

Awareness and uptake of human papillomavirus vaccines among female undergraduate students: Implications for cervical cancer prevention in South-South, Nigeria

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Abstract

Background: Human papillomavirus (HPV) is a sexually transmitted infection found most commonly among sexually active adolescents and young women. HPV vaccine is available in Nigeria. However, very few persons have been vaccinated. This study, therefore, aimed to assess the level of awareness of HPV infection and its vaccine uptake among female university students in Rivers State.

Methods: This was a descriptive cross-sectional study carried out between July and October 2015 in three Universities in Rivers State, Nigeria. Multistage sampling was used to identify the study participants.

Results: A total of 780 eligible females were recruited into the study. About 262 (33.6%) had heard of HPV infection and 203 (26%) had heard of HPV vaccines. Among those who had heard of HPV vaccines, 148 (72.9%) were aware that the vaccine could protect against HPV infection while 97 (47.8%) were aware that the vaccine could protect against cervical cancer. Only 40 (5.1%) of study participants had been vaccinated with HPV vaccine. HPV vaccine uptake was significantly predicted by respondent's marital status (adjusted OR [AdjOR] = 0.061; 0.015–0.246), parity (AdjOR = 5.855; 1.433–23.923) and knowledge about HPV (AdjOR = 7.918; 3.062–20.475).

Conclusion: Awareness of HPV infection and HPV vaccine among female undergraduates in Rivers State is poor. There is, therefore, need for health promotion interventions that address this gap as part of cervical cancer control activities.

Keywords: Cervical cancer, human papilloma virus vaccine, human papillomavirus, undergraduates, uptake

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Received: 05.04.2017, **Accepted:** 30.09.2017

INTRODUCTION

Human papillomavirus (HPV) is a sexually transmitted infection (STI) found most commonly among sexually active adolescents and young women.¹ It can infect any woman irrespective of the age group.² There are many types of HPV, many of which have not been associated with problems. Most HPV infections usually clear up within a few months

or years of acquisition without any interventions. Some can persist and progress to cancer such as cancer of the anus, vulva, vagina, cervix or penis. Cervical cancer, however, is by far the most common HPV-related cancer, and nearly, all cases of cervical cancer are attributed to HPV infection.³ HPV high-risk types 16 and 18 have been implicated in the aetiology of cervical cancer in approximately 70% of cases.^{4,5}

Access this article online	
Quick Response Code:	Website: www.phmj.org
	DOI: 10.4103/phmj.phmj_14_17

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How to cite this article: Ojimah C, Maduka O. Awareness and uptake of human papillomavirus vaccines among female undergraduate students: Implications for cervical cancer prevention in South-South, Nigeria. Port Harcourt Med J 2017;11:134-40.

New vaccines have been developed to protect against HPV infection and cervical cancer. These vaccines were produced through a combination of genetic material from more than one origin, and do not contain any biological product or DNA. Thus, they are non-infectious.⁶ The HPV vaccines target 'high risk' HPV types 16 and 18 and 'low risk' HPV types 6 and 11.⁷ On completion of clinical trials, two vaccines (Gardasil and Cervarix) were commercially released in government-sponsored vaccination programmes that targeted women, girls and even boys as young as 9 years of age.⁸ The vaccines are believed to be about 98% effective against HPV types 6, 11, 16 and 18, given in three doses over a 6-month period. However, a vaccine which targets both HPV strains 16 and 18 and is proven to be 92% effective with more than 4 years potency is both licensed and available in Nigeria.⁹

Vaccination with HPV vaccines does not protect women with pre-existing infection, and may even leave them more susceptible to other forms of oncogenic HPV types. Thus, cervical cancer should be ruled out through Pap smear test before the administration of HPV vaccine.⁶ Infection with HPV at a young age could be very dangerous because the virus tends to have more time to cause damage that will eventually lead to cancer.⁶ Despite vaccination, women still need to continue screening for cervical cancer.¹⁰

Despite the fact that human papillomavirus vaccine is available in Nigeria very few persons have been vaccinated.¹¹ We, therefore, aimed to assess the level of awareness of HPV infection, and its vaccine uptake among female university students in Rivers State. Although the target population for HPV vaccination in developing countries is 10–14-year-old girls,¹² this study focuses on female undergraduates because they are at risk of contracting HPV infection.

