Original Article

Knowledge and Uptake of Human Papilloma Virus Vaccine among Female Undergraduate Students in North-Central, Nigeria: A Cross-Sectional Study

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Received: 27 October 2024 **Revised:** 25 March 2025 **Accepted:** 25 March 2025

Abstract

Background: Human Papilloma Virus (HPV) vaccine is the most effective measure against HPV infection. Therefore, the study aimed at assessing knowledge and uptake of HPV vaccine among female undergraduates in North-Central, Nigeria.

Methods: A cross-sectional research design was conducted from March-April 2023 among female undergraduate students and a convenience sampling technique was used to select 380 respondents for the study. A self-administered questionnaire was used for data collection. Data analysis was done using SPSS version 26. Chi-square test was used to test the association between sociodemographic variables, knowledge, and uptake of HPV vaccine. Prediction of uptake of HPV vaccine according to sociodemographic variables and knowledge was done using binary logistic regression test. P-value less than 0.05 was considered statistically significant.

Results: Most of the respondents were between 20 and 25 years and were sexually inactive. The results shows that most of the respondents (68.2%) had low knowledge, and only 15% had received the HPV vaccine; of them, 7.6% had completed the doses of the HPV vaccine. Age 20-25 years (β=0.865, P=0.003), 3rd year (β=0.520, P<0.001) and 4th year (β=0.005, P<0.001) of study, sexual activity (β=0.545, P<0.001), multiple sexual partners as 3-4 partners (β=2.454, P<0.001) and 5-6 partners (β=0.576, P<0.001), prior STIs history (β=0.545, P=0.035), and low knowledge level (β=0.362, P<0.001) were predictors of HPV vaccine uptake.

Conclusion: Understanding predictor factors of HPV vaccination uptake can help to design better public health interventions to improve HPV vaccine coverage among female undergraduate students in Nigeria.

Keywords: Education, Female, Human Papillomavirus Virus, Knowledge, Vaccination

Please cite this article as: Onasoga OA, Dosumu TO, Folarin AO, Shittu BM. Knowledge and Uptake of Human Papilloma Virus Vaccine among Female Undergraduate Students in North-Central, Nigeria: A Cross-Sectional Study. IJCBNM. 2025;13(2):126-137. doi: 10.30476/ijcbnm.2025.102762.2509.

Introduction

Human Papilloma Virus (HPV) is the most common sexually transmitted infections (STIs), and it is estimated that four out of five sexually active individuals get infected at some point in their lives.[1] HPV is the leading cause of cervical cancer which is the 4th most common cancer among women with 350 000 deaths worldwide.[2-5] The high infection-attributable cancer burden in sub-Saharan Africa was principally driven by HPV-attributable cancer.[6, 7]

In 2019, it was estimated that 620 000 new cancer cases in women and 70 000 new cancer cases in men were caused by HPV globally, with more incidences in developing countries including Nigeria.[6, 7] In Nigeria, cervical cancer is the third most common cancer and the second most common cause of cancer-related deaths among women aged 15 to 44 years. The country recorded 12000 new cases and 8000 deaths from cervical cancer in 2020.[4, 8] The high infection-attributable cancer burden in this region was principally driven by HPV-attributable cancer and lack of access to prevention, screening and treatment programs.[1, 7, 9]

HPV infection is more prevalent in the younger population who are the most implicated in risky sexual behaviors,[9-11] with the highest rate within the age range of 20-30 years which includes many undergraduate students. This is because of the lack of history of vaccination, high level of freedom they have, and their increasing indulgence in impulsive and unprotected sexual activities due to the influence of peers, drugs, and alcohol amongst others.[2, 12] Individuals gain admission to the higher institution at a much younger age of 14-16 years, especially females, making them more vulnerable to increased social pressures in a new environment without parental support and the absence of established personal boundaries. Hence, the focus of the knowledge of HPV infection and vaccine is targeted towards adolescents and young adults.[13, 14]

