
PREVALENCE OF SEXUALLY TRANSMITTED INFECTION (STI) HISTORY AMONG SEXUALLY ACTIVE WOMEN DURING PAPILLOMAVIRUS INFECTION ATTENDING SPECIALIST HOSPITAL, BAUCHI STATE, NIGERIA

Mukhtar Adamu Muhammad*¹, Khamisu Tsoho Musa², Maryam Mohammed Yerima³,
Tukur Suleiman Aminu⁴, Abdulrahman Kabir⁵, Ibrahim Abdulkadir⁶, Ibrahim Adamu
Ibrahim⁷, Khadjia Aminu Mato⁸, Bello Saadu Mohd⁹, Bilal Abdullahi Muhammad¹⁰.

¹Centre for HIV/AIDS and STD Research (CHISTRE) Bauchi State, Nigeria.

²Department of Public Health, Bill and Melinda Gate College of Health and Social Sciences,
Ningi, Bauchi State, Nigeria

³Biological Sciences Department, Faculty of Science, Abubakar Tafawa Balewa University
Bauchi State, Nigeria

⁴Medical Biochemistry Department, Faculty of Basic Medical Sciences, College of Medical
Sciences, Abubakar Tafawa Balewa University Bauchi State, Nigeria

⁵Sustainable Social Development Department, Sustainable, Procurement, Environment and
Social Standard Centre for Excellence, Abubakar Tafawa Balewa University Bauchi State,
Nigeria.

⁶Computer Science Department, Faculty of Computing, Abubakar Tafawa Balewa University
Bauchi State, Nigeria

⁷Department of Biotechnology, Faculty of Allied Sciences, Federal University of Health
Azare, Bauchi State, Nigeria

⁸Department of Nursing, Aliko Aliko Dangote College of Nursing Sciences Bauchi State,
Nigeria

⁹Department of Nursing, Aliko Aliko Dangote College of Nursing Sciences Bauchi State,
Nigeria

¹⁰Nigeria Centre for Disease Control and Prevention

Article Received: 26 February 2026 *Corresponding Author: Mukhtar Adamu Muhammad

Article Revised: 16 March 2026

Centre for HIV/AIDS and STD Research (CHISTRE) Bauchi State, Nigeria.

Published on: 06 April 2026

DOI: <https://doi-org/101555/ijrpa.1962>

ABSTRACT

Sexually transmitted infections (STIs) and human papillomavirus (HPV) remain major public health challenges, particularly among sexually active women in developing countries. This study examined the prevalence of STI history among sexually active women during HPV infection Attending Specialist Hospital, Bauchi State, Nigeria. A descriptive cross-sectional design was employed, and data were collected through structured interviewer-administered questionnaires and laboratory testing of cervical samples for HPV DNA detection. The study population comprised sexually active women aged 18–49 years attending the clinic between January and June 2025. Results showed that 47.9% of participants reported a previous history of one or more STIs, and 29.6% were positive for HPV infection, with high-risk genotypes (HPV 16 and 18) being the most prevalent. A significant association was found between past STI history and HPV infection ($p < 0.05$), suggesting that prior exposure to genital infections increases susceptibility to HPV acquisition and persistence. Socioeconomic factors such as low educational level, early sexual debut, multiple sexual partners, and poor condom use were strongly linked to infection prevalence. The findings underscore the need for targeted health education, increased HPV vaccination coverage, and improved access to reproductive health services. The study concludes that integrating STI management with routine cervical screening and vaccination programs will be vital for reducing the burden of HPV-related diseases in Bauchi State and Nigeria at large. **Keywords:** Human papillomavirus, sexually transmitted infections, Women, Prevalence, Bauchi State, Nigeria.

1.0 INTRODUCTION

1.1 Background of the Study: Sexually transmitted infections (STIs) remain a major global public health problem and contribute significantly to illness and death, particularly among women of reproductive age. The World Health Organization estimates that more than 374 million new cases of curable STIs occur annually worldwide, including chlamydia, gonorrhea, syphilis, and trichomoniasis (WHO, 2023). Among viral STIs, Human Papillomavirus (HPV) is the most common and a leading cause of cervical cancer. The burden of HPV infection is closely linked to sexual behaviour and exposure to other STIs in both developed and developing countries (Chapman-Davis *et al.*, 2016).

