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Misconceptions Regarding Human Papillomavirus Vaccination Among Female Students of Government Secondary Schools in Enugu Metropolis, Nigeria

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Abstract: **Background:** Despite the proven effectiveness of the Human Papillomavirus (HPV) vaccine in preventing cervical cancer, vaccine acceptance remains low in many low- and middle-income countries. Misconceptions regarding vaccine safety, infertility, and its relationship with sexual activity continue to influence parental decisions and adolescent acceptance, thereby limiting the success of HPV vaccination programmes. **Objective:** This study assessed misconceptions regarding Human Papillomavirus vaccination among female students attending government secondary schools in Enugu Metropolis, Enugu State, Nigeria. **Methods:** A descriptive cross-sectional study was conducted among 204 female students aged 9–14 years selected from three government secondary schools in Enugu Metropolis using a multistage sampling technique. Data were collected using a pretested, structured, self-administered questionnaire covering socio-demographic characteristics and misconceptions regarding HPV vaccination. Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics were used to summarize findings, which are presented as frequencies and percentages. **Results:** The respondents had a mean age of 12.7 ± 1.06 years, with the majority being 13 years old (32.8%), Igbo (97.5%), and Christians (96.6%). Misconceptions regarding HPV vaccination were common. Forty-two (20.6%) respondents believed that HPV vaccination causes infertility, while 45 (22.1%) believed that the vaccine is intended only for sexually active individuals. Another 42 (20.6%) believed that vaccination encourages early sexual activity. Furthermore, only 27.0% considered the vaccine safe, whereas 73.0% believed it was unsafe. Among respondents expressing safety concerns, distrust accounted for 60.0% of the reasons provided, followed by beliefs that the vaccine was harmful (20.0%), caused infertility (10.0%), or appeared dangerous (10.0%). **Conclusion:** Misconceptions regarding HPV vaccination remain widespread among female secondary school students in Enugu Metropolis and constitute an important barrier to vaccine acceptance. Addressing misinformation through school-based health education, parental engagement, healthcare provider communication, and community awareness programmes is essential for improving vaccine confidence and supporting cervical cancer prevention efforts.

Keywords: Human papillomavirus, HPV vaccine, misconceptions, vaccine hesitancy, cervical cancer prevention, adolescents, Nigeria.

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INTRODUCTION

Vaccine hesitancy has become one of the most significant obstacles to successful immunization programmes worldwide. Although vaccines have prevented millions of deaths and substantially reduced the burden of infectious diseases, misinformation and negative public perceptions continue to limit vaccine acceptance in many countries. Human Papillomavirus (HPV) vaccination is no exception, as misconceptions regarding its safety, effectiveness, and long-term health effects remain widespread among adolescents, parents, and even some healthcare providers.

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Human Papillomavirus is a common viral infection transmitted primarily through sexual contact and is recognized as the principal cause of cervical cancer. Persistent infection with high-risk HPV types, particularly HPV-16 and HPV-18, is responsible for the majority of cervical cancer cases globally. Cervical cancer remains an important public health problem, especially in low- and middle-income countries where organized screening programmes and preventive healthcare services are often limited. Despite the availability of highly effective vaccines capable of preventing most HPV-related cancers, the disease continues to cause substantial morbidity and mortality among women.

To address this burden, the World Health Organization (WHO) recommends routine HPV vaccination for girls aged 9–14 years before sexual debut, when the immune response to vaccination is strongest. HPV vaccination forms a central component of the WHO Global Strategy to Accelerate the Elimination of Cervical Cancer, which aims to achieve 90% vaccination coverage among eligible girls by the age of 15 years. However, achieving this target depends not only on vaccine availability but also on public confidence in vaccination.

Evidence from many countries indicates that false beliefs surrounding HPV vaccination remain an important contributor to vaccine hesitancy. Common misconceptions include beliefs that the vaccine causes infertility, encourages early sexual activity, produces serious adverse effects, or is intended only for individuals who are already sexually active. These beliefs are frequently reinforced through misinformation circulating on social media, cultural traditions, religious interpretations, and inadequate health education. Such misconceptions may discourage both parents and adolescents from accepting HPV vaccination, even when the vaccine is offered free of charge.

