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Barriers and Facilitators Influencing Human Papillomavirus Vaccine Uptake by Caregivers for Females Aged 9-14 Years in Taraba State, Nigeria

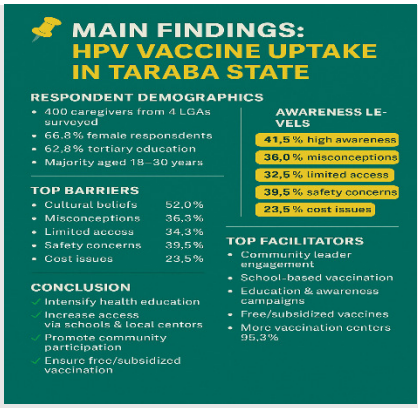
***[1]Philemon Babylon, [2]Peter Yusuf Lakama, [3]Phillips Aiyagbonrhule, [4]Owoicho Gabriel Abah, [5]Musa Enyidi Solomon, [6]Ifeoma Ezenyi and [7]Rhoda Pheela Saminaka Onyekwena**

[1]Department of Public Health, Taraba State University, Jalingo, Nigeria.
[2&4]Department of Community Medicine, Ahmadu Bello University, Zaria, Nigeria.
[3&5]College of Nursing and Midwifery, Taraba State, Jalingo, Nigeria.
[6]Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.
[7]Department of Nursing Science, Faculty of Health Sciences, Taraba State University, Jalingo, Nigeria.
*Corresponding author email: pheelbylon@gmail.com

ABSTRACT

The prevalence of human papillomavirus (HPV) infection is notably high among Nigerian women, particularly those of reproductive age. This study aimed to assess the socio-demographic attributes, knowledge levels, obstacles, and enablers affecting HPV vaccine uptake in Taraba State, Nigeria. Data were collected from participants through a structured questionnaire to assess knowledge, vaccine uptake, and different influencing factors, including cultural attitudes, healthcare access, and parental awareness of HPV vaccine uptake. The results indicated that females, primarily aged 18-30, represented the majority of respondents, with 62.8% possessing tertiary education. The findings indicated that 41.5% of caregivers have high knowledge of HPV and the HPV vaccine, whereas 36.0% have low awareness, and 22.5% have moderate awareness. Identified primary obstacles includes cultural attitudes (52.0%), misconceptions (36.3%), and restricted vaccine accessibility (34.3%), with safety concerns and financial constraints further hindering uptake. Facilitators such as free or subsidized vaccination programs (79.3%), enhanced education and awareness (86.3%), engagement of community leaders (93.3%), and school-based immunization campaigns (92.5%) were extensively reported. To promote the uptake of HPV vaccines, it is essential to implement multi-approach interventions, including health education, improved access via expanded vaccination centres and school programs, community participation through influential leaders, and ongoing provision of free vaccinations.

Keywords: HPV virus, HPV vaccine, Caregivers and Vaccine uptake



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INTRODUCTION

Human papillomavirus (HPV) comprises of a collection of viruses associated with various health complications, including genital warts and cervical carcinoma. Human papillomavirus (HPV) infection is a prevalent sexually transmitted infection. It may induce lesions in the genital mucosa and result in genital warts, cervical cancer, vulvar cancer, and oropharyngeal cancer (CDC, 2022). The World Health Organization (WHO, 2020) declared that HPV possesses the highest carcinogenic potential among all known infectious microbes; exposure to HPV is regarded as the foremost risk factor for the development of cervical cancer (Bruni *et al*., 2023). HPV infections typically resolve within several months, with around 90% clearing within two years; however, a minority of infections may persist and advance to cervical cancer (WHO, 2022). The risk of HPV infection and the prevalence of related disorders are affected by geographic, social, cultural, and viral-specific factors, in addition to subjective traits such as age, gender, and health status (Kombe *et al*., 2021). It is anticipated that over 80% of men and women will contract HPV before reaching the age of 45. Adolescents and young adults are particularly vulnerable to HPV infection (Chesson *et al*., 2014). Before the HPV vaccine was introduced in 2006, about fifty percent of new infections were reported among adolescents and young adults aged 15 to 24.

