Knowledge, acceptance, and use of human papillomavirus vaccines among undergraduate students of the faculty of pharmaceutical sciences, Nnamdi Azikiwe University, Awka, Nigeria

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Abstract

Human Papillomavirus **(**HPV) is the most common viral infection of the reproductive tract, and its infection is a global concern. More than half a million cancers and over 250,000 deaths are attributed annually to HPV infection. The knowledge, acceptance, and vaccine uptake will help reduce the transmission of HPV infection and the subsequent development of cancers. This study assessed the level of knowledge, acceptance, and use of HPV vaccines among undergraduate pharmacy students using a self-administered, adapted, and validated questionnaire. The questionnaire contained information under four cluster headings: demographics, knowledge of HPV, HPV Vaccination, acceptance, and HPV vaccine uptake. It was distributed to randomly selected eligible students in the faculty. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive and inferential statistics were used to present the findings. The level of significance was set at a p-value of <0.05. The number of students who participated was 253, comprising 126 (49.8%) males and 127 (50.2%) females. Of the total, 216 (85.4%) have heard of HPV, 189 (74.7%) have heard of HPV Vaccination, 160 (63.2%) believed that only girls should be vaccinated, and 253 (100%) have not received the vaccination. The participants showed a fair knowledge of HPV, but a low level of knowledge of HPV Vaccination, as 216 (85.4%) knew that HPV is dangerous, 142 (56.1%) knew that the virus causes cervical cancer, and only 93 (36.8%) knew that the HPV vaccine is recommended for both males and females. None of the participants had received the vaccine, and most of them (60.1%) were willing to accept the HPV vaccine. This study suggested that the pharmacy students have a fair knowledge of cervical cancer and HPV but are less informed regarding the HPV vaccines. Despite a below-average knowledge about the HPV vaccines, the students showed a willingness to receive the HPV vaccines.

Keywords: Knowledge; acceptance; Human Papillomavirus; Vaccine; Undergraduate Students, Nigeria.

Introduction

Human papillomavirus is the most common viral infection of the reproductive tract. Most sexually active women and men will be infected at some point in their lives, and some may be repeatedly infected (WHO, 2021). In general, HPV is thought to be responsible for more than 90% of anal and cervical cancers, about 70% of vaginal and vulvar cancers, and 60% of penile cancers (WHO, 2021).

Human papillomavirus infection is now a global concern. According to the HPV Information Centre, more than half a million cancers, including cervical, vulvar, anal, penile, and oropharyngeal cancer, and over 250,000 deaths are attributed annually to HPV infection (Stelzle et al., 2021). Three HPV vaccines, namely: 9-valent HPV vaccine (Gardasil 9, 9vHPV), quadrivalent HPV vaccine (Gardasil, 4vHPV), and bivalent HPV vaccine (Cervarix, 2vHPV), have been licensed by the United States Food and Drug Administration (FDA). All three HPV vaccines protect against HPV types 16 and 18 that cause most HPV cancers. Africa carries a heavy burden of HPV related diseases. Cervical cancer remains one of the major causes of morbidity and mortality from cancer in women. Cervical cancer rates (incidence and mortality) in sub-Saharan Africa are among the highest globally, due to high HPV infection prevalence, poor access to screening services, low vaccination coverage, and poor health care infrastructure. Though they account for a small proportion of the world's population, recent estimates suggest that Africa bears about 20% of the world's burden of cervical cancer. Most cervical cancers on the continent are caused by a persistent infection with high-risk HPV types, especially HPV-16 and HPV-18 (Bruni et al., 2023). In Nigeria, only Cervarix and Gardasil are available for the prevention of cervical cancer (Rabiu et al., 2020). The World Health Organization (WHO) estimates that at least one-third of all HPV-related cancers in Africa could be prevented with vaccination (Gallagher et al., 2017). In 2016, the WHO identified HPV vaccines as a public health priority that should be included in national immunization programs (Ezeanochie & Olasimbo, 2020).

