

**THE COMPLICATION OF MALARIA AMONG PREGNANT WOMEN: A CASE
STUDY OF SABON ICHE COMMUNITY OF KAGARKO LOCAL GOVERNMENT
AREA OF KADUNA STATE.**

BY

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CERTIFICATION

This research project titled “The Complication of Malaria Among Pregnant Women: A case study of Sabon Iche community of Kagarko Local Government Area of Kaduna State” by Henry Kingsley with the Admission number (2010302147) has been read and approved by the undersigned after meeting the requirements for the award for Bachelor of Science (Hons.) Degree in Biology in the Department of Biology, Faculty of Chemical and Life Sciences, Usmanu Danfodiyo University Sokoto.

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DEDICATION

I humbly dedicate this project to my beloved parents Mr. Henry Bala Daudu and Mrs. Blessing Henry.

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ABSTRACT

Malaria remains a significant public health challenge in sub-Saharan Africa, particularly among pregnant women, who are highly vulnerable to its adverse effects. This study investigates the implications of malaria infection among pregnant women in the Sabon Iche community of Kagarko Local Government Area, Kaduna State, Nigeria. Employing a case study approach, the research examines the prevalence, risk factors, and consequences of malaria in pregnancy, focusing on maternal, fetal, and neonatal outcomes. Data were collected through structured interviews with pregnant women attending antenatal care in local health facilities. The findings reveal a high burden of *Plasmodium falciparum* infection, with significant associations between malaria and adverse outcomes such as maternal anemia, low birth weight, preterm delivery, and increased risk of neonatal mortality. Socioeconomic factors, including limited access to preventive measures like insecticide-treated nets and intermittent preventive treatment, were identified as key contributors to the high malaria prevalence. The study underscores the urgent need for targeted interventions, including improved access to antenatal care, enhanced malaria prevention strategies, and community-based health education, to mitigate the impact of malaria in this vulnerable population. These findings contribute to the growing body of evidence on malaria in pregnancy and provide actionable insights for policymakers and healthcare providers in Kaduna State and similar endemic settings.

CHAPTER ONE

1.0. INTRODUCTION

1.1 Background to the Study

Malaria is an infectious disease caused by a parasite plasmodium which infects red blood cells. Malaria infection during pregnancy is a major public health problem in tropical and subtropical regions of the world, it is endemic in 107 countries of the world which 2.5 billion people live (50% of the world population) and developing countries account for most of these. With such a large Number of people living in the shadow of malaria, it accounts for about 1.1 to 2.5 million deaths a year for mostly mothers. The burden of malaria in pregnancy is very high and from malaria situation analysis document and country survey show that 23.7% of women in pregnancy are found to have malaria parasite in their blood, WHO (1989).

Malaria infection during pregnancy is caused mainly by plasmodium falciparum the most common malaria species in Africa every year at least 3 million pregnancies occur among women in malarious areas of Africa. Malaria during pregnancy differ with the intensity of malaria transmission and thus with level of immunity, the pregnant women and children are vulnerable to malaria which is a major cause of prenatal mortality, low birth weight and maternal anemia. It is a disease that can be treated in just 48hours, yet it can cause fatal complications if the diagnosis and treatment are delayed, it is reemerging as the number one priority tropical disease of the world Kakkilaya (2000).

In malaria endemic areas pregnant women are the highest risk groups for malaria infection who develop a severe form of the disease that result in mortality. Thus, increasing the use of anti-malaria intervention that target pregnant women which can address the social, cultural and economic factor that heightens susceptibility and also has the potential to control the disease in most of the susceptible and underserved groups.

The history of malaria stretches from its prehistorically origin as a zoonotic disease in a primate of Africa through to the 21st century. A wide spread and potentially lethal human infectious disease at its peak. The estimated number of malaria deaths stood at 627,000 in 2020. The WHO African Region carries a disproportionate high share of the global malaria programme. According to the world malaria report 2020, there were 241 million cases of malaria globally in 2020 (uncertainty range 218-269million) and 627, 000 malaria cases.

Infection of malaria during pregnancy is common, which can result in fatal low birth weight, still birth and decrement in intrauterine fetal growth. Similarly, malaria infection has the greatest impact on the survival of mothers; the factor behind the high burden of malaria during pregnancy could be the increased body surface and specific odour secretion during pregnancy which may expose them to increased mosquito bites.

Malaria is one of the killer diseases worldwide; according to the world health organization (WHO) report in 2016 around 216 million new cases of malaria occurred globally. So also, most of the malaria cases were in the African region (90%) followed by the Southeast Asian

region (7%) and eastern Mediterranean region (2%) similarly there was an estimated 445,000 malaria death worldwide.

The rate of malaria infection is higher in pregnant women because of their decreased immunity; mainly pregnant women living in area of low or unstable malaria transmission have little or no immunity to malaria and are at higher risk of developing the severe disease as a result of malaria infection than non-pregnant women with malaria. Pregnant women have an increased risk of abortion, stillbirths, premature delivery and low birth weight infants. Currently the most substantive malaria prevention and control measures include; insecticide treated mosquitoes net (ITNs), indoor residuals spraying (IRS) intermittent preventive treatment for pregnant women (IPTP), seasonal malaria chemoprevention (SMC) and diagnosis by malaria microscopy or rapid diagnostic test (RDT) together with effective treatment for confirmed malaria cases with artemisinin based combination therapy (ACT).

As a result of the above burden of malaria and its consequences the Nigerian government through the Federal ministry of health adopted a new concept of using intermittent preventive treatment (IPT) by national guidelines and strategies. It is based on the highlights of the complications associated to malaria infection during pregnancy that prompted the study of the effect and complications of malaria among pregnant women within Sabon Iche, Kagarko Local Government Area of Kaduna State.

1.2 Statement of Research Problem

Malaria disease is dangerous especially an infection with *plasmodium falciparum* is more hazardous during pregnancy, pregnancy appears to interfere with the immune process in malaria, a disease which itself alters immune reactivity. In highly endemic malarious areas where

semi immune adults usually have substantially acquired resistance to local strains of plasmodium, in, the prevalence of clinical malaria is higher and severity greater in pregnant women than non-pregnant women.

Inspire of the government advocacy and enlightenment on the dangers of malaria disease especially von pregnant women and infant mortality rate caused by malaria, malaria is still rampant among pregnant women and the responsible for high infant mortality. It is based on this that the study is intends to find out the complication of malaria among pregnant woman in Sabon Iche community.

