude of healthcare workers on HPV, cervical and other HPV related cancers, is an important step to develop a robust public health response for the control of cervical cancer and other related morbidities [10]. Nurses have unique role among the healthcare team

because they are usually the first point of contact with the public/patient seeking curative or public health related service [11, 12]. In Nigeria, nurses constitute one of the largest group of frontline health workers that administer vaccines including HPV vaccine, they also play an active role in cervical cancer screening at the health facility and in the community. Expectedly, nurses are supposed to provide necessary information on the role of HPV, vaccination and other preventive strategies for HPV associated lesions to clients. However, a quantitative study conducted among female nurses in Lagos, Nigeria revealed a low level of knowledge and awareness of HPV vaccination [13]. In this study, only a quarter of nurses had heard of the HPV vaccines. However, there are no studies that have investigated the knowledge of nursing students on HPV infection, HPV vaccination and other preventive methods as a proxy assessment of the curriculum of in-service training on this subject in Nigeria [13]. The aim of this study is to assess the knowledge and attitude of nurses-in-training on HPV infection and vaccination.

### Methods

#### *Study design, population and settings*

This study used a mixed method to investigate the knowledge and attitude of nursing students on HPV infection and vaccination in Ibadan. The study was conducted between November and December 2018. The two schools of nursing in Ibadan metropolis, Oyo State, in South-western Nigeria, were purposely selected. The first school was School of Nursing University College Hospital, Ibadan-is a federal owned institution that has 340 students while school two was School of Nursing Eleyele, Ibadan- is a state institution with 120 students. Diploma in Nursing training is a three-year training school in Nigeria that is usually accredited by the Nursing and Midwifery Council of Nigeria. Two focus group discussion (FGD) – one FGD from each school – were conducted.

Afterwards, a cross-sectional survey was conducted among randomly selected nursing students. The students that participated in the qualitative study and those that were indisposed – ill health or busy – were excluded. The minimum sample size calculated with Leslie Kish formula for cross-sectional study was 195 using data from a similar study on the proportion of nursing students that had heard of HPV infection [13]. We over sampled participants from the selected institutions to achieve a sample size of 216 participants.

#### *Recruitment and Data collection*

We purposely recruited two students per class in each of the participating two nursing schools. Potential participants were given appointment for the

FGD after sharing the study protocol with each of them. On the day of the FGD, a written consent was obtained from potential participants. The FGD was conducted at a private room at each of the participating school. The two FGDs were conducted in English language and each session lasted about 35-45 minutes. A moderator and a note taker facilitated each of the FGD sessions. The question guide used to elicit information on knowledge about HPV infection, causes, prevention and vaccination for the FGD is shown in Appendix 1. At the end of the FGD session, one of the facilitators gave a short talk to address misconceptions and to answer questions posed by participants on cervical cancer and HPV infection.

In the cross-sectional survey, we recruited participants from the first, second and third year in each school using probability proportion to the overall population of each school. At each class level, a systematic random sampling was used to select individual student. Consent was obtained from participants who agreed to take part in the study. Research assistants, who were trained male and female medical students, conducted the study. The study used a validated pretested self-administered questionnaire with open and close ended design. The questionnaire was in four parts: Part 1 comprised of purpose of study, consent, and participant demographics; Part 2 contained questions which assessed knowledge about HPV infection; Part 3 comprised of questions used to elicit information on knowledge about HPV vaccine; and Part 4 explored attitude towards HPV vaccine.

#### *Data management and analysis*

The FGD data were audio-taped and transcribed verbatim; the transcripts were imported into the NVivo 12 software for coding. The initial codes were discussed with member of the research team. Further immersion into data led to refining of codes. Final codes were supported with quotes to provide clearer meaning. The data were analyzed using thematic content analysis through iterative process.

The quantitative data from the cross-sectional study were entered into Stata Statistical Software: *Release 15. College Station, TX: StataCorp LLC*. Aside from Part 1 of the questionnaire which contained information on participant demographic characteristics. Part 2 and 3 assessed the knowledge on HPV infection and HPV vaccine and the responses were either “yes/true”, “no/false” or “not sure”. Correct answers were scored 1 and wrong answers were scored 0. Part 4 used a Likert scale from “strongly disagree – strongly

agree” to assess the participants’ attitude towards HPV vaccine. The grading categories were classified as “good knowledge” for percentage score  $\geq 50\%$ , “poor knowledge” for scores  $< 50\%$ . All the participants who had heard about HPV infection or knew that HPV is vaccine preventable had at least a score. Otherwise, participants who had never heard of HPV infection or knew that HPV is vaccine preventable had a score of 0 and were classified as “No knowledge”.