Cervical cancer, a major consequence of persistent HPV infection, is the third most common cancer in women worldwide and has claimed around 311,000 women's lives in 2018 (Khatiwada et al., 2021). The majority of these deaths took place in low- and middle-income countries (LMICs). In LMICs, where cervical cancer screening coverage is low, the HPV vaccine is a promising tool for preventing HPV infections and, thus, averting cervical cancer cases (Khatiwada et al., 2021). In Nigeria, a developing nation, cervical cancer ranks as the second most frequent cancer among women between 15 and 44 years of age. A recent systematic review reported a 90% reduction in the prevalence of HPV infections after 10 years of administration of the HPV vaccines in an organized immunization program (Ezeanochie & Olasimbo, 2020). Increased knowledge, acceptance, and uptake of HPV vaccines in both males and females may significantly reduce the transmission of HPV infection and the burden of HPV related cancers. Vaccination against HPV is most effective when given before exposure to the virus, but vaccination can still be beneficial for those who weren't vaccinated as a child or adolescent. CDC and the Advisory Committee on Immunization Practices (ACIP) recommend catch-up HPV vaccination for all persons through age 26 years who were not previously adequately vaccinated(CDC, 2024; Meites et al., 2019). So, university students aged 20–26 years who have not received the HPV vaccine from their parents are mature enough to make an informed decision about their health and can opt for the HPV vaccine to reduce their risk

of future HPV infection and HPV-related cancers (Meites et al., 2019).

Acceptance of childhood vaccination by parents is critical. Although HPV vaccination is acceptable to most people surveyed, most acceptability data have emanated from North America and Europe, which may not be applicable elsewhere (Rabiu et al., 2020). A study conducted in 2020 about HPV knowledge and vaccine acceptability among European adolescents and their parents concluded that since HPV knowledge and vaccine acceptability were still modest and varied widely between studies across European Union (EU) countries, coordinated efforts should be made to provide the relevant population with information to allow informed decision-making on HPV vaccination (López et al., 2020). A pilot study conducted in the United States on the knowledge and acceptability of HPV vaccination among parents and adolescents suggested that increased knowledge about HPV influences vaccine acceptance (Allison et al., 2020). Data are scarce regarding the acceptance of HPV vaccination in developing countries (Rabiu et al., 2020). According to another study on willingness-to-pay for HPV Vaccines among women, demand for the HPV vaccine was high, although short of the estimated Cost per Vaccinated Girl (CVG). High demand for the vaccine should be capitalized upon to increase vaccine uptake. Education on cervical cancer and provider-initiated vaccination should be promoted to increase vaccine uptake. The study also suggested that co-payment could be a feasible financing strategy in the event of national HPV vaccination (Umeh et al., 2016).

Few studies in the country have assessed undergraduate students. The undergraduate students who are 18 years and above are considered by Nigerian law to be old enough to make certain decisions concerning their health or advise their parents appropriately if they have enough knowledge of HPV and its vaccination. Undergraduate students are mostly young adults, a group more likely to be sexually active and thus at higher risk of exposure to human papillomavirus (HPV) infection. Pharmacy students in particular are future healthcare professionals who will have important roles in health promotion, disease prevention, patient education, and advocacy for vaccination, including HPV vaccination. Their knowledge and attitudes may have an important impact on future public acceptance and uptake of the vaccine. Therefore, it is important to assess the level of knowledge, acceptance, and uptake of HPV vaccines among pharmacy students to identify the gaps in awareness and vaccination practices and to develop appropriate evidence-based interventions that can improve their health outcomes and contribute to the reduction of HPV-related diseases in the general population. This study, therefore, assessed the knowledge, acceptance, and use of HPV vaccines among undergraduate students of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka. The study assessed the level of knowledge, acceptance, and use of HPV vaccines among undergraduate pharmacy students by assessing the level of knowledge of HPV infection among the students, ascertaining the knowledge of cervical cancer and HPV vaccines, and the level of acceptance of HPV vaccines and the number of students who have taken and completed the vaccination against HPV infections.

Methods

Study area and setting:

The study was carried out at the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Anambra State, Nigeria. The

faculty is located at Agulu. Agulu is a suburban town located in the Anaocha Local Government Area in Anambra State, Nigeria. It had an estimated population of 79,021 as of 2017, based on the 2006 Nigerian census. Agulu town is popularly known for its lake (Agulu Lake).

Study design

This work is a cross-sectional descriptive study that utilized a self-administered questionnaire to establish the knowledge of HPV, acceptance, and use of HPV vaccines among the undergraduate students of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka.

Study population

This study was carried out among undergraduate students (excluding the 100L students) of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka, Nigeria.

