**THE HUMAN PAPILLOMAVIRUS (HPV) EPIDEMIC AMONG WOMEN IN NIGERIA: A SYSTEMATIC REVIEW OF VACCINATION, PREVENTION, AND PUBLIC HEALTH MEASURES.**

**ABSTRACT**

**Background**: Human papillomavirus (HPV) is a sexually transmitted infection that affects approximately 70% of individuals during their lifetime, with approximately 47 million women aged 15 years and older at risk of developing the disease in Nigeria. Studies have revealed that HPV is associated with various cancers, including cervical cancer, which is the most prevalent HPV-related cancer among women in Nigeria. Annually, approximately 14,089 Nigerian women are diagnosed with cervical cancer, and 8,240 die from the disease. Despite the availability of preventive measures such as HPV vaccination and screening, cervical cancer remains a significant public health issue, particularly in low- and middle-income countries (LMICs) such as Nigeria.

**Objective:** This study reviews the epidemiology, prevention, and barriers to HPV vaccination in Nigeria, highlighting the low awareness and uptake of the vaccine among adolescents and young adults.

**Methods:** We conducted a systematic review of the PRISMA guidelines. PubMed, Google Scholar, and Research Gate were used to retrieve all relevant literature that focused on HPV prevalence, vaccination coverage, and prevention policies in Nigeria. We identified 38 studies, 8 of which met the inclusion criteria for comprehensive review.

**Results:** The findings revealed an HPV prevalence of 14.7% in Iran to 37% in Abuja. Cervical cancer is the second most common cancer among Nigeria women with approximately 14,089 new cases each year. Nevertheless, awareness of the HPV vaccine is relatively low with only 13.7% of women of age taking at least one dose. We identified barriers such as high cost, little or no availability of public health infrastructure, cultural views, and lack of information to constitute this.

**Conclusion:** There is a need for strategic public health awareness about the menace of HPV. This should include HPV vaccines at little or no cost, school-based immunization programs, and nationwide sensitization programs. The incorporation of HPV vaccination into the national immunization program scheme would also to reduce the incidence and mortality rates of cervical cancer to a large extent.

**Keywords**: HPV, Epidemiology, Vaccination, Prevention, Cervical cancer, Nigeria.

**1.0 INTRODUCTION**

**1.1 EPIDEMIOLOGY OF HUMAN PAPILLOMAVIRUS**

Human papillomavirus (HPV) is a sexually transmitted infection that affects approximately 70% of individuals during their lifetime **(1).**  HPV is associated with several types of cancers, including anal, penile, head and neck, and cervical cancer, with cervical cancer being the most common HPV-related cancer (WHO, 2023). Globally, the prevalence of HPV infection is estimated to be between 11% and 12%, with Nigeria reporting an overall HPV prevalence of up to 26.3% **(2).** Cervical cancer is the second most common cancer among women in Nigeria, with approximately 47million women aged 15 years and older at risk of developing the disease. Annually, approximately 14,089 Nigeria women are diagnosed with cervical cancer, and 8,240 die from the disease **(2)**. HPV vaccination is the primary preventive measure recommended to combat infection. The quadrivalent vaccine, approved by the FDA in 2006, targets HPV types 16 and 18, which are responsible for 70% of cervical cancers, as well as HPV types 6 and 11, which cause benign anogenital warts and recurrent respiratory papillomatosis **(3)**. A bivalent vaccine which targets HPV types 16 and 18, was also approved in 2009 **(3)**. Both vaccines are most effective when administered before sexual debut, as HPV infection typically occurs shortly after sexual initiation **(4)**. The CDC reported that if healthcare professionals increase HPV vaccination rates among eligible individuals under 12 to 80%, they can prevent approximately 53,000 cervical cancer cases in their lifetimes **(5)**. For those who start the vaccination series later, between the ages of 15 and 26, three doses are required **(6)**. Despite advancements in prevention and treatment, cervical cancer remains a leading cause of mortality among women, particularly in LMICs. Over 90% of the 604,000 cases and deaths that occurred globally in 2020 were recorded in low- and middle-income nations **(7)**. In Nigeria, cervical cancer is the second most common cancer among women of reproductive age (15--45 years), with an estimated 12,075 new cases annually as of 2020 **(8)**. HPV types 16 and 18 are responsible for 66.9% of invasive cervical cancers, and these types are expected to be found in 3.5% of women with cervical cancer in Nigeria **(8)**. The lack of awareness and knowledge about HPV and its vaccines among adolescents and young adults in Nigeria is a significant barrier to prevention efforts- Even though there are vaccines everywhere, the vaccination system in Nigeria is rated among the lowest in SSA. This study aims to explore the prevalence and determinants of HPV knowledge and vaccine uptake among young people in Nigeria, providing valuable insights for public health policy and program development **(9)**.