MATERIALS AND METHODS

This study was a descriptive cross-sectional study conducted in Rivers State, an oil-rich state in the south of Nigeria. The population of Rivers State according to the 2006 census figures is 5,185,400, which makes it the sixth-most populated state in Nigeria.^{13,14} There are four universities in the State: the University of Port Harcourt, the Rivers State University of Science and Technology, the Rivers State University of Education (Ignatius Ajuru University) and the Madonna University, Elele.¹⁵

We conducted the study among full-time female undergraduate students in the state, aged between 15 and 45 years. Student's matriculation number or school

identification card was used to qualify the selected female students into the study. We excluded female students without any form of identification. We calculated sample size using the formula for descriptive cross-sectional study with 95% confidence interval, given as 1.96, the proportion of HPV awareness (p) used from a previous study was 48.7%,¹⁶ precision of 5% and 10% inflation for non-response. The calculated sample size of 384 females was multiplied by two to cater for design effect due to multistage sampling to give a final sample of 845 females.

We used a multistage sampling technique to select participants from the study population. In the first stage, we obtained a list of all the universities in Rivers State from which we selected three universities through simple random sampling, using balloting. The selected universities were Rivers State University of Science and Technology Nkpolu-Oroworukwo Port Harcourt, Ignatius Ajuru University of Education Rumuolumeni, and the University of Port Harcourt, Choba, Port Harcourt. Two hundred and eighty-two study participants were recruited from each university by disproportionate probability sampling method. In the second stage, we prepared a list of all the faculties in each selected university and selected five faculties by simple random sampling. We then selected 57 females from each of the selected faculties. In the third stage, we prepared a list of all the departments in each selected faculty and selected three departments through simple random sampling. In the final stage, we selected 19 females from each of the selected departments using systematic sampling method. The sampling interval (k) was calculated using the formula ($k = N/n$), where N is the population of female students in each department, and n is the number of the study participants required to be sampled from the department. We selected the first study participants from each department by simple random sampling, while others followed the order of the calculated sampling interval.

We collected data using a self-administered questionnaire. The questionnaire consisted of three sections as follows: Section A (sociodemographic characteristics), Section B (awareness of cervical cancer, HPV infection and HPV vaccines) and Section C (HPV vaccine uptake). We pre-tested the questionnaire on female students from another institution not included in the study. Data collection was done for 2 months from 4 May to 29 June 2015.

Knowledge scores were awarded to participant's responses to questions concerning cervical cancer, HPV infection and HPV vaccines. Participants who had heard of cervical cancer and responded correctly to at least two questions (out of three) about cervical cancer were

classified as having good knowledge about cervical cancer. Participants who had heard of HPV and correctly got at least three questions (out of four) about HPV and the HPV vaccine were classified as having good knowledge of HPV and HPV vaccine, respectively. Participants who did not meet the set cut-off score were classified as having poor knowledge about cervical cancer, HPV or the vaccine. We defined HPV vaccination as taking at least one dose of the vaccine. This was intended to capture all those who had ever taken the vaccine.

Data collected was coded and entered into Microsoft Excel 2013 and analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 owned by IBM SPSS Statistics; as acquired on 31st October 2015 by UNICOM Systems Inc., a division of UNICOM Global, under the UNICOM Intelligence brand. The analysed results on the study participants' sociodemographic characteristics and outcome variables were summarised using descriptive summary measures; including mean and standard deviation for continuous variable and percentages for categorical variables. Chi-squared test was used to determine the association between categorical variables. Binary logistical regression was used to test for significant predictors of uptake of the vaccine, and odds ratio was used to determine the statistical significance and strength of association. We set the level of significance at 5% (using 2-tailed tests) with a confidence interval of 95%, and the associated *P* value reported in two decimal places with *P* < 0.05 considered statistically significant.

Approval for the study was obtained from the Research Ethics Committee of the University of Port Harcourt. We also obtained informed consent from the study participants before questionnaire administration and ensured confidentiality of data.

RESULTS

A total of 780 females returned adequately filled questionnaires giving a response rate of 92.3%. The age of respondents ranged from 15 to 41 years with an average age of 21.9 ± 3.7 years. Only 108 (13.8%) of the respondents were married, whereas 455 (58.3%) were sexually active as at the time of the study. Almost half, i.e., 375 (48.1%) of the respondents who were sexually active had their first sexual debut on or before the age of 18 years. The mean age at which respondents had their first sexual intercourse was 18.2 ± 3.5 years [Table 1].