Sample size calculation

Yamane's (1967:886) formula was used to calculate the sample size. This formula is shown below.

$n = N \div [1 + N (e)^2]$.

n = sample size

e = margin of error (0.05)

Yamane's (1967) formula for finite populations was used to calculate the sample size with a 5% margin of error. According to class registers from 2023, there were 612 undergraduate students enrolled in the Faculty of Pharmaceutical Sciences at Nnamdi Azikiwe University in Awka. There were 139 students in the 200 level, 136 in the 300 level, 170 in the 400 level, and 167 in the 500 level. The sample size of 241 respondents was determined by entering these numbers into the formula.

An overage of 5% of the sample size was added; hence, the sample size was 253 participants.

Sampling technique

Proportionate calculation was used to determine the number of students for each class for the random sampling. The sample size was divided across the several study levels using a proportionate stratified sampling procedure. There were 58 participants at the 200-level, 56 at the 300-level, 70 at the 400-level, and 69 at the 500-level based on the ratio of each class population to the overall population (612) multiplied by the computed sample size (253). This made sure that every class had an equal representation in the study based on the size of its population.

Eligibility criteria

Inclusion criteria

All 200 Level-500 Level undergraduate students of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka, who gave their informed consent to participate in the study.

Exclusion criteria

The 100L pharmacy students, because they are still in Awka Campus for their preliminary studies, and students who were used for the pilot study were excluded to prevent bias.

Study Instrument and Validation

An adapted and validated self-administered questionnaire was used for the study (Matranga *et al* .2019). The questionnaire was modified based on the objectives of this work to suit the purpose of the study. The questionnaire was English-based and subjected to face validation by three lecturers in the faculty to check for clarity and comprehension of questions. The survey instrument covered questions on knowledge,

acceptance, and use of HPV. The self-administered questionnaire collected information under four cluster headings. The first included the general information data (including age, gender, level of study, and Religion), the second cluster was about the knowledge of HPV, the third cluster was about HPV vaccination knowledge, and the fourth cluster comprised the acceptance and use of HPV vaccines. The questionnaire was pilot tested among 20 100-level students of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka. This was done to ascertain the level of comprehension of the questions by the participants. The findings from their responses were used to modify the instrument to enhance clarity.

Ethical consideration

Before commencement of the study, ethical approval for the study protocol was obtained from the Research and Ethical Committee of Nnamdi Azikiwe University Teaching Hospital, Nnewi, and the reference number is NAUTH/CS/66/VOL.16/VER.3/293/2023/169. Informed consent was obtained orally from all participants before the administration of questionnaires. The participant's name or any means of identification were not in the questionnaire to ensure confidentiality.

Data collection

The questionnaire for the study was directly administered and collected by hand immediately after the participants had provided the necessary information.

Study duration

The study lasted for three months, from May to August, 2023.

Data analysis

All data in the questionnaire were first entered into Microsoft Excel and then transferred to the Statistical Package for the Social Sciences (SPSS) version 26 for statistical analysis. In the statistical analysis, frequency tables and percentages were generated to describe categorical data. Chi-square was used to determine the association between categorical variables, with a p-value <0.05 as statistically significant.

Results

All 253 eligible undergraduate students of the Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka, filled out and returned their questionnaires. The demographic findings showed almost an equal number of males to females (126:127), with the 400-level having the greatest number of participants, 70 (27.7%). The age range with the highest frequency of 195 (77.1%) is 21-25 years. All participants were Christians, as shown in Table 1. The level of knowledge of HPV and the HPV vaccine amongst the undergraduate students (200L-500L) showed that the majority of the participants (85.3%) had heard of HPV infection, while 56.1% of them considered HPV infection to be related to cervical cancer. However, half of the participants were not aware of the role of HPV infection in other HPV-related cancers. More than half (62.5%) of the participants thought that it is only women who can get an HPV infection. Also, 189 (74.7%) had heard about the HPV vaccine; only 93 (36.8%) knew that both boys and girls could be vaccinated, and none of the participants had received the HPV vaccine. Other findings are shown in Tables 2, 3, and 4

