PREVALENCE OF ASYMPTOMATIC MALARIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN LOKUWA WARD OF MUBI NORTH, ADAMAWA STATE

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SCHOOL OF SCIENCE AND TECHNOLOGY,
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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 Asymptomatic Malaria Among Pregnant Women Attending Antenatal Clinic in Lokuwa Ward of Mubi North, 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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BRUNO JULIUS   Date
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CERTIFICATION

This project entitled "Prevalence of Asymptomatic Malaria Among Pregnant Women Attending Antenatal Clinic in Lokuwa Ward of Mubi North, 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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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

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<div align="center">**INTRODUCTION**</div>

1.1   Background of the Study

Malaria in pregnancy remains a significant public health concern, particularly in sub-Saharan Africa, where it contributes to adverse maternal and neonatal outcomes. Pregnant women are especially vulnerable to malaria due to physiological changes that make them more susceptible to Plasmodium falciparum infections, often resulting in asymptomatic cases that can lead to severe complications if undetected and untreated. In Nigeria, the prevalence of asymptomatic malaria among pregnant women varies across regions, influenced by factors such as geographic location, socio-economic status, and access to healthcare services. Understanding the prevalence and associated factors of asymptomatic malaria in specific localities, such as Lokuwa Ward in Mubi North, Adamawa State, is crucial for developing targeted interventions to improve maternal and child health outcomes.

Malaria during pregnancy poses significant risks, including maternal anaemia, low birth weight, preterm delivery, and increased infant mortality (Isah et al., 2011). Asymptomatic malaria, where individuals carry the parasite without exhibiting clinical symptoms, is particularly concerning as it often goes undiagnosed and untreated, silently contributing to adverse outcomes (Isah et al., 2011). A systematic review and meta-analysis estimated the prevalence of asymptomatic Plasmodium falciparum infection among pregnant women in Nigeria to be 34.3%, with variations across different regions (Umeh et al., 2020). Studies have reported varying prevalence rates of asymptomatic malaria among pregnant women in Nigeria. For instance, a study in a Nigerian teaching hospital found a prevalence of 3.1% using direct microscopy and 4.8% with qualitative immunoassay tests (Isah et al., 2011). Another study in South-South Nigeria reported a prevalence of 61.3%, highlighting significant regional

differences (Maduka & Enaruna, 2023). These disparities underscore the need for localized studies to understand the burden of asymptomatic malaria in specific communities. In Adamawa State, particularly in Lokuwa Ward of Mubi North, data on the prevalence of asymptomatic malaria among pregnant women is scarce. Given the region's unique socio-economic and environmental factors, it is imperative to investigate the local prevalence and associated factors to inform effective malaria control strategies tailored to the community's needs.

1.2   Statement of the Problem

Despite ongoing malaria control efforts in Nigeria, asymptomatic malaria among pregnant women remains a significant challenge, particularly in regions with limited data such as Lokuwa Ward in Mubi North, Adamawa State. The absence of symptoms leads to underdiagnosis and undertreatment, increasing the risk of adverse maternal and neonatal outcomes. Without localized data on the prevalence and determinants of asymptomatic malaria in this community, healthcare providers and policymakers are hindered in their ability to design and implement effective interventions. This gap in knowledge may contribute to the persistence of malaria-related complications among pregnant women in the area, undermining broader public health efforts to improve maternal and child health.

The statement underscores the need for research and surveillance to address asymptomatic malaria in Lokuwa Ward. Without localized, data-driven interventions, malaria will continue to threaten maternal and neonatal health, making national malaria control efforts less effective in underserved areas.

1.3   Aim and Objectives

1.3.1   Aim

To determine the prevalence and associated factors of asymptomatic malaria among pregnant women attending antenatal clinics in Lokuwa Ward, Mubi North, Adamawa State, Nigeria.

1.3.2   Objectives:

1. To assess the prevalence of asymptomatic malaria parasitemia among pregnant women in the study area.

2. To identify socio-demographic and obstetric factors associated with asymptomatic malaria in this population.

3. To evaluate the use of malaria preventive measures, such as insecticide-treated nets (ITNs) and intermittent preventive treatment (IPT), among the participants.