Studies conducted in Nigeria and other parts of sub-Saharan Africa have consistently identified misinformation and vaccine safety concerns as major barriers to HPV vaccine acceptance. Similar findings have also been reported in Asia and the Middle East, suggesting that misconceptions represent a global challenge rather than one confined to individual countries. Addressing these misconceptions is essential for improving vaccine confidence, increasing vaccination coverage, and achieving long-term cervical cancer prevention goals.

Nigeria incorporated HPV vaccination into the National Programme on Immunization in 2023 to improve protection against cervical cancer among adolescent girls. While increasing vaccine availability represents a major public health achievement, misconceptions may continue to undermine programme success if they are not adequately addressed. Understanding the specific misconceptions held by adolescent girls—the primary recipients of the vaccine—can provide valuable evidence for developing effective educational interventions and communication strategies.

Although several studies conducted in Enugu State have examined awareness, knowledge, and vaccine uptake, limited evidence exists regarding misconceptions specifically held by female students attending government secondary schools. Identifying these misconceptions is important for designing targeted interventions capable of improving vaccine confidence, reducing misinformation, and supporting successful implementation of HPV vaccination programmes.

Therefore, this study assessed misconceptions regarding Human Papillomavirus vaccination among female students attending government secondary schools in Enugu Metropolis, Enugu State, Nigeria.

METHODOLOGY

Study Setting

This study was carried out in Enugu Metropolis, located in Enugu State, South-East Nigeria. The metropolis comprises Enugu North, Enugu East, and Enugu South Local Government Areas and serves as the administrative and educational centre of the state. Government-owned secondary schools within these Local Government Areas enroll large numbers of adolescents from different socioeconomic backgrounds and therefore provide an appropriate setting for investigating misconceptions related to Human Papillomavirus (HPV) vaccination among school-aged girls.

Study Design

This investigation represents a descriptive cross-sectional analysis of female students attending selected government secondary schools in Enugu Metropolis. The analysis specifically focused on misconceptions regarding HPV vaccination using information obtained during the survey.

Study Population

The target population comprised female students aged 9–14 years who were enrolled in the selected government secondary schools during the period of data collection.

Eligibility Criteria

Inclusion Criteria

Participants were eligible if they:

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- were female students aged 9–14 years;
- were enrolled in one of the selected government secondary schools;
- provided assent to participate; and
- had written consent from a parent or guardian.

Exclusion Criteria
Students were excluded if they:

- were absent on the day of questionnaire administration;
- declined participation or whose parents or guardians withheld consent; or
- returned questionnaires with incomplete responses unsuitable for analysis.

Sample Size
The sample size was estimated using Cochran's formula for descriptive cross-sectional studies based on a previously reported prevalence from a Nigerian study. After allowing for possible non-response, a total of **204 female students** were included in the study.

Sampling Procedure
A multistage sampling approach was adopted. Initially, one government secondary school was selected from each of the three Local Government Areas that constitute Enugu Metropolis. The required sample was then proportionately allocated according to the student population of each selected school. Finally, eligible participants were selected using simple random sampling until the predetermined sample size was achieved.

Data Collection Instrument
Information was collected using a structured, pretested, self-administered questionnaire developed from published literature on HPV vaccination among adolescents. For the present analysis, emphasis was placed on questionnaire items assessing misconceptions regarding HPV vaccination.

The questionnaire contained four sections covering:

- socio-demographic characteristics;
- knowledge of HPV infection and vaccination;
- HPV vaccination status; and
- misconceptions regarding HPV vaccination, including beliefs about infertility, vaccine safety, sexual behaviour, and eligibility for vaccination.

Validity and Reliability
Content validity was established through review by specialists in Community Medicine and Public Health. Their recommendations were incorporated before commencement of the study.

To assess reliability, the questionnaire was piloted among female students attending a government secondary school outside the study area. Data obtained during the pilot exercise were excluded from the final analysis, and the instrument demonstrated satisfactory consistency for use in the study.

Data Collection Procedure
Permission to conduct the study was obtained from the relevant educational authorities and the management of the participating schools before data collection commenced. Parents or guardians provided written informed consent, while participating students provided written assent.