Table 1: Sociodemographic Variables of the Study Participants

Variables	**Levels/ Frequencies and Percentages**				**TOTAL**
	200 L	300 L	400 L	500 L	
GENDER					
Male	30(51.7%)	30 (53.6%)	34 (48.6%)	32 (46.4%)	126
Female	28 (48.3%)	26 (46.4%)	36 (51.4%)	37 (53.6%)	127
AGE IN YEARS					
(≤20)	11(19%)	12 (22.9%)	0	0	23
(21-25)	41 (70.7%)	29 (50.8%)	64 (91.4%)	61 (88.4%)	195
(26-30)	6 (10.3%)	15 (26.3%)	6 (8.6%)	8 (11.6%)	35
RELIGION					
Christian	58 (100%)	56 (100%)	70 (100%)	69 (100%)	253
Muslim	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0
African Traditional Religion (ART)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0

Table 2: Participants' Knowledge of HPV

Variables	**200 L**	**300 L**	**400 L**	**500 L**	**Total**
(1) Have You Heard of Human Papillomavirus (HPV)?					
(Yes)	28 (48.3%)	52 (87.5%)	68 (97.2%)	68 (98.6%)	216
(No)	16 (27.6%)	3 (5.36%)	2 (2.8%)	1 (1.45%)	22
(I Don't Know)	14 (24.1%)	1 (1.8%)	0	0	15
(2) HPV is Dangerous					
(Correct)	27 (46.6%)	51 (91.1%)	70 (100%)	68 (98.6%)	216
(Incorrect)	13 (22.4%)	0	0	0	13
(I Don't Know)	18 (31%)	5 (8.9%)	0	1 (1.4%)	24
(3) HPV Causes Cervical Cancer					
(Correct)	16 (27.6%)	30 (52.4%)	46 (65.7%)	50 (72.5%)	142
(Incorrect)	16 (27.6%)	1 (1.8%)	0	2 (2.9%)	19
(I Don't Know)	26 (44.8%)	25 (44.7%)	24 (34.3%)	17 (24.6%)	92
(4) HPV Causes Oropharyngeal Cancer					
(Correct)	11 (19%)	19(34%)	17 (24.3%)	18 (26.1%)	65
(Incorrect)	11 (19%)	3 (5.4%)	17 (24.3%)	21 (30.4%)	52
(I Don't Know)	36 (62%)	34 (60.6%)	36 (51.4%)	30 (43.5%)	136
(5) HPV does not Cause Penile Cancer					
(Correct)	11 (19%)	10 (17.9%)	19 (27.1%)	21 (30.5%)	61
(Incorrect)	13 (22.4%)	18 (32.2%)	18 (25.7%)	19 (23.5%)	68
(I Don't Know)	34 (58.6%)	28 (49.9%)	33 (47.2)	29 (42%)	139
(6) HPV Infection is Symptomatic					
(Correct)	11 (19%)	18 (32.1%)	15 (21.4%)	25 (36.2%)	69
(Incorrect)	16 (27.6%)	19 (33.9%)	28 (40%)	29 (42%)	92

(I Don't Know)	31 (53.4%)	19 (33.9%)	27 (38.6%)	15 (21.8%)	92
(7) Human Papillomavirus Infection is not a Sexually Transmitted Disease (STD)					
(Correct)	8 (13.8%)	6 (10.7%)	15 (21.4%)	10 (14.5%)	39
(Incorrect)	23 (39.7%)	40 (71.4%)	48 (68.6%)	53 (76.8%)	164
(I Don't Know)	27 (46.5%)	10 (17.8%)	7 (9.8%)	6 (8.7%)	50
(8) Only Women Can Get HPV					
(Correct)	9 (15.6%)	6(10.8%)	10 (14.3%)	11(15%)	36
(Incorrect)	24 (41.4%)	34 (60.7%)	49(69.9%)	51(73.9%)	158
(I Don't Know)	25(43.1%)	16(28.5%)	11(15.7%)	7(10.1%)	59
(9) Human Papillomavirus and Human Immunodeficiency Virus (HIV) are the Same					
(Correct)	1 (1.7%)	3(5.4%)	1 (1.4%)	1 (1.4%)	6
(Incorrect)	27 (46.6%)	47(83.8%)	64 (92.3%)	65 (94.2%)	203
(I Don't Know)	30 (51.7%)	6(10.7%)	5(7.2%)	3(4.3%)	44
(10) The Probability of Contracting HPV Infection is not High					
(Correct)	6 (10.3%)	8 (14.3%)	9 (12.8%)	12 (17.4%)	35
(Incorrect)	22 (37.9%)	33 (58.9%)	44 (62.8%)	44 (63.8%)	143
(I Don't Know)	30 (51.8%)	15 (26.8%)	17 (24.3%)	13 (18.8%)	75