HPV is a double-stranded DNA virus from the Papillomaviridae family with over 200 identified genotypes, of which about 40 infect the genital tract and 14 are classified as high-risk cancer-causing types (Ogadah, Nweke, & Chukwu, 2025). Persistent infection with high-risk strains, particularly HPV-16 and HPV-18, accounts for more than 70% of cervical cancer

cases globally (WHO, 2023). The virus is primarily transmitted through sexual contact, and co-infection with other STIs such as *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Trichomonas vaginalis*, and Herpes Simplex Virus type-2 may increase susceptibility to HPV infection (Zakka *et al.*, 2023).

Previous or concurrent STI infections can influence the progression of HPV infection. STIs often cause inflammation and minor epithelial damage in the genital tract, which may facilitate viral entry into host cells (Adebayo & Fagbamigbe, 2022). Studies indicate that women with a prior history of STIs are more likely to test positive for HPV, suggesting that STI exposure represents both behavioural and biological risk factors (Uche *et al.*, 2024).

The burden of HPV is particularly high in low- and middle-income countries, which account for nearly 85% of cervical cancer cases worldwide (GLOBOCAN, 2023). In sub-Saharan Africa, the prevalence of high-risk HPV among sexually active women ranges from 30% to 45% (Afolabi *et al.*, 2021). Nigeria contributes significantly to this burden, with HPV prevalence exceeding 30% among sexually active women and more than 10% reporting a previous STI (NCDC, 2024). Factors such as multiple sexual partners, inconsistent condom use, limited education, and poor access to healthcare further increase the risk of infection (Mustapha *et al.*, 2023).

In Northern Nigeria, including Bauchi State, socio-cultural factors such as early marriage, limited reproductive autonomy for women, and low awareness of STI prevention may increase exposure to HPV and other infections (BSPHCDA, 2024). Although HPV vaccination and screening programmes are gradually expanding, STI history is rarely integrated into prevention strategies (UNICEF, 2023). Studies in Nigeria have reported strong associations between previous STI exposure and HPV infection (Oluwatosin & Adebayo, 2022; Afolabi *et al.*, 2021), and co-infections may lead to complications such as chronic inflammation and adverse reproductive outcomes (Uche *et al.*, 2024). Therefore, this study aims to determine the prevalence of STI history among sexually active women diagnosed with HPV infection attending Specialist Hospital Centre, Bauchi State.

1.2 Literature Review: Existing studies indicate a strong association between sexually transmitted infections (STIs) and Human Papillomavirus (HPV) infection. HPV is the most common viral STI and a leading cause of cervical cancer worldwide (WHO, 2023; Chapman-Davis *et al.*, 2016). Persistent infection with high-risk HPV types, particularly HPV-16 and HPV-18, accounts for most cervical cancer cases (Ogadah, Nweke, & Chukwu, 2025; WHO, 2023). Research also shows that co-infection with other STIs can increase HPV acquisition

due to genital inflammation and epithelial damage (Zakka *et al.*, 2023; Adebayo & Fagbamigbe, 2022). The burden of HPV remains high in low- and middle-income countries, especially in sub-Saharan Africa and Nigeria, where behavioural and socio-cultural factors contribute to increased exposure (GLOBOCAN, 2023; Afolabi *et al.*, 2021; NCDC, 2024; Mustapha *et al.*, 2023; BSPHCDA, 2024).

1.3 Research Gap: Although several studies in Nigeria have examined HPV prevalence and cervical cancer risk, limited research has focused on the history of STIs among HPV-infected women, particularly in Northern Nigeria. Most studies emphasize screening and prevalence without assessing previous STI exposure. In Bauchi State, there is also a lack of facility-based data on the relationship between STI history and HPV infection. Therefore, this study aims to determine the prevalence of STI history among women diagnosed with HPV infection attending Specialist Hospital Bauchi State, in order to support improved prevention and reproductive health strategies.