1.3 Justification of the Study

Malaria remains one of the leading causes of maternal and neonatal morbidity and mortality, particularly in sub-Saharan Africa. Pregnant women are at higher risk due to physiological and immunological changes that make them more susceptible to infection (Desai *et al.*, 2007). This study, focusing on the implications of malaria among pregnant women in Sabon Iche Community, Kagarko Local Government Area, Kaduna State, is crucial for several reasons.

Malaria in pregnancy can result in severe complications, including maternal anemia, miscarriage, stillbirth, premature birth, and low birth weight in newborns (WHO, 2021). Pregnant women in malaria-endemic areas are more prone to *Plasmodium falciparum* infections, which can lead to placental malaria, impairing fetal development (Takem & D'Alessandro, 2013). By studying the impact in Sabon Iche, this research will help quantify the burden and inform targeted interventions.

Rural communities in Nigeria, including Sabon Iche, often face environmental and socio-economic conditions that contribute to high malaria transmission rates. These include: The presence of stagnant water, which serves as breeding grounds for mosquitoes. Limited access to healthcare services, leading to delayed diagnosis and treatment (Afolabi *et al.*, 2020). Poor socio-economic conditions, which hinder access to preventive measures such as insecticide-treated nets (ITNs) and intermittent preventive treatment in pregnancy (IPTp) (Adebayo *et al.*, 2015).

A significant barrier to malaria prevention in rural areas is the lack of knowledge and misconceptions surrounding the disease. Studies have shown that many pregnant women in Nigeria either do not recognize malaria symptoms or delay seeking medical care due to cultural beliefs and financial constraints (Okonofua *et al.*, 2018). This research will evaluate: Awareness levels of malaria transmission and prevention. The influence of traditional beliefs on healthcare-seeking behavior. The effectiveness of health education programs in the community.

Healthcare access in rural communities is often constrained by factors such as: Insufficient healthcare facilities and a shortage of trained healthcare personnel (Ebuehi & Akintujoye, 2012). Poor road networks, making it difficult for pregnant women to access antenatal care (ANC) services. The cost of malaria treatment, which can be a financial burden on low-income households (Umeh *et al.*, 2015).

Malaria during pregnancy is a major contributor to maternal and neonatal mortality in Nigeria. The disease affects fetal development, increases the risk of preterm delivery, and leads to congenital malaria in newborns (Uneke, 2008). This study will provide insights into the specific maternal and child health outcomes associated with malaria in pregnancy within Sabon Iche and suggest strategies to mitigate these risks.

1.4. Aim and Objectives

AIM

The Complication of Malaria among Pregnant Women: A case study of Sabon Iche community Area of Kagarko Local Government, Kaduna State.

Objectives

The objectives of this research is to find the complication of malaria cases among pregnant women in two different communities and the method adopted by these communities in control and prevention of malaria diseases. Specific objectives:-

- i. To determine the effects of malaria disease among pregnant women in Sabon Iche Community.
- ii. To determine the knowledge of pregnant women on the control measures taken to prevent malaria disease.
- iii. To determine what pregnant women know about malaria in pregnancy.
- iv. Recommend appropriate strategies to mitigate the impact of malaria among pregnant women in Sabon Iche Community.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Introduction

Malaria remains a significant public health challenge globally, with the greatest burden occurring in sub-Saharan Africa where pregnant women and children under five are particularly vulnerable (World Health Organization [WHO], 2022). In Nigeria, malaria accounts for a substantial proportion of maternal and neonatal morbidity and mortality, exacerbated by limited access to healthcare services, inadequate preventive measures, and socio-cultural practices that hinder timely interventions (National Malaria Elimination Programme [NMEP], 2021).

Pregnancy increases a woman's susceptibility to malaria infection due to changes in immunity and physiological conditions. These infections can result in severe complications such as maternal anemia, low birth weight, preterm delivery, and even death of the mother or infant (Desai *et al.*, 2007). Recognizing the critical need to address this issue, malaria control programs have implemented specific strategies targeting pregnant women, such as the use of insecticide-treated nets (ITNs), intermittent preventive treatment in pregnancy (IPTp), and health education (WHO, 2014).

In rural communities like Sabon Iche, the successful implementation of such strategies requires a thorough understanding of local health behaviors, infrastructure, and cultural dynamics. The Malaria initiative, as a localized malaria intervention program, seeks to bridge the gap between

national policy and grassroots application by focusing on the unique challenges faced in specific communities. This chapter reviews the existing literature on malaria prevention during pregnancy, the structure and strategies of Malaria, and the theoretical models that inform its implementation within the context of Sabon Iche community.

2.2. Conceptual Review

The conceptual review explores key terms and ideas relevant to the implementation of malaria concepts among pregnant women, providing clarity and context for the study. These include the concepts of malaria, malaria in pregnancy, prevention strategies, and the malaria intervention itself.

2.2.1. Malaria

Malaria is a life-threatening disease caused by parasites of the *Plasmodium* species, transmitted through the bites of infected female mosquitoes. The most common and dangerous species, *Plasmodium falciparum*, is predominant in Nigeria and sub-Saharan Africa (WHO, 2022). Symptoms include fever, chills, vomiting, and in severe cases, seizures, coma, and death. The disease burden is highest among vulnerable populations, including children under five and pregnant women.

2.2.2 Malaria in Pregnancy (MiP)

Malaria in pregnancy (MiP) is a major cause of maternal and neonatal complications, such as severe anemia, low birth weight, miscarriage, and stillbirth (Desai *et al.*, 2007). The increased susceptibility of pregnant women is attributed to reduced immunity during pregnancy, especially in first-time mothers. According to WHO (2014), MiP contributes significantly to

poor pregnancy outcomes and remains a priority area for intervention in malaria-endemic regions.

2.2.3. Malaria Prevention Strategies in Pregnancy

Key prevention strategies for MiP include:

- a. Intermittent Preventive Treatment in Pregnancy (IPTp): Through the administration of sulfadoxine-pyrimethamine (SP) at regular intervals during pregnancy to prevent malaria infection (WHO, 2014).
- b. Insecticide-treated nets (ITNs): Use of bed nets treated with long-lasting insecticides to protect pregnant women from mosquito bites (NMEP, 2021).
- c. Health Education: Educating pregnant women on malaria transmission, symptoms, and prevention practices to improve knowledge and behavior (Okeke *et al.*, 2016).

2.2.4 The Malaria Intervention

The term “Malaria” refers to a community-driven malaria eradication initiative tailored to the specific needs of pregnant women in rural Nigerian communities. It involves a multi-faceted approach that includes free distribution of ITNs, provision of IPTp during antenatal visits, training of community health workers, and grassroots sensitization programs. The core aim of Malaria intervention is to reduce the incidence of malaria in pregnancy through a combination of education, medical intervention, and community involvement (Adebayo *et al.*, 2015).