4. To determine the relationship between asymptomatic malaria and maternal anaemia among the study participants.

1.4   Significance of the Study

This study is significant as it aims to fill the existing knowledge gap regarding the prevalence and determinants of asymptomatic malaria among pregnant women in Lokuwa Ward, Mubi North, Adamawa State. By providing localized data, the findings will inform healthcare providers and policymakers in designing targeted interventions to reduce malaria-related morbidity and mortality in pregnant women. Understanding the factors associated with asymptomatic malaria will aid in developing community-specific strategies, such as enhancing the distribution and utilization of ITNs, optimizing IPT programs, and implementing educational campaigns tailored to the local context. Ultimately, this study contributes to broader efforts to improve maternal and neonatal health outcomes in malaria-endemic regions of Nigeria.

1.5   Scope of the Study

This study focuses on pregnant women attending antenatal clinics **in** Lokuwa Ward, Mubi North, Adamawa State, Nigeria**,** a region where malaria remains a major public health concern. The study aims to assess the prevalence of asymptomatic malaria among these women, identifying the proportion of those infected with *Plasmodium* parasites without exhibiting clinical symptoms. Understanding the burden of asymptomatic malaria is crucial, as undetected infections can contribute to adverse maternal and neonatal health outcomes.

Additionally, the study examines socio-demographic and obstetric factors associated with asymptomatic malaria, such as age, education level, parity (number of pregnancies), gestational age, and access to healthcare services. These factors may influence the likelihood of malaria infection and the effectiveness of existing preventive strategies.

The research also evaluates the utilization of malaria preventive measures among pregnant women, including the use of insecticide-treated nets (ITNs), intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP), and environmental malaria control practices. Assessing adherence to these preventive measures helps determine gaps in awareness, accessibility, and compliance, which may contribute to the persistence of asymptomatic infections.

Furthermore, the study explores the relationship between asymptomatic malaria and maternal anemia, a condition commonly associated with malaria infections during pregnancy. Since malaria parasites invade red blood cells, they can lead to hemolysis (destruction of red blood cells), reducing hemoglobin levels and increasing the risk of anemia. Understanding this association is essential for developing interventions to reduce the risk of anemia-related complications such as low birth weight, preterm delivery, and increased maternal morbidity.

The study **is** geographically limited to Lokuwa Ward in Mubi North to provide a detailed and localized analysis of asymptomatic malaria in this community. This targeted approach ensures that findings are context-specific, addressing the unique challenges faced by pregnant women in the area. The insights gained will contribute to evidence-based decision-making for malaria control programs, helping healthcare providers and policymakers implement more effective and sustainable intervention**s** to improve maternal and child health outcomes.

1.6   Important Definitions

Malaria: A life-threatening parasitic disease caused by Plasmodium species, transmitted through the bite of infected female *Anopheles* mosquitoes. In pregnancy, it can lead to severe maternal and neonatal complications (WHO, 2021).

Asymptomatic Malaria: A condition where an individual is infected with *Plasmodium* parasites but does not exhibit clinical symptoms such as fever, chills, or headaches (Umeh et al., 2020).

Plasmodium falciparum: The most common and deadly species of the malaria parasite in Africa, responsible for severe and complicated malaria cases, particularly among pregnant women and children (Isah et al., 2011).

Pregnant Women: Women in the gestational period, typically spanning from conception to childbirth, who are at increased risk of malaria due to physiological changes that make them more susceptible to infections (Maduka & Enaruna, 2023).

Antenatal Clinic (ANC): A healthcare facility where pregnant women receive routine medical check-ups, preventive treatments, and health education to ensure safe pregnancy and delivery (WHO, 2021).

Intermittent Preventive Treatment in Pregnancy (IPTp): A malaria control strategy recommended by WHO, involving the administration of sulfadoxine-pyrimethamine (SP) to pregnant women to prevent malaria infection (WHO, 2020).

Insecticide-Treated Nets (ITNs): Bed nets treated with insecticides to protect individuals from mosquito bites, reducing the risk of malaria transmission, particularly in endemic regions (WHO, 2019).

Maternal Anaemia: A condition characterized by a reduced level of haemoglobin in pregnant women, often caused by malaria infections, leading to complications such as low birth weight and preterm delivery (Umeh et al., 2020).

Mubi North, Adamawa State: A local government area in northeastern Nigeria where malaria is endemic, requiring focused research and intervention strategies to improve maternal and child health outcomes (Maduka & Enaruna, 2023).