1. **METHODS**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria were adhered to in this systematic review in order to guarantee a thorough and open research procedure **(46)**. A comprehensive literature search was conducted via **PubMed, Google Scholar, and Research Gate**, which Boolean operators (e.g. “HPV AND NIGERIA AND VACCINATION”) were used to identify studies related to **HPV epidemiology, vaccination, prevention, and antiepidemic measures in Nigeria.** A table summarizing the key studies, their methodologies, and findings is provided in **Table 1.** The initial search retrieved **38 articles** from the three databases. After 10 duplicates were removed, **28 articles** remained for screening. Titles and abstracts were assessed for relevance, and **18 articles** were excluded because of the unavailability of the full text or lack of focus on the research objectives. The remaining **10 articles** underwent full-text review for eligibility. After applying the inclusion criteria—focusing on **HPV epidemiology, vaccination coverage, prevention, and antiepidemic measures in Nigeria—8 articles** were deemed highly relevant and included in the final review, whereas **2 articles** were excluded because they were less relevant. The inclusion Criteria included observational studies, systematic reviews, and meta-analyses that were published in English from 2009 -- 2024, and focused solely on HPV prevalence, vaccination coverage, and prevention strategies in Nigeria, whereas the exclusion criteria were researched with no full-text access, and did not focus on women and were conducted outside of Nigeria.

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### **Figure1:** PRISMA flow diagram

### **Table 1: Summary of key studies on HPV in Nigeria**

| **Author** | **Objective** | **Methodology** | **Key Findings** | **Limitations** |
| --- | --- | --- | --- | --- |
| Umeh et al., 2016 | Examined HPV prevalence and cervical cancer risk in Nigeria | Cross-sectional study, survey-based data collection | HPV prevalence is estimated at 26.3%, with cervical cancer as the second most frequent cancer among Nigerian women | Limited sample size, potential reporting bias |
| Olajide et al., 2024 | Investigated HPV awareness and vaccine uptake in Otukpo, Nigeria | Quantitative survey of women of reproductive age | Only 16.1% had undergone cervical screening, and 13.7% had received at least one dose of the vaccine. | The study was limited to one region. |
| Ezebialu et al., 2020 | Determined the prevalence of HPV DNA among women in Awka, Nigeria | Molecular testing (PCR-based HPV DNA detection) | 19.5% of women tested positive for HPV, with HPV 16 being the most common serotype | Small sample, limited generalizability |
| Duru et al., 2024 | Investigated HPV vaccine awareness among secondary school adolescents in Nnewi, Nigeria | Cross-sectional survey with structured questionnaires | 65% of adolescents aged 15-18 had never heard of HPV or the vaccine | Potential selection bias in a school-based sample |
| Ohareri et al., 2020 | Explored parental perceptions and concerns about HPV vaccination in Nigeria | Qualitative interviews with parents | Religious beliefs and misinformation were key barriers to vaccine acceptance. | Subjective nature of qualitative responses |
| Balogun et al., 2022 | Examined healthcare workers' perspectives on HPV vaccine recommendation in Nigeria | Mixed-methods study (survey + interviews) | Lack of training and knowledge among healthcare workers reduced HPV vaccine recommendations. | The sample was limited to urban areas. |
| Akarolo et al., 2014 | Assessed regional variations in HPV prevalence across Nigeria | Population-based study | HPV prevalence ranged from 14.7% (Irun) to 37% (Abuja) | No data on HPV vaccination impact |
| Isara & Osayi, 2022 | Evaluated knowledge and awareness of HPV among students in Nigeria | School-based survey | Only 5.2% of students knew about HPV; 17% were aware of the vaccine | Self-reported data may introduce bias |