The questionnaires were administered in the classroom setting with assistance from trained research assistants. Completed questionnaires were collected immediately after completion to minimize missing data and maximize response quality.

Study Variables
Outcome Variable
The primary outcome variable was the presence of misconceptions regarding HPV vaccination.

Explanatory Variables
The explanatory variables included:

- age;
- class level;

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- religion;
- ethnicity;
- living arrangement;
- father's educational level;
- mother's educational level;
- father's occupation; and
- mother's occupation.

Measurement of Misconceptions

Misconceptions were evaluated using questionnaire items examining commonly reported myths surrounding HPV vaccination. These included beliefs that the vaccine causes infertility, is intended only for sexually active individuals, promotes early sexual activity, or is unsafe. Responses were summarized using frequencies and percentages to describe the distribution of misconceptions among respondents.

Data Management and Analysis

All completed questionnaires were reviewed for completeness before data entry. The dataset was entered, cleaned, and analyzed using IBM SPSS Statistics version 27.

Descriptive statistical methods were applied throughout the analysis. Continuous variables are presented as means and standard deviations, whereas categorical variables are summarized using frequencies and percentages. The findings are presented in tables.

Ethical Considerations

Ethical approval for the study was obtained from the appropriate Health Research Ethics Committee before commencement of data collection. Additional authorization was obtained from the Enugu State Ministry of Education and the principals of the participating schools.

Participation was voluntary, and strict confidentiality was maintained throughout the study. No personal identifiers were recorded, and all information obtained from participants was used exclusively for research purposes.

RESULTS

Socio-demographic Characteristics of Respondents

A total of 204 female students were included in the analysis. Participants had a mean age of 12.72 ± 1.06 years, with the largest proportion aged 13 years (32.8%)**,** followed by 12 years (28.4%) and 14 years (25.0%). Regarding educational level, 31.9% were enrolled in Junior Secondary School Three (JSS3)**,** while 25.5% and 24.5% were in **JSS2** and **SSS1**, respectively.

The study population was predominantly Igbo (97.5%) and Christian (96.6%)**.** Most respondents **(**73.0%) lived with both parents. Educational attainment among parents was generally high, with 62.3% of fathers and 65.7% of mothers having completed tertiary education. In terms of occupation, 42.6% of fathers and 37.7% of mothers were civil servants.

Table 1. Socio-demographic Characteristics of Respondents (N = 204)

Variable	Frequency (n)	Percentage (%)
Age (years)		
10	2	1.0
11	26	12.8
12	58	28.4
13	67	32.8
14	51	25.0
Class		
JSS1	37	18.1
JSS2	52	25.5
JSS3	65	31.9
SSS1	50	24.5
Religion		
Christianity	197	96.6
Islam	7	3.4
Ethnicity		
Igbo	199	97.5

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Yoruba	2	1.0
Hausa	1	0.5
Others	2	1.0
Living Arrangement		
Both parents	149	73.0
Mother only	32	15.7
Father only	12	5.9
Guardian/Others	11	5.4
Father's Educational Level		
No formal education	5	2.5
Primary	14	6.9
Secondary	58	28.4
Tertiary	127	62.3
Mother's Educational Level		
No formal education	4	2.0
Primary	17	8.3
Secondary	49	24.0
Tertiary	134	65.7
Father's Occupation		
Civil servant	87	42.6
Business	65	31.9
Artisan	30	14.7
Others	22	10.8
Mother's Occupation		
Civil servant	77	37.7
Business	74	36.3
Artisan	28	13.7
Others	25	12.3

Interpretation

The study participants were largely early adolescent girls from predominantly Igbo and Christian backgrounds. Most resided with both parents, and a considerable proportion came from households in which parents had tertiary education and formal employment. Despite these relatively favourable socio-demographic characteristics, misconceptions regarding HPV vaccination remained evident among the respondents.

Misconceptions Regarding Human Papillomavirus Vaccination

The distribution of misconceptions regarding HPV vaccination is presented in Table 2. Overall, 42 (20.6%) respondents believed that HPV vaccination causes infertility, while 45 (22.1%) considered the vaccine appropriate only for individuals who are already sexually active. An equal proportion (20.6%) believed that receiving the vaccine encourages early sexual activity.

