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Predictors of HPV Vaccine Uptake Among Young Women in Bauchi State, Nigeria: A Cross-Sectional Study

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Abstract

Introduction: Cervical cancer remains a major public health challenge in Nigeria and is among the leading causes of cancer-related morbidity and mortality among women. Persistent infection with high-risk human papillomavirus (HPV) types is the primary cause of cervical cancer, and HPV vaccination is recognized globally as one of the most effective preventive interventions. Despite increasing global efforts to improve HPV vaccine coverage, uptake in many low- and middle-income countries, including Nigeria, remains low. This study aimed to identify predictors of HPV vaccine uptake among young women aged 15–24 years in Bauchi State, Nigeria. **Methods:** A cross-sectional descriptive study was conducted between January and March 2025 among 600 young women recruited from secondary schools, tertiary institutions, and community centers across urban and rural areas of Bauchi State using stratified random sampling. Data were collected using structured interviewer-administered questionnaires assessing sociodemographic characteristics, awareness and knowledge of HPV and cervical cancer, attitudes toward HPV vaccination, parental influence, peer support, and access to healthcare services. Descriptive statistics and multivariable logistic regression analyses were performed using SPSS version 26. **Results:** The mean age of participants was 19.2 ± 3.1 years. Overall HPV vaccine uptake was low, with only 18.0% of respondents reporting receipt of at least one dose. Awareness of HPV infection and cervical cancer was limited, as only 38.0% had heard of HPV and 25.0% knew that HPV causes cervical cancer. Significant predictors of vaccine uptake included higher educational attainment (OR = 2.4, 95% CI: 1.5–3.8), parental support (OR = 3.1, 95% CI: 2.0–4.9), awareness of cervical cancer (OR = 2.0, 95% CI: 1.2–3.3), and access to youth-friendly healthcare services (OR = 2.7, 95% CI: 1.6–4.5). **Conclusion:** HPV vaccine uptake among young women in Bauchi State remains suboptimal. Educational status, parental support, awareness of cervical cancer, and access to youth-friendly services significantly influence vaccine uptake. Comprehensive interventions focusing on health education, parental engagement, improved vaccine accessibility, and culturally appropriate community sensitization are needed to improve HPV vaccination coverage and reduce the burden of cervical cancer in northern Nigeria.

Keywords: HPV vaccine; cervical cancer prevention; vaccine uptake; predictors; Bauchi State; Nigeria; young women.

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Introduction

Cervical cancer remains a major public health challenge globally and is one of the leading causes of cancer-related morbidity and mortality among women in low- and middle-income countries (Bruni et al., 2023). Persistent infection with high-risk human papillomavirus (HPV) types has been identified as the principal cause of cervical cancer, with HPV types 16 and 18 accounting for the majority of cases worldwide (Sung et al., 2021). The introduction of HPV vaccines has significantly transformed cervical cancer prevention strategies because the vaccines are highly effective in preventing infections caused by oncogenic HPV strains when administered before sexual debut (World Health Organization, 2022).

Despite the proven effectiveness of HPV vaccination, uptake remains suboptimal in many African countries, including Nigeria, where awareness, accessibility, affordability, and sociocultural barriers continue to limit vaccine coverage (Ekwunife et al., 2021).

Nigeria bears a substantial burden of cervical cancer, with thousands of new cases and deaths recorded annually, making it one of the most common cancers among women in the country (International Agency for Research on Cancer (IARC), 2023). Studies conducted in different parts of Nigeria have shown that awareness and knowledge of HPV infection and HPV vaccination among young women remain relatively low, particularly in northern regions where educational attainment and healthcare access are often limited (Adejuyigbe et al., 2015; Musa et al., 2017). Cultural beliefs, misconceptions regarding vaccine safety, concerns about infertility, religious considerations, and inadequate health communication have also been identified as barriers to acceptance and uptake of the HPV vaccine (Black et al., 2019; Ezeanochie & Olagbuji, 2014). Parental influence has been reported as a particularly important determinant among adolescents and young women, given that vaccination decisions are often influenced by family perceptions and support systems (Perlman et al., 2014).