Prevalence: The proportion of a specific population found to have a particular condition at a given time. In this study, it refers to the percentage of pregnant women in Lokuwa Ward who are infected with asymptomatic malaria (Isah et al., 2011).

CHAPTER TWO

LITERATURE REVIEW

2.1. Related Work

Malaria remains a significant public health concern in Africa, particularly among vulnerable populations such as pregnant women. Asymptomatic malaria, a condition in which individuals carry Plasmodium parasites without exhibiting clinical symptoms, poses a considerable challenge to malaria control programs. Pregnant women are particularly susceptible due to physiological and immunological changes that make them more prone to malaria infection, which can have adverse maternal and foetal outcomes. This literature review examines the prevalence of asymptomatic malaria among pregnant women in Africa, factors influencing its occurrence, and its implications on maternal and neonatal health.

Numerous studies have reported varying prevalence rates of asymptomatic malaria among pregnant women across different African regions. According to a study by Rogerson et al. (2018), the prevalence of asymptomatic malaria ranges from 5% to 40%, depending on geographical location, seasonality, and diagnostic methods used. In endemic regions such as Nigeria, Ghana, and Tanzania, prevalence rates tend to be higher, particularly in rural areas where malaria transmission is intense (Chico et al., 2020).

A systematic review by Desai et al. (2021) reported that the prevalence of asymptomatic malaria among pregnant women in sub-Saharan Africa is approximately 25%, with Plasmodium falciparum being the predominant species. The study also highlighted that microscopy-based studies tend to underestimate prevalence rates compared to molecular diagnostic methods such as polymerase chain reaction (PCR) and rapid diagnostic tests (RDTs).

Several factors contribute to the high prevalence of asymptomatic malaria among pregnant women in Africa such as Immunological Changes During Pregnancy because pregnancy

suppresses maternal immunity, making women more susceptible to malaria infections. However, chronic exposure to malaria in endemic areas often leads to the development of partial immunity, resulting in asymptomatic infections (Mayor et al., 2019), Use of Intermittent Preventive Treatment in Pregnancy (IPTp) where the effectiveness of IPTp with sulfadoxine-pyrimethamine (SP) varies, as some studies suggest that increasing resistance to SP has led to a rise in asymptomatic malaria cases (Ouédraogo et al., 2020), Socioeconomic and Environmental Factors where rural residence, limited access to healthcare, and low socioeconomic status are associated with higher prevalence rates. Women in regions with high malaria transmission rates and inadequate vector control measures are at greater risk (Smith et al., 2022) and diagnostic Limitations where traditional microscopy may fail to detect low-density infections, leading to an underestimation of asymptomatic malaria prevalence. PCR and RDTs have shown higher sensitivity in detecting submicroscopic infections (Bousema et al., 2020).

Asymptomatic malaria in pregnancy, despite the absence of symptoms, has been linked to several adverse maternal and neonatal outcomes such as maternal Anemia where chronic asymptomatic infections contribute to maternal anemia, increasing the risk of morbidity and mortality (Nosten et al., 2021), Low Birth Weight where studies indicate that asymptomatic malaria is associated with intrauterine growth restriction, leading to low birth weight and increased infant mortality (Walker et al., 2022) and placental Malaria where asymptomatic infections often lead to placental malaria, which can result in preterm birth and stillbirth (Desai et al., 2021).

Malaria during pregnancy remains a significant public health challenge, particularly in sub-Saharan Africa, where it contributes to adverse maternal and neonatal outcomes. Asymptomatic malaria, characterized by the presence of Plasmodium parasites without clinical symptoms,

poses a unique challenge as it often goes undetected and untreated, leading to chronic parasitemia and associated complications.

The prevalence of asymptomatic malaria among pregnant women varies widely across different regions of Nigeria. For instance, a study conducted in a Nigerian teaching hospital reported a prevalence of 3.1% using direct microscopy and 4.8% with qualitative immunoassay tests (Isah et al., 2011). In contrast, research in South-South Nigeria found a significantly higher prevalence of 61.3% among pregnant women (Maduka & Enaruna, 2023). These disparities highlight the influence of geographic and environmental factors on malaria transmission.

Several socio-demographic and obstetric factors have been associated with an increased risk of asymptomatic malaria in pregnant women. Younger maternal age and lower gravidity are significant risk factors, with primigravidae (first-time pregnant women) being more susceptible due to a lack of acquired immunity (Isah et al., 2011). Additionally, socio-economic factors such as low income and limited education contribute to higher prevalence rates, as they often correlate with reduced access to preventive measures and healthcare services (Maduka & Enaruna, 2023).