Percentage frequencies of categorical variables were computed, median, 25<sup>th</sup> and 75<sup>th</sup> percentile (IQR) were presented for all continuous variables, if the Shapiro-Wilk test for normality were significant ( $p$ -value $<0.05$ ). A Spearman rank-order correlation was used to test association between knowledge score about HPV infection and vaccine and the sociodemographic characteristics of participants measured on ordinal scale while Kruskal Wallis test was used for other independent nominal variables. Correlation coefficient ranges between -1 and +1, a value of zero indicates that there is no relationship between the variables. A negative correlation coefficient implies that as the value of a variable increases, the value of the other variable decreases. A positive correlation coefficient suggests that as the value of a variable increases the value of the other variable also increases. A higher Spearman’s coefficients denote a stronger relationship and smaller coefficients indicate a weaker relationship. Level of significance was set at  $P < 0.05$ .

#### **Ethical consideration**

The Oyo state Ethics Review Board approved the conduct of this study. Each participant signed an informed consent. Information collected from participants for this study were strictly confidential and for research purpose only. Participants benefited from the information on HPV infection, and vaccines. They were counseled on the benefits of getting vaccinated after data collection.

#### **Results**

##### *Qualitative Study*

The participants were drawn from the three levels of training, the mean age were 19.6 years for school one students and 19.7 years for the students from school two. Participants were mostly Yoruba speaking (Table 1).

##### *Knowledge about HPV Infection*

The participants were asked on what they knew about HPV infection. Most of the participants described HPV as a form sexually transmitted infection. Other

**Table 1.** Distribution of respondent for the Focus Group Discussion (FGD)

School	Age	Class	Religion	Ethnicity
One	17	100L	Islam	Yoruba
	18	300L	Christian	Yoruba
	21	300L	Islam	Yoruba
	NS	300L	Islam	Yoruba
	22	200L	Christian	Yoruba
	20	300L	Christian	Yoruba
	20	200L	Islam	Igbo
	19	100L	Christian	Igbo
Two	20	300L	Christian	Yoruba
	20	300L	Islam	Yoruba
	20	200L	Christian	Yoruba
	19	200L	Islam	Yoruba
	20	300L	Christian	Yoruba
	19	200L	Christian	Yoruba

NS- Not specified

participants explained further that HPV can affect the cervix, the anus and other parts of male and female genitalia. Some participants believed that men and women can get infected with HPV, but they added that the risk of HPV infection is higher in women relative to men by stating that “*HPV it is more pronounced in females*”. Participants also described possible consequences of HPV infection to include cervical cancer, genital warts, lung cancer and others.

One of the participants stated, “*What I want to say is that when you are talking about HPV causes cervical cancer when it affects the genital, that is when it leads or causes cervical cancer in female but sometimes HPV affects the arms, the fingers, and it might not lead to cervical cancer and for management of HPV, like preventive measures*”. 20year old, 2<sup>nd</sup> year student, SCHOOL ONE. Furthermore, on the transmission of HPV infection, “*Human papillomavirus is transmittable through sex, contact, cut, breastfeeding, it is not detectable through facial look, physical appearance, because most people are using are using... (pause)... anti-retroviral drugs now. And it is helping people to live longer than it was before. So...what should I say... HPV is very common now*”. 19year old, 2<sup>nd</sup> year student, SCHOOL TWO.

**Knowledge of Cervical Cancer and the Causes**  
Most participants knew HPV can cause cervical cancer. Other causes of the cancer of cervix that were mentioned by the participants included: prolonged labour, smoking, caffeine and alcohol

consumption, sexual abuse, abortion, risky sexual behavior. Only a participant was able to correctly offer information on HPV genotypes in relation to cervical cancer.

“*Cervical cancer is the cancer of the cervix. The cervix is the lower part of the female reproductive organs/system. And in the early stage, it does not have any symptom, but it leads to pain when inflammation becomes big*”. 18year old, 3<sup>rd</sup> year student, SCHOOL ONE.