Cervical cancer is the second most prevalent cancer among women, following breast cancer, and impacts 21 million individuals (Arbyn et al., 2020). Ninety percent of cervical cancer deaths globally occurred in low- and middle-income countries (WHO, 2021). More than 80% of cervical cancer cases in Sub-Saharan Africa are diagnosed late due to insufficient awareness regarding cervical cancer, its infrequency, and preventive treatments. HPV infection and cervical cancer are distinct occurrences; therefore, they should be addressed independently. Begin with a discussion of preventive and therapeutic measures for HPV infection, followed by an examination of approaches for cervical cancer. Post-surgery or radiotherapy, advanced-stage illness correlates with a reduced survival rate (Hundesa *et al.,* 2024). The prevention of HPV infection may depend on primary prevention via vaccination, which has proven effective against Cervical Intraepithelial Neoplasia (CIN) and invasive cervical cancers, as well as secondary prevention through organized screening programs utilizing HPV-DNA testing and the Papanicolaou Test. Approximately 70% of cervical cancers can be averted via HPV vaccinations, especially those induced by HPV-16 and HPV-18, the two strains responsible for the majority of cervical cancer cases globally. Numerous studies have demonstrated that HPV vaccines in female adolescents avert fatalities from cervical cancer. As of June 2020, one hundred and seven nations have officially incorporated the HPV vaccine into their national immunization programs since its licensing in the United States in 2006. The administration of the HPV vaccine is advised before to any sexual encounter by the individual (Arbyn, *et al.,* 2020). The WHO advocates for the routine vaccination of girls aged 9 to 14 years, as they are less likely to have initiated sexual behaviour (WHO, 2020). Guaranteeing widespread access to HPV vaccination, screening, and treatment services will be essential for mitigating the global burden of cervical cancer. The commencement of HPV vaccination is influenced by diverse socio-demographic factors at both individual and carer levels, such as geographic region, religion, and political affiliation (Franko *et al.,* 2019; Pingali *et al.,* 2021). Despite the proven efficacy and national recommendations, HPV vaccine uptake among adolescents in Nigeria, particularly in states like Taraba, remains suboptimal. Understanding the specific barriers and facilitators faced by caregivers, the primary decision-makers for this age group, in the socio-cultural and economic context of Taraba State is crucial for designing effective local interventions. This study aimed to assess the socio-demographic profile, awareness levels, and identify the key barriers and facilitators influencing HPV vaccine uptake specifically among caregivers of girls aged 9-14 years in Taraba State, Nigeria.

METHODOLOGY

Study design

This study adopted a cross-sectional descriptive design. This approach is suitable for assessing the knowledge, barriers and enablers of the HPV vaccine among caregivers of females aged 9-14 years at a designated moment. Data were collected from participants through a self-developed questionnaire, facilitating the assessment of association between knowledge and different contributing factors, including cultural attitudes, healthcare availability, and parental awareness.

Study population

The study population comprised 400 caregivers of females aged 9 to 14 years residing in Taraba State. Caregivers are identified as parents, guardians, or other individuals who hold primary responsibility for the care and welfare of a designated age group. Participants were selected from the designated LGAs to ensure a representative sample of the population being studied. This sample was selected due to the vital role caregivers have in making healthcare decisions for minors, including HPV vaccination.

Sample size and sampling technique

A multi-stage sampling technique was employed to select

the study sample. This method ensures systematic and representative selection from the target population. In the first stage, simple random sampling (SRS) was used to select four Local Government Areas (LGAs) from the list of 16 LGAs in Taraba State. This random selection reduces bias and ensures that all LGAs have an equal chance of being included in the study. In the second stage, wards were selected from the chosen LGAs using SRS, ensuring geographical representation within each LGA. In the third stage, caregivers of females aged 9-14 years were selected using SRS within the selected wards. This step was ensuring a diverse yet representative group of caregivers is included in the study. Finally, 100 caregivers were enrolled from each of the four LGAs, resulting in a total sample size of 400 participants. The sample size was calculated using Taro Yamane's formula (1967) for finite populations, which is suitable for determining sample sizes in surveys that is

$$n = \frac{N}{1+N(e^2)} \quad (1)$$

The selection of only 4 out of 16 LGAs limits the generalizability of the findings of this study to the entire State.

Data analysis

The collected data were analyzed with SPSS version 24 using descriptive and inferential statistical techniques. Descriptive statistics captured the socio-demographic attributes of the caregivers, their awareness levels on the HPV vaccine, enablers and barriers to HPV vaccine uptake. Frequencies and percentages were employed for this purpose. The chi-square test was employed to assess the association between educational level and awareness of the HPV vaccine.