2.2.5 Community-Based Health Interventions

Community-based health programs emphasize local ownership and participation, leveraging community health workers and traditional leaders to promote health-seeking behavior. These

approaches have been shown to increase uptake of malaria prevention tools and improve maternal outcomes in underserved areas (Umar *et al.*, 2018). In Sabon Iche, a semi-rural community with limited access to formal healthcare, such programs are essential for improving maternal health.

2.3 The Cycle of the Plasmodium

The Plasmodium life cycle is a complex biological process involving both human and mosquito hosts. Understanding this cycle is critical to grasping how malaria is transmitted and how to carry out the prevention strategies.

The cycle begins when an infected female mosquito bites a human, injecting Plasmodium sporozoites into the bloodstream. These sporozoites travel quickly to the liver, where they infect liver cells and undergo asexual reproduction. After a period of approximately 7 to 14 days, the parasites, now in the form of merozoites, are released into the bloodstream (CDC, 2020; Cowman *et al.*, 2016).

In the blood, the merozoites invade red blood cells and continue to multiply. This erythrocytic stage is responsible for the clinical symptoms of malaria, such as fever, chills, and anemia. Some of the parasites differentiate into sexual forms called gametocytes. When another mosquito bites the infected individual, it ingests these gametocytes, which mature and fertilize in the mosquito's gut, forming zygotes (Murray *et al.*, 2008).

The zygotes develop into ookinetes and then oocysts, which release new sporozoites. These migrate to the mosquito's salivary glands, ready to be transmitted to another human host, thus

continuing the cycle (WHO, 2022). This dual-host lifecycle complicates malaria control, necessitating interventions that target both mosquito vectors and human reservoirs of infection. In pregnant women, especially in areas like Sabon Iche, the *Plasmodium falciparum* species poses a particular threat as it tends to sequester in the placenta, leading to severe maternal and fetal complications (Desai *et al.*, 2007). Hence, understanding the parasite's cycle supports the development of targeted prevention strategies such as the use of insecticide-treated nets (ITNs), intermittent preventive treatment in pregnancy (IPTp), and early diagnosis and treatment.

2.3.1 Mosquito Life Cycle

The mosquito, particularly the female species, plays a crucial role in the transmission of malaria. Understanding its life cycle is essential in identifying key intervention points for malaria prevention programs such as Malera, which is being implemented in communities like Sabon Iche.

The mosquito undergoes a complete metamorphosis consisting of four distinct stages: egg, larva, pupa, and adult. This life cycle typically takes between 7 to 14 days, depending on environmental factors such as temperature, humidity, and availability of stagnant water (Becker *et al.*, 2010).

1. Egg Stage:

After a blood meal, the female mosquito lays between 50 to 200 eggs on the surface of stagnant or slow-moving water. These eggs hatch within 2–3 days in favorable conditions (Service, 2012).

2. Larva Stage:

The hatched larvae live in water and feed on organic matter and microorganisms. They come to the surface frequently to breathe and develop through four instar stages over 4–7 days (WHO, 2017).

3. Pupa Stage:

The larva transforms into a pupa, a non-feeding but active stage during which metamorphosis into an adult occurs. This stage lasts for 1–3 days. Pupae are also aquatic and visible near the water surface (Gullan & Cranston, 2014).

4. Adult Stage:

The adult mosquito emerges from the pupa case and rests on the water surface until its body and wings dry. Within a few days, female mosquitoes begin seeking blood meals needed for egg development, while males feed on nectar. Only the female mosquitoes bite humans and are capable of transmitting malaria parasites (CDC, 2020).

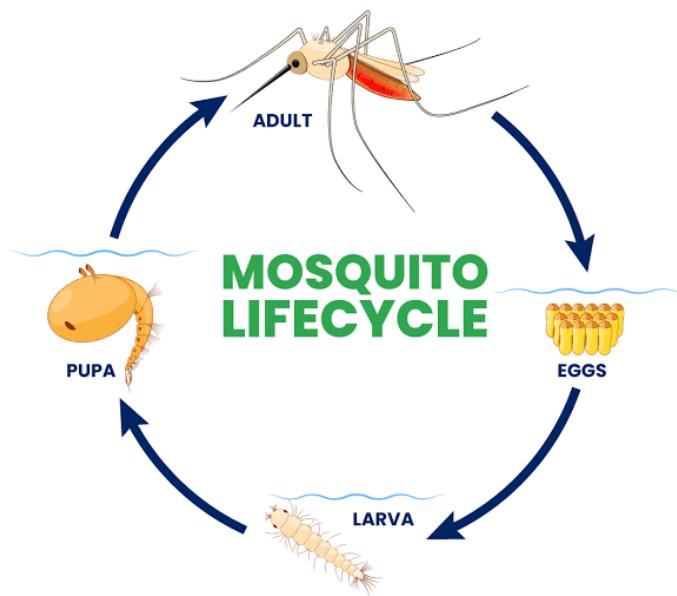


Fig. 1. Life Cycle of a Mosquito

Effective malaria prevention, therefore, targets different stages of the mosquito's life cycle. Environmental management strategies such as removing stagnant water sources help disrupt egg laying, while insecticide-treated nets (ITNs) and indoor residual spraying target adult mosquitoes (WHO, 2022). In communities like Sabon Iche, educating residents about these stages empowers them to participate actively in mosquito control.

2.3.2 Types of Malaria

Malaria is caused by protozoan parasites of the genus *Plasmodium*, with five species known to infect humans. Each species causes a distinct clinical presentation and varies in severity, geographic distribution, and response to treatment. Understanding these types is essential for designing appropriate interventions, especially in malaria-endemic areas like Sabon Iche.

1. Plasmodium falciparum

This is the most prevalent and deadly form of malaria, especially in sub-Saharan Africa. It is responsible for the majority of malaria-related deaths due to its ability to cause severe complications such as cerebral malaria, acute kidney failure, and pregnancy-related malaria (WHO, 2022). *Plasmodium falciparum* infects red blood cells of all ages and multiplies rapidly, leading to high parasite loads and severe symptoms (Murray *et al.*, 2008).

2. Plasmodium vivax

More common in Asia and Latin America, *Plasmodium vivax* is notable for its ability to remain dormant in the liver as hypnozoites, causing relapses weeks or months after the initial infection. While rarely fatal, it contributes significantly to morbidity and affects overall health and productivity (Baird, 2013).

3. Plasmodium ovale

Plasmodium ovale is less common and primarily found in West Africa. Like *Plasmodium vivax*, it can also form hypnozoites, leading to relapses. It generally causes milder symptoms but still requires proper diagnosis and treatment (Collins & Jeffery, 2005).