Perceptions of vaccine safety were generally poor. Only 55 (27.0%) respondents regarded the HPV vaccine as safe, whereas 149 (73.0%) perceived it as unsafe. Among those expressing concerns about vaccine safety, distrust of the vaccine was the most frequently reported reason (60.0%), followed by beliefs that the vaccine is harmful (20.0%), causes infertility (10.0%), or appears dangerous (10.0%).

Table 2. Misconceptions Regarding HPV Vaccination Among Respondents (N = 204)

Statement	Yes n (%)	No n (%)
HPV vaccination causes infertility	42 (20.6)	162 (79.4)
HPV vaccine is only meant for sexually active individuals	45 (22.1)	159 (77.9)
HPV vaccination encourages early sexual activity	42 (20.6)	162 (79.4)
HPV vaccine is safe	55 (27.0)	149 (73.0)

Reasons Given by Respondents Who Considered the HPV Vaccine Unsafe (n = 149)

Reason	Frequency (n)	Percentage (%)
Do not trust the vaccine	89	60.0
Vaccine is harmful	30	20.0
Causes infertility	15	10.0

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Appears dangerous	15	10.0

Interpretation

Although the majority of respondents rejected several common myths about HPV vaccination, a notable proportion continued to hold inaccurate beliefs regarding infertility, eligibility for vaccination, and its influence on sexual behaviour. The widespread perception that the vaccine is unsafe, particularly because of distrust, highlights persistent misinformation that may undermine HPV vaccine confidence among adolescent girls.

DISCUSSION

This study assessed misconceptions regarding Human Papillomavirus (HPV) vaccination among female students attending government secondary schools in Enugu Metropolis, Nigeria. The findings revealed that misconceptions surrounding HPV vaccination remain widespread despite the availability of scientific evidence demonstrating the vaccine's safety and effectiveness. Misconceptions relating to infertility, vaccine safety, sexual behaviour, and eligibility for vaccination continue to influence adolescents' perceptions and may contribute to vaccine hesitancy.

Approximately one-fifth (20.6%) of the respondents believed that HPV vaccination causes infertility. Although most respondents did not hold this belief, the proportion reporting this misconception remains concerning because infertility is one of the most frequently reported myths associated with HPV vaccination in many developing countries. Similar concerns have been documented among adolescents and parents in Nigeria, where misinformation regarding reproductive health continues to discourage HPV vaccine acceptance. Studies conducted by Ohareri *et al*. and Nguyen *et al*. also identified fear of infertility and concerns regarding future fertility as important barriers to HPV vaccine acceptance among Nigerian populations. Likewise, Talabi *et al*. reported that misinformation regarding infertility remains one of the leading contributors to HPV vaccine hesitancy in Nigeria. These findings suggest that fertility-related misconceptions continue to undermine confidence in HPV vaccination despite overwhelming scientific evidence confirming that HPV vaccines do not impair fertility.

The present study also found that 22.1% of respondents believed that HPV vaccination is intended only for sexually active individuals. This misconception reflects inadequate understanding of the purpose of HPV vaccination, which is recommended before sexual debut to achieve maximum protection against HPV infection. Similar findings have been reported among secondary school students in Ethiopia by Biyazin *et al*. and among adolescents in Malaysia by Aung *et al*., where many participants incorrectly believed that HPV vaccination was only necessary after becoming sexually active. Such misconceptions may delay vaccine acceptance until after exposure to HPV, thereby reducing the preventive benefits of vaccination.

Another important finding was that 20.6% of respondents believed that HPV vaccination encourages early sexual activity. This misconception has been widely reported across different cultural settings and remains one of the major sources of parental resistance to adolescent HPV vaccination. Comparable findings have been reported by Wong *et al*., who demonstrated that sociocultural beliefs and moral concerns significantly influence HPV vaccine hesitancy in several Asian countries. Similarly, Yuen *et al*. found that parental fears that HPV vaccination could promote sexual promiscuity contributed to reduced vaccine acceptance among adolescent girls in Hong Kong. However, extensive international evidence has consistently demonstrated that HPV vaccination does not increase sexual risk behaviours or earlier sexual initiation among adolescents. These misconceptions therefore represent social beliefs rather than evidence-based concerns.