**2.1. RESULTS**

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**Fig 2:** HPV prevalence and vaccine uptake by regions in Nigeria

The reviewed literature indicated that HPV infection remains a significant public health concern in Nigeria ranging from 14.7% in Irun to 37% in Abuja. **(10)**.The differences in prevalence represent the need for strategized public health interventions. (Fig 2). Cervical cancer is the second most common cancer among women aged 15--44 years, with approximately 14,943 new cases diagnosed annually **(11)**. HPV is the primary cause of several cancers, including cervical cancer, which is the most frequently occurring HPV-related cancer **(12)**. Despite its prevalence, only 16.1% of women in Otukpo, Nigeria, have undergone recommended HPV/cervical cancer screenings **(13)**. Regional variations in HPV prevalence have been documented, with rates ranging from 14.7% in Irun to 37% in Abuja **(10, 14).**  A study in Awka, Nigeria, revealed that 19.5% of women attending a tertiary hospital tested positive for HPV DNA, with HPV 16 being the most common serotype **(15)**. Knowledge about HPV and its vaccines among adolescents is alarmingly low, with only 5.2% of students in one study demonstrating awareness of HPV and 17% being aware of the vaccine **(16)**. Similarly, a study in Nnewi reported that 65% of participants aged 15—18years had never heard of HPV or its vaccine **(17)**

**2.2 VACCINATION COVERAGE**

HPV vaccination coverage in Nigeria remains low, with only 13.7% of women in Otukpo having received at least one dose of the vaccine **(13)**. As shown in Figure 1, the HPV prevalence is highest in Abuja; however, vaccine uptake remains inexplicably low across all regions. The quadrivalent and bivalent vaccines, approved in 2006 and 2009, respectively, are effective when administered before sexual debut **(3, 4).** However, the vaccine is primarily available in private and public hospitals at a cost ranging from N9000 to N15000 per dose, making it inaccessible to many individuals **(18)**. The National Primary Health Care Development Agency is working to integrate HPV vaccination into the national immunization schedule, but progress has been slow **(18)**. Barriers to vaccination include a lack of awareness, cultural beliefs, and misinformation, particularly in northern Nigeria, where parents are hesitant to vaccinate their children **(19).**  Educational interventions have been shown to improve HPV knowledge and vaccine acceptability in other countries, but such initiatives are limited in Nigeria **(20)**.

**2.3 HPV VACCINATION IN SPECIAL POPULATIONS**

At pregnancy, human papillomavirus vaccination is recommended; nevertheless, routine pregnancy testing is not encouraged before receiving the vaccine. This is because it may prevent vaccination in populations where pregnancy tests are logistically/financially challenging (e.g., adolescents, low-resource settings). Unintentional vaccine administration during pregnancy has yielded reassuring safety data; however, such evidence remains limited due to the vaccine’s avoidance in routine prenatal use **(21, 22, 23)**. Individuals who conceive during their HPV vaccination regimen should defer the remaining doses until after childbirth, as continuation of the series post-pregnancy does not necessitate restarting from the beginning.
Breastfeeding individuals aged 26 or younger who have not received the HPV vaccine are eligible for vaccination, as research indicates it doesn't negatively impact breastfeeding safety or newborn health **(24)**. Immunocompromised patients are ineligible, but the three-dose schedule is recommended for all, including those under 15 years old **(25)**. It is advised that children who have been sexually abused or assaulted and have tested negative to the virus should get vaccinated against HPV for future eventualities particularly for lower income countries like Nigeria **(26)**.