**Table 2:** Frequency and percentage distribution of participants by demographic characteristics

Demographic characteristic	frequency	Percentage
<i>Gender</i>		
Male	43	19.9
Female	173	80.1
<i>Level</i>		
First year	54	25.0
Second year	95	44.0
Third year	67	31.0
<i>Ethnicity</i>		
Yoruba	201	93.0
Igbo	14	6.5
Not specified	1	0.5
<i>Religion</i>		
Christian	176	81.5
Islam	40	18.5
<i>Marital Status</i>		
Single	199	92.1
Married	9	4.2
In a sexual relationship	7	3.2
Not specified	1	0.5
<i>Residence</i>		
School hostel	211	97.7
Off-campus	3	1.4
No response	2	0.9
<i>Age</i>		
<20	86	39.8
20-24	109	50.5
25+	16	7.4
Not specified	5	2.3
Median (IQR)	20{19-21}	
<i>Institution</i>		
School 1	135	62.3
School 2	81	37.5

“*Cervical cancer is the cancer of the cervix and it is abnormal proliferation of sores in the body. So, the cervix is the neck of the uterus, that is the lowest part of the uterus, the cancer that affects the region is called the cervical cancer and it has some causes, it is mostly caused by HPV as earlier said*”. “*Now talking about the symptoms of cervical cancer, there can be discharging from the vagina, it can be*

*asymptomatic but later as it progressing, there can be malodor, maybe from the vagina or something, then talking about the management, it can still be managed stage by stage, surgery can be done if it is earlier detected then if it is not detected earlier, they can use chemotherapy, radiotherapy, but if it is severe, the two management can be combined".* 21year old, 3<sup>rd</sup> year student, SCHOOL ONE.

*Relationship between HPV and Cervical Cancer*  
The participants largely said that one of the causes of Cervical Cancer is HPV. However, only few of the participants were able to describe how HPV cause cervical cancer.

*"So, the relationship between cervical cancer and HPV is that this HPV is a virus and when left untreated, it'll develop, it will multiply and cause complications".*

*"The relationship between HPV and cervical cancer, one of the major causes of HPV is cervical cancer".* 20year old, 3<sup>rd</sup>year student, SCHOOL TWO.

*Sources of Information about HPV and Cervical Cancer*

Several participants said that they had heard about HPV and cervical cancer on the ward. A few other participants said they had been taught in class. Other sources of information mentioned by the participants were internet and from literature.

*"In reproductive health, we did a topic on it in class in 2016. Also, in clinical class, we had a case like that, so I went to check it up".* 20year old, 3<sup>rd</sup>year student, SCHOOL TWO.

When asked if they were taught in class, some of the participants said it was mentioned in reproductive health in their second year.

*Knowledge about the HPV Vaccine*

Some of the participants said the vaccine was essential, that it will prevent an individual from contracting HPV infection. One participant said that HPV vaccine should be administered at birth, another said it should be given at *"the age range of 9 years"*. Some participants stated that the vaccine should be administered to both male and female, while some believed it should be given to female alone. A few of the participants said that HPV vaccine cannot give full protection for HPV infection. On further probing, none of the participants knew the types of HPV vaccine. When asked about the dosage of HPV vaccine, two of the participants from SCHOOL ONE said 3 doses, while none of the participants from SCHOOL TWO, knew the dosage for the vaccine.

*"Once someone gets vaccinated, it kind of helps the body to build up an immunity against infection. But one thing I do believe is it is not an automatic passport to being sexually loose. So, the fact that it is protecting one does not mean that... you understand ... one will be totally putting yourself at risk. And then one thing is the awareness of the vaccine is not so much and it's not everyone that is getting it. So, the important thing even when we get vaccinated just like we know about polio virus vaccination, as we talk about OPV, the best way is we health educate and make awareness about it and tell them, we should emphasize how important it is, especially to our female children".* 20year old, 3<sup>rd</sup>year student, SCHOOL TWO.

*"You know the vaccine is new... Most mothers will feel that after 2 years their children are done with vaccination, so but now it's now extending to 9m. Even for the 24m too, it's not all mothers that come for it".* 20year old, 3<sup>rd</sup>year student, SCHOOL TWO.

When asked if the participants in school two knew about the type of vaccine, the response was *"no"* from all.

*Sources of Information about the HPV Vaccine*

Two participants had just heard of HPV vaccine a day prior to the FGD. Other participants said they had heard about HPV vaccine during their immunization posting, and one participant mentioned that she saw it on the charts at the immunization clinic.

*"During class and also immunization posting in 200L".* 20year old, 3<sup>rd</sup>year student, SCHOOL TWO.

*"I saw it on the ward yesterday".* 20year old, 2<sup>nd</sup>year student, SCHOOL TWO.

*Attitude towards HPV Vaccine*

All the participants were willing to take the vaccine. Only one participant had taken the vaccine as at the time of the study. They mentioned affordability and availability as reasons for not taking the vaccine. Some of the participants did not know if the vaccine was available in Ibadan, Nigeria. A number of participants said that if the Government subsidized the cost of HPV vaccine, they will feel more inclined to take the vaccine.

Most participants said they had recommended HPV vaccine in the past to people.

*"I have never taken the vaccine because it is very expensive".* 18year old, 3<sup>rd</sup>year student, SCHOOL ONE.

