

Prevalence and factors associated with bacterial vaginosis among women of reproductive age attending General Hospitals in Sokoto State, Nigeria

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ABSTRACT

Background: Bacterial vaginosis (BV) is a common vaginal infection that poses serious reproductive health risks, including increased gynecological morbidity and adverse obstetric outcomes. Understanding its prevalence and associated factors among women of reproductive age is essential for improving prevention and treatment. **Aim:** This study aimed to assess the prevalence and associated factors of BV among women of reproductive age attending general hospitals in Sokoto State, Nigeria. **Materials and Methods:** A cross-sectional survey was conducted among 496 women aged 15-49, selected through multi-stage sampling from a population of 1,230,388. Data were collected using a checklist based on Amsel's criteria for diagnosing BV and analyzed using descriptive statistics, and Pearson's chi-square test. **Results:** The prevalence of BV was 64.5%. Women aged 15-34 years, those who were married, housewives, and those residing in rural areas had higher BV prevalence. Occupation was significantly associated with BV ($p < 0.05$), but age, education level, marital status, and residence showed no significant associations ($p > 0.05$). **Conclusion:** The high prevalence of BV among women of reproductive age in Sokoto State, Nigeria, with a notable association between BV and occupation, particularly among housewives, underscores the potential for increased gynecological morbidity and adverse outcomes like preterm delivery and pelvic inflammatory disease. These findings align with research across Nigeria and sub-Saharan Africa, indicating that socio-demographic factors, healthcare access limitations, and cultural practices drive BV's high prevalence. Effective interventions require targeted public health efforts, economic empowerment, and expanded healthcare access to improve reproductive health outcomes.

Keywords: Bacterial vaginosis, prevalence, associated factors, reproductive health, Sokoto State

INTRODUCTION

Bacterial vaginosis (BV) is a common vaginal condition caused by an imbalance in the normal bacterial flora of the vagina, where an overgrowth of anaerobic bacteria replaces the typical lactobacilli. Globally, BV is recognized as the most prevalent cause of vaginal discharge among women of reproductive age, accounting for significant gynecological and obstetric morbidity.¹ The condition increases the risk of several adverse health outcomes, including pelvic inflammatory disease (PID), preterm birth, and increased susceptibility to sexually transmitted infections (STIs), including HIV.^{2,3}

Studies have shown that women diagnosed with BV have a significantly higher risk of preterm labor, low birth weight infants, and even spontaneous abortions.^{4,5} These complications make it a critical issue in reproductive health care globally.

In sub-Saharan Africa, the burden of BV remains high, contributing significantly to poor maternal health outcomes. For instance, in countries such as Nigeria, BV is a major public health concern due to its strong association with poor obstetric outcomes and increased risk of HIV transmission.^{6,7}

The widespread occurrence of BV in developing countries exacerbates the already high rates of maternal and neonatal morbidity and mortality, further complicating efforts to achieve global health targets related to maternal and child health.⁸ In Nigeria, several studies have demonstrated the high prevalence of BV among women of reproductive age. A study conducted in a tertiary health institution, southwestern Nigeria reported that the prevalence of BV among pregnant women with abnormal vaginal discharge was 16.6%.⁹

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Similarly, a hospital-based study in Lagos found that 34.9% of pregnant women presented with BV, emphasizing the magnitude of the condition in both urban and rural settings.¹⁰ The variation in BV prevalence across different regions of Nigeria can be attributed to a range of factors, including differences in sexual behaviors, hygiene practices, socioeconomic status, and access to healthcare.¹¹ For example, BV has been shown to be more common among women from lower socioeconomic backgrounds who may have limited access to proper hygiene and health care services.¹² Thus, understanding the local prevalence and associated risk factors is crucial for tailoring public health interventions in these communities.