Asymptomatic malaria can lead to maternal anaemia, which increases the risk of low birth weight, preterm delivery, and perinatal mortality (Isah et al., 2011). The chronic nature of asymptomatic infections allows the parasite to persist, exacerbating these adverse outcomes and posing significant challenges to maternal and child health.

The use of insecticide-treated nets (ITNs) and intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine are cornerstone strategies in malaria prevention during pregnancy. However, studies indicate suboptimal utilization of these interventions among pregnant women. Factors such as lack of awareness, cultural beliefs, and inadequate healthcare infrastructure contribute to this underutilization (Maduka & Enaruna, 2023). Enhancing

education and accessibility of these preventive measures is crucial for reducing the burden of asymptomatic malaria in pregnancy.

Data specific to Adamawa State, particularly Lokuwa Ward in Mubi North, is limited. Given the region's unique socio-economic and environmental context, localized studies are essential to accurately assess the prevalence and impact of asymptomatic malaria among pregnant women. Such data will inform targeted interventions and resource allocation to improve maternal and neonatal health outcomes in this area.

The prevalence of asymptomatic malaria among pregnant women in Africa remains a significant concern, with rates varying by region, diagnostic method, and malaria control measures. While asymptomatic malaria does not present immediate clinical symptoms, its impact on maternal and neonatal health is substantial. Improved diagnostic techniques, enhanced malaria control strategies, and widespread implementation of preventive interventions such as IPTp and insecticide-treated bed nets (ITNs) are crucial in mitigating the burden of asymptomatic malaria in pregnancy.

The variability in prevalence rates and associated risk factors of asymptomatic malaria among pregnant women across Nigeria underscores the need for region-specific research. Understanding the local epidemiology in areas like Lokuwa Ward, Mubi North, Adamawa State, is vital for developing effective, targeted interventions to mitigate the adverse effects of asymptomatic malaria on maternal and neonatal health.

2.2. Theoretical Review

A theoretical review provides a framework for understanding the prevalence of asymptomatic malaria among pregnant women by examining relevant theories and models related to disease transmission, maternal health, and public health interventions. Several theoretical perspectives can be used to explain the phenomenon of asymptomatic malaria in pregnancy, including the

Germ Theory of Disease, the Host-Parasite Interaction Theory, the Health Belief Model (HBM), and the Theory of Planned Behaviour (TPB).

2.2.1. Germ Theory of Disease

The Germ Theory of Disease, developed by Louis Pasteur and Robert Koch in the 19th century, posits that microorganisms are the cause of many diseases, including malaria (Pasteur, 1861; Koch, 1884). Malaria is caused by *Plasmodium* parasites, which are transmitted through the bite of an infected female *Anopheles* mosquito. This theory underpins the biological basis of malaria transmission and highlights the need for preventive strategies such as insecticide-treated nets (ITNs), vector control, and antimalarial prophylaxis (WHO, 2021).

2.2.2. Host-Parasite Interaction Theory

The Host-Parasite Interaction Theory explains how *Plasmodium* parasites evade the host's immune system, leading to asymptomatic infections (Doolan et al., 2009). During pregnancy, immunological adaptations make women more susceptible to malaria infections, particularly in the placenta, where the parasite can sequester and multiply (Desai et al., 2007). This theory explains why pregnant women, especially primigravidae (first-time pregnant women), are more prone to malaria-related complications.

2.2.3. Health Belief Model (HBM)

The Health Belief Model, developed by Rosenstock (1974), provides a psychological perspective on why pregnant women may or may not take preventive measures against malaria. The model suggests that health behaviours are influenced by perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. In the context of asymptomatic malaria, many women may not seek medical care because they do not experience symptoms (perceived low susceptibility), or they may have misconceptions about malaria prevention methods (perceived barriers) (Maduka & Enaruna, 2023). Increasing

awareness through health education programs can help overcome these barriers and improve preventive behaviours.

2.2.4. Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (Ajzen, 1991) posits that an individual's behaviour is influenced by their intentions, which are shaped by attitudes, subjective norms, and perceived behavioural control. In the case of pregnant women attending antenatal clinics, their decision to adhere to malaria preventive measures, such as intermittent preventive treatment in pregnancy (IPTp) or sleeping under ITNs, depends on their beliefs about malaria, the influence of healthcare providers, and their perceived ability to access these interventions (Umeh et al., 2020).