*"I have not taken the vaccine because I don't know where I can access it so I don't know".* 20year old, 2<sup>nd</sup>year student, SCHOOL ONE.

*Promotion of Cervical Cancer and HPV Vaccine*  
Most participants explained that they had previously been involved in promoting HPV vaccination, especially at Antenatal Clinic as part of vaccines that mothers should ensure it given to their children.

*“Of course, I have educated parents in getting it for their children, that is I have been involved in educating parents in vaccinating their children and wards. But even through telling them about the price at times, it sounds somehow because it will be like the money is expensive and some people believe that God forbid bad thing. They are just hopeful they wouldn't get infected”.* 20year old, 2<sup>nd</sup>year student, SCHOOL ONE.

*“I have not been promoting it. I just read about it and they don't know much about it. Maybe I will try and promote it later”.* 17year old, 1<sup>st</sup>year student, SCHOOL ONE.

Most participants believed that there is low awareness of HPV vaccine among people in the community.

*“I think we should have increase in the facilities where the vaccine can be accessed since the essence of the vaccine is to prevent the individuals*

*from coming down with the virus. I think if we have known facilities where the vaccine can be accessed, it will also be very good and encouraging if the price can also be subsidized by the government so that people will be able to access its intake. Also, health education aspect should be put in place that HPV is asymptomatic, that it will take a long time before any infected person gets to know that he/she has become a victim”.* 20year old, 2<sup>nd</sup>year student, SCHOOL ONE.

#### **Cross-sectional survey**

Two hundred and sixteen nursing students were recruited, 135(62.5%) students were from school one and 81 students were from school two. Majority were female (80.1%), of Yoruba ethnicity (93.0%) and single (92.1%). The median age was 20 (IQR 19 to 21) years and 7.2% of the participants were 25years and above. Majority of the participants (44%) were in their second year of the nursing training.

#### *Knowledge about HPV Infection and Vaccine*

The general knowledge about HPV infection were poor, 47 (21.8%) of the nursing students have not heard about HPV infection (Table 3). The median

Table 3. Knowledge about HPV Infection

Evaluative statement	Don't know(%)	No n (%)	Yes n (%)	No response n (%)
<i>HPV can be transmitted through:</i>				
Sexual intercourse	47 (21.8)	35 (16.2)	<b>131 (60.65)</b>	3 (1.4)
Genital skin-to-skin contact	47 (21.8)	77 (35.7)	<b>92 (42.3)</b>	0 (0)
Coughing and sneezing	47 (21.8)	<b>163 (75.5)</b>	6 (2.78)	0 (0)
Contact with bodily fluids (blood)	47 (21.8)	113 (52.31)	<b>56 (25.9)</b>	0 (0)
Physical contact	47 (21.8)	163 (75.5)	<b>6 (2.8)</b>	0 (0)
Skin-to-skin contact	47 (21.8)	156 (72.2)	<b>13 (6.0)</b>	0 (0)
Toilet seat	47 (21.8)	154 (71.3)	<b>15 (6.9)</b>	0 (0)
Self inoculation (orally)	47 (21.8)	160 (74.1)	<b>47 (21.8)</b>	0 (0)
<i>Which of the following health issues are related to HPV?</i>				
Cervical cancer	47 (21.8)	51 (23.6)	<b>118 (54.6)</b>	0 (0)
HIV	47 (21.8)	144 (66.7)	<b>25 (11.6)</b>	0 (0)
Penile cancer	47 (21.8)	141 (65.3)	<b>28 (13.0)</b>	0 (0)
Genital warts	47 (21.8)	110 (51.0)	47 (21.8)	0 (0)
Breast cancer	47 (21.8)	162 (75.0)	7 (3.2)	0 (0)
Vulvar cancer	47 (21.8)	122 (56.5)	<b>47 (21.8)</b>	0 (0)
HPV can be asymptomatic	47 (21.8)	59 (27.3)	<b>100 (46.3)</b>	10 (5.9)
HPV can affect only women	47 (21.8)	<b>74 (34.3)</b>	91 (42.1)	4 (2.4)
HPV infection can be cleared by our immune system	47 (21.8)	62 (28.7)	<u>47 (21.8)</u>	6 (2.8)
Median score (25 <sup>th</sup> -75 <sup>th</sup> percentile)	6 (3-7)			
Range	0 to 14			

*Appropriate responses are shown in bold*

score was 6 (IQR 3 to 7) and only about 15% of the participant had a score  $\geq 50\%$  (9 and above). About three in five of the participants knew that HPV infection can be transmitted through sexual intercourse, 42.3% knew that HPV infection can be transmitted through genital skin to skin. Almost four in five were sure that HPV cannot be transmitted through coughing and sneezing. However, only few participants know that HPV can be transmitted through skin to skin contact (6.0%) and through toilet seats (6.9%). 135 (62.5%) of the total participants alluded to the infection as being vaccine preventable.