The development of BV is influenced by a range of behavioral, socio-demographic, and biological factors. Studies have consistently shown that BV is more common in women with multiple sexual partners, those who engage in unprotected sexual intercourse, and those with a history of sexually transmitted infections.^{13,14} In Nigeria, research has highlighted the role of sexual activity in the development of BV, with studies indicating that women with early sexual debut and multiple sexual partners are at increased risk.¹¹ Other associated factors include poor vaginal hygiene practices, such as frequent douching, and socioeconomic factors like low educational attainment and occupation, particularly in women engaged in informal or low-income jobs.^{9,10}

Further, biological factors such as hormonal changes during pregnancy or the menstrual cycle can alter the vaginal environment and predispose women to BV.¹⁵ In northern Nigeria, cultural practices and beliefs surrounding sexual health and hygiene may also play a significant role in the development of BV, with certain communities practicing vaginal cleansing techniques that disrupt the natural flora.¹⁶ This makes it imperative to assess the specific factors contributing to the high prevalence of BV in Sokoto State to implement effective prevention strategies.

BV is not only a common cause of vaginal discharge but also has profound clinical implications for reproductive health. Women with BV are at increased risk of developing pelvic inflammatory disease (PID), which can lead to chronic pelvic pain, infertility, and ectopic pregnancy.³ In a study conducted in Nigeria, BV was identified as a significant contributor to gynecological

morbidities such as PID, which is a major cause of infertility among women in the country.⁶ Furthermore, BV has been implicated in poor pregnancy outcomes, including preterm delivery and low birth weight.^{8,17}

The link between BV and increased susceptibility to STIs, including HIV, is well-documented. BV alters the vaginal environment, reducing the protective role of lactobacilli and increasing the susceptibility to infections.¹⁸ This has important public health implications, particularly in areas with high HIV prevalence, such as sub-Saharan Africa. For women in northern Nigeria, where cultural factors may limit access to reproductive health services, the burden of BV and its complications could be significant.

Despite the known prevalence and health risks associated with BV, there is a dearth of research on the condition in Sokoto State, a region with unique socio-cultural dynamics that may influence reproductive health outcomes. Sokoto State, located in northwestern Nigeria, has a predominantly Muslim population with cultural norms that influence sexual behavior, reproductive health practices, and access to healthcare services.¹⁹ The limited availability of reproductive health services, coupled with low levels of health literacy, particularly among women of reproductive age, may exacerbate the prevalence of BV and its associated complications in the region. Given the high burden of maternal and neonatal morbidity in Sokoto State, understanding the prevalence and associated factors of BV is essential for informing public health strategies aimed at improving reproductive health outcomes. This study aims to fill the knowledge gap by investigating the prevalence of BV among women attending general hospitals in Sokoto State and identifying the socio-demographic and behavioral factors associated with the condition.

MATERIALS AND METHODS

Study Design, Population and Area

This was a cross-sectional study among women of reproductive age (15 to 49 years) attending general hospitals in Sokoto State, Nigeria. All those who gave consent to participate in the study were considered eligible and enrolled in the study.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 480 using the Cochrane formula for estimating sample size in cross-sectional

studies,²⁰ based on a null prevalence of 50% (since no similar previous study was available), a 5% margin of error, and an anticipated 80% response rate. A multi-stage sampling technique was employed to select the eligible participants. In stage 1, the state was clustered based on the 3 senatorial zones and stratified into urban and rural Local Government Areas (LGAs). One urban and one rural Local Government Area was then selected from each senatorial zone. In stage 2, one general hospital was selected from the selected LGAs. In stage 3, the number of participants selected from the selected general hospitals was allocated proportionately based on the patient load, and they were selected using a systematic sampling technique using the patients' attendance list to constitute the sampling frame.