Only 455 (58.3%) of the study participants had heard of cervical cancer. Among the 455 respondents who had ever

heard of cervical cancer, 150 (33%) were aware that cervical cancer could be sexually transmitted, and 135 (29.7%) were aware that cervical cancer could be screened through Pap smear test. Two hundred and sixty-two (33.6%) of the students had heard of HPV infection, and 203 (26%) had heard of the vaccine. Among the students who had heard of HPV infection, 182 (69.4%) were aware that the infection could be sexually transmitted and 133 (50.8%) were aware that the infection could cause cervical cancer. Most of the students (92.7%) who had heard of HPV infection knew at least one risk factor for the infection. Respondents listed multiple sex partners 117 (44.7%) and sexual debut before 18 years of age 36 (13.7%), as the top risk factors for HPV infection. Among the study participants who had heard of HPV vaccine 148 (72.9%) were aware that the vaccine could protect against HPV infection and 97 (12.4%) were aware that the vaccine could protect against cervical cancer. A total of 165 (81.3%) participants were aware that the vaccine is available in Nigeria [Table 2].

Using the scoring criteria, we found knowledge about cervical cancer, HPV infection and HPV vaccine to be poor; 25.4%, 26.2% and 18.3%, respectively.

Only 40 (5.1%) of the students had received at least one dose of HPV vaccine [Figure 1]. Bivariate analysis showed

Table 1: Socio-demographic characteristics of study participants

Variables	Frequency (n=780)	Percentage
Age of respondent (years)		
15-19	210	26.9
20-24	391	50.1
25-29	139	17.8
30-34	33	4.2
35-39	5	0.6
40-44	2	0.3
Religion		
Christian	730	93.6
Islam	43	5.5
Others	7	0.9
Level of study		
100 Level	245	31.4
200 Level	217	27.8
300 Level	180	23.1
400 Level	111	14.2
500 Level	27	3.5
Marital status		
Married	108	13.8
Not married	672	86.2
Parity		
Have child	108	13.8
Don't have child	672	86.2
Sexual activity		
Ever had sex	455	58.3
Never had sex	325	41.7
Age of first sex (n=455)		
≤18 years	219	48.1
>18 years	236	51.9

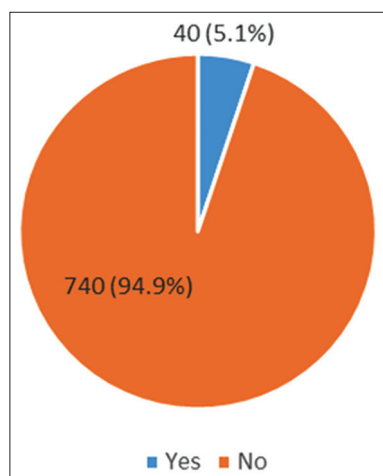


Figure 1: Pie chart showing uptake of at least one dose of HPV vaccine among female undergraduates

that HPV vaccine uptake was significantly associated with participant's marital status ($P < 0.001$), parity ($P < 0.001$), sexual activity ($P = 0.028$), knowledge of cervical cancer, HPV infection and its vaccine ($P < 0.001$) [Table 3]. Binary logistic regression analysis was used to determine the significant predictors of HPV vaccine uptake. All the variables that were significantly associated with HPV vaccine uptake, as well as those close to significance, were initially included in the regression analysis model. From the model, the variables that significantly predicted HPV vaccine uptake were marital status (adjusted OR [AdjOR] = 0.061; 0.015–0.246), parity (AdjOR = 5.855; 1.433–23.923) and knowledge about HPV (AdjOR = 7.918; 3.062–20.475) [Table 4]. Further analysis was conducted to identify the factors associated with HPV vaccine uptake among female undergraduates who had never had sex before, as at the time of the study, and it was found that respondent's knowledge about HPV infection and their knowledge about the vaccine were significantly associated with HPV vaccine uptake among non-sexually active female student; $P = 0.011$ and $P < 0.001$, respectively [Table 5]. When this finding was subjected to binary logistic regression, only respondent's knowledge about HPV vaccine significantly predicted HPV vaccine uptake among non-sexually active female students (AdjOR = 0.177; 0.036–0.873) [Table 6].