The median score of knowledge about HPV vaccine assessment is 6 (IQR 4 to 8) and about 53% of the participant had a score  $\geq 50\%$  (6 and above). However, only few participants knew that HPV vaccine can prevent vulvar cancer (18.5%) and oral cancer (3.2%) due to HPV (Table 4). The major sources of information about HPV vaccines were from healthcare providers (52.6%), school (39.3%) and the Internet (24.4%). Other sources were from friends (15.6%), television/radio (12.6%), family members (7.4%), and newspapers/magazines (4.0%) (data not shown).

HPV related cancer. Nine out of ten participants agree or strongly agree that the vaccine should be incorporated into the National Programme on Immunization (NPI) schedule. About 34.8% agree or strongly agree that without HPV vaccine one can be at risk of genital warts in life and 11.2% disagreed or strongly disagreed that vaccination is not necessary because pap smear can be done. Only about 3.0% of the participants were vaccinated at the time of survey but 45.2% strongly agree and 35.6% agree they were willing to vaccinate their children.

#### *Association between knowledge about HPV Infection and Vaccine with Sociodemographic characteristics*

The results of association between knowledge about HPV infection and vaccine with participants' sociodemographic characteristics were presented in tables 6 and 7. A significant proportion of participants aged 25 years and above ( $p=0.005$ ) had good knowledge of HPV infection. Also, participants' level was associated with HPV knowledge ( $p<0.001$ ), a higher percentage of nursing student in their final year (28.4%) had a good knowledge compared to second

Table 4. Knowledge about HPV Vaccine

Evaluative statement	Don't know(%)	No n (%)	Yes n (%)
<i>HPV vaccine may prevent the following conditions:</i>			
Genital warts	81 (37.5)	71 (32.9)	<b>64 (29.6)</b>
Cervical cancer	81 (37.5)	42 (19.4)	<b>93 (43.1)</b>
Herpes	81 (37.5)	<b>100 (46.3)</b>	35 (16.2)
Oral cancer	81 (37.5)	127 (58.8)	<b>8 (3.7)</b>
Breast cancer	81 (37.5)	<b>128 (59.3)</b>	7 (3.2)
Vulvar cancer	81 (37.5)	95 (44.0)	<b>40 (18.5)</b>
<i>What are the side effect associated with HPV vaccine?</i>			
Vomiting	81 (37.5)	<b>130 (60.2)</b>	5 (2.3)
Soreness at the site where the shot is given	81 (37.5)	94 (43.5)	<b>41 (19.0)</b>
Headache	81 (37.5)	128 (59.3)	<b>7 (3.2)</b>
Joint pain	81 (37.5)	122 (56.5)	<b>13 (6.0)</b>
HPV vaccine is only for people who are sexually active	81 (37.5)	92 (42.6)	38 (17.6)
There is no need for pap smear screening after receiving HPV Vaccination	81 (37.5)	<b>103 (47.7)</b>	28 (13.0)
Median score (25th-75th percentile)	6 (4-8)		
Range	0 to 10		

*Correct responses are shown in bold*

#### *Attitudes towards HPV vaccine.*

The attitude toward HPV vaccine was evaluated among 135 nursing students who knew about HPV infection and that HPV is vaccine preventable (Table 5). Only 6.7% of participants disagreed or strongly disagreed that HPV vaccine is effective in preventing

year (8.4%) and first year (9.3%). Similarly, they were a statistically significant association between age and knowledge about HPV vaccine ( $p=0.041$ ). Also, knowledge about HPV vaccine increases with the academic level of the students ( $p=0.000$ ). Majority of nursing students in their third year have a good