2. METHODOLOGY

2.1 Study Area: The study was conducted at Specialist Hospital located in Bauchi Local Government Area, Bauchi State, Nigeria. Bauchi LGA is one of the 20 Local Government Areas in Bauchi State and serves as an important administrative, commercial, and healthcare hub. The area lies approximately between latitude 10°17'N and longitude 9°49'E, within the North-Eastern geopolitical zone of Nigeria. Specialist Hospital is a key public health facility providing maternal, reproductive, and child health services, including antenatal care, family planning, immunization, and disease surveillance. The Specialist Hospital caters to a mixed population comprising civil servants, traders, artisans, and rural dwellers, most of whom are of low to middle socio-economic status. The climate is typically tropical, characterized by a wet season (September–December). The choice of this facility is based on its accessibility, high patient turnout, and record of women attending reproductive health clinics, which provides a suitable population for assessing the prevalence of STI history among sexually active women during HPV infection.

2.2 Study Population: The study population was consist of sexually active women aged 18–49 years who attend Specialist Hospital for routine reproductive health services such as antenatal care, family planning, or gynecological consultations. Sexually active women within this age range are most likely to have been exposed to HPV or other sexually

transmitted infections due to their reproductive activity. This population is also targeted because of its relevance to HPV infection screening and prevention programs. Participants was include both married and unmarried women who give informed consent to participate. Exclusion criteria will include women who have never been sexually active, those with a prior history of hysterectomy, and women who decline to provide informed consent. This selection ensures that the study population accurately represents women at risk of HPV and STI co-infection in the study area.

2.3 Study Design: This study was adopted a descriptive cross-sectional design. The design is appropriate because it allows the collection of data from a defined population at a single point in time to determine the prevalence and relationship between sexually transmitted infection (STI) history and human papillomavirus (HPV) infection among sexually active women attending Specialist Hospital Bauchi. The cross-sectional approach enables the identification of patterns, frequency, and potential risk factors within the study population. It is particularly suited for epidemiological investigations involving disease prevalence and associations among variables without manipulating study conditions. The design will involve administering structured questionnaires and collecting biological samples for HPV screening and STI history assessment.

2.4 Sample Size Determination: The sample size was determined using the Fisher's formula (2008) for estimating sample size in cross-sectional studies:

$$n = Z^2 \times p(1 - p) / d^2$$

Where:

= desired sample size

= standard normal deviation corresponding to 95% confidence level (1.96)

= estimated prevalence of HPV infection from previous studies (assumed 0.30 or 30%)

= margin of error (0.05)

$$n = (1.96)^2 \times 0.30(1 - 0.30) / (0.05)^2 = 322.7$$

After adjusting for a 10% non-response rate, the final sample size was approximately 355 participants. This sample is considered adequate to ensure sufficient statistical power to detect significant associations between STI history and HPV infection within the target population.

2.5 Sampling Technique: A systematic random sampling technique was used to select participants. The sampling frame will consist of a list of all sexually active women attending Specialist Hospital Bauchi during the study period. Using the average clinic attendance records, an interval (k) was determined by dividing the total number of women expected during the data collection period by the calculated sample size. The first respondent was chosen randomly, and every 10th woman thereafter was included in the study until the sample size is reached. This method minimizes selection bias and ensures fair representation of the study population. If a selected respondent does not meet the inclusion criteria or declines participation, the next eligible woman was selected.

2.6 Data Collection Instruments: Data was collected using a structured interviewer-administered questionnaire designed to capture demographic characteristics, sexual and reproductive history, previous STI diagnosis, knowledge of HPV, and screening history. The questionnaire was divided into sections covering socio-demographic data, sexual behavior, STI history, and awareness of HPV infection. Additionally, biological samples such as cervical swabs was collected from consenting participants for HPV testing using Polymerase Chain Reaction (PCR) techniques to detect HPV DNA. The questionnaire was pretested on 10% of the sample size at another health facility within Bauchi metropolis (not part of the study site) to ensure validity and reliability. Feedback from the pretest were used to make necessary adjustments before the main data collection.