4. Plasmodium malariae

This species is globally distributed and can cause a chronic infection lasting for years if untreated. It infects older red blood cells and often leads to low-grade, persistent symptoms. While rarely life-threatening, it can cause nephrotic syndrome in long-standing infections (White *et al.*, 2014).

5. Plasmodium knowlesi

Primarily found in Southeast Asia, *Plasmodium knowlesi* is a zoonotic malaria transmitted from macaque monkeys to humans. It can lead to rapidly progressing illness and has been misdiagnosed as *Plasmodium malariae* due to similarities under microscopy (Singh *et al.*, 2004). It is now considered a rising public health concern in specific regions.

In Nigeria, particularly in rural areas like Sabon Iche, *Plasmodium falciparum* is the dominant species, accounting for over 90% of all malaria cases (NMEP, 2021). This underscores the importance of interventions such as IPTp for pregnant women and widespread distribution of insecticide-treated nets.

2.3.3 Mode of Transmission

Malaria is primarily transmitted through the bite of an infected female *Anopheles* mosquito. The transmission cycle is complex and involves both human and mosquito hosts. Understanding the mode of transmission is crucial for implementing targeted preventive strategies, particularly in vulnerable groups such as pregnant women in communities like Sabon Iche.

The primary mode of transmission occurs when a female mosquito bites a human to obtain a blood meal. If the mosquito is infected with *Plasmodium* parasites most commonly *Plasmodium falciparum* in Nigeria it injects sporozoites into the human bloodstream. These sporozoites travel to the liver, where they mature and multiply before entering the bloodstream again to infect red blood cells (CDC, 2020; WHO, 2022).

Although vector transmission is the most common route, malaria can also be transmitted through other, less frequent means:

1. Congenital Transmission:

This occurs when an infected pregnant woman transmits the parasite to her unborn child during pregnancy or delivery. Congenital malaria can lead to low birth weight, anemia, and increased infant mortality (Desai *et al.*, 2007).

2. Blood Transfusion:

In rare cases, malaria can be transmitted through transfusion of infected blood or organ transplants, particularly in settings where blood is not adequately screened (Mungai *et al.*, 2001).

3. Needle Sharing or Contaminated Instruments:

Malaria can be spread through the use of unsterilized needles or medical equipment, though this is uncommon and mostly occurs in medical settings with poor infection control.

4. Laboratory Accidents:

There are isolated cases where laboratory personnel have contracted malaria due to accidental exposure to infected blood samples or parasites (CDC, 2020).

Among all these modes, vector-borne transmission remains the most significant, especially in endemic regions like Nigeria. The high mosquito density, poor environmental sanitation, and limited use of preventive tools such as insecticide-treated nets (ITNs) contribute to ongoing transmission. Effective control strategies, including community sensitization, environmental

management, and the Malera intervention, are essential for interrupting this cycle in rural areas like Sabon Iche.

2.3.4. Susceptibility

Susceptibility to malaria varies based on several factors including age, pregnancy status, immunity, genetic makeup, and environmental exposure. In malaria-endemic regions like Sabon Iche, understanding who is most at risk is essential for effective targeting of interventions such as the Malera program.

1. Pregnant Women:

Pregnancy significantly increases susceptibility to malaria due to altered immunity. Pregnant women, especially during their first and second pregnancies, are more prone to *Plasmodium falciparum* infections, which can lead to placental malaria. This condition is associated with severe anemia, low birth weight, stillbirth, and increased maternal and neonatal mortality (Desai *et al.*, 2007; WHO, 2014). Malaria also compromises the placenta's ability to supply nutrients and oxygen to the fetus.

2. Children Under Five Years:

Children below the age of five are particularly vulnerable because their immune systems are not fully developed. Malaria in this group often leads to severe anemia, cerebral complications, and a high risk of death if not promptly treated (WHO, 2022).

3. Non-Immune Individuals:

Individuals who have never been exposed to malaria or who live in non-endemic regions are at high risk when they enter endemic areas. This includes travelers, migrants, and internally displaced persons who lack partial immunity (CDC, 2020).

4. People with Weakened Immune Systems:

Those with compromised immunity such as individuals with HIV/AIDS, malnutrition, or chronic illnesses are more susceptible to malaria and its complications (Abu-Raddad *et al.*, 2006).

5. Genetic Factors:

Certain genetic traits can affect susceptibility. For example, people with sickle cell trait (HbAS) have some protection against severe *P. falciparum* malaria, while those with G6PD deficiency may be at risk of hemolysis when treated with certain antimalarial drugs (Allison, 2004).

6. Environmental and Socio-economic Factors:

Living conditions such as overcrowding, poor sanitation, and lack of access to preventive tools like insecticide-treated nets (ITNs) increase exposure to mosquito bites and, consequently, malaria transmission. In rural communities like Sabon Iche, these factors contribute significantly to high susceptibility rates (NMEP, 2021).

2.3.5 Stages of Malaria Attack

Malaria progresses through a series of stages, each characterized by distinct clinical features. These stages reflect the parasite's lifecycle within the human host and play a crucial role in the diagnosis and treatment of the disease. Understanding the progression of malaria is especially

important in rural communities like Sabon Iche, where early detection can help reduce complications, particularly in high-risk groups such as pregnant women.

Malaria attacks typically occur in cycles and are commonly described in three main stages:

1. Cold Stage (Chill Stage):

This stage marks the beginning of a malaria attack. The patient experiences intense cold, shivering, and a feeling of extreme chill, even in warm environments. This is caused by the synchronized rupture of infected red blood cells, which releases *Plasmodium* merozoites and toxic substances into the bloodstream (Murray et al., 2008). This stage lasts for 15 minutes to 1 hour.

2. Hot Stage (Fever Stage):

Following the cold stage, the patient enters the hot stage, which is characterized by a sudden rise in body temperature (up to 40–41°C or 104–106°F), severe headache, dry skin, nausea, and sometimes delirium. This fever corresponds with the immune system's reaction to the parasite and the released toxins. The hot stage can last for 2 to 6 hours (WHO, 2022).

3. Sweating Stage (Defervescence):

In this final stage, the fever subsides, and profuse sweating begins. The patient often experiences relief from symptoms and extreme fatigue. Body temperature returns to normal, and the individual may feel weak but improved. This stage can last for 2 to 4 hours (CDC, 2020).

These stages typically repeat every 48 to 72 hours depending on the *Plasmodium* species:

- i. *Plasmodium falciparum* and *Plasmodium vivax*: every 48 hours (tertian malaria),

- ii. *Plasmodium malariae*: every 72 hours (quartan malaria),
- iii. *Plasmodium knowlesi*: every 24 hours.