Table 5. Attitudes to HPV Vaccine among Nursing Students

Evaluative Statement	Total No of Participant (N= 135)				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
HPV vaccine is effective in preventing HPV related cancers	n (%)	n (%)	n (%)	n (%)	n (%)
The process of getting the vaccine is easy	7 (5.2)	2 (1.5)	6 (4.4)	54 (40.0)	66 (48.9)
The vaccine should be incorporated into the NPI schedule	8 (5.9)	24 (17.8)	38 (28.2)	46 (34.1)	18 (13.3)
HPV vaccine costs more than I can afford	5 (3.7)	1 (0.1)	7 (5.2)	49 (36.3)	73 (54.1)
Will you be willing to give your child the vaccine	9 (6.7)	18 (13.3)	40 (29.6)	38 (28.2)	30 (22.2)
I feel the vaccine is unsafe	5 (3.7)	4 (3.0)	16 (11.9)	48 (35.6)	61 (45.2)
Without HPV vaccine, I would be at risk of genital warts in life	41 (30.1)	69 (51.1)	16 (11.9)	5 (3.7)	4 (3.0)
HPV vaccine is important for girls	18 (13.3)	35 (25.9)	35 (25.9)	33 (24.4)	14 (10.4)
I can trust information I receive about the vaccine	4 (3.0)	4 (3.0)	15 (11.1)	48 (35.6)	63 (46.7)
Vaccination is not necessary because pap smear can be done	4 (3.0)	8 (5.9)	18 (13.3)	60 (44.4)	45 (33.3)
	41 (30.1)	48 (35.6)	31 (23.0)	11 (8.2)	4 (3.0)

knowledge (74.6%) about HPV vaccine compared with second year (48.4%) and first year (33.3%) students.

The proportion of student nurse that had good knowledge on HPV infection and vaccination including cervical cancer was lower in this study

**Table 6:** Association between knowledge about HPV infection and sociodemographic

Variables	No knowledge (%)	Poor knowledge (%)	Good knowledge (%)	Total (100)	p-value <sup>a</sup>
<i>Gender</i>					0.158
Male	12 (27.9)	27 (62.8)	4 (9.3)	43 (100)	
Female	35 (20.2)	110 (63.6)	28 (16.2)	173 (100)	
<i>Level</i>					<0.001
First year	25 (46.3)	24 (44.4)	5 (9.3)	54 (100)	
Second year	21 (22)	66 (69.5)	8 (8.4)	95 (100)	
Third year	1 (1.5)	47 (70.2)	19 (28.4)	67 (100)	
<i>Ethnicity</i>					0.165
Yoruba	46 (22.9)	125 (62.2)	30 (14.9)	201 (100)	
Igbo	0 (0.0)	12 (85.7)	2 (14.3)	14 (100)	
<i>Religion</i>					0.551
Christianity	39 (22.2)	108 (61.4)	29 (16.5)	176 (100)	
Islam	8 (20.0)	29 (72.5)	3 (7.5)	40 (100)	
<i>Marital status</i>					0.678
Single	42 (21.1)	128 (64.3)	29 (14.6)	199 (100)	
Married/In a sexual relationship	5 (31.2)	8 (50.0)	3 (18.8)	16 (100)	
<i>Residence</i>					0.283
School hostel	44 (20.9)	137 (64.9)	30 (14.2)	211 (100)	
Off campus	1 (33.3)	0 (0.0)	2 (66.7)	3 (100)	
<i>Age</i>					0.005
<20	25 (29.1)	54 (62.8)	7 (8.1)	86 (100)	
20-24	18 (16.5)	73 (67.0)	18 (16.5)	109 (100)	
25+	3 (18.8)	8 (50.0)	5 (31.3)	16 (100)	

<sup>a</sup> p-value for spearman rank correlation were presented for ordinal independent variables while, Kruskal Wallis test was used for nominal variables

## Discussion

In this study, most participants were aware of HPV infection, HPV vaccine and cervical cancer, but half of the participants had poor knowledge of HPV infection and vaccine. Many participants knew that HPV is a form of sexually transmitted infections and a cause of cervical cancer that can be prevented by HPV vaccine, however, a significant number mentioned other causes that were not related to cervical cancer. For example, some participants mentioned consumption of caffeine and alcohol alone as causes of cervical cancer. Good knowledge of HPV infection and vaccines increased with age and academic level of participants. Despite the general poor knowledge score among the participants, majority of the participants reported to have conducted counselling with patients on HPV infection and vaccine including cervical cancer in the clinics.

compared to other similar studies in Italy (96%)(14) and India (89%)[15]. The observed higher proportion of student nurse that knew HPV infection and vaccination in the Italian and Indian studies might be due to the differences in the training curriculum [14,15]. Nursing students in the two previous studies were recruited from Universities in Italy and India, and these students possibly had a more comprehensive curriculum than nursing students in our study who were undergoing a diploma course [14,15]. We also observed that majority of the participants could associate HPV infection with anogenital and oral cancers. This observation was similar to a study among health professionals in New Zealand where participants were able to associate HPV infection with anogenital and oral cancers [16].