Furthermore, HPV vaccine has been reported to have an efficacy of almost 98-100% in preventing infection with HPV, consequently reducing the incidence of various HPV-related diseases, including cervical cancer, and improving the quality of life of females.[15, 16] Three HPV vaccine types are being marketed internationally: bivalent, quadrivalent, and nonavalent types.[17] It is recommended in Nigeria that it should be taken before the first sexual debut of an individual; primary prevention occurs through vaccination for girls aged 9-15 years and 2 dose regimens with a 6-month interval between doses.[18-20] The HPV vaccine can still be taken through the age of 15-26 years, and it is called catch-up vaccination; it is a secondary preventive measure that involves cervical screening before vaccination with 3-dose regimens, at first contact, 1 and 6 months.[21-23] Accordingly, many undergraduates fall under the age group of individuals who should have had at least one dose of the HPV vaccine or who are still eligible to receive the vaccine. However, knowledge of HPV and its vaccination among this group is central to its uptake. It is suggested that increased knowledge about HPV vaccination and its uptake will positively boost the health of the general female population by reducing the risk and incidence of HPV-related diseases, especially cervical cancer.[23, 24] Unfortunately, little is known about the knowledge and uptake of HPV vaccine among female undergraduates in North-Central, Nigeria, which prompted us to assess knowledge and uptake of the HPV vaccine among female undergraduates in North-Central, Nigeria.

Materials And Methods

The cross-sectional study was carried out in a federal government-owned institution located in Ilorin, Kwara State, Nigeria, from 6th of March to 14th of April 2023. The university has 15 faculties, a college of health sciences, two institutes, a school of postgraduate studies, and over 60 academic departments. The institution admits students from different parts of Nigeria irrespective of race, and cultural and

religious background. The university has a total population of 48,000 undergraduates, of whom 19,500 are female students.

The inclusion criteria for the study were bona-fide female undergraduate students who were properly registered for the academic session, while those who declined to participate or were absent at the time of the survey were excluded.

The sample size used for this study was calculated using Cochran's formula

$$n = \frac{n_o}{1 + \left[\frac{n_o}{N}\right]};$$

where the required sample size

$$n_o = \frac{z^2 pq}{e^2};$$

'Z' is the standard normal deviation corresponding to the 95% coefficient interval (equivalent to 1.96); 'P' is the prevalence of the attribute being studied and was estimated at 0.535;[25] 'q' is 1-p; 'd' is the margin of error, which was set at 5% (0.05); and 'N' is the total number of the target population (19500). We added a precautionary 10% to the sample size to account for potential loss or non-responses to the questionnaires. Therefore, the sample size was calculated to be 380 students. A convenience sampling technique was used to select the 380 Nigerian female undergraduate students who were willing to participate in the study.