In cases of *Plasmodium falciparum*, however, the classic cycle may not be as clearly defined, and symptoms can be continuous or overlapping, making diagnosis more difficult without laboratory testing (White *et al.*, 2014).

In vulnerable populations like pregnant women, the symptoms may be subtle or confused with other pregnancy-related conditions, increasing the risk of undiagnosed infections. This reinforces the importance of routine screening and prophylactic treatment under interventions like Malaria in the Sabon Iche community.

2.3.6 Signs and Symptoms of Malaria Attack

Malaria presents with a variety of clinical signs and symptoms, which can range from mild to severe, depending on factors such as the *Plasmodium* species involved, the individual's level of immunity, age, pregnancy status, and the timeliness of treatment. In communities like Sabon Iche, where access to prompt healthcare may be limited, recognizing these signs early is vital to reducing complications and mortality especially among vulnerable groups like pregnant women and children.

Common Symptoms of Malaria Include:

1. Fever:

Fever is the most characteristic and earliest symptom. It often follows a cyclic pattern but may be irregular in severe cases, particularly with *P. falciparum* infections (WHO, 2022).

2. Chills and Rigors:

These usually accompany the onset of fever, with patients experiencing intense shivering and a feeling of coldness followed by profuse sweating (CDC, 2020).

3. Headache:

Often severe and persistent, headaches are a common complaint, especially in adults and older children.

4. Muscle and Joint Pains (Myalgia):

Patients often report generalized body aches and fatigue.

5. Nausea and Vomiting:

These symptoms can be mistaken for other conditions like gastrointestinal infections but are common in malaria, especially among children and pregnant women (Desai *et al.*, 2007).

6. Sweating:

Profuse sweating follows the hot phase of the malaria cycle and usually coincides with the drop in fever.

Other Possible Signs and Symptoms:

- i. Anemia: Resulting from destruction of red blood cells, common in chronic or severe cases.
- ii. Jaundice: Due to liver involvement or massive red blood cell breakdown.
- iii. Convulsions: Especially in young children with high fever.
- iv. Enlarged spleen and liver: Detectable upon physical examination in prolonged or repeated infections.
- v. Severe Malaria Manifestations Include: Cerebral malaria (seizures, coma), Severe anemia

- vi. Acute respiratory distress syndrome (ARDS)
- vii. Hypoglycemia

These severe signs require urgent medical attention and are more likely to occur in non-immune individuals, pregnant women, and young children.

Recognizing the signs and symptoms of malaria is crucial in early diagnosis and treatment. Community health education and access to diagnostic tools can improve health outcomes, particularly in malaria-prone communities like Sabon Iche.

2.4 Malaria in Pregnancy

Malaria in pregnancy remains a major public health concern, particularly in sub-Saharan Africa, where it contributes significantly to maternal and infant morbidity and mortality. Pregnant women are more susceptible to malaria due to natural changes in immunity during pregnancy, especially during the first and second pregnancies. In malaria-endemic communities like Sabon Iche, the consequences of malaria in pregnancy are severe, calling for targeted interventions such as the Malaria program.

Increased Susceptibility in Pregnancy

Pregnancy reduces a woman's immunity, making her more vulnerable to infections, including malaria. The placenta also provides a unique environment for *Plasmodium falciparum* to accumulate and multiply, which can lead to placental malaria. This form of malaria can impair the transfer of oxygen and nutrients to the fetus, resulting in poor pregnancy outcomes (Desai *et al.*, 2007).

- i. Maternal Complications
- ii. Malaria during pregnancy can cause: High fever and Hypoglycemia
- iii. Increased susceptibility to other infections
- iv. In severe cases, maternal death (WHO, 2014)
- v. Fetal and Neonatal Complications
- vi. Infection with malaria during pregnancy is associated with: Low birth weight, Preterm delivery, Intrauterine growth restriction (IUGR) and Stillbirth or miscarriage
- vii. Neonatal death (Menéndez *et al.*, 2010)

Impact on Primigravidae

First-time pregnant women (primigravidae) are particularly vulnerable, as they lack the specific immunity to placental malaria that may develop over successive pregnancies. This is a major reason why interventions like intermittent preventive treatment in pregnancy (IPTp) are prioritized in antenatal care (WHO, 2022).

Prevention and Control Strategies

Key strategies for preventing malaria in pregnancy include:

1. Intermittent Preventive Treatment (IPTp): The World Health Organization recommends at least three doses of sulfadoxine-pyrimethamine (SP) during pregnancy, starting from the second trimester.
2. Insecticide-Treated Nets (ITNs): Regular use of ITNs significantly reduces mosquito bites and infection risk.

3. Early diagnosis and prompt treatment: Malaria in pregnancy should be treated promptly using appropriate antimalarial drugs that are safe for both the mother and fetus (NMEP, 2021).

2.4.1 Malaria Transmission and Maternal Immunity

Malaria transmission occurs primarily through the bite of an infected female *Anopheles* mosquito, which injects *Plasmodium* parasites—most commonly *P. falciparum* in sub-Saharan Africa—into the human bloodstream. Pregnant women are particularly vulnerable to malaria infection due to changes in their immune system and the unique environment created by the placenta, which facilitates parasite accumulation (WHO, 2022).

Malaria Transmission in Pregnancy

Transmission of malaria during pregnancy can lead to placental malaria, where infected red blood cells adhere to chondroitin sulfate A receptors in the placenta. This process is primarily associated with *Plasmodium falciparum* and can significantly impair nutrient and oxygen exchange between the mother and fetus (Desai *et al.*, 2007). In rural settings like Sabon Iche, where mosquito control may be limited and antenatal care attendance is low, the risk of transmission and its consequences is even greater.

Maternal Immunity

Maternal immunity to malaria is complex and influenced by previous exposure, parity, and geographic location. In areas of stable malaria transmission, such as northern Nigeria, women typically acquire some immunity to malaria through repeated exposure before pregnancy. However, this immunity is only partially protective and often reduced during pregnancy,

especially in first-time mothers (primigravidae) who have not yet developed specific immunity to placental malaria (Menéndez *et al.*, 2010).

This immunity tends to improve with successive pregnancies (multigravidae), as the immune system gradually adapts and produces antibodies that block the binding of infected red blood cells to the placenta. Nonetheless, maternal immunity does not eliminate the risk of infection and may be compromised by conditions such as HIV, malnutrition, or lack of access to preventive care (Tutu *et al.*, 2011).