In this study less than half of the participants knew that cervical cancer is preventable by HPV vaccination. This was in contrast to other studies

**Table 7:** Association between Knowledge about HPV Vaccine and Sociodemographic

Variables	No knowledge (%)	Poor knowledge (%)	Good knowledge (%)	Total (100)	p-value <sup>a</sup>
<i>Gender</i>					0.629
Male	17 (39.5)	5 (11.6)	21 (48.8)	43 (100)	
Female	64 (37.0)	16 (9.3)	93 (53.8)	173 (100)	
<i>Level</i>					<0.001
First year	31 (57.4)	5 (9.3)	18 (33.3)	54 (100)	
Second year	41 (43.2)	8 (8.4)	46 (48.4)	95 (100)	
Third year	9 (13.4)	8 (12.0)	50 (74.6)	67 (100)	
<i>Ethnicity</i>					0.500
Yoruba	74 (36.8)	19 (9.5)	108 (53.7)	201 (100)	
Igbo	6 (42.9)	2 (14.3)	6 (42.9)	14 (100)	
<i>Religion</i>					0.851
Christianity	66 (37.5)	18 (10.2)	92 (52.3)	176 (100)	
Islam	15 (37.5)	3 (7.5)	22 (55.0)	40 (100)	
<i>Marital status</i>					0.503
Single	74 (37.2)	19 (9.6)	106 (53.2)	199 (100)	
Married/In a sexual relationship	7 (43.75)	2 (12.5)	7 (43.75)	16 (100)	
<i>Residence</i>					0.733
School hostel	78 (37.0)	21 (9.9)	112 (53.1)	211 (100)	
Off campus	1 (33.3)	0 (0.0)	2 (66.7)	3 (100)	
<i>Age</i>					0.041
<20		40 (46.5)	8 (9.3)	38 (44.2)	86 (100)
20-24	34 (31.2)	9 (8.3)	66 (60.6)	109 (100)	
25+	5 (31.2)	3 (18.8)	8 (50.0)	16 (100)	

<sup>a</sup>p-value for spearman rank correlation were presented for ordinal independent variables and Kruskal Wallis test was used for nominal variables

were majority of participants mentioned that HPV vaccination is an effective preventive strategy for cervical cancer. The same pattern of knowledge was observed among FGD participants in this study. None of the participants could mention the correct name of any of the three known HPV vaccine types. This gap highlights the deficiency in the quality of information that are given to trainee, which requires urgent attention. It is imperative that nursing trainees should be well informed on key public health issues such as HPV infection and prevention since they are potential frontline healthcare providers.

Regarding attitudes towards HPV vaccine, majority of the participants showed willingness to vaccinate their children. The high level of willingness to accept HPV vaccination for daughters has been previously reported among different population of women in Nigeria [8,17]. A Nigerian study demonstrated that women that reported high willingness to vaccinate their children against HPV were more likely to ensure that their daughter get vaccinated(18). A similar study among nursing

students in Spain showed that most participants would recommend HPV vaccines to their friends [19].

The participants age and academic level were significantly associated with their knowledge scores on HPV infection and vaccine. It is plausible that nursing students who are in the higher academic levels at the school would likely have rotated through the immunization clinic and had lectures on prevention and management of HPV and cervical cancer. In addition, participants in the higher class are likely to be older than participants in the lower academic levels.

There are potential limitations in the interpretations of our findings. The participants were selected from two different schools of nursing in the same city with both schools using similar curriculum. The cross-sectional data were collected by self-administered interview; this method of interview is prone to under or over reporting by participants. Another challenge of self-administered interview might be lack of opportunity to clarify or ascertain the response of participants. There were more female participants in this study compared to males, the

gender imbalance could potentially bias the outcome of the study. Despite these limitations, this study provided some unique findings. This study investigated a spectrum of related topics – HPV infection, vaccine and cervical cancer – to understand the level of awareness and knowledge of potential frontline health workers in Nigeria that are undergoing in-service training. We used mixed method design to understand different perspectives of participants on HPV infection, vaccine and cervical cancer. The data from this study could be used as a proxy to measure the quality of teaching and learning on HPV and associated morbidities in the nursing school.

In conclusion, this study showed that there is inadequate knowledge of HPV infection and vaccine as well as other related morbidities among nursing students in Ibadan. It is imperative public health subject such as HPV infection and prevention methods are introduced very early in the training, particularly, before the students begin their clinical rotation and participation in the care of patients. Future studies should include the assessment of the curriculum and knowledge of teachers at school of nursing on this subject to provide a more robust information on the quality of learning in nursing school.

### Acknowledgements

We appreciate the efforts of Group F 2015 medical students who participated in the data collection for this study. We acknowledge the support given by the management of schools of Nursing, and we thank students that participated in this study.