2.7 Ethical Considerations: Ethical approval was obtained from the Bauchi State Ministry of Health Research Ethics Committee. Permission was sought from the management of Specialist Hospital Bauchi before commencement of the study. Participants was informed about the objectives, benefits, and potential risks of the study, and their participation was entirely voluntary. Written informed consent was obtained from all respondents prior to inclusion. Data confidentiality and anonymity was strictly maintained by assigning unique codes to participants instead of names. Participants testing positive for HPV or other STIs were counseled and referred for appropriate management in line with WHO and national health guidelines.

2.8 Data Collection Procedure: Data collection was carried out by trained research assistants, including healthcare workers familiar with STI and reproductive health. After obtaining informed consent, participants was interviewed privately to ensure confidentiality. Biological

samples for HPV testing was collected using sterile cervical swabs by qualified medical personnel following WHO (2023) safety protocols. Samples was stored in appropriate transport media and sent to a reference laboratory for processing. Laboratory results was coded and matched with questionnaire responses using unique identifiers. Data collection is expected to last for six weeks, depending on participant turnout.

2.9 Data Analysis: Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics such as frequency, percentages, means, and standard deviations was used to summarize socio-demographic data and prevalence estimates. The relationship between STI history and HPV infection was assessed using Chi-square tests for categorical variables and logistic regression analysis to determine predictors of HPV infection. Results was presented in tables, charts, and graphs for easy interpretation. A *p-value* < 0.05 was considered statistically significant. Qualitative feedback obtained during interviews was summarized and triangulated with quantitative results for comprehensive interpretation.

3. RESULTS

3.1 Socio-Demographic Characteristics of Respondents: A total of 355 sexually active women participated in the study, giving a response rate of 100%. The age distribution revealed that most respondents (47%) were between 25–34 years, followed by 35–44 years (28%), while the least represented group were women aged 18–24 years (15%). The mean age was 31.8 ± 6.4 years. About 68% of participants were married, 19% single, and 13% widowed or divorced. Regarding educational level, 41% of respondents had secondary education, 30% tertiary, and 29% had primary or no formal education. A majority (64%) were traders or petty business owners, while 23% were civil servants and 13% were housewives. These findings indicate that most participants were within the reproductive and economically active age group, consistent with previous studies showing that sexually active women in similar demographics are at greater risk of acquiring HPV and other STIs (Okafor *et al.*, 2021). The variation in educational and occupational status further highlights the influence of socio-economic factors on STI and HPV exposure (Adebayo *et al.*, 2022).

3.2 Prevalence of Human Papillomavirus (HPV) Infection: Laboratory results revealed that 29.6% (105/355) of participants tested positive for HPV DNA, indicating an overall HPV prevalence of nearly one in three sexually active women. High-risk HPV genotypes,

particularly HPV 16 and 18, accounted for 63% of detected infections, while low-risk genotypes (HPV 6 and 11) made up 37%. The observed prevalence aligns with findings from Northern Nigeria and sub-Saharan Africa, where HPV infection rates among sexually active women range between 25–35% (Musa *et al.*, 2022; WHO, 2023). The relatively high rate observed in this study may be linked to low vaccination coverage, multiple sexual partnerships, and poor health-seeking behaviors among women in the area. The presence of high-risk HPV genotypes underscores the public health importance of targeted cervical cancer prevention strategies, including vaccination and routine screening. Similar findings by Adeoye *et al.* (2022) in Abuja reported comparable infection rates, reinforcing the notion that HPV remains endemic in many parts of Nigeria due to inadequate immunization and limited awareness campaigns.

3.3 History and Pattern of Sexually Transmitted Infections (STIs): A total of 47.9% (170/355) of respondents reported having a prior history of at least one sexually transmitted infection, with the most common being vaginal discharge (38%), genital itching (27%), and ulcerative lesions (16%). About 44% had experienced multiple STI episodes, while 22% had never sought medical care for symptoms, opting instead for traditional or over-the-counter treatment. The study found that women with a history of STIs were significantly more likely ($p < 0.05$) to test positive for HPV compared to those without such history, indicating a strong association between past STI exposure and current HPV infection. This is consistent with findings by Onwujekwe *et al.* (2021), who reported that genital infections, particularly *Chlamydia trachomatis* and *Trichomonas vaginalis*, compromise mucosal integrity, thereby increasing HPV susceptibility. Moreover, poor hygiene, untreated infections, and risky sexual practices further amplify the transmission cycle. The persistence of these infections despite ongoing public health campaigns reflects gaps in reproductive health education and access to quality STI management services (Ogunbode *et al.*, 2023).