DISCUSSION

Findings from this study reveal a low level of awareness among the study population about cervical cancer, HPV and the HPV vaccine. Only 5% of the study participants had taken at least one dose of HPV vaccination. However, the majority of those not vaccinated were willing to be vaccinated and refer others for vaccination. Regression

Table 2: Awareness of cervical cancer, HPV infection and its vaccine

Awareness	Frequency	Percentage
Ever heard of cervical cancer ($n=780$)		
Yes	455	58.3
No	325	41.7
Cervical cancer can be transmitted through sexual intercourse ($n=455$)		
Yes	150	33.0
No	91	20.0
I don't know	214	47.0
Cervical cancer can be screened by Pap smear test ($n=455$)		
Yes	135	29.7
No	23	5.1
I don't know	297	65.3
Ever heard of HPV ($n=780$)		
Yes	262	33.6
No	518	66.4
HPV can be sexually transmitted ($n=262$)		
Yes	182	69.4
No	19	7.3
I don't know	61	23.3
HPV can cause cervical cancer ($n=262$)		
Yes	133	50.8
No	16	6.1
I don't know	113	43.1
Ever heard of HPV vaccine ($n=780$)		
Yes	203	26.0
No	577	74.0
HPV vaccine can protect against HPV infection ($n=203$)		
Yes	148	72.9
No	14	6.9
I don't know	41	20.2
HPV vaccine can protect against cervical cancer ($n=203$)		
Yes	97	47.8
No	18	8.9
I don't know	88	43.3
HPV vaccine is available in Nigeria ($n=203$)		
Yes	165	81.3
No	21	10.3
I don't know	17	8.4

HPV: Human papillomavirus

analysis showed that marital status, parity and knowledge about cervical cancer and HPV were significantly related to HPV vaccination. Knowledge remained a significant predictor of HPV vaccination among the study participants who had never had sex.

Our research findings concerning awareness of cervical cancer are in agreement with findings from similar studies in Nigeria^{11,16,19} in contrast to the study findings from more developed countries which show higher levels of awareness of cervical cancer, HPV and the HPV vaccine.^{17,18,12} We also found evidence in the literature of low awareness of HPV in low- and high-income countries alike.^{4,11,16,20,21} Furthermore, one review article found low levels of awareness of cervical cancer, HPV and HPV vaccine in low- and high-income countries.²² Findings from other studies are also similar to

Table 3: Uptake of HPV vaccine among female undergraduates

Variable	Have received at least one dose of HPV vaccine		χ^2	P
	n=40 Yes (%)	n=740 No (%)		
Age group (years)				
≤18	2 (1.7)	113 (98.3)	3.184	0.074
>18	38 (5.7)	627 (94.3)		
Marital status				
Married	20 (18.5)	88 (81.5)	46.199	<0.001*
Not married	20 (3.0)	625 (97.0)		
Parity				
Have child	15 (13.9)	93 (86.1)	19.775	<0.001*
Don't have child	25 (3.7)	647 (96.3)		
Sexual activity				
Ever had sex	30 (6.6)	425 (93.4)	4.819	0.028*
Never had sex	10 (3.1)	315 (96.9)		
Age of first sex (years)				
≤18	11 (5.0)	208 (95.0)	1.691	0.193
>18	19 (8.1)	217 (91.9)		
Knowledge about cervical cancer				
Good knowledge	22 (11.1)	176 (88.9)	19.524	<0.001*
Poor knowledge	18 (3.1)	564 (96.9)		
Knowledge about HPV				
Good knowledge	30 (14.7)	174 (85.3)	52.086	<0.001*
Poor knowledge	10 (1.7)	566 (98.3)		
Knowledge about HPV vaccine				
Good knowledge	30 (21.0)	113 (79.0)	90.426	<0.001*
Poor knowledge	10 (1.6)	627 (98.4)		