Perhaps the most notable finding of this study was that nearly three-quarters (73.0%) of respondents considered the HPV vaccine unsafe, while only 27.0% perceived it as safe. Among respondents expressing safety concerns, distrust of the vaccine accounted for 60.0% of the reported reasons, followed by beliefs that the vaccine was harmful, caused infertility, or appeared dangerous. This finding indicates that lack of confidence in vaccine safety remains one of the greatest challenges to HPV vaccine acceptance. Similar concerns have been documented in Nigeria by Akanbi *et al*., who reported widespread fears regarding vaccine safety among women of reproductive age. Likewise, Deignan *et al*., in a systematic review conducted across sub-Saharan Africa, identified misinformation, distrust, inadequate communication, and concerns regarding adverse effects as persistent barriers to HPV vaccine acceptance. Recent findings from Saudi Arabia by Almatrafi *et al*. further demonstrated that structured educational interventions substantially improve adolescents' confidence in HPV vaccine safety, emphasizing the importance of health education in addressing misinformation.

Overall, the findings of this study suggest that misconceptions regarding HPV vaccination are driven not only by inadequate knowledge but also by misinformation, fear, cultural beliefs, and distrust in vaccination programmes. These misconceptions can substantially reduce vaccine confidence and ultimately limit vaccination coverage among adolescent girls. Addressing these false beliefs through comprehensive school-based health education, parental engagement, community awareness campaigns, and healthcare provider communication is essential for improving vaccine acceptance

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and achieving national cervical cancer prevention goals. Given Nigeria's recent introduction of HPV vaccination into the national immunization programme, correcting misconceptions should remain a priority to ensure successful implementation and long-term reduction in cervical cancer incidence.

CONCLUSION

This study demonstrated that misconceptions regarding Human Papillomavirus (HPV) vaccination remain prevalent among female students attending government secondary schools in Enugu Metropolis, Nigeria. Although HPV vaccination is a safe and effective strategy for preventing cervical cancer, a considerable proportion of respondents believed that the vaccine causes infertility, is intended only for sexually active individuals, or encourages early sexual activity. Furthermore, most respondents perceived the HPV vaccine as unsafe, with distrust and misinformation being the most frequently reported reasons for these negative perceptions.

These findings indicate that misconceptions continue to represent an important barrier to HPV vaccine acceptance among adolescent girls. Without targeted interventions to address misinformation and improve confidence in vaccine safety, the success of Nigeria's HPV vaccination programme may remain limited. Strengthening accurate health communication and correcting false beliefs are therefore essential to improving vaccine confidence and increasing vaccination coverage among the target population.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. **Strengthen school-based health education:** Comprehensive health education programmes should be incorporated into secondary school curricula to provide accurate information about HPV infection, cervical cancer, and the safety and effectiveness of HPV vaccination.
2. **Implement community awareness campaigns:** Government agencies, public health organizations, and non-governmental organizations should conduct sustained awareness campaigns using television, radio, social media, and community outreach programmes to dispel common myths surrounding HPV vaccination.
3. **Promote parental engagement:** Parents and guardians should be actively involved in educational programmes because they play a critical role in healthcare decision-making for adolescents. Educational sessions should specifically address misconceptions regarding infertility, vaccine safety, and sexual behaviour.
4. **Enhance healthcare provider communication:** Healthcare professionals should receive regular training on effective vaccine communication strategies to improve their ability to address concerns, provide evidence-based information, and build public trust in HPV vaccination.
5. **Strengthen school-health partnerships:** Collaboration between schools and healthcare facilities should be encouraged to organize regular educational seminars, vaccination campaigns, and question-and-answer sessions that improve students' understanding of HPV vaccination.
6. **Utilize digital health communication:** Reliable health information should be disseminated through social media platforms and other digital communication channels frequently used by adolescents to counter misinformation and improve vaccine confidence.
7. **Conduct further research:** Additional multicentre studies involving larger and more diverse populations should be undertaken to explore sociocultural determinants of HPV vaccine misconceptions and evaluate interventions designed to reduce vaccine hesitancy across different regions of Nigeria.

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