## **2.4 SAFETY OF HPV VACCINE**

According to the Vaccination Adverse Events Reporting System, in 2006, over 270 million HPV vaccine doses were distributed globally to prevent the spread of HCV. After the distribution and administration on the study populations, the study revealed no adverse impacts or responses were found **(27)**. The 9-valent vaccine was more likely to cause erythema and edema at the injection site due to the higher number of antigens stimulating a stronger local immune response, possible differences in adjuvants or vaccine formulation, and the cumulative effect of multiple antigens leading to more inflammation at the injection site **(28)**. There were no concerns about its dependability between December 2014 and December 2017 **(29)**. Additionally, after receiving the quadrivalent vaccine, a study identified no health risks in those who received the 9-valent HPV vaccine **(21, 30)**.

## **2.5 VACCINE EFFICACY**

The effectiveness of Human Papillomavirus (HPV) vaccines is widely recognized, with studies showing over 99% efficacy when administered to women not exposed to specific HPV types **(28)**. The number of newly registered cases of genital warts, oropharyngeal cancer, and anogenital cancer in both men and women was believed to be significantly decreased by HPV vaccinations **(31, 32)**. From 2006 to 2014, the United States recorded a 71% reduction in vaccine-type HPV infection, and genital warts significantly declined in countries with high vaccination rates **(33)**. The 9-valent vaccine prevents approximately 99% of cases of HPV infection associated with genotypes 6, 11, 16, and 18 **(28)**.The HPV vaccine is reported to exhibit prophylactic properties; hence, it is a suitable recommendation as a preventive measure against HPV and other related infectious diseases. Although there is currently no evidence to support its use as a therapeutic vaccine, recent research indicate that it may be able to prevent recurring disorders **(24)**.

**2.6 BARRIERS TO VACCINATION**

Despite the availability of HPV vaccines since 2006, awareness and uptake remain low in Nigeria. Many parents and adolescents are hesitant to accept the vaccine because of concerns about safety and a lack of information **(34)** The high cost of the vaccine and its limited availability in public health facilities further exacerbate the problem **(35,36)**. While some African countries have made progress in HPV vaccination through GAVI support, Nigeria is still in the reintroduction phase **(37, 38).** Vaccine safety concerns, particularly among parents of teenage girls, remain a significant barrier to uptake **(39)**.

The key barriers to vaccination include the following:

1. **Limited Access and High Cost:** Vaccine, which cost between N9000 and N15000 per dose, remain unaffordable for many families **(18).**
2. **Lack of Awareness:** Studies reported that only 5.2% of adolescents have heard of HPV and its vaccine **(16)**.
3. **Cultural and religious concerns:** Misinformation associated with vaccines with infertility has led to parental resistance, particularly in northern Nigeria **(19)**.
4. **Healthcare System Challenges:** Limited vaccine availability in public health facilities and inconsistent policy implementation hinder national immunization efforts.

**2.7 PREVENTIVE AND ANTI-EPIDEMIC MEASURES**

Vaccination, cytological screening, and health education are the primary strategies for HPV prevention and control **(40)**. The WHO recommends HPV vaccination before sexual debut as the most effective preventive measure **(19)**. Regular HPV typing and Pap smear screening are essential for the early detection and treatment of precancerous lesions **(15)**. Therapeutic HPV vaccines, which target infected cells, are also being developed to complement prophylactic vaccines **(41)**. The 9-valent HPV vaccine, which protects against nine HPV types, has been available since 2016 and has shown significant efficacy in reducing HPV-related diseases **(42)**. The CDC and FDA recommend HPV vaccination for both males and females aged 12 to 26, with three doses administered over six months **(43)**. It has been shown that vaccination at a younger age (9–11 years) improves immune response and offers better protection against malignancies linked to HPV. **(44)**.

**3.0 DISCUSSION**

Table 1 shows the gap between the prevalence of HPV and vaccine uptake across Nigerian regions, highlighting the need to improve vaccine accessibility, affordability, and awareness campaign programs urgently. The existing disparities in vaccine coverage will continue to fuel the high burden of cervical cancer in Nigeria.