* Significant

Table 4: Predictors of uptake of HPV vaccine among female undergraduates

Independent variables	OR	95% CI for OR		P	AOR	95% CI for AOR		P
		Lower limit	Upper limit			Lower limit	Upper limit	
Age group	0.292	0.069	1.228	0.093	0.417	0.083	2.105	0.290
Marital Status	0.135	0.070	0.261	<0.001*	0.061	0.015	0.246	<0.001*
Parity	0.240	0.122	0.471	<0.001*	5.855	1.433	23.923	0.014*
Sexual Activity	0.450	0.217	0.934	0.032*	1.249	0.491	3.174	0.641
Knowledge about cervical cancer	3.917	2.054	7.469	<0.001*	1.244	0.556	2.783	0.596
Knowledge about HPV	9.759	4.677	20.363	<0.001*	2.374	0.889	6.339	0.084
Knowledge about HPV vaccines	16.646	7.917	35.000	<0.001*	7.918	3.062	20.475	<0.001*

* Significant

Table 5: Uptake of HPV vaccine among non-sexually active female undergraduates

Variable	Have received at least one dose of HPV vaccine		χ^2	P
	n=10 Yes (%)	n=315 No (%)		
Age group (years)				
≤18	2 (2.5)	78 (97.5)	0.118	0.731
>18	8 (3.3)	237 (96.7)		
Knowledge about cervical cancer				
Good knowledge	3 (4.3)	67 (95.7)	0.437	0.509
Poor knowledge	7 (2.7)	248 (97.3)		
Knowledge about HPV				
Good knowledge	5 (8.1)	57 (91.9)	6.391	0.011*
Poor knowledge	5 (1.9)	258 (98.1)		
Knowledge about HPV vaccine				
Good knowledge	5 (11.6)	38 (88.4)	12.150	<0.001*
Poor knowledge	5 (1.8)	277 (98.2)		

* Significant

our findings regarding a high acceptance of HPV vaccine among the study participants.^{4,12,18,19,23,24}

The predictors of willingness to receive HPV vaccination identified in this study are similar to findings from a South

African researcher who found knowledge about Pap smear test, knowledge of risk factors for cervical cancer (such as having multiple sex partners, sexual intercourse before the age of 18 years, smoking, and having contracted any sexually transmitted diseases) as significant predictors

Table 6: Predictors of uptake of HPV vaccine among non-sexually active female undergraduates

Independent variables	OR	95% CI for OR		P	AOR	95% CI for AOR		P
		Lower limit	Upper limit			Lower limit	Upper limit	
Age group	0.760	0.158	3.653	0.731	1.171	0.225	6.088	0.851
Knowledge about cervical cancer	0.630	0.159	2.504	0.512	1.969	0.387	10.026	0.415
Knowledge about HPV	0.221	0.062	0.789	0.020*	0.374	0.072	1.941	0.242
Knowledge about HPV vaccines	0.137	0.038	0.496	0.002*	0.177	0.036	0.873	0.033*

* Significant

of willingness to receive HPV vaccination.¹² However, other studies identified partner's approval, history of the gynaecological disease, and one's mother having experienced cancer as factors that significantly predicted acceptability of HPV vaccination.²⁵⁻²⁸

The burden of cervical cancer in developing countries is significant as cervical cancer has been identified as the second most prevalent cancer of women.³⁻⁵ Cervical cancer screening and HPV vaccination are useful preventive tools. HPV vaccination is no longer new in Nigeria, having been introduced several years ago. The low levels of knowledge and lower levels of uptake are, therefore, not acceptable. This underscores the need to improve information, education and communication about cervical cancer prevention among most at-risk populations. The study findings point to the fact that if more women knew about cervical cancer and its prevention, especially HPV vaccination, they would be willing to receive it.

Although the target age for cervical cancer vaccination has been identified as 10–14 years, this study population of undergraduate students aged between 15 and 41 years represent women of reproductive age at risk of STIs such as HPV and its sequelae of cervical cancer. For instance, the HIV prevalence in these age groups ranged between 2.9% and 4.4%, according to the 2012 National HIV and AIDS reproductive health survey.²⁹

This study did not evaluate the accessibility of cervical cancer prevention services, especially HPV vaccination, as we sought to focus on demand-side factors for cervical cancer vaccination. However, it is important that as interventions to improve knowledge and demand for HPV vaccination are implemented, public health authorities also make adequate provision for HPV vaccine to be available and affordable.

CONCLUSION

Awareness and uptake of HPV vaccination in this study population are unacceptably low. However, the study participants have a good perception of risk and showed willingness to take advantage of vaccination services. Public health authorities, therefore, need to implement

information, education and communication interventions among at-risk populations.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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