Table 3: Participants' Knowledge of HPV Vaccination

	Levels/ frequencies and percentages n (%)				
Variables	**200 L**	**300 L**	**400 L**	**500 L**	**Total**
(11) Have You Ever Heard About Vaccination and Prevention Against HPV Infection?					
(Yes)	41 (70.69%)	34 (60.7%)	58(82.9%)	56 (81.2%)	189
(No)	17 (29.31%)	20 (35.6%)	10(14.3%)	12 (17.4%)	59
(I Don't Know)	0	2 (3.7%)	2 (2.8%)	1 (1.4%)	5
(12) Have You Seen Any HPV Vaccine Before?					
(Yes)	3 (5.2%)	4 (7.2%)	2 (2.8%)	5 (7.2%)	14
(No)	55 (94.8%)	51 (91%)	66(94.3%)	63 (91.3%)	235
(I Don't Know)	0	1 (1.8%)	2 (2.9%)	1 (1.5%)	4
(13) Human Papillomavirus Vaccines are Available for the Nigerian Population					
(Correct)	25 (43.2%)	19 (34%)	30(42.8%)	33 (47.9%)	107
(Incorrect)	7 (12%)	7 (12.5%)	6 (8.6%)	4 (5.85%)	24
(I Don't Know)	26 (44.8%)	30 (53.6%)	34(48.6%)	32 (46.4%)	122
(14) The HPV Vaccination is Recommended Only for Women and Girls					
(Correct)	8 (13.8%)	7 (5.45)	20 (28.6%)	16 (23.2%)	51
(Incorrect)	13 (22.4%)	26 (30.4%)	20 (28.6%)	34 (49.3%)	93
(I Don't Know)	37 (63.8%)	23 (41.1%)	30 (42.8%)	19 (28.5%)	109
(15)Do You Know By Whom and Where You Could Be Vaccinated?					
(Yes)	7 (12%)	15 (26.8%)	14 (20%)	17 (24.7%)	53
(No)	27 (46.5%)	26 (46.4%)	38 (54.3%)	33 (47.9%)	124
(I Don't Know)	24 (41.4%)	15 (26.8%)	18 (25.8%)	19 (27.5%)	76

(16) Human Papillomavirus Vaccines Have Side Effects					
(Correct)	0 (0%)	14 (25%)	22 (29.6%)	23 (33.5%)	59
(Incorrect)	4 (6.9%)	2 (3.6%)	0 (0%)	0 (0%)	6
(I Don't Know)	54 (93.1%)	40 (71.5%)	48 (68.5%)	46 (66.7%)	188
(17) One Can Still Contract a Disease Even If You Are Vaccinated Against It					
(Correct)	10 (17.2%)	14 (24.9%)	18 (25.8%)	17 (24.7%)	59
(Incorrect)	26 (44.9%)	19 (34%)	26 (37.2%)	31 (45%)	102
(I Don't Know)	22 (37.9%)	23 (41.1%)	26 (37.2%)	21 (30.4%)	92
(18) Human Papillomavirus Vaccination is Effective Even After Contracting Infection or Having Been in Contact with A Contagious Case					
(Correct)	14 (24.1%)	11 (19.7%)	19 (27.2%)	21 (30.4%)	65
(Incorrect)	17 (29.3%)	11 (19.7%)	20 (28.6%)	20 (28.9%)	68
(I Don't Know)	27 (46.5%)	34 (60.8%)	31 (44.2%)	28 (40.6%)	120
(19) Do You Know Anyone Who Has Had the HPV Vaccination?					
(Yes)	0	1 (1.7%)	11 (15.7%)	6 (8.8%)	18
(No)	47(81.1%)	48 (85.8%)	45 (64.3%)	53 (76.7%)	193
(I Don't Know)	11 (18.9%)	7 (12.5%)	14 (20%)	10 (14.5%)	42