Data Collection

A structured interviewer-administered questionnaire was developed and used to obtain information on the research variables. The instrument contained two sections, i.e., sections A and B. Section A contained five items on the sociodemographic characteristics of the study participants. Section B contained the adopted Amsel Clinical Criteria Checklist,²¹ which contains 4-items for determining the prevalence of bacterial vaginosis, including the presence of vaginal pH > 4.5, clue cells, positive whiff test and characteristic vaginal discharge (thin whitish or grey homogenous milky discharge). Hence, for any women that had three (3) or all four (4) criteria indicating the presence of bacterial vaginosis, litmus paper was inserted in the vaginal discharge, and thereafter, the colour change was read against the corresponding pH value. Thus, a decision was made regarding the pH being either greater than or less than 4.5. On clue cell identification, a wet mount was made with the vaginal discharge on a slide using normal saline. The clue cells are vaginal epithelial cells coated with bacteria that look speckled rather than translucent and have serrated or unclear borders because of the adherent bacteria. A positive whiff test is an accentuation of amine or fishy odour when vaginal fluid is prepared with a 10 per cent potassium hydroxide solution.

A vaginal swab was taken from the participants who consented to participate in the study, following which they were asked to complete the questionnaire. Four research assistants assisted in data collection after being trained on the study's objectives, participant selection, and data collection procedure. The research tools were pretested on 30 women of childbearing age attending one of the facilities that were not selected for the study. This was done to familiarize the research assistants with the survey tools and to detect any ambiguity that requires modifications.

Data Analysis

The returned questionnaires were cross-checked for completeness of responses. Data were analyzed using IBM SPSS version 25 computer statistical software package. Quantitative variables were summarized using mean and standard deviation, while categorical variables were summarized using frequencies and percentages. The chi-square test was used to establish associations between the sociodemographic variables and the presence of bacterial vaginosis. All levels of significance were set at $p < 0.5$.

Ethical Consideration

A letter of introduction was obtained from the Head of the Department of Human Kinetics and Health Education, Ebonyi State University, Abakaliki. Also, ethical approval was obtained from the Sokoto State Research and Ethics Committee. The letter of introduction and ethical approval were presented to the Chief Medical Directors of the selected hospital for permission to conduct the study in their respective facilities. The purpose of the study was explained to the participants, and they were assured of the confidentiality of the information they gave. Informed written consent was also obtained from them before commencing data collection.

RESULTS

Sociodemographic characteristics of participants

All 496 questionnaires administered were filled out and used for analysis, giving a response rate of 100%. The majority of participants were aged 15-34 (85.5%) and married (86.9%). A larger proportion of participants had no formal education (45.4%), were housewives (88.9%), and resided in urban communities (83.1%) (Table 1).

Prevalence and factors associated with bacterial vaginosis among participants

Three hundred and twenty (64.5%) of the 496 participants had bacterial vaginosis (Figure 1). Although the prevalence of BV was higher among participants aged 15-34, those who were married, housewives, and those residing in rural areas, BV was associated with only the participants' occupations. The prevalence of bacterial vaginosis was significantly higher among housewives (66.9%) than among artisans (57.1%), civil servants (43.9%), and farmers (33.3%), $LR\chi^2 = 11.964$, $p = 0.018$ (Table 2).

Table 1: Sociodemographic characteristics of participants

Variables	Frequency (%) n = 496
Age group (years)	
15-34	425 (85.5)
35-49	72 (14.5)
Marital status	
Single	44 (8.9)
Married	431 (86.9)
Divorced	21 (4.2)
Level of education	
No formal education	225 (45.4)
Primary	40 (8.1)
Secondary	173 (34.9)
Tertiary	58 (11.7)
Occupation	
Farmer	6 (1.2)
Artisan	7 (1.4)
Civil servant	41 (8.3)
Housewife	441 (88.9)
Student	1 (0.2)
Residence	
Urban	412 (83.1)
Rural	84 (16.9)

DISCUSSION

This study investigated the prevalence and factors associated with bacterial vaginosis (BV) among women of reproductive age attending general hospitals in Sokoto State, Nigeria. A majority of the participants in this study were young (aged 15-34) and married, with a significant portion having no formal education, identifying as housewives, and residing in urban areas. These socio-demographic patterns align with other studies in northern Nigeria, where young age, limited formal education, and urban residency are prominent among women of reproductive age seeking care in general hospitals.^{22,23} This trend may reflect the higher fertility rates in younger women and the cultural emphasis on early marriage in many northern Nigerian communities.²⁴ The high prevalence of housewives among the participants is also notable, as this occupation type often correlates with lower health literacy and access to healthcare resources, both of which are potential risk factors for bacterial vaginosis (BV).²⁵