Implications for Malaria Control in Pregnancy

Understanding the dynamics of malaria transmission and maternal immunity is critical for effective intervention. Strategies like the use of insecticide-treated nets (ITNs), intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP), and improved antenatal services are essential in reducing maternal and neonatal morbidity. In areas like Sabon Iche, community-based health education and strengthened maternal healthcare infrastructure can enhance the impact of these interventions.

2.4.2 Prevention of Malaria During Pregnancy

Preventing malaria during pregnancy is a critical component of maternal and child health, particularly in endemic regions such as Sabon Iche in northern Nigeria. Malaria prevention strategies aim to reduce maternal morbidity and mortality, prevent adverse birth outcomes such as low birth weight and stillbirth, and interrupt the transmission cycle of the disease. The World Health Organization (WHO) recommends a three-pronged approach to malaria prevention in

pregnancy: the use of insecticide-treated nets (ITNs), intermittent preventive treatment (IPTp), and prompt diagnosis and treatment of confirmed cases (WHO, 2022).

1. Insecticide-Treated Nets (ITNs)

ITNs serve as a physical and chemical barrier between pregnant women and mosquitoes. Sleeping under an ITN has been proven to reduce malaria episodes, severe disease, and all-cause mortality among pregnant women and their unborn children (Eisele *et al.*, 2010). Distribution of free or subsidized nets during antenatal visits has been effective in increasing usage, though challenges remain in rural communities like Sabon Iche, where cultural beliefs and hot weather may discourage their consistent use.

2. Intermittent Preventive Treatment in Pregnancy (IPTp)

IPTp involves administering sulfadoxine-pyrimethamine (SP) to pregnant women at scheduled intervals during antenatal care visits, beginning in the second trimester. WHO recommends that IPTp-SP be given at least three times during pregnancy, with each dose spaced at least one month apart. IPTp has been shown to reduce maternal parasitemia, anemia, placental malaria, and the risk of low birth weight (Ter Kuile *et al.*, 2007). Despite its proven benefits, coverage remains suboptimal in many rural areas due to poor antenatal attendance, stockouts, and limited awareness.

3. Prompt Diagnosis and Effective Treatment

Early diagnosis and treatment of malaria cases during pregnancy are vital to prevent complications. Pregnant women with suspected malaria should be tested promptly using rapid diagnostic tests (RDTs) or microscopy. Treatment must follow national guidelines, with

artemisinin-based combination therapies (ACTs) prescribed during the second and third trimesters. In the first trimester, quinine plus clindamycin is recommended due to safety concerns (NMEP, 2021).

4. Health Education and Community Mobilization

Educating pregnant women, their families, and the wider community about the risks of malaria in pregnancy and the importance of preventive measures is essential. Community health workers and local health campaigns can play a pivotal role in raising awareness and increasing the uptake of ITNs and IPTp, particularly in rural areas like Sabon Iche where access to formal health services is limited.

5. Strengthening Antenatal Care Services

Improving access to and quality of antenatal care (ANC) services ensures that preventive interventions such as ITNs and IPTp are delivered effectively. Integrating malaria prevention into routine ANC visits increases the likelihood of reaching pregnant women with life-saving interventions (WHO, 2022).

2.5 Prevention and Disease Control

Malaria prevention and disease control remain pivotal in reducing the global burden of the disease, especially in vulnerable populations such as pregnant women. The goal of malaria control is not only to prevent transmission but also to reduce illness and death by interrupting the life cycle of the parasite and its vector. In communities like Sabon Iche, where health infrastructure may be limited, community-based strategies and targeted interventions are crucial.

1. Vector Control Strategies

The primary method of malaria prevention focuses on controlling the mosquito vector—*Anopheles* mosquitoes. This includes:

- i. **Insecticide-Treated Nets (ITNs):** Long-lasting insecticide-treated nets reduce human-vector contact and have been shown to significantly reduce malaria incidence and mortality, especially among pregnant women and children under five (WHO, 2022).
- ii. **Indoor Residual Spraying (IRS):** IRS involves spraying walls and other surfaces with insecticides to kill mosquitoes that rest indoors. When applied correctly, IRS can reduce malaria transmission for several months (USAID PMI, 2020).
- iii. **Larval Source Management:** This involves environmental modifications such as draining stagnant water, filling puddles, and covering water containers to eliminate breeding sites.

2. Chemoprevention

Chemoprevention refers to the use of antimalarial drugs to prevent the onset of malaria in high-risk groups.

- i. **Intermittent Preventive Treatment (IPTp):** Recommended for all pregnant women in areas of moderate to high transmission, IPTp with sulfadoxine-pyrimethamine (SP) is administered during antenatal visits from the second trimester onwards (WHO, 2022).
- ii. **Seasonal Malaria Chemoprevention (SMC):** SMC involves administering full therapeutic doses of antimalarial drugs at monthly intervals during the peak malaria season, mainly targeting children under five but adaptable to specific community needs.

3. Case Management and Prompt Treatment

Early diagnosis and prompt, effective treatment of malaria are essential for disease control.

This includes:

- i. **Rapid Diagnostic Tests (RDTs):** RDTs help in quick identification of malaria cases, especially in rural or remote areas like Sabon Iche where microscopy might not be available.
- ii. **Artemisinin-based Combination Therapies (ACTs):** ACTs are the first-line treatment for uncomplicated *Plasmodium falciparum* malaria and have proven efficacy in clearing parasites and reducing transmission (NMEP, 2021).
- iii. **Referral Systems:** Strengthening referral pathways ensures that severe cases are promptly referred to facilities capable of managing complications, especially in pregnant women.

4. Health Education and Community Involvement

Health education is critical for sustaining malaria control efforts. Educating pregnant women and the general public about:

- i. The importance of using ITNs and attending antenatal care regularly
- ii. Recognizing early signs of malaria
- iii. The dangers of self-medication and untreated malaria
- iv. Engaging local leaders, religious heads, and traditional birth attendants helps reinforce these messages and fosters community ownership of malaria control programs.

5. Surveillance and Monitoring

Disease surveillance allows health systems to track malaria trends and evaluate the effectiveness of control measures. In Sabon Iche and similar communities, integrating malaria reporting into primary healthcare systems can help target resources more effectively.

- i. **Community-Based Surveillance:** Trained health volunteers can monitor and report suspected malaria cases, increasing detection rates and improving timely response.
- ii. **Data-Driven Interventions:** Using local data helps in deploying the right interventions at the right time, such as distributing nets before the rainy season.

2.5.1 Treatments

Treatment of malaria, particularly during pregnancy, is a critical component of disease control. Prompt and effective treatment not only reduces the severity and duration of illness but also helps prevent complications such as maternal anemia, low birth weight, stillbirth, and even maternal death. In malaria-endemic areas like Sabon Iche, appropriate treatment protocols and accessibility to medication are key to managing the disease burden.