Table 4: Participants' Human Papillomavirus (HPV) Vaccine Acceptance and Use

	Levels/ frequencies and percentages n (%)				
Variables	**200 L**	**300 L**	**400 L**	**500 L**	**TOTAL**
(20) Has a Healthcare Provider or Anyone Ever Recommended That You Obtain the HPV Vaccination?					
(Yes)	14 (24.1%)	11 (19.6%)	14 (20%)	16 (23.2%)	55
(No)	43 (87.93%)	43 (76.8%)	54 (77.1%)	50 (72.5%)	190
(I Don't Know)	1 (1.72%)	2 (3.6%)	2(2.8%)	3 (4.3%)	8
(21) Have You Received the HPV Vaccine?					
(Yes)	0	0	0	0	0
(No)	46 (79.3%)	53 (94.6%)	67 (95.6%)	66 (95.7%)	232
(I Don't Know)	12 (20.7%)	3 (5.3%)	3 (4.3%)	3 (4.3%)	21
(22) If (Yes) To the Question Above (21), Did You Take The Complete Dose of The Vaccine?					
(Yes)	0	0	0	0	0
(No)	0	0	0	0	0
(I Don't Know)	0	0	0	0	0
(23) If (No) To Question 21, Would You Be Willing to Get Vaccinated Against HPV?					
(Yes)	20 (34.5%)	38 (67.9%)	44 (62.9%)	50 (72.5%)	152
(No)	5 (8.6%)	13 (23.2%)	16(22.9%)	11 (15.9%)	45
(I Don't Know)	33 (56.9%)	5 (8.9%)	10 (14.2%)	8 (11.6%)	56

Relationship between demographic variables and knowledge of human papillomavirus

In this section, a score of 1 was awarded to correct answers, and 0 to wrong answers. A maximum score of 12 was obtained; the cumulative scores for participants were further graded into 0-6 (poor knowledge), 7-9(fair knowledge), and 10-12(Good knowledge).

The analysis revealed that there was a statistically significant association between participants' level of study and gender with their knowledge of human papillomavirus (HPV), as both variables had p-values less than 0.05 ($p < 0.05$), indicating that the differences observed were unlikely due to chance. However, no statistically significant relationship was found between age and knowledge of HPV, as the p-value was greater than 0.05 ($p > 0.05$), suggesting that age did not meaningfully influence the level of HPV knowledge among the participants.

Table 5: Relationship between Demographic Variables and Knowledge of Human Papillomavirus

AGE IN YEARS	**Poor-Knowledge (n%)**	**Fair-Knowledge (n%)**	**Good-Knowledge (n%)**	**P-value**
≤20	25(9.89%)	20(7.90%)	20(7.91%)	0.586
21-25	38(15.19%)	60(23.71%)	30(11.86%)	
26-30	18(7.11%)	32(12.65%)	10(3.95%)	
Total	81(32.01%)	112(44.27%)	60(23.71%)	
Gender				
Female	46(18.18%)	81(32.02%))	14 (5.53%)	**0.03**
Male	33(13.04%)	68(26.88%))	11 (4.34%)	
Total	79(31.22%)	149(58.90%))	25(9.88%)	
Study Level				
200	35(13.83%)	25 (9.88%)	0 (0%)	**0.000**
300	13(5.14%)	35 (13.84%)	17(6.72%)	
400	20(7.91%)	46 (18.18%)	0 (0%)	
500	11(4.34%)	43 (16.10%)	8(3.16%)	
TOTAL	79(31.22%)	149(58.90%)	25(9.88%)	

Table 6: Relationship between Demographic Variables and Knowledge of Human Papillomavirus Vaccination

Demographic Variables	**Knowledge Scores**			
Age In Years	**Poor Knowledge (n/%)**	**Fair Knowledge(n/%)**	**Good Knowledge (n/%)**	**P-value**
≤20	25(9.88%)	20(7.91%)	20(7.91%)	0.265
21-25	38(15.02%)	60(23.71%)	30(11.86%)	
26-30	18(7.11%)	32(12.65%)	10(3.95%)	
Total	81(32.01%)	112(44.27%)	60(23.71%)	
Gender				
Female	11(4.35%)	126(49.80%)	0	0.03
Male	14(5.53%)	102(40.32%)	0	
Total	25(9.88%)	228 (90.12%)	0	
Study Level				
200	80(31.62%)	3(1.19%)	0	0.000
300	50(19.76%)	5(1.98%)	0	
400	60(23.71%)	5(1.98%)	0	
500	37(14.62%)	12(4.74%)	0	
Total	227(89.72%)	26(10.28%)	0	