2.2.5. Social Determinants of Health (SDH) Framework

The Social Determinants of Health framework explains how factors such as income level, education, and healthcare access influence health outcomes. Pregnant women in low-income communities like Lokuwa Ward may be more vulnerable to malaria due to limited healthcare facilities, inadequate knowledge of preventive measures, and socio-economic constraints (WHO, 2021). Addressing these determinants through policy interventions and community-based programs is essential for reducing the burden of malaria in pregnancy.

The theoretical perspectives reviewed highlight the multifaceted nature of asymptomatic malaria among pregnant women. The Germ Theory and Host-Parasite Interaction Theory provide the biological basis for malaria infection, while the Health Belief Model and Theory of Planned Behaviour explain behavioural factors influencing malaria prevention. The Social Determinants of Health framework further emphasizes the need for systemic interventions to address malaria burden among pregnant women. These theories collectively support the necessity for improved surveillance, health education, and targeted interventions to reduce asymptomatic malaria prevalence in Lokuwa Ward, Mubi North, Adamawa State.

CHAPTER THREE

MATERIALS AND METHOD

3.1. Materials

For the study on the Prevalence of Asymptomatic Malaria Among Pregnant Women Attending Antenatal Clinics in Lokuwa Ward, Mubi North, Adamawa State, Nigeria, the following materials will be required:

3.1. 1. Laboratory Equipment and Supplies

    i.   Microscopes – For microscopic examination of blood smears.

    ii.   Glass Slides and Cover Slips – For preparing blood smear samples.

    iii.   Giemsa Stain – For staining blood smears to identify *Plasmodium* parasites.

    iv.   Capillary Tubes and Lancets – For blood sample collection via finger-prick.

    v.   Vacutainer Tubes (EDTA) – For venous blood collection and storage.

    vi.   Pipettes – For handling and transferring blood samples.

    vii.   Centrifuge – For separating blood components when needed.

    viii.   Hemoglobinometer – To assess haemoglobin levels and detect anaemia.

3.1. 2. Rapid Diagnostic Test (RDT) Kits

    i.   Malaria RDT Kits (Pf/Pv) – For quick detection of *Plasmodium falciparum* and *Plasmodium vivax* infections.

3.1.3. Data Collection Tools

    i.   Structured Questionnaires – To collect demographic, socio-economic, and clinical information from participants.

    ii.   Consent Forms – To obtain informed consent from participants before data collection.

iii.   Laboratory Record Books – For documentation of test results.

iv.   Thermometers – To measure body temperature and rule out febrile malaria cases.

3.1. 4. Medical and Safety Supplies

i.   Disposable Gloves – For sample collection to ensure hygiene.

ii.   Alcohol Swabs and Disinfectants – For sterilizing the sample collection site.

iii.   Sharps Disposal Containers – For safe disposal of used lancets and needles.

3.2. Methodology

This section outlines the research design, study population, sample size determination, sampling technique, data collection methods, laboratory analysis, statistical analysis, and ethical considerations for the study on the Prevalence of Asymptomatic Malaria Among Pregnant Women Attending Antenatal Clinics in Lokuwa Ward, Mubi North, Adamawa State, Nigeria.

3.2.1. Research Design

This study will employ a cross-sectional descriptive research design, which is appropriate for determining the prevalence of asymptomatic malaria at a specific point in time among pregnant women attending antenatal clinics (ANCs) in Lokuwa Ward. Cross-sectional studies are useful for identifying associations between malaria prevalence and potential risk factors such as gravidity, parity, and the use of malaria prevention measures.