The prevalence of BV in this study was 64.5%, which is relatively high and consistent with findings from other Nigerian studies. For example, studies in Benin City and Ilorin reported BV prevalence rates of 45.3% and 40.1%, respectively, among women attending healthcare facilities.^{11,26} In contrast, studies conducted in Lagos,

Nnewi, and Ado-Ekiti reported lower prevalence rates of 26.0%, 21.7%, and 16.1%, respectively.^{4,9,27} These variations may be attributed to differences in socio-demographic characteristics, lifestyle factors, and healthcare accessibility across regions. Urban residency among the majority of participants suggests greater healthcare accessibility in urban areas compared to rural settings, a disparity observed across various parts of Nigeria.²² The high prevalence of BV observed in this study may reflect certain socio-cultural practices in northern Nigeria, such as specific cleansing practices that may disrupt vaginal flora, or dietary patterns that could affect microbial balance.⁶ Additionally, limited access to health education and preventive measures may contribute to the high rates of BV in this population. These findings highlight the importance of culturally tailored interventions to reduce the incidence of BV among women in this region.

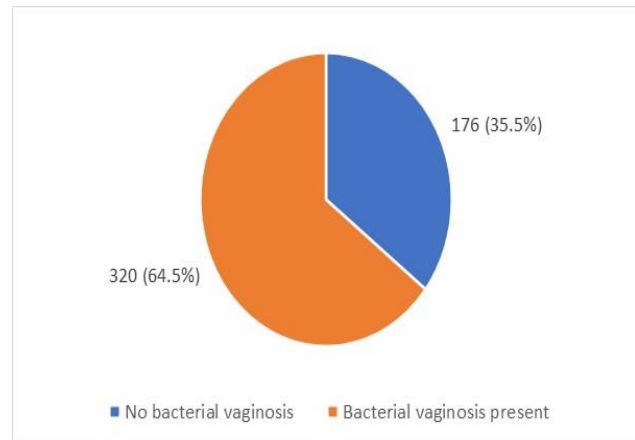


Figure 1: Prevalence of bacterial vaginosis among participants

Studies conducted in other African countries also show wide variations in BV prevalence rates across the continent, with high prevalence rates of 50.0% and 49.8% obtained in Ethiopia and Sudan, respectively,^{28,29} and lower prevalence rates observed in some East African countries, such as Tanzania (28.5%) and Kenya (19.2%).^{30,31} Regional differences in healthcare accessibility and educational outreach efforts may explain this. East African countries have implemented various community-based interventions and educational programs focused on reproductive health, potentially lowering BV prevalence.^{30,31}

Table 2: Factors associated with bacterial vaginosis among participants

Variables	Bacterial Vaginosis		Test of significance
	Present Frequency (%)	Absent Frequency (%)	
Age group (years)			
15-34	276 (65.1)	148 (34.9)	$\chi^2 = 0.427$, p = 0.514
35-49	44 (61.1)	28 (38.9)	
Marital status			
Single	25 (56.8)	19 (43.2)	$\chi^2 = 4.245$, p = 0.120
Married	285 (66.1)	146 (33.9)	
Divorced	10 (47.6)	11 (52.4)	
Level of education			
No formal education	149 (66.2)	76 (33.8)	$\chi^2 = 4.987$, p = 0.173
Primary	23 (57.5)	17 (42.5)	
Secondary	117 (67.6)	56 (32.4)	
Tertiary	31 (53.4)	27 (46.6)	
Occupation			
Farmer	2 (33.3)	4 (66.7)	LR $\chi^2 = 11.964$, p = 0.018*
Artisan	4 (57.1)	3 (42.9)	
Civil servant	18 (43.9)	23 (56.1)	
Housewife	295 (66.9)	146 (33.1)	
Student	1 (100)	0 (0)	
Place of residence			
Urban	265 (64.3)	147 (35.7)	$\chi^2 = 0.041$, p = 0.840
Rural	55 (65.5)	29 (34.5)	

*Statistically significant (p < 0.05); χ^2 = Pearson's Chi square test; LR χ^2 = Likelihood Ratio Chi square test

These disparities highlight the need for similar targeted public health interventions in Nigeria to address the high prevalence of BV in certain socio-demographic groups.