Table 7: Relationship between Demographic Variables and Human Papillomavirus Vaccine Acceptance and Use

Demographics	**Acceptance**			
Age In Years	**Poor Acceptance (n/%)**	**Fair Acceptance (n/%)**	**Good Acceptance (n/%)**	**P-value**
0≤20	27(10.67)	14(5.53)	35(13.83)	0.001
21-25	25(9.88)	30(11.86)	60(23.71)	
26-30	10(3.95)	6(2.37)	40(15.81)	
Total	68(26.88)	50(19.76)	135(53.40)	
Gender				
Female	18 (7.11)	16 (6.32)	93 (36.76)	0.002
Male	16 (6.32)	61 (24.11)	49 (19.37)	
Total	34 (13.44)	77 (30.43)	142 (56.13)	
Study Level				
200	5 (1.98)	33 (13.04)	20 (7.91)	0.001
300	13 (5.14)	5 (1.98)	38 (15.01)	
400	16 (6.32)	10 (3.95)	44 (17.39)	
500	11 (4.34)	8 (3.16)	50 (19.76)	
Total	45 (17.78)	56 (22.13)	152 (60.08)	

Discussion

From the results, the degree of awareness of HPV among undergraduate students is fair, as 58.90% had a fair knowledge of it and 9.88% had a good knowledge of it. This finding is similar to a recent study done in Jordan where more than half of the clinical dental students had heard of HPV infection (Sallam et al., 2019). The findings from this research showed that females had better knowledge of HPV infection, as more female participants had a fair and good knowledge of the infection compared to the males, which is similar to the study carried out amongst undergraduate female health sciences students in Fujian, China (Lin et al., 2019). This could be a result of awareness campaigns on cervical cancer screening targeted towards females. The high level of knowledge among the participants in higher levels could be a result of the lecture curriculum, which has been broadened to include public health problems. Similar findings of improved knowledge of HPV with higher levels were also reported in similar studies (Poelman et al., 2017).

Another study by Khatiwada (2021) on the knowledge and awareness of HPV amongst medical students revealed that more than half of the participants claimed that HPV is the leading cause of cervical cancer, therefore indicating that the participants are knowledgeable about cervical cancer. This could be as a result of medical students having more exposure to the topic of cervical cancer as a result of public health campaigns and other educational materials. This finding is similar to the findings in this research, as more than half (56.1%) agreed that HPV causes cervical cancer. The same study by Khatiwada (2021) revealed that there was a lack of information about other HPV – related diseases and even more about those affecting males, as only about one-third of the participants knew the correct answer. Poor awareness of these cancers may explain the poor knowledge recorded in the study, and this is contrary to the findings of this research, as 62.5% knew that HPV affects males as well.

Furthermore, more than half of the students have some understanding of HPV transmission, as over 60% pointed out that HPV is transmitted sexually, in correlation with the findings among medical students in Indonesia, where 366 (85%) out of 430 participants stated that HPV is a Sexually Transmitted Infection (STI) (Khatiwada et al., 2021). It suggests that the participants are likely to have some basic knowledge of the virus and its transmission because the topic, among others, is covered in biology and health-related subjects. The female participants had higher knowledge levels of HPV infection and its vaccination, which is consistent with the study done in the United States of America amongst College students (Jin et al., 2023).

In this study, the pharmacy students had a fair knowledge of cervical cancer and HPV, but were less informed about the available HPV vaccines. Only a small percentage of the participants knew about the availability of the vaccines in Nigeria. This finding is similar to the results of a previous study that reported a low level of knowledge about HPV vaccination among university students in Lagos (Makwe et al., 2012), but contrasts with a study which reported higher knowledge of HPV vaccines among the participants in the United Kingdom, the United States, and Australia (Marlow et al., 2013). The majority of the students stated that lectures were the main source of information about HPV and its vaccination in Nigeria, followed by the internet. This is not surprising as they were exposed to these topics in the course of their studies, and the internet is now readily accessible to the students.