The low awareness and uptake of HPV vaccination in Nigeria highlight significant gaps in public health education and policy implementation. Studies reveal that only a small percentage of young women are knowledgeable about HPV and its vaccines, with vaccination rates as low as 1.5% in some regions **(17)**. This is in stark contrast to developed countries such as the United States, where vaccination rates are significantly higher **(45)**. The lack of awareness among parents and caregivers further highlights this problem, as they play a crucial role in vaccine uptake **(16)**. Addressing these barriers requires a multifaceted approach, including government-led vaccination programs, subsidized vaccine costs, and widespread public health campaigns.

**LIMITATIONS:** This review relied solely on available studies online, which may not have captured in detail HPV trends in all the regions in Nigeria. Additionally, some studies used a limited sample size, which may affect generalizability and accuracy. There are no longitudinal studies that have fully assessed the impact of vaccines throughout the year. Future research focusing on longitudinal studies evaluating the effectiveness of HPV vaccination programs in Nigeria is strongly encouraged.

**3.1 CONCLUSION**

HPV is still one of the dominant causes of cervical cancer in Nigeria, yet the use of vaccines is alarmingly low due to financial, cultural, and systemic constraints. Integrating HPV vaccination into the national immunization schedule, subsidizing vaccine costs, and implementing comprehensive health education programs in schools, religious institutions, and public spaces are essential to reduce the number of HPV-related cancer cases. Strong measures should be taken to increase public awareness through educational campaigns, parental engagement, and government subsidies, which will be essential for improving vaccine coverage and protecting the health of Nigerian women.

**4.0 RECOMMENDATIONS**

* Government Intervention: The Federal Government of Nigeria, through the Federal Ministry of Health and the National Primary Health Care Development Agency, should expedite the integration of HPV vaccination into the national immunization schedule. This will ensure that young girls receive the vaccine free of charge or at a highly subsidized cost.
* Public awareness campaigns: Intensive health promotion programs should be launched to increase awareness of HPV, its associated cancers, and the benefits of vaccination. These campaigns should target schools, religious institutions, and community centers to reach a broad audience.
* Parental Education: Parents and caregivers should be educated about the importance of HPV vaccination for their children. This can be achieved through workshops, seminars, and informational materials distributed in healthcare facilities and community centers.
* School-Based Vaccination Programs: HPV vaccination should be a prerequisite for admission to secondary schools. This will ensure that young girls are vaccinated before they become sexually active.
* Subsidized Vaccine Costs: The government should work with international organizations and pharmaceutical companies to reduce the cost of HPV vaccines, making them accessible to low-income families.
* Research and Monitoring: Further research is needed to understand the barriers to HPV vaccination in different regions of Nigeria. Continuous monitoring and evaluation of vaccination programs will help identify gaps and improve implementation strategies.

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**Author Contributions;**

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Ogadah Cletus Okechukwu conceptualized the research topic, designed the study framework, and supervised the systematic review process. He was responsible for drafting the introduction, discussion, and conclusion sections. Additionally, he ensured adherence to PRISMA guidelines, provided oversight of the methodology, and managed the manuscript submission, revisions, and correspondence with the journal.

**N .I.P. (Co-Author**)

Nweke Izuchukwu Prince conducted literature searches and data extraction from relevant studies. He contributed to structuring the methods and results sections, performed data interpretation and statistical analysis where applicable, and assisted in manuscript editing and reference management.

**C. C. V. (Co-Author)**

Chukwu Chibuike Victor contributed to reviewing the epidemiological data and analyzing the public health implications of HPV in Nigeria. He played a key role in drafting discussions on vaccination barriers and policy recommendations, preparing tables and figures summarizing key findings, and proofreading the final manuscript for accuracy and coherence before submission.

All authors have read and approved the final manuscript.

**Authorship:** I confirm the corresponding author has read the journal policies and submits this manuscript in accordance with those policies.

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