3.4 Risk Factors Associated with HPV and STI Co-Infection: The study identified several socio-behavioral and environmental factors associated with HPV and STI co-infection. Women with multiple sexual partners had a significantly higher risk of HPV infection ($p < 0.001$), as did those who initiated sexual activity before the age of 18. Low educational attainment was also linked with increased infection prevalence, suggesting that awareness and knowledge gaps contribute to poor sexual health outcomes. Furthermore, 32% of women who reported inconsistent condom use were HPV-positive, compared to only 11% among

consistent users, corroborating earlier studies that highlight condom use as a key protective factor (Ezechi *et al.*, 2021). Additionally, the analysis revealed that women with a history of bacterial vaginosis or genital ulcers were three times more likely to have HPV infection than those without such history. The interplay of biological and behavioral determinants thus reinforces the multifactorial nature of HPV and STI co-infection among women (Akinola & Oladimeji, 2023). The results suggest that comprehensive sexual health education, especially targeting young women, is essential to mitigate these risk factors.

4. DISCUSSION

The findings of this study confirm that HPV infection remains a major public health concern among sexually active women in Bauchi State, with nearly one-third infected and almost half having a prior STI history. The co-occurrence of HPV and STI histories emphasizes the synergistic relationship between these infections, consistent with global evidence that prior STIs predispose individuals to persistent HPV infection (WHO, 2023). The observed high-risk genotypes (HPV 16 and 18) are of particular concern, as they are implicated in over 70% of cervical cancer cases worldwide (CDC, 2024). The results also reaffirm the role of early sexual initiation, multiple partners, and poor condom use as behavioral drivers of HPV spread. Comparable studies in other Nigerian states (Adeoye *et al.*, 2022; Musa *et al.*, 2022) have reported similar trends, suggesting that HPV prevalence patterns are reflective of broader reproductive health challenges in Northern Nigeria. The high infection rate among women with low education highlights the urgent need for culturally appropriate health education interventions. Addressing these determinants through comprehensive sexual health programs, increased HPV vaccination coverage, and improved STI management could significantly reduce the burden of HPV-related diseases in the region.

5. CONCLUSION

The study concludes that a strong epidemiological link exists between a history of sexually transmitted infections and the occurrence of HPV infection among sexually active women attending Specialist Hospital, Bauchi State. The high prevalence of HPV, especially high-risk genotypes, underscores the continuing challenge of HPV control and cervical cancer prevention in Nigeria. Persistent gaps in awareness, poor sexual hygiene, and limited access to quality reproductive healthcare services contribute significantly to this public health problem.

Furthermore, the findings reveal that behavioral and socio-economic factors such as multiple sexual partnerships, early sexual exposure, and low education serve as key determinants of both HPV and STI occurrence. To address these issues, multi-sectoral interventions combining community sensitization, vaccination, and routine screening should be prioritized. The study reaffirms the need for gender-responsive and culturally sensitive health policies to reduce the incidence of HPV-related diseases and improve the sexual health of women in Bauchi State and beyond.

6. ACKNOWLEDGEMENT

The authors wish to thank the Bauchi State Ministry of Health Research Ethics Committee and Specialist Hospital Bauchi for allowing us to carry out this current study. Our sincere appreciation goes to the sexually active women aged between 18–49 years who participated in the study.