1. First-Line Treatment for Uncomplicated Malaria

For non-pregnant individuals and pregnant women in the second and third trimesters, the World Health Organization (WHO) recommends Artemisinin-Based Combination Therapies (ACTs). These therapies combine two active ingredients with different mechanisms of action to improve efficacy and reduce the risk of resistance. Common ACTs include:

- i. Artemether-lumefantrine
- ii. Artesunate-amodiaquine

iii. Dihydroartemisinin-piperaquine

ACTs are effective in rapidly clearing parasites and alleviating symptoms, and they remain the cornerstone of malaria treatment (WHO, 2022).

2. Treatment in Pregnancy

Treatment in pregnancy is more sensitive due to the potential effects of drugs on the fetus:

First Trimester: ACTs are not recommended during the first trimester due to limited safety data. Instead, quinine combined with clindamycin is the preferred treatment for uncomplicated malaria (NMEP, 2021).

Second and Third Trimesters: ACTs are considered safe and are the recommended treatment during these stages. Artemether-lumefantrine is commonly used.

3. Treatment of Severe Malaria

Severe malaria, which can involve complications like cerebral malaria, severe anemia, or respiratory distress, requires urgent intervention. WHO guidelines recommend:

Parenteral artesunate as the first-line treatment, administered intravenously or intramuscularly.

Where artesunate is not available, quinine may be used as an alternative, though with more side effects. Once the patient can tolerate oral medication, a full course of ACT should follow the injectable therapy to ensure complete parasite clearance (WHO, 2022).

4. Supportive Treatments

Alongside antimalarial drugs, supportive care is essential, especially in severe cases or during pregnancy:

Antipyretics like paracetamol for fever IV fluids and blood transfusion if necessary

Management of hypoglycemia and anemia Monitoring fetal wellbeing in pregnant women

5. Challenges in Treatment Implementation

In rural communities like Sabon Iche, treatment access may be hindered by: Inadequate drug supply Poor health-seeking behavior Lack of trained health workers Self-medication and use of unapproved traditional remedies

These challenges highlight the need for stronger health systems, reliable drug distribution, and community health education.

2.5.2 Currently Available Antimalarial Drugs

The treatment of malaria relies heavily on the availability and proper use of effective antimalarial drugs. These medications target different stages of the Plasmodium parasite and are selected based on the species involved, disease severity, patient age, pregnancy status, and drug resistance patterns. In Nigeria and other malaria-endemic countries, the National Malaria Elimination Programme (NMEP) recommends a range of antimalarial drugs, especially artemisinin-based combinations, as the most effective tools against Plasmodium falciparum, the most dangerous species.

1. Artemisinin-Based Combination Therapies (ACTs)

ACTs are the current first-line treatment for uncomplicated *Plasmodium falciparum* malaria.

These combinations reduce the risk of resistance and ensure rapid parasite clearance.

Commonly used ACTs include:

Artemether-Lumefantrine (AL): The most widely used ACT in Nigeria. It is effective and well-tolerated, suitable for adults and children.

Artesunate-Amodiaquine (AS-AQ): Another ACT recommended for use, often used in mass distribution campaigns.

Dihydroartemisinin-Piperaquine (DHA-PPQ): Known for its long half-life and reduced dosing frequency.

Artesunate-Mefloquine (AS-MQ): Less commonly used due to neuropsychiatric side effects associated with mefloquine.

2. Drugs for Severe Malaria

For severe cases, particularly those involving complications like coma or organ failure, injectable antimalarials are recommended:

Artesunate (IV or IM): Preferred for the treatment of severe malaria due to its rapid action and fewer side effects.

Quinine: An alternative where artesunate is not available, but it requires careful monitoring due to the risk of hypoglycemia and cardiac toxicity.

3. Drugs for Use in Pregnancy

Malaria treatment in pregnancy requires caution to avoid harm to the fetus:

First Trimester: Quinine plus clindamycin is the recommended treatment due to limited safety data on ACTs in early pregnancy.

Second and Third Trimesters: Artemether-lumefantrine and other ACTs are considered safe and effective.

For prevention, Intermittent Preventive Treatment in Pregnancy (IPTp) with Sulfadoxine-Pyrimethamine (SP) is used from the second trimester onwards.

4. Drugs for Non-falciparum Malaria

For species like *Plasmodium vivax* or *Plasmodium ovale*, which can cause relapsing infections: Chloroquine (where still effective) or ACTs can be used.

Primaquine is used to clear liver hypnozoites in *P. vivax* and *P. ovale*, but it is contraindicated in pregnancy and in individuals with G6PD deficiency.

5. Antimalarial Prophylaxis

Prophylactic antimalarial drugs are sometimes recommended for travelers and vulnerable groups: Atovaquone-proguanil Mefloquine

Doxycycline (for non-pregnant adults) These are not commonly used in the general population in Nigeria but are important in specific cases.

2.5.3 Health Education

Health education is a fundamental component of malaria prevention and control, especially among vulnerable groups such as pregnant women. It plays a critical role in improving

awareness, influencing health-seeking behavior, and promoting the proper use of preventive measures like insecticide-treated nets (ITNs) and intermittent preventive treatment in pregnancy (IPTp). In a rural community like Sabon Iche, where traditional beliefs and limited access to formal education may shape perceptions, targeted health education is essential for effective malaria control.

1. Raising Awareness on Malaria Causes and Prevention

Educating pregnant women and their families about the causes, transmission, and consequences of malaria empowers them to take preventive actions. Common topics include:

- i. Understanding how mosquitoes transmit malaria
- ii. Importance of using ITNs every night
- iii. Benefits of attending antenatal care (ANC) visits for IPTp
- iv. Recognizing early signs and symptoms of malaria

Community health talks, radio programs, and outreach sessions by trained health workers can reinforce these messages in local languages.

2. Promoting Early Care-Seeking Behavior Health education encourages pregnant women to seek prompt medical care when symptoms of malaria appear. Many rural women may delay treatment due to: Cultural beliefs or misconceptions Preference for traditional healers Distance to health facilities

Behavior change communication (BCC) strategies using posters, dramas, or peer educators can help shift these behaviors and emphasize the risks of untreated malaria during pregnancy.

3. Empowering Local Influencers and Community Structures Involving community leaders, religious figures, traditional birth attendants (TBAs), and male partners can increase the credibility and reach of malaria education. These influencers can: Advocate for regular ANC attendance Dispel myths around IPTp or ITNs Promote shared responsibility for household malaria prevention In Sabon Iche, using familiar and trusted community structures can improve message acceptance.