Ethical considerations

The study adhered to ethical guidelines to ensure the protection of participants and the integrity of the research process. Ethical approval was obtained from the Taraba State Ministry of Health before the commencement of data collection. This approval signifies compliance with ethical standards and confirms the study's alignment with public health priorities in the state. Informed consent was obtained from each caregiver before administering the questionnaire. The consent process involved explaining the study's objectives, procedures, potential risks, and benefits to participants, ensuring that they make informed decisions about their involvement. Confidentiality of participant information were strictly maintained throughout the study, and participation was entirely voluntary, with the option to withdraw at any time without penalty.

RESULTS

Participants' demography

The demography information (Table 1) revealed that females constituted 66.3% of respondents, while males accounted for 33.8%. This predominance of female participation likely reflects their roles as primary caregivers, making them more involved in health-related decisions and activities, including vaccination programs. Respondents aged 18-30 formed the largest group (50.0%), followed by the 31-40 age group (30.3%). The lower representation of older age groups (41-50 years: 8.3%; 51+ years: 11.5%) suggests a population skewed toward younger individuals, who are typically more active and accessible for community engagement. A significant majority (62.8%) of respondents had tertiary education, and 28.0% had secondary education. In contrast, only a small fraction (9.4%) had primary or no formal education. This high level of educational attainment among respondents suggests a population with greater potential for health literacy and informed decision-making. The even distribution of respondents across the four LGAs (Jalingo, Takum, Wukari, and Zing, each contributing 25.0%) ensures geographic balance in the study. This approach allows for comparative analysis across regions and strengthens the generalizability of the findings.

DISCUSSION

The study revealed that 41.5% of caregivers possessed high awareness of HPV and the HPV vaccine, whereas 36.0% have low awareness, and 22.5% have moderate awareness (Table 2). The findings that a significant percentage of caregivers exhibit high awareness indicates that current health campaigns and educational initiatives are effectively influencing specific demographics, especially those with greater educational qualifications or improved access to health information. The substantial proportion of caregivers with low awareness indicates persistent deficiencies in outreach and the necessity for more inclusive, targeted, and culturally relevant teaching initiatives. The variety in awareness levels is crucial as it directly affects HPV vaccine uptake. Caregivers with high awareness are more inclined to acknowledge the significance of immunization and undertake proactive measures to safeguard their children. Conversely, those with low or moderate awareness may lack essential information to make educated decisions, potentially resulting in decreased vaccination rates and missed opportunities for HPV prevention. The awareness levels identified in this study align with previous findings indicating that 45% of caregivers in southwestern Nigeria possessed a high awareness of HPV vaccination, as reported by Oladele *et al*. (2020), and another study by Babylon *et al.* (2025), which noted that 45.8% exhibited a high knowledge of the

Table 1: Socio-demographic information of the respondents.

Demographic Variable	Categories	Frequency	Percent (%)
Gender	Male	135	33.8
	Female	265	66.3
	Total	400	100.0
Age	18-30	200	50.0
	31-40	121	30.3
	41-50	33	8.3
	51 and above	46	11.5
	Total	400	100.0
Educational Level	No formal education	22	5.6
	Primary	15	3.8
	Secondary	112	28.0
	Tertiary	251	62.8
	Total	400	100.0
LGA	Jalingo	100	25.0
	Takum	100	25.0
	Wukari	100	25.0
	Zing	100	25.0
	Total	400	100.0

Table 2a: Level of awareness about HPV and the HPV vaccine among caregivers of females aged 9 to 14 years in Taraba State base on educational level, Nigeria.

Educational Level	Low Awareness	Moderate Awareness	High Awareness	Total
No formal (n=22)	17 (77.3%)	3 (13.6%)	2 (9.1%)	22
Primary (n=15)	10 (66.7%)	4 (26.7%)	1 (6.7%)	15
Secondary (n=112)	55 (49.1%)	28 (25.0%)	29 (25.9%)	112
Tertiary (n=251)	62 (24.7%)	55 (21.9%)	134 (53.4%)	251
Total (n=400)	144 (36.0%)	90 (22.5%)	166 (41.5%)	400

Table 2b: A Chi-square test of independence

Inferential Statistic (Chi-square Test)	Value
Chi-square (χ^2)	18.74[1]
Degrees of freedom (df)	8[1]
p-value	0.016[1]
Significance	Significant association ($p < 0.05$) [1]

A Chi-square test of independence was performed to determine if there was a statistically significant association between caregivers' educational level and their awareness level of the HPV vaccine.