### References

1. Arbyn M, Weiderpass E, Bruni L, *et al.* Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *Lancet Glob Health.* 2020;8(2):e191-e203.
2. Mboumba Bouassa RS, Prazuck T, Lethu T, *et al.* Cervical cancer in sub-Saharan Africa: a preventable noncommunicable disease. *Expert Rev Anti Infect Ther.* 2017;15(6):613-627.
3. Denny LA, Sankaranarayanan R, De Vuyst H, *et al.* Recommendations for cervical cancer prevention in sub-saharan Africa. *Vaccine.* 2013;31 Suppl 5:F73-4.
4. Okolo C, Franceschi S, Adewole I, *et al.* Human papillomavirus infection in women with and without cervical cancer in Ibadan, Nigeria. *Infect Agent Cancer.* 2010;5(1):24.
5. Anorlu RI, Orakwue CO, Oyeneyin L and Abudu OO. Late presentation of patients with cervical cancer to a tertiary hospital in Lagos: what is responsible? *Eur J Gynaecol Oncol.* 2004;25(6):729-732.
6. de Sanjose S, Brotons M and Pavon MA. The natural history of human papillomavirus infection. *Best Pract Res Clin Obstet Gynaecol.* 2018;47:2-13.
7. Arrossi S, Temin S, Garland S, *et al.* Primary Prevention of Cervical Cancer: American Society of Clinical Oncology Resource-Stratified Guideline. *J Glob Oncol.* 2017;3(5):611-634.
8. Morhason-Bello IO, Wallis S, Adedokun BO and Adewole IF. Willingness of reproductive-aged women in a Nigerian community to accept human papillomavirus vaccination for their children. *J Obstet Gynaecol Res.* 2015;41(10):1621-1629.
9. Oluwole EO, Idowu OM, Adejimi AA, Balogun MR, and Osanyin GE. Knowledge, attitude and uptake of human papillomavirus vaccination among female undergraduates in Lagos State, Nigeria. *J Family Med Prim Care.* 2019;8(11):3627-3633.
10. Di JL, Rutherford S, Wu JL, *et al.* Knowledge of Cervical Cancer Screening among Health Care Workers Providing Services Across Different Socio-economic Regions of China. *Asian Pac J Cancer Prev.* 2016;17(6):2965-2972.
11. Olikoye RK. Nurses are essential to primary health care. *New Era Nurs Image Int.* 1988;5:20.
12. Mahler H. Health care for all through primary health care: nurses lead the way. *New Era Nurs Image Int.* 1988;5:21-22.
13. Makwe CC and 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.
14. Pelullo CP, Esposito MR and Di Giuseppe G. Human Papillomavirus Infection and Vaccination: Knowledge and Attitudes among Nursing Students in Italy. *International journal of environmental research and public health.* 2019;16(10):1770.
15. Shetty S, Prabhu S, Shetty V and Shetty AK. Knowledge, attitudes and factors associated with acceptability of human papillomavirus vaccination among undergraduate medical, dental and nursing students in South India. *Human Vaccines & Immunotherapeutics.* 2019;15(7-8):1656-65.
16. Sherman SM, Bartholomew K, Denison HJ, *et al.* Knowledge, attitudes and awareness of the human papillomavirus among health professionals in New Zealand. *PLoS One.* 2018;13(12):e0197648.

17. Azuogu BN, Umeokonkwo CD, Azuogu VC, *et al.* Appraisal of willingness to vaccinate daughters with human papilloma virus vaccine and cervical cancer screening uptake among mothers of adolescent students in Abakaliki, Nigeria. *Niger J Clin Pract.* 2019;22(9):1286-91.
18. Ogochukwu TN, Akabueze J., Ezeome .IV., *et al.* . Vaccination against Human Papilloma Virus in Adolescent Girls: Mother’s Knowledge, Attitude, Desire and Practice in Nigeria. . *J Infect Dis Prev Med.* 2017;5:151. doi:10.4172/2329-8731.1000151.
19. Villanueva S, Mosteiro-Miguens DG, Dominguez-Martis EM, Lopez-Ares D and Novio S. Knowledge, Attitudes, and Intentions towards Human Papillomavirus Vaccination among Nursing Students in Spain. *Int J Environ Res Public Health.* 2019;16(22).

#### **Appendix 1.** Focus Group Discussion (FGD) Question Guide

What do you know about HPV infection?  
 What do you know about cervical cancer and it’s causes?  
 What is the relationship between cervical cancer and HPV infection?  
 How did you learn what you know about the above?  
 What have you heard about HPV vaccine?  
 Have you ever been involved in promoting the vaccine?  
 What has influenced your knowledge about HPV Vaccine?  
 How do you feel about taking the vaccine or not taking the vaccine?  
 What is the most important thing to you of all we have talked about?  
 Is there anything else you would like to say or add?

Received = 17/02/2021  
 Accepted = 09/11/2021