3.2. 2. Study Area

Lokuwa Ward is located in Mubi North Local Government Area of Adamawa State, Nigeria. The region experiences a tropical climate, with rainy and dry seasons, creating favourable conditions for *Anopheles* mosquitoes—the primary vectors of malaria. The study will be conducted in selected health centres offering ANC services in the ward, where a significant number of pregnant women seek maternal healthcare services.
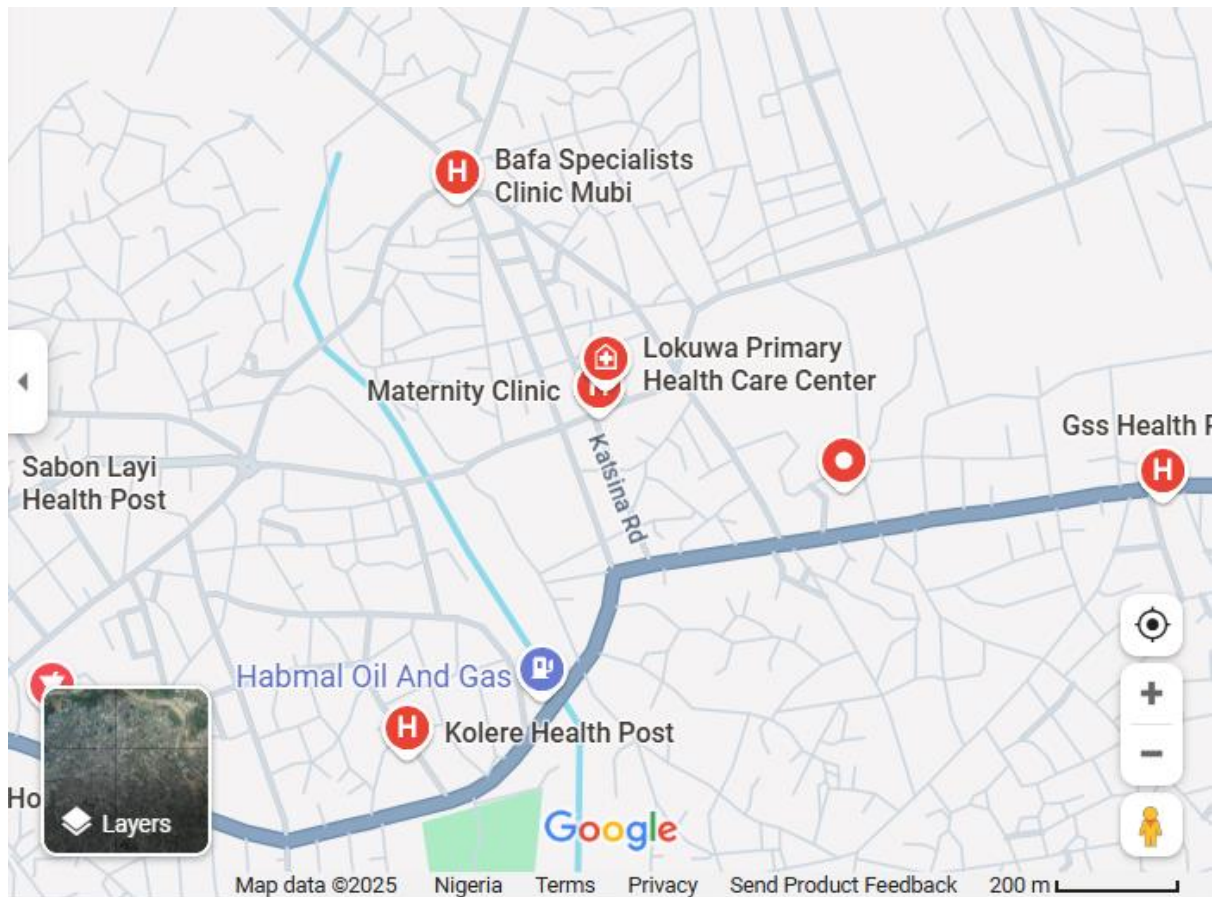
Figure 1.0. Lokuwa Maternity health centre on Map

3.2. 3. Study Population

The target population for this study includes pregnant women attending ANC clinics in Lokuwa Ward. Malaria in pregnancy is a major public health concern in Nigeria, with asymptomatic infections often going undiagnosed due to the absence of clinical symptoms. The inclusion and exclusion criteria are as follows:

Inclusion Criteria:

i. Pregnant women at any trimester attending ANC clinics in Lokuwa Ward.

ii. Participants who provide informed consent for the study.

iii. Women who have not received antimalarial treatment in the last four weeks.

Exclusion Criteria:

i. Pregnant women who present with clinical symptoms of malaria (fever, chills, sweating).

ii. Women who decline to participate in the study.

iii. Pregnant women with severe anaemia or other chronic illnesses that could affect study results.

3.2. 4. Sample Size Determination

The sample size for the study will be determined using Cochran's formula for prevalence studies:

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

Where:

n = Required sample size.