Occupation was the only socio-demographic variable significantly associated with BV in this study, with housewives having a higher prevalence (66.9%) compared to artisans, civil servants, and farmers. This finding aligns with studies indicating that women with limited occupational roles outside the home, particularly housewives, often have reduced health literacy and awareness regarding preventive healthcare practices, potentially contributing to higher BV risk.³² In contrast, women engaged in employment or self-driven economic activities may have better access to health education and healthcare services, possibly lowering their risk for BV.⁹ Interestingly, similar studies from other parts of Nigeria and sub-Saharan Africa have also highlighted occupation as a factor associated with BV prevalence.^{4,11,27} Women employed in service-oriented jobs have significantly lower BV rates than those working in less structured occupations, such as housewives.³³ These occupational disparities in BV prevalence suggest that socioeconomic empowerment and increased access to health information could play key roles in reducing BV risk.

The high prevalence of BV among housewives and those residing in rural areas in Sokoto State underscores the need for targeted reproductive health interventions aimed at these vulnerable groups. BV is known to increase the risk of various reproductive health issues, including preterm delivery, pelvic inflammatory disease, and heightened susceptibility to HIV and other STIs.³⁴ Given the high burden of maternal and child morbidity in Nigeria, addressing BV in high-risk populations is essential for improving overall reproductive health outcomes. This study's findings have implications for reproductive health policy and program planning in Nigeria. Public health initiatives should focus on enhancing awareness about BV, particularly in rural areas where prevalence rates are high. Additionally, integrating reproductive health education into community-based programs could help mitigate the impact of BV on women's health, particularly among housewives who may have limited access to conventional healthcare services.^{9,32}

To address the high prevalence of bacterial vaginosis (BV) among women of reproductive age in Sokoto State, community-based health education programs focused on BV prevention and reproductive health are recommended, especially in rural areas. These programs

should be culturally tailored to address hygiene practices affecting vaginal flora. Economic empowerment initiatives for women, such as vocational training and small business loans, could improve health literacy and access to healthcare, reducing BV risk. Improved healthcare access through mobile clinics and affordable services is also crucial, particularly in underserved rural areas. Finally, integrating routine BV screening and treatment into maternal health services could help mitigate associated risks to maternal and neonatal health.

STUDY LIMITATIONS

Although this study provides valuable insights into the prevalence and factors associated with bacterial vaginosis among women of reproductive age in Sokoto State, Nigeria, the study design may limit the generalizability of the findings to other regions of Nigeria or other sub-Saharan African countries. Future research could address this limitation by conducting longitudinal studies across multiple regions to explore trends in BV prevalence over time and the effects of targeted interventions. Additionally, research exploring the molecular characteristics of BV in Nigerian women could provide deeper insights into its pathogenesis and contribute to more effective prevention and treatment strategies. Investigating the impact of cultural practices on vaginal health and BV risk would also be valuable for developing culturally tailored health education interventions.

CONCLUSION

The findings of this study underscore the high prevalence of BV among women of reproductive age attending general hospitals in Sokoto State, Nigeria, with a notable association between BV and occupation, particularly among housewives. These findings are consistent with research from other regions in Nigeria and sub-Saharan Africa, suggesting that socio-demographic factors, limited healthcare access, and cultural practices contribute to the high burden of BV in this population. Addressing this issue requires targeted public health interventions, economic empowerment initiatives, and increased healthcare accessibility to mitigate the impact of BV on reproductive health outcomes among Nigerian women.

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Nil.

Conflict of interest

None declared.

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