Healthcare system factors further contribute to low vaccine uptake in Nigeria. Limited availability of youth-friendly services, inadequate integration of HPV vaccination into routine immunization services, and insufficient awareness campaigns have hindered successful vaccine implementation (Ngabo et al., 2016). In northeastern Nigeria, including Bauchi State, these challenges are compounded by socioeconomic inequalities, lower literacy levels, insecurity, and reduced access to healthcare facilities, particularly in rural communities. Previous studies have demonstrated that women with higher educational attainment and better knowledge of cervical cancer are more likely to accept HPV vaccination and participate in preventive health behaviors (Ekwunife et al., 2021; Marlow et al., 2007). Similarly, supportive parental attitudes and recommendations from healthcare workers have consistently been associated with increased vaccine acceptance (Holman et al., 2014).

Although efforts are ongoing to improve HPV vaccination coverage in Nigeria, there remains limited evidence on the specific predictors of vaccine uptake among young women in Bauchi State. Understanding these predictors is essential for designing culturally appropriate interventions that can improve awareness, strengthen parental engagement, and enhance access to vaccination services. Therefore, this study aimed to identify the predictors of HPV vaccine uptake among young women aged 15–24 years in Bauchi State, Nigeria, in order to provide evidence that can inform policy development and targeted public health interventions.

Methods

Study Design

This study employed a cross-sectional descriptive design to assess predictors of HPV vaccine uptake among young women in Bauchi State, Nigeria.

Study Area

The study was conducted in Bauchi State, located in northeastern Nigeria. Bauchi State has a mix of urban and rural populations and experiences challenges related to healthcare access, educational disparities, and limited preventive health services.

Study Population

The study population comprised young women aged 15–24 years residing in Bauchi State.

Inclusion Criteria

Participants were eligible if they:

- Were aged between 15 and 24 years;
- Resided in Bauchi State during the study period;
- Provided informed consent or assent with parental consent for minors.

Exclusion Criteria

Participants who were critically ill or unable to provide informed responses were excluded.

Sample Size Determination

A sample size of 600 participants was determined using Cochran's formula for cross-sectional studies and adjusted for non-response. Stratified random sampling was used to ensure adequate representation from urban and rural areas.

Sampling Technique

A multistage sampling technique was employed:

1. Urban and rural local government areas were selected.
2. Schools, tertiary institutions, and community centers were identified.

3. Eligible participants were selected using systematic random sampling.

Data Collection Instrument

Data were collected using a structured questionnaire adapted from previously validated instruments used in HPV vaccine studies. The questionnaire contained sections on:

- Sociodemographic characteristics;
- Knowledge of HPV and cervical cancer;
- Awareness and perceptions of HPV vaccination;
- Attitudes toward vaccination;
- Parental and peer influence;
- Healthcare access and service utilization.

The questionnaire was pretested among 30 young women in a neighboring community to ensure clarity and reliability.

Variables

0.9.1 Dependent Variable

The dependent variable was HPV vaccine uptake, defined as receipt of at least one dose of the HPV vaccine.

0.9.2 Independent Variables

Independent variables included:

- Age;
- Educational level;
- Residence;
- Knowledge of HPV;
- Awareness of cervical cancer;
- Parental support;
- Peer influence;
- Access to healthcare services.

Data Analysis

Data were entered and analyzed using SPSS version 26. Descriptive statistics were used to summarize participant characteristics. Frequencies, percentages, means, and standard deviations were calculated.

Bivariate analyses were conducted using chi-square tests to assess associations between independent variables and HPV vaccine uptake. Variables with p-values less than 0.05 were entered into multivariable logistic regression models to identify independent predictors of vaccine uptake. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported.

Ethical Considerations

Ethical approval was obtained from the Bauchi State Ministry of Health Research Ethics Committee. Written informed consent was obtained from participants aged 18 years and above. For participants younger than 18 years, assent and parental consent were obtained. Confidentiality and anonymity were maintained throughout the study.