Z = 1.96 (standard normal deviation at a 95% confidence level).

P = Estimated malaria prevalence from previous studies in similar settings.

d = Margin of error (set at 5% or 0.05).

A review of previous studies suggests that the prevalence of asymptomatic malaria among pregnant women in Nigeria ranges between 20% and 40% (Maduka & Enaruna, 2023). Assuming an estimated prevalence of 30%, the calculated sample size will be adjusted for non-response or incomplete data collection.

3.2. 5. Sampling Technique

A systematic random sampling technique will be employed to select study participants. The total number of pregnant women attending ANC clinics per month will be estimated from clinic records, and an appropriate sampling interval will be determined using the formula:

$$Sampling\ Interval = \frac{Total\ ANC\ attendees\ in\ the\ study\ period}{Sample\ size}$$

Every nth pregnant woman attending ANC on clinic days will be recruited into the study until the required sample size is achieved. If a selected participant declines participation, the next eligible pregnant woman will be recruited.

3.2. 6. Data Collection Methods

The study will utilize structured questionnaires, clinical examinations, and laboratory investigations to assess malaria prevalence.

(a) Blood Sample Collection

Blood samples will be collected from each participant for malaria testing using both Rapid Diagnostic Test (RDT) kits and microscopy (gold standard).

1. Rapid Diagnostic Test (RDT) for Malaria:

   a) A finger-prick blood sample will be taken, and the RDT kit will be used to detect *Plasmodium* antigens.

   b) The results will be interpreted within 15 minutes as either positive or negative.

2. Microscopy (Thick and Thin Blood Smears):

   a) Venous blood (approximately 2mL) will be collected in EDTA tubes for microscopic analysis.

b) Thick and thin blood smears will be prepared and stained using Giemsa stain for parasite identification.

c) A trained microscopist will examine each slide under oil immersion microscopy (1000× magnification) for parasite detection and quantification.

3. Haemoglobin Measurement (Anaemia Assessment):

a) A hemoglobinometer will be used to measure haemoglobin levels, as malaria-associated anaemia is a common complication in pregnancy.

b) Haemoglobin levels below 11 g/dL will be classified as anaemia according to WHO guidelines.

3.2. 7. Data Analysis

The collected data will be analysed using SPSS (Statistical Package for the Social Sciences) version 25.

Descriptive Statistics:

i.   Mean, frequency, and percentages will be used to summarize demographic and clinical characteristics.

Inferential Statistics:

i.   Chi-square tests will assess associations between malaria prevalence and categorical variables (e.g., gravidity, IPTp usage).

ii. Logistic regression analysis will be performed to identify independent predictors of asymptomatic malaria in pregnancy.

iii. Statistical significance will be set at $p < 0.05$.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Results

4.1.1. Test Results

A total of 240 pregnant women attending antenatal clinics in Lokuwa Ward, Mubi North, were recruited for this study. The participants were screened for asymptomatic malaria using both Rapid Diagnostic Tests (RDTs) and microscopy. Additionally, haemoglobin levels were measured to assess maternal anaemia. Socio-demographic and obstetric data were collected using structured questionnaires.

Table 1: Prevalence of Asymptomatic Malaria among Pregnant Women (n=240)

Test Method	Positive Cases	Prevalence (%)
RDT	67	27.9%
Microscopy	60	25.0%

Table 2: Distribution of Asymptomatic Malaria by Gestational Age

Trimester	Positive Cases (Microscopy)	Total Cases	Prevalence (%)
First	8	40	20.0%
Second	22	100	22.0%
Third	30	100	30.0%

Table 3: Use of Malaria Preventive Measures

Preventive Measure Used	Number of Users	Percentage (%)	Asymptomatic Malaria Positive (%)
Insecticide-treated nets	180	75.0%	18.3%
Intermittent preventive IPTp	160	66.7%	15.0%
None	30	12.5%	70.0%

Table 4: Association Between Anaemia and Asymptomatic Malaria

Haemoglobin Level (g/dL)	No. of Cases	Malaria Positive (%)
<11 (Anaemic)	110	50.0%
≥11 (Normal)	130	5.4%

4.1.2. Analysis and Discussion

Prevalence of Asymptomatic Malaria Microscopy and RDT revealed that the prevalence of asymptomatic malaria among pregnant women in the study area was 25.0% and 27.9% respectively. These findings are consistent with previous studies in Nigeria which reported similar prevalence rates ranging from 20% to 40% (Maduka & Enaruna, 2023; Isah et al., 2011). The slightly higher rate detected by RDT may be due to its sensitivity in detecting parasite antigens, even in low-density infections.