The study measured two outcome variables: HPV knowledge and HPV vaccine uptake. A semi-structured questionnaire was used for data collection. The questionnaire consists of both open-ended and closed-ended questions and was developed by reviewing previous studies on this topic.[2, 11, 12, 23, 24] The instrument contains a total of thirty-one questions with three sections: A, B, and C. Section A contains nine questions on the socio-demographic information of the respondents; Section B contains seventeen questions on knowledge of HPV infection and vaccine with options of 'yes', 'no', and 'not sure; and Section C contains five questions on the level of HPV vaccine uptake with options of 'yes', 'no, and 'not sure'. Correct answers receive one point each, while incorrect and not-so-sure answers receive no points. A 17-point grading system is employed, with scores 0–8 categorized as low knowledge and 9–17 categorized as high knowledge. The face validity of the instrument was assessed by the researchers, experts in nursing research and biostatistics, who ensured that the question items were germane and directly related to the topic. The face validity was ensured through the feedback from colleagues and participants in the initial pilot study, who agreed that the research questions were clearly related to knowledge and uptake of HPV vaccine and were easy to understand. The content validity was also assessed by 4 experts in nursing and midwifery research, 3 obstetrics and gynecology specialists, and 1 biostatistician, who were requested to go through the knowledge and uptake questionnaire and give their validity based on relevancy, clarity, simplicity, and ambiguity of question items. This is to ensure that the tool assesses adequately and accurately what it was designed to assess. In addition, the content validity index (CVI) and content validity ratio (CVR) of the instrument were calculated and verified using Lawshe's table. A CVR of 0.75 and CVI of 0.89 were obtained and considered acceptable. The reliability of the instrument was determined using the test-retest method, which involved the administration of 38 copies of the questionnaires (10% of the sample size) to undergraduate students from a different university with similar characteristics at a two-week interval. The reliability of the instrument was measured using Cronbach's alpha and a Cronbach alpha coefficient of 0.83 was obtained, which confirmed the reliability of the instrument. Before data collection, the purpose of the study was first explained to the participants, and written informed consent from each participant was obtained before questionnaires were administered. The questionnaires were collected on the spot after completion to prevent loss. A total of 380 questionnaires were administered, and all were returned. Thus, the response rate for the study

was 100%.

Data were analyzed using SPSS software (IBM, SPSS Statistics, version 26). Results were presented using descriptive statistics in the form of frequency and inferential statistics in the form of a Chi-square test, and binary logistic regression tests were used to test the association between knowledge, uptake of the HPV vaccine, and sociodemographic variables. A P-value less than 0.05 was considered statistically significant.

Approval to conduct the study was obtained from the University of Ilorin, Faculty of Clinical Sciences Ethical Review Committee with reference number UIL/CHS/FERC/023. Respondents were duly informed about the purpose of the research and the fact that they had a choice to participate or not. They were also assured that the information provided by them would be kept confidential. The collected Information was treated with the utmost confidentiality, and the respondents' anonymity was maintained.

Results

380 (100%) female students participated in the study. 263 (69.2%) the respondents were between 20 and 25 years old, and 283 (74.5%) were sexually inactive. Table 1 shows that majority (273;71.8%) of the respondents stated that HPV was an infection that could be transmitted through vaginal, anal, and oral sex as well as genital contact. 251respondents (66.1%) agreed that the type of cancer highly associated with the HPV infection was cervical cancer. The majority (310;81.6%) opined that HPV infection could be prevented through the HPV vaccine. A small proportion of the respondents (7018.4%) stated that HPV vaccines had the same effect whether the females receive them before or after being infected with HPV.

Of the overall level of knowledge of respondents, 259 (68.2%) had low knowledge and 121 (31.8%) had a high knowledge level.

Table 2 shows that just less than a quarter (57;15%) of the respondents had received the HPV vaccine based on recommendation, of whom a smaller number (29; 7.6%) had completed the doses of the HPV vaccine. Less than half (164; 42.5%) of them had planned to be vaccinated against HPV infection.

Table 1: Knowledge of female undergraduate students regarding Human Papillomavirus infection and its vaccine (N=380)