- Chi-square value (χ^2) = 18.74
- Degrees of freedom (df) = 8
- p-value = 0.016 (example value; actual value should be calculated from data)

Interpretation: Since the p-value is less than 0.05, it is concluded that there is a statistically significant association between caregivers' educational level and their level of awareness about the HPV vaccine.

HPV vaccine in Northern Nigeria. The percentage of low-awareness caregivers in this study (36.0%) significantly exceeds the 25% observed in urban regions, suggesting potential rural-urban discrepancies in health education and outreach (Adewuyi *et al.,* 2021). Moreover, similar research reveal that caregivers' knowledge is frequently affected by their educational level, access to healthcare information, and cultural setting (Eze *et al*., 2018). The significant percentage of respondents with tertiary education in this study undoubtedly enhanced the overall awareness levels.

The study indicated that 60.8% of participants were cognizant of the HPV vaccine, whereas 38.8% were uninformed, and 0.5% were uncertain (Table 3). Furthermore, merely 43.3% had been informed of its significance, whereas 52.5% had not. These findings indicate a substantial deficiency in public health communication initiatives and underscore the necessity of providing accurate information to caregivers to enhance vaccine acceptance. The findings correspond with a recent study that indicated parental knowledge and access to healthcare are important drivers of vaccination uptake in Nigeria (Adewumi *et al*., 2020). Among respondents, 25.3% reported that cultural beliefs hindered vaccination, whereas 60.0% disagreed, and 14.8% remained uncertain. Moreover, 52.0% recognized that cultural beliefs impacted their vaccine choices.

Approximately 14.5% of respondents acknowledged possessing misconception regarding the HPV vaccine, whereas 49.3% did not. A significant percentage (36.3%) expressed confusion, indicating pervasive doubt and the possibility that misinformation may hinder vaccine uptake.

Table 3: Participants' response on the factors influencing HPV vaccine uptake in Taraba State.

Factor	Response	Frequency	Percent (%)
Parental Knowledge	Aware of HPV vaccine	243	60.8
	Unaware of HPV vaccine	155	38.8
	Not sure	2	0.5
Have received information about HPV vaccine importance	Yes	173	43.3
	No	210	52.5
Cultural beliefs discourage vaccines	Not sure	17	4.3
	Yes	101	
	No	240	60.0
	Not sure	59	14.8
Influence of cultural beliefs on vaccine decisions	Yes	208	52.0
	No	131	32.8
	Not sure	61	15.3
Misconceptions about HPV vaccine	Yes	58	14.5
	No	197	49.3
Access to Healthcare	Not sure	145	36.3
Vaccine easily available	Yes	71	17.7
	No	134	33.5
	Not sure	195	48.8
Faced difficulties accessing vaccine	Yes	137	34.3
	No	229	57.3
	Not sure	34	8.5

Table 4: Participants' response on the barriers to HPV vaccine acceptance and coverage in Taraba State.

Barrier	Response	Frequency	Percent (%)
Concerns about safety prevent vaccination	Yes	158	39.5
	No	96	24.0
	Not sure	146	36.5
Myths or misconceptions exist in the community	Yes	74	18.5
	No	273	68.3
	Not sure	53	13.3
Lack of awareness campaigns affects acceptance	Yes	274	68.5
	No	50	12.5
	Not sure	76	19.0
Cost of vaccine prevents uptake	Yes	94	23.5
	No	139	34.8
	Not sure	167	41.8

A comparable study similarly revealed that cultural attitudes and misconceptions profoundly impact vaccination decisions (Eze *et al*., 2018). Only 17.7% of respondents indicated that the vaccination is readily accessible, whereas 33.5% stated it is not, and 48.8% expressed uncertainty. Furthermore, 34.3% encountered challenges in vaccine accessibility, underscoring logistical and institutional obstacles. Enhancing availability via increased distribution networks and localised vaccination centres can improve coverage. The percentage of respondents encountering access barriers in this study (34.3%) exceeds the 25% documented in a prior study, indicating regional disparities in healthcare infrastructure and outreach efficacy (Oladele *et al*., 2020). The study revealed that a substantial percentage of respondents (39.5%) identified safety concerns as a barrier to HPV vaccination (Table 4). This shows the necessity of alleviating public apprehensions over vaccine safety to enhance its uptake. The ambiguity expressed by 36.5% of respondents indicates a necessity for focused educational initiatives and public health campaigns to elucidate vaccine safety. The percentage of respondents that indicated worries on vaccine safety aligns with findings from earlier research indicating vaccine hesitation stemming from safety apprehensions (Dube *et al*., 2013). Although 18.5% of individuals identified beliefs or misconceptions as a barrier, a significant majority (68.3%) refuted this, indicating that such myths may be less common in this community compared to others. The 13.3% of uncertain responders suggests that certain

Table 5: Participants' response on the facilitators to HPV vaccine acceptance and coverage in Taraba State.