Despite the poor knowledge of the HPV vaccines among the study participants, the vaccine acceptance rate was above average at 60.1%, which is almost the same as that obtained in a study in Lagos, where 60% of female university students were willing to receive the HPV vaccine (Makwe et al., 2012). A study conducted among Mozambican adolescent girls in 2017 showed that 91% (1,025 out of 1,130 participants) were willing to be vaccinated if HPV vaccines were available in Mozambique (Doshi et al., 2015). In Malaysia, the vaccine acceptance rate was as high as 83.8% (Rajiah et al., 2015). The high acceptance rate of HPV vaccines amongst undergraduate pharmacy students could be a result of the basic education given to the participants about the HPV vaccines. None of the participants in this study had received the HPV vaccines, which is almost similar to a study done in Lebanon on female college students, where 16.7% of 215 participants had been vaccinated with the HPV vaccine before starting the survey (Dany et al., 2015). This could be as a result of the high cost of the vaccine, which is probably beyond the affordability of most of the middle-income families.

It is critical to note that the goal of HPV vaccination programs is the eradication of HPV – related diseases, not just cervical cancer. To this aim, establishing a gender-neutral vaccination program would therefore be important. The majority of the participants in this study did not know that the vaccines are for both genders, although they have heard of it. Only a small fraction knew that the vaccines were available in Nigeria, and also have had the vaccines recommended by a healthcare professional. These findings are similar to the study done in India amongst healthcare providers, where more than half of the participants did not recommend HPV vaccination or did not know anything about it and were not contributing to cervical cancer prevention through HPV vaccination (Chawla et al., 2025). This calls for proper training and sensitization of the healthcare professionals about their role in ensuring dissemination of information about HPV and optimal vaccination against HPV-related diseases

Some limitations were encountered in this study. Participant-reported response is subjective and may have given incorrect responses. Also, the study was limited to one University in Nigeria; therefore, it is difficult to generalize the findings. However, the study was done with a diverse group of participants (both genders and different levels) to increase the reliability of the findings. Despite these limitations, this is the first study to shed light on knowledge of HPV, acceptance of, and use of HPV vaccines amongst undergraduate Pharmacy students in Southeastern Nigeria. The timeliness of this study makes the findings useful for HPV vaccination planning in Nigeria.

It is also important for healthcare professionals and teachers to develop and disseminate educational messages about the HPV vaccines and organize vaccine awareness programs at the University and school levels, along with awareness programs to reach dropout students in the community, since they are highly trusted by the general public and students. The academic curriculum could be improved to include HPV and cervical cancer preventive measures. Moreover, the internet, which is commonly used by young adults for leisure and entertainment, can be used effectively to disseminate credible information about HPV, cervical cancer, and HPV vaccines in Nigeria.

This study also emphasizes the need to implement actions to provide the relevant population with information, including the possible impact of HPV in males, and

therefore empower them to make informed decisions. As the vaccines have been incorporated into the National Immunization Program (NIP) to ensure that the program covers all participants, awareness-raising campaigns are crucial (Aldaba et al., 2024). The willingness to receive HPV vaccination varies in different regions of the world. Proper education of health professionals to inform patients and the general public about HPV vaccination is another way of ensuring effective HPV vaccination.

Conclusion

The study revealed that undergraduate pharmacy students have a fair knowledge about cervical cancer and HPV but are not well-informed about the HPV vaccines. Although their knowledge about the vaccines is limited, the students are enthusiastic about receiving the vaccines. This study proved that there was a significant influence of gender and study levels on the knowledge of HPV infection, its vaccination, and the vaccines' acceptance and use. It is important to note that the students are not experts in the field and their knowledge is limited. Therefore, more efforts should be made to educate them about HPV and the available vaccines.

Recommendation

This study should be carried out among undergraduates in different fields in other states in Nigeria to know if they have similar findings, which will help to inform policymakers' decisions and achieve a high vaccine coverage rate (VCR). The internet can be widely mobilized to raise awareness about HPV vaccination in Nigeria, along with the active engagement of healthcare professionals who have been properly educated, because the use of the vaccine will depend on how knowledgeable and willing they are to inform the public. It is also important to involve religious leaders, Ministry of Health representatives, health organization representatives, and healthcare professionals in the organization of vaccination awareness programs to ensure that accurate information is disseminated to the general public.

Conflict of interest

The authors declare no conflict of interest.

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