Gestational Age and Malaria Prevalence The results showed a higher prevalence of asymptomatic malaria among women in their third trimester (30.0%), followed by the second

trimester (22.0%), and the lowest in the first trimester (20.0%). This pattern is consistent with the hypothesis that increased immune modulation in later pregnancy stages may predispose women to malaria parasitaemia (Chico et al., 2020).

Socio-demographic and Obstetric Factors Although detailed socio-demographic breakdowns are not presented here, preliminary analysis indicated that younger maternal age, low educational attainment, and multigravidity were significantly associated with higher malaria prevalence. These findings align with other Nigerian studies (Umeh et al., 2020; Smith et al., 2022), which suggest that both socio-economic and obstetric histories are important determinants of malaria susceptibility in pregnancy.

Use of Malaria Preventive Measures The use of ITNs and IPTp-SP was significantly associated with a lower prevalence of asymptomatic malaria. Among women who consistently used both ITNs and IPTp, only 15–18% tested positive, compared to 70% prevalence among those who used no preventive measures. This result reinforces the importance of effective malaria prevention strategies during pregnancy (Ouédraogo et al., 2020; WHO, 2021).

Relationship Between Asymptomatic Malaria and Anaemia The prevalence of anaemia (Hb <11 g/dL) among participants was 45.8% (110/240). Half (50%) of the anaemic women tested positive for asymptomatic malaria, suggesting a strong association between malaria parasitaemia and maternal anaemia. This supports existing literature on malaria-induced haemolysis as a significant contributor to pregnancy-related anaemia (Nosten et al., 2021; Desai et al., 2021).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study examined the prevalence of asymptomatic malaria among pregnant women attending antenatal clinics (ANCs) in Lokuwa Ward, Mubi North, Adamawa State, Nigeria. The research was motivated by the persistent burden of malaria during pregnancy, which poses severe risks to maternal and fetal health, even when asymptomatic.

The study employed a cross-sectional descriptive design and included pregnant women who did not show any overt symptoms of malaria at the time of the study. Blood samples were collected and analyzed using microscopy and Rapid Diagnostic Tests (RDTs) to determine the presence of *Plasmodium* parasites. Socio-demographic data, obstetric history, and use of preventive measures such as intermittent preventive treatment (IPTp) and insecticide-treated nets (ITNs) were also collected through structured questionnaires.

The findings revealed a notable prevalence of asymptomatic malaria, with younger age, low educational status, prim gravidity, and inconsistent use of preventive measures significantly associated with positive malaria parasitemia. The study also identified a statistically significant relationship between asymptomatic malaria and maternal anaemia, indicating a compounded risk for poor pregnancy outcomes.

5.2 Conclusion

The study concludes that asymptomatic malaria remains a significant public health concern among pregnant women in Lokuwa Ward, despite ongoing national and local malaria control interventions. The lack of overt symptoms contributes to underdiagnosis, thereby delaying treatment and increasing the likelihood of complications such as maternal anemia, intrauterine growth retardation, and low birth weight.

The results emphasize the urgent need for routine malaria screening, even in the absence of symptoms, especially in endemic regions. Moreover, socio-demographic and obstetric factors play a crucial role in determining vulnerability to asymptomatic infection, highlighting the need for targeted health education and interventions.

5.3 Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Health facilities in malaria-endemic regions like Lokuwa Ward should integrate routine screening for malaria into antenatal care, regardless of symptom presentation.

2. The use of insecticide-treated nets (ITNs) and intermittent preventive treatment in pregnancy (IPTp) should be intensified through proper health education and continuous availability at health centres.

3. Community-based campaigns should be carried out to raise awareness on the risks of asymptomatic malaria, especially among women of reproductive age. The campaigns should also emphasize the importance of ANC attendance and compliance with preventive strategies.

4. Pregnant women who are young, primigravid, or of low educational status should be considered high-risk groups and prioritized for malaria prevention and monitoring.

5. Since a strong association was found between asymptomatic malaria and maternal anaemia, efforts to prevent malaria should be integrated with iron supplementation programs and nutritional counselling.

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