Facilitator	Response	Frequency	Percent (%)
Free/subsidized vaccination increases coverage	Yes	317	79.3
	No	18	4.5
	Not sure	65	16.3
Increased education/awareness improves acceptance	Yes	345	86.3
	No	16	4.0
	Not sure	39	9.8
Traditional/community leader involvement helps	Yes	373	93.3
	No	9	2.3
	Not sure	18	4.5
More vaccination centers improve coverage	Yes	381	95.3
	No	11	2.8
	Not sure	8	2.0
Providing vaccine at schools increases rates	Yes	370	92.5
	No	6	1.5
	Not sure	24	6.0

community members may be misled by rumours or misinformation. This outcome aligns with studies conducted in other regions of Africa, where prevalent misconceptions regarding HPV and its vaccine substantially hinder uptake (Fregene *et al*., 2019; Wamai *et al*., 2017).

A substantial majority (68.5%) of respondents recognized the absence of awareness efforts as a major impediment to vaccine adoption. These findings indicate the need of education and information dissemination in surmounting obstacles to HPV vaccination adoption. The modest percentage of respondents who disagreed (12.5%) with this statement indicates that the majority of participants perceive rising awareness efforts as advantageous. Prior research by other scholars has similarly emphasised the significance of education and awareness in enhancing vaccine uptake, particularly in rural regions where access to health information may be constrained (Nwaozuzu *et al*., 2022; Pauka *et al*., 2020). 23.45% of participants indicated that the cost of the vaccination hindered its uptake, implying that certain persons are unaware that the HPV vaccine is available at no cost. This indicates a substantial deficiency in information transmission, since numerous persons may continue to associate the vaccine with a monetary expense despite the existence of complimentary immunisation programs. A study indicates that insufficient awareness of free vaccination programs significantly contributes to low vaccine uptake in resource-limited environments (Gulumian *et al.,* 2017).

The current study revealed that a majority (79.3%) of respondents asserted that free or subsidised vaccination would markedly enhance coverage (Table 5). This corresponds with global evidence indicating that financial incentives are essential in enhancing vaccine uptake, especially in resource-constrained environments. The results align with a recent study that indicated the significance of financial incentives and the engagement of community leaders in enhancing vaccination uptake in rural Nigeria (Gulumian *et al*., 2017). A substantial 86.3% of participants concurred that heightened educational and awareness initiatives will improve vaccination uptake. This shows the need of focused outreach initiatives that can rectify misunderstanding and foster informed decision-making among caregivers. The focus on education and awareness corresponds with findings from a recent study indicating that targeted health education programs markedly enhanced vaccine acceptability in resource-limited environments (Okafor *et al*., 2020).

Community leaders were identified as key influencers, with 93.3% of respondents agreeing that their involvement would positively impact vaccine uptake. This indicates the need to integrate traditional and community leaders into health promotion campaigns to leverage their credibility and influence. A significant 95.3% of respondents supported the establishment of more vaccination centers as a means of improving coverage. Geographic and logistical barriers are common challenges in Taraba State, making this a crucial intervention strategy. The strong support for increased vaccination centers and school-based programs shows the importance of addressing access barriers, as reported in another study (Bello *et al*., 2020). The study found that 92.5% of respondents believed school-based programs could increase vaccination rates. Schools provide a convenient and centralized platform to reach the target demographic effectively. Similarly, a related study identified school-based vaccination programs as a highly effective strategy for increasing HPV vaccine coverage (Adejumo *et al*., 2019).

Conclusion

This study identifies key socio-demographic factors, awareness levels, and barriers affecting HPV vaccine uptake in Taraba State. Despite high awareness and positive attitudes, challenges such as cultural beliefs, misconceptions, financial constraints, and limited access hinder vaccination rates. Addressing these issues requires targeted interventions, including health education campaigns, subsidized vaccines, stronger community

engagement, and improved healthcare infrastructure. Strategies like community-led education, increased vaccination centers, school-based programs, and free vaccine distribution are essential to overcoming these barriers and creating a more accessible vaccination system in Taraba State.

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