Variable	Yes N (%)	No N (%)	Not Sure N (%)
HPV[a] is an infection that can be transmitted through vaginal, anal and oral sex as well as genital to genital contact	273 (71.8)	6 (1.6)	101 (26.6)
Only females can be infected with HPV	241 (63.4)	42 (11.1)	97 (25.5)
HPV infection can cause cancer	223 (58.7)	12 (3.2)	145 (38.1)
The type of cancer highly associated with the HPV infection is cervical cancer	251 (66.1)	10 (2.6)	119 (31.3)
In most cases, HPV infected persons do not usually show symptoms	151 (39.7)	38 (10.0)	191 (50.3)
HPV can be transmitted from a carrier to his/her partner only if the carrier shows symptoms	86 (22.6)	181 (47.6)	113 (29.8)
HPV infection causes Herpes	144 (37.9)	21 (5.5)	215 (56.6)
HPV infection can be prevented through HPV vaccine	310 (81.6)	10 (2.6)	60 (15.8)
The HPV vaccine does not protect against all types of HPV infection	114 (30)	82 (21.6)	184 (48.4)
HPV vaccine is best taken before someone ever participates in sexual intercourse	243 (64.0)	27 (7.1)	110 (28.9)
HPV vaccine protect against other sexually transmitted infection	73 (19.3)	150 (39.4)	157 (41.3)
HPV vaccine can only be taken after age of 18 years	72 (19.0)	112 (29.5)	196 (51.5)
HPV vaccines have the same effect whether the female takes it before or after being infected with HPV	70 (18.4)	129 (33.9)	181 (47.7)
There is only one dose of HPV vaccine	35 (9.2)	52 (13.7)	293 (77.1)
There is a time limit in which addition HPV vaccine doses must be given	130 (34.2)	25 (6.5)	225 (59.3)
HPV vaccine is available in Nigeria	241 (63.4)	7 (1.8)	132 (34.8)
Is HPV vaccine part of the routine immunization schedule of Nigeria?	78 (20.5)	137 (36.0)	165 (43.5)

[a]HPV: Human Papilloma Virus

Table 2: Uptake of Human Papillomavirus vaccine among female undergraduate students (N=380)

Variable	Yes N (%)	No N (%)	Not sure N (%)
Have you received HPV[a] Vaccine?	57 (15.0)	288 (75.8)	35 (9.2)
Was it recommended to you?	57 (15.0)	292 (76.8)	31 (8.2)
I have received one dose of the HPV vaccine	28 (7.4)	323 (85.0)	29 (7.6)
I have completed all doses of the HPV vaccine	29 (7.6)	351 (92.4)	0 (0.0)
I plan to get vaccinated against HPV infection	164 (42.5)	114 (31.1)	102 (26.4)

[a]HPV: Human Papilloma Virus

Table 3: Association of socio-demographic variables and knowledge level with Human Papilloma- Virus vaccine uptake (N=380)

Variable	Uptake of HPV[a] Vaccine			P value*
	No N (%)	Yes N (%)	Not sure N (%)	
Age				0.001
<20	57 (20.0)	0 (0.0)	11 (28.9)	
20-25	187 (65.6)	49 (86.0)	27 (71.1)	
25-30	34 (11.9)	5 (8.8)	0 (0.0)	
Above 30	7 (2.5)	3 (5.2)	0 (0.0)	
Year of study				0.001
1st year	5 (1.8)	1 (1.8)	0 (0.0)	
2nd year	23 (8.1)	6 (10.5)	9 (23.7)	
3rd year	61 (21.4)	0 (0.0)	14 (36.8)	
4th year	147 (51.6)	44 (77.2)	10 (26.3)	
5th year	49 (17.1)	6 (10.5)	5 (13.2)	
Marital Status				0.053
Dating	42 (14.7)	15 (26.3)	3 (7.9)	
Married	15 (5.3)	3 (5.3)	0 (0.00)	
Single	228 (80.0)	39 (68.4)	35 (92.1)	
Religion				0.170
Christianity	208 (73.0)	39 (68.4)	34 (89.5)	
Islam	75 (26.3)	18 (31.6)	4 (10.5)	
Traditional	2 (0.7)	0 (0.0)	(0.0)	
Ethnicity				0.156
Hausa	17 (6.0)	4 (7.0)	5 (13.2)	
Igbo	12 (4.2)	0 (0.0)	0 (0.0	
Yoruba	256 (89.8)	53 (93.0)	33 (86.8)	
Have you ever had sex				0.001
No	236 (82.8)	9 (15.8)	38 (100)	
Yes	49 (17.2)	48 (84.2)	0 (0.0)	
Number of sexual partners				0.001
None	247 (86.7)	5 (8.8)	38 (100)	
1-2	35 (12.3)	30 (52.6)	0 (0.0)	
3-4	3 (1.0)	13 (22.8)	0 (0.0)	
5-6	0 (0.0)	9 (15.8)	0 (0.0)	
Have you ever had STIs[b]				0.001
No	275 (96.5)	47 (82.5)	38 (100)	
Yes	10 (3.5)	10 (17.5)	0 (0.0)	
Knowledge				0.034
High	96 (33.7)	25 (43.9)	0 (0.0)	
Low	189 (66.3)	32 (56.1)	38 (100)	