Results

Sociodemographic Characteristics

A total of 600 young women participated in the study. The mean age of respondents was 19.2 ± 3.1 years. Most participants (65.0%) were students, while 70.0% resided in urban areas.

Table 1: Sociodemographic Characteristics of Participants ($N = 600$)

Variable	Frequency	Percentage (%)
Age Group		
15–19 years	340	56.7
20–24 years	260	43.3
Mean ± SD	19.2 ± 3.1	
Educational Level		
Secondary education or less	280	46.7
Tertiary education	320	53.3
Residence		
Urban residence	420	70.0
Rural residence	180	30.0
Occupation		
Students	390	65.0
Employed/Self-employed	210	35.0

Percentages may not sum exactly to 100 due to rounding.

Knowledge and Awareness of HPV and Cervical Cancer

Only 38.0% of respondents had heard of HPV infection, while 25.0% correctly identified HPV as the cause of cervical cancer. Awareness of the HPV vaccine was reported by 42.0% of participants.

Table 2: Awareness and Knowledge of HPV and Cervical Cancer ($N = 600$)

Variable	Frequency	Percentage (%)
Heard of HPV	228	38.0
Aware HPV causes cervical cancer	150	25.0
Aware of HPV vaccine	252	42.0
Received information from healthcare workers	198	33.0
Received information from social media	174	29.0

Percentages may not sum exactly to 100 due to rounding.

HPV Vaccine Uptake

Overall, 18.0% of respondents reported receiving at least one dose of the HPV vaccine.

Table 3: HPV Vaccine Uptake Among Participants ($N = 600$)

Vaccine Uptake	Frequency	Percentage (%)
Vaccinated	108	18.0
Not vaccinated	492	82.0

Percentages may not sum exactly to 100 due to rounding.

Predictors of HPV Vaccine Uptake

Multivariable logistic regression analysis identified several significant predictors of HPV vaccine uptake.

Table 4: Multivariable Logistic Regression Analysis of Predictors of HPV Vaccine Uptake

Variable	OR	95% CI	*p*-value
Higher educational level	2.4	1.5–3.8	< 0.001
Parental support	3.1	2.0–4.9	< 0.001
Awareness of cervical cancer	2.0	1.2–3.3	0.004
Access to youth-friendly services	2.7	1.6–4.5	< 0.001

OR = Odds Ratio; CI = Confidence Interval.

Participants with higher educational attainment were more than twice as likely to receive the HPV vaccine compared with those with lower educational levels. Parental support emerged as the strongest predictor of uptake.

Discussion

This study assessed predictors of HPV vaccine uptake among young women in Bauchi State, Nigeria, and found that vaccine uptake remains low despite increasing global awareness of cervical cancer prevention. The HPV vaccine uptake rate of 18.0% observed in this study is consistent with findings from several Nigerian and sub-Saharan African studies reporting low vaccination coverage among adolescents and young women (Ekwunife et al., 2021; Perlman et al., 2014). The low uptake may reflect persistent barriers such as poor awareness, financial constraints, vaccine hesitancy, limited healthcare access, and sociocultural misconceptions surrounding vaccination (Black et al., 2019).

Educational level was significantly associated with vaccine uptake in this study. Young women with higher educational attainment were more likely to receive the vaccine, likely due to better health literacy, increased exposure to health information, and improved understanding of preventive healthcare services. Similar findings have been reported in studies conducted in Nigeria and other low- and middle-income countries, where education consistently predicts acceptance of HPV vaccination and cervical cancer screening services (Marlow et al., 2007; Musa et al., 2017). Educated women are generally more likely to seek healthcare information and adopt preventive health behaviors, including immunization.