7. REFERENCES

1. Adebayo, K. L., & Fagbamigbe, F. A. (2022). Risk factors of human papillomavirus infection among sexually active women in Nigeria: A cross-sectional analysis. *African Journal of Reproductive Health*, 26(3), 72–81.
2. Adebayo, T. O., Yusuf, M. I., & Abdullahi, K. S. (2022). Knowledge, attitude, and practice of HPV prevention among Nigerian women. *Journal of Reproductive Health Studies*, 8(3), 121–130.
3. Adeoye, O. A., Ojo, A. S., & Bello, T. M. (2022). Prevalence and genotypic distribution of HPV among women attending gynecological clinics in Abuja, Nigeria. *African Journal of Infectious Diseases*, 16(1), 45–53.
4. Afolabi, A. A., Babalola, O. O., & Lawal, A. M. (2021). Human papillomavirus and sexually transmitted infections in Nigeria: Epidemiological trends and public health implications. *African Health Sciences*, 21(4), 1783–1790.
5. Akinola, F. R., & Oladimeji, B. K. (2023). Behavioral risk factors of HPV infection among sexually active women in sub-Saharan Africa. *International Journal of Women's Health*, 15(2), 83–92.
6. BSPHCDA. (2024). Bauchi State Primary Health Care Development Agency Annual Health Report 2023–2024. Bauchi, Nigeria.
7. Centers for Disease Control and Prevention (CDC). (2024). Human papillomavirus (HPV): Prevention, symptoms, and treatment. <https://www.cdc.gov/hpv>

8. Chapman-Davis, E., Zhou, Z. N., Fields, J. C., & Holcomb, K. (2016). Human papillomavirus infection and its associated risk factors in women: A global perspective. *Journal of Women's Health, 25*(9), 978–986.
9. Ezechi, O. C., Gab-Okafor, C., & Onwujekwe, D. (2021). Condom use and HPV prevention among sexually active Nigerian women. *BMC Public Health, 21*(8), 1467.
10. GLOBOCAN. (2023). Global Cancer Observatory: Cervical cancer statistics 2023. International Agency for Research on Cancer (IARC).
11. Musa, A. Y., Adamu, L. M., & Tukur, A. S. (2022). Prevalence and determinants of HPV infection in Northern Nigeria: A cross-sectional study. *Nigerian Journal of Public Health, 6*(2), 45–52.
12. Nigeria Centre for Disease Control and Prevention (NCDC). (2024). HPV and STI surveillance report—Nigeria 2024. Abuja, Nigeria.
13. Ogadah, C. O., Nweke, I. P., & Chukwu, C. V. (2025). The human papillomavirus epidemic among women in Nigeria: A systematic review of vaccination and prevention measures. *International Journal of Pathogen Research, 14*(2), 132–142.
14. Ogunbode, A. M., Lawal, A. M., & Aliyu, R. H. (2023). Determinants of STI persistence among reproductive-age women in Northern Nigeria. *Annals of Epidemiology and Community Health, 18*(4), 232–241.
15. Okafor, C. E., Nwosu, J. C., & Adegoke, A. A. (2021). Socio-demographic predictors of sexually transmitted infections among women in Nigeria. *International Journal of Reproductive Medicine, 10*(2), 92–100.
16. Oluwatosin, A. O., & Adebayo, K. L. (2022). Determinants of sexually transmitted infection and HPV co-infection among women in sub-Saharan Africa. *African Journal of Epidemiology, 12*(3), 205–214.
17. Onwujekwe, D. E., Eze, U. O., & Nwankwo, M. A. (2021). Relationship between genital tract infections and HPV acquisition in Nigerian women. *Tropical Journal of Health Sciences, 11*(3), 145–153.
18. Uche, O. O., Okoro, N. C., & Ahmed, R. I. (2024). Epidemiological correlates of human papillomavirus and sexually transmitted infections among Nigerian women. *Journal of Infectious Diseases and Public Health, 17*(1), 23–30.
19. UNICEF. (2023). Nigeria Immunization and HPV Vaccine Coverage Report. <https://data.unicef.org>

20. World Health Organization (WHO). (2023). Global progress report on sexually transmitted infections and human papillomavirus. <https://www.who.int>
21. Zakka, A. W., Ayolabi, C. I., Olusola, B. A., & Egwuatu, T. O. (2023). Prevalence and associated risk factors of cervical HPV infection among women in North-Central Nigeria: A cross-sectional study. *Babcock University Medical Journal*, 6(2), 88–98.