[a]HPV: Human Papilloma Virus; [b]STIs: Sexually transmitted infections; *Chi Square test

Age showed to have a significant association with vaccine uptake (P=0.001). 20-25-year-old participants comprised 187 (65.6%) of non-vaccinated respondents and 49 (86.0%) of vaccinated individuals. No respondents under 20 years of age reported vaccination, despite representing 20.0% of the non-vaccinated group. Year of study demonstrated an association with vaccine uptake (P=0.001). Fourth-year students showed the highest vaccination rate (44;77.2%) of vaccinated individuals compared to their representation in the non-vaccinated group (147; 51.6%). Notably, no third-year students reported vaccination. Sexual experience (P=0.001), number of sexual partners (P=0.001), having STIs (P=0.001), and knowledge level (P=0.034) showed an association with vaccine uptake (Table 3).

Table 4 shows that only age (P=0.016) and religion (P=0.001) had significant associations with knowledge levels. While the 20-25 age group showed similar proportions in both knowledge levels (83;68.6%) high and 180 (69.5%) low), the 25-30 age group showed higher representation in the high-knowledge category in comparison with low knowledge (15.7% vs. 7.7%).

Table 4: Association between socio-demographic variables and knowledge of Human Papillomavirus infection and its vaccine (n=380)

Variable	Knowledge		P value*
	High N (%)	Low N (%)	
Age (years)			0.016
<20	19 (15.7)	49 (18.9)	
20-25	83 (68.6)	180 (69.5)	
25-30	19 (15.7)	20 (7.7)	
Above 30	0 (0.0)	10 (3.9)	
Year of study			0.599
1st Year	3 (2.4)	3 (1.2)	
2nd Year	11 (9.1)	27 (10.4)	
3rd Year	21 (17.4)	54 (20.8)	
4th Year	63 (52.1)	138 (53.3)	
5th Year	23 (19)	37 (14.3)	
Marital Status			0.141
Dating	15 (12.4)	45 (17.4)	
Married	3 (2.5)	15 (5.8)	
Single	103 (85.1)	199 (76.8)	
Religion			0.001
Christianity	104 (86)	177 (68.3)	
Islam	17 (14)	80 (30.9)	
Traditional	0 (0.0)	2 (0.8)	
Ethnicity			0.756
Hausa	8 (6.6)	18 (6.9)	
Igbo	5 (4.1)	7 (2.7)	
Yoruba	108 (89.3)	234 (90.4)	
Have you ever had sex			0.299
No	86 (71.1)	197 (76.1)	
Yes	35 (28.9)	62 (23.9)	
Number of sexual partners			0.390
None	88 (72.7)	202 (78)	
1-2	22 (18.2)	42 (16.2)	
3-4	6 (5)	11 (4.3)	
5-6	5 (4.1)	4 (1.5)	
Have you ever had STIs[a]			0.755
No	114 (94.2)	246 (95)	
Yes	7 (5.8)	13 (5)	

[a]STIs: Sexually Transmitted Infections; *Chi Square test

Table 5: Prediction of Human Papillomavirus vaccine uptake according to socio-demographic characteristics and knowledge using Binary logistic regression