Parental support emerged as the strongest predictor of vaccine uptake. In many African settings, parents and guardians strongly influence healthcare decisions involving adolescents and young women. Participants who received encouragement and approval from parents were significantly more likely to be vaccinated. This finding is consistent with previous studies demonstrating that parental recommendation and family support are major determinants of HPV vaccine acceptance among adolescents (Ezeanochie & Olagbuji, 2014; Perlman et al., 2014). The finding highlights the importance of involving parents and guardians in HPV vaccination campaigns and educational interventions.

Awareness of cervical cancer was also significantly associated with vaccine uptake. Participants who understood the relationship between HPV infection and cervical cancer demonstrated greater willingness to receive the vaccine. Similar findings have been reported globally, where awareness and knowledge of HPV-related diseases positively influence vaccine acceptance and uptake (Holman et al., 2014; World Health Organization,

2022). This finding underscores the importance of public health education and community sensitization campaigns aimed at improving knowledge about cervical cancer prevention.

Access to youth-friendly healthcare services significantly influenced vaccine uptake. Young women who had access to respectful, confidential, and accessible healthcare services were more likely to utilize preventive health interventions, including HPV vaccination. Previous studies have shown that healthcare provider recommendation and access to adolescent-friendly services are critical factors influencing vaccine uptake among young populations (Holman et al., 2014; Ngabo et al., 2016). Healthcare providers therefore play an essential role in promoting vaccine acceptance through counseling, advocacy, and improved service delivery.

The study findings have important implications for public health policy and cervical cancer prevention programs in Nigeria. Expanding HPV vaccination services, improving awareness campaigns, strengthening school-based vaccination initiatives, and addressing sociocultural misconceptions may substantially improve vaccine uptake and contribute to reducing the burden of cervical cancer among Nigerian women (World Health Organization, 2022).

Conclusion

HPV vaccine uptake among young women in Bauchi State remains low despite the increasing burden of cervical cancer in Nigeria. Educational attainment, parental support, awareness of cervical cancer, and access to youth-friendly healthcare services were significant predictors of vaccine uptake.

Improving HPV vaccination coverage will require multifaceted interventions involving health education, parental engagement, improved healthcare access, school-based vaccination initiatives, and culturally appropriate community mobilization strategies. Strengthening HPV vaccination programs in Bauchi State and similar settings may contribute substantially to reducing cervical cancer incidence and mortality among Nigerian women and support progress toward global cervical cancer elimination goals.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design limits causal interpretation of observed associations between predictor variables and HPV vaccine uptake. Second, vaccination status was self-reported and may therefore be subject to recall bias and social desirability bias. Third, the study was conducted in Bauchi State, and findings may not be fully generalizable to other regions of Nigeria with different sociocultural and healthcare contexts.

Despite these limitations, the study provides valuable insights into determinants of HPV vaccine uptake in a resource-limited setting and contributes to the growing body of evidence on cervical cancer prevention in Nigeria.

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Conflict of Interest Statement

The authors declare no competing financial interests or personal relationships that could have influenced this work.

Implications for Practice and Policy

The findings of this study have several important implications for policymakers, healthcare providers, educators, and community stakeholders. There is a need for sustained public health education campaigns focusing on HPV infection, cervical cancer prevention, and vaccine safety. Educational interventions should target schools, tertiary institutions, religious centers, and community organizations to improve awareness and reduce misinformation.

Programs designed to increase parental awareness and involvement may improve vaccine acceptance among young women. Collaboration with traditional and religious leaders may also help address sociocultural barriers and misconceptions that hinder vaccine uptake in northern Nigeria.

Healthcare facilities should strengthen youth-friendly reproductive health services that ensure confidentiality, respect, and culturally sensitive counseling. Expanding vaccination outreach services to underserved rural communities may also improve accessibility and equity in vaccine distribution.

School-based vaccination programs remain one of the most effective strategies for improving HPV vaccine coverage among adolescents. Integrating HPV education into school curricula may further improve aware-

ness, acceptance, and long-term cervical cancer prevention outcomes.

Authors' Contributions

- YAM AS Designed the study, MGL conducted data analysis, and interpretation of findings.
- SBA and MMS Conducted data collection.
- KUI Drafted and reviewed the manuscript.

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