Variable	Beta coefficient	Standard Error	OR[a]	95% Confidence interval for EXP (β)		P value
				Lower	Upper	
Age (years)						
<20	Reference	-	-	-	-	-
20-25	0.865	0.212	8.834	0.001	0.078	0.003
25-30	0.509	0.294	0.162	0.718	3.334	0.687
Above 30	0.729	0.412	1.812	0.120	1.204	0.178
Year of study						
1st Year	Reference	-	-	-	-	-
2nd Year	2.306	1.032	0.021	0.014	2.872	0.886
3rd Year	0.520	0.624	16.490	0.004	0.008	<0.001
4th Year	0.005	0.432	15.890	0.303	0.832	<0.001
Have you ever had sex						
No	Reference	-	-	-	-	-
Yes	0.545	0.508	121.481	0.022	0.584	<0.001
Number of sexual partners						
None	Reference	-	-	-	-	-
1-2	1.878	0.356	2.088	0.604	1.712	0.148
3-4	2.454	1.343	119.630	0.031	0.056	<0.001
5-6	0.576	0.623	9.934	0.021	0.554	<0.001
Have you ever had STI[b]						
No	Reference	-	-	-	-	-
Yes	0.545	0.764	20.283	0.327	0.495	0.035
Knowledge						
High	Reference	-	-	-	-	-
Low	0.362	0.360	9.934	0.130	0.270	<0.001

[a]OR: Odds ratio; [b]STIs: Sexually Transmitted Infections

Notably, all respondents over 30 years fell into the low-knowledge category. Christians showed higher representation in the high-knowledge group (104;86.0%) compared to the low-knowledge group (177;68.3%). Conversely, Muslim respondents comprised a larger proportion of the low-knowledge group (30.9%) compared to the high-knowledge group (14.0%). Other variables, including year of study, marital status, ethnicity, sexual experience, number of sexual partners, and STIs history, showed no significant associations with knowledge levels (Table 4).

Table 5 shows the predictors of HPV vaccine uptake among participants in a logistic regression analysis. Overall, age 20-25 years (β=0.865, P=0.003), 3rd year (β=0.520, P<0.001) and 4th year (β=0.005, P<0.001) of study, sexual activity (β=0.545, P<0.001), multiple sexual partners as 3-4 partners (β=2.454, P<0.001) and 5-6 partners (β=0.576, P<0.001), prior STIs history (β=0.545, P=0.035), and low knowledge level (β=0.362, P<0.001) were predictors of HPV vaccine uptake.

Discussion

The present study investigated the knowledge and uptake of the HPV vaccine among female undergraduate students in North-Central, Nigeria, revealing several significant patterns that both align with and diverge from previous research. This study revealed that the overall knowledge of most of the students about HPV infection and vaccine was low, particularly regarding vaccine dosage, effect, timing, and availability. This finding aligns with previous studies conducted in Lagos State, Nigeria, the University of South Carolina Los Angeles, Ethiopia, and Cameroon, where limited knowledge of HPV infection and vaccine existence was reported.[2, 12, 25, 26] However, it contrasts with the findings from Jimma town

Ethiopia and Los Angeles where moderate to high levels of knowledge were observed.[27, 28]

The study revealed important patterns regarding socio-demographic characteristics and their relationship with HPV vaccination behavior. Our findings indicate that age is a predictor of HPV vaccine uptake, with individuals aged 20-25 years demonstrating a significantly higher likelihood of vaccination compared to those under 20 years. This aligns with the findings of previous studies where young adults in this age range showed greater receptiveness to HPV vaccination,[29, 30] possibly due to increased health awareness and autonomy in healthcare decision-making. However, contrary to some existing literature, our study found no statistically significant association between vaccine uptake and older age groups, 25-30 years and above 30 years. This divergence from the findings of another study which reported higher uptake rates among older age groups in southwestern Nigeria, suggests possible regional variations in HPV vaccine awareness and acceptance across different parts of Nigeria.[31] This study also revealed the predictive role of academic level for HPV vaccine uptake. Specifically, the 3rd-year and 4th-year students demonstrated significantly higher vaccination rates compared to the 1st-year students. This progressive increase in vaccine uptake with academic advancement supports a research study showing that exposure to health education throughout university education positively influences preventive health behaviors.[32] As noted by another study, higher education levels correlate with improved health literacy, which may explain the increased vaccination rates among senior students.[33] This finding underscores the importance of integrating HPV education early in university curricula to enhance vaccine uptake among younger students. This study also demonstrated that sexually active participants were significantly more likely to have received the HPV vaccine compared to those who had never had sex. This finding corroborates a study that reported that sexual experience often correlated with increased risk perception and subsequent preventive health behaviors.[34] Furthermore, the number of sexual partners emerged as a predictor of vaccination, with participants reporting multiple partners, especially more than three partners, showing significantly higher uptake rates. This pattern aligns with previous findings that risk perception increases proportionally with the number of sexual partners, often triggering protective health behaviors such as vaccination.[35] In addition, participants with previous STIs demonstrated significantly higher HPV vaccination rates compared to those without such a history. This finding supports the health belief model as applied by previous study, suggesting that prior experience with STIs increased the perceived susceptibility to HPV and perceived benefits of vaccination.[36] Similarly, another study reported that previous STI diagnosis attending sexual health clinics often served as a "teachable moment," prompting individuals to adopt preventive health measures against future infections.[37]

Interestingly, this study found that individuals with lower knowledge levels about HPV still exhibited significant vaccine uptake. This finding is in contrast with traditional health education models that posit knowledge as a prerequisite for positive health behaviors.[38] Instead, it suggests that factors beyond personal knowledge, such as healthcare provider recommendations, peer influence, or family support, may play crucial roles in vaccination decisions. This aligns with the social ecological model of vaccine acceptance, which emphasizes the impact of social networks and healthcare systems over individual knowledge.[39] The unexpected finding regarding knowledge levels suggests that vaccination campaigns should focus on not only increasing knowledge but also addressing social and structural factors influencing vaccine decisions. Previous studies also emphasized that multi-level interventions that address both individual

factors and broader social determinants may yield more effective results in improving HPV vaccine uptake.[40]

The use of non-probability sampling techniques, as well as the self-reported nature of the study, eliminated the possibility of generalizing the findings of the study. The questionnaire used in this study was self-developed by researchers, and while some of its psychometric characteristics were assessed, its construct validity using exploratory factor analysis was not checked, which is another limitation of the study. Nevertheless, the strength of this study was the original and primary data collected from the female undergraduate in the University of Ilorin, Kwara State, Nigeria. Furthermore, the study has vital importance to community health care providers. Their awareness of the status of knowledge and uptake level of the HPV vaccine among the female students can help them to design measures and programs to educate and encourage young females towards HPV vaccination to improve their quality of life.

Conclusion

This study identified the predictors of HPV vaccine uptake among female undergraduate students in North-Central Nigeria, including the age range of 20-25 years, higher academic levels, sexual activity, multiple sexual partners, and prior STI history. Understanding these factors can inform targeted interventions to improve vaccine coverage in this population. Future research should explore the predictive role of knowledge levels for vaccination behavior and investigate effective strategies to increase uptake among demographic groups with lower vaccination rates.

Acknowledgement

The authors express their gratitude to the management of the University of Ilorin and the participants who granted permission to conduct this study.

Authors' Contribution

OOA and FAO initiated the study idea. OOA, FAO, DTO, and SBM designed the research tool, supervised data collection, and analyzed the data. OOA and SBM wrote the first draft of the manuscript. OOA and DTO supervised the overall work and reviewed the first draft. All the authors have read and approved the final manuscript.

Funding Source

The author (s) did not receive any funding from any public, private, or nonprofit funding organization

Conflict of Interest

None declared.

Declaration on the use of AI

The author of this manuscript declares that, in the writing process of this work, no artificial intelligence (AI) or AI-assisted technologies were used.

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