4. School and Youth-Based Education Programs: Educating school children and youth about malaria has long-term benefits. They can: Serve as messengers to their families grow into adults who practice preventive behaviors help in community-based clean-up activities to reduce breeding sites Such programs can be integrated into school curricula or youth health clubs.

5. Tailored Communication for Pregnant Women Specific health education targeted at pregnant women should: Be delivered during ANC visits or home visits by community health workers Include demonstrations on how to use and care for ITNs Explain drug safety and the importance of taking all IPTp doses Visual aids, storytelling, and interactive sessions are particularly effective in low-literacy settings.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Research Design

The descriptive survey research method was employed for this study because of its capacity of obtaining information about the situation under study of the complications of malaria among pregnant women. This affords the collection of information directly from the representative samples of the population and then drawing conclusion on the available information which form the percept of the entire population.

3.2 Area of the Study

Sabon Iche community is the area of study in Kagarko Local Government Area of Kaduna state along Jere road. It is estimated of five thousand five hundred and fifty-nine (5,559), people according to " Sarkin Samarin Gwada (2020) ". In the above mention population two thousand five hundred and fifty (2,550) are females while one thousand and nine (1009) are males and two thousand (2000) are children. Sabon Iche community is consisting of three main religions which are Christianity, Islam, and Traditional religion. Sabon Iche community is located in Kagarko Local Government Area, it also comprise of different languages which are (Hausa, Koro, Gbagi). Some languages that are not populated as those mentioned above, include the Igbo, Kadara, and Fulani among others.

The main occupations in Sabon Iche community are trading and farming, and there are many neighborhood communities, such as Kuta, Igwa and Tawali located in southern part Gwadan

Gwari, Dandaudu, Kaffin Koro and Fukka are found in the northern part of the community, on the eastern part we have Erena, Galadiman kogo and Gussoro, while Gbayipe, Mutun daya, Gunu and Shakuwatu are located in the western part of the community.

In Sabon Iche community, there are two private schools of Health Technology which are, Great Success College of Health Science and Technology, Sabon Iche, and First Class School of Health Science and Technology, Sabon Iche. Also, there's one government clinic located in the area known as Maternal Child Health, Sabon Iche (MCH Sabon Iche). More so, there are several private clinics which include; Mai godiya PHC, Mcdonia Clinic and Maternity, Alheri clinic and maternity, among others.

3.3 Population of the Study

The total population of the study area is 6,050 but the target population is 1,076 people which is made up of pregnant women in Sabon Iche Community of Kagarko Local Government area. Below are the estimated populations of pregnant women in Sabon Iche community.

POPULATION OF THE PREGNANT WOMEN

Table 3.1. Showing area and population of pregnant women in Sabon Iche Community of Kagarko LGA of Kaduna State.

AREA	POPULATION
Pabeyi	235
Tawali	288
Central	289
Bisi / Tukulu	188

(Sources: Office of the in-charge of anti-natal facilities)

3.3 Sample Techniques

The multiple probability sampling technique was employed to achieve appropriate method of selecting a sample from every large population of health care facility users that come to the selected health facilities.

Other private clinics count with many neighborhood communities which are Kuta, Egwa and Tawali located at the eastern part, Gwadan Gwari, Daudaudu, Kaffin Koro, Fuka located at the southern part, Erena, Galadima, Gussoro located at the northern part of the community while Bmayipe, Mutun daya, Gunu and Shakwatu are in the western part of the community

3.4 Instruments of Data Collection.

For the purpose of the study, a self-developed questionnaire was used to collect relevant information from the respondents on the assessment of knowledge on the complication of malaria among pregnant woman in maternal and Child Health Centre and ECWA clinic in the study area. A questionnaire containing two sections, section "A" consisting of the demographic characteristic of the respondents while "B" contains the assessment knowledge on the complication of malaria among pregnant woman in the study area.

3.4.1 Validity and Reliability of the Instrument

The questionnaire instrument of data collection employed by the researcher is an acceptable instrument. It is capable of giving logical, reasonable information about the study which can be analyzed to draw acceptable, accurate conclusion; the instrument is also applied to the pregnant women in the study area.

3.5 Procedure For Data Collection

The researcher obtained a letter of introduction from the office of the supervisor for the study, two research assistants were trained based on the local language, Some health workers are also engaged in the distribution of the questionnaires due to the large number of the respondents; a random sampling technique was used to get number of the respondents for the study.

3.6 Procedure for Data Analysis.

The completed, returned questionnaire is gathered and the data obtained were analyzed by using simple table, descriptive statistics of frequency and percentage over a hundred units (100%). The frequency represents the number of respondents.

The percentage was calculated using:- $x/y \times 100$

Where x = frequency (i.e number of respondents)

And, y = total number of respondents.

CHAPTER FOUR

4.0

DATA PRESENTATION

4.1 Introduction

The research project is done by the distribution of questionnaire, the questionnaire contained twenty question based on the objective of the study complication of malaria among pregnant women in Sabon Iche Community Kagarko Local Government. One hundred and one questionnaires were distributed among the pregnant women attending antenatal care (ANC) in Maternal Child Health Centre Gwada (MCH)

Table 4.1: Based on Age of Respondents

Variables	Frequency	Percentage %
15 - 24	25	24.7
25 -34	57	56.4
35 - 44	16	15.8
45 & above	3	2.9
Total	101	100%

The table above shows that 25 which is 24.7% of the respondents range from 15 - 24, 57 which is 56.4% range from 25 - 34 years, while 16 which is 15.8 range from 35 - 44 years and 3 respondents which is 2.9% range from 45 & above. The majority of the respondents are between the ages of 45 and above.

Table 4.2: Based on Gender of Respondents

Variable	Frequency	Percentage %
Male	0	0%
Female	101	100
Total	101	100%

The table above show that 101 which is 100% are females, 0% respondents are males. The majority in the study area are female which 100% is.

TABLE 4.3: Based on Marital Status

Variable	Frequency	Percentage %
Single	24	23.7 %
Married	77	76%
Others	0	0%
Total	101	100%

The table above shows that frequency 24 which is 23. 7% of the respondents in the study are single, frequency 77, which is 76% are married and 0 which is 0% are others. The majority in the study are married which is 77 respondents (76%)

TABLE 4.4: Based on Educational level of respondents

Variable	Frequency	Percentages
Primary	33	32.7
Secondary	16	15.9
Tertiary	3	2.9
Other	49	48.5
Total	101	100%

The table above indicate that 33 (32.7%) of the respondents attended primary school, 16 (15.9%) attended secondary school, 2.9 (3) of the respondents attended tertiary school and 49 which is 48.5% of the total population didn't attended any of the institutions. The majority in the study didn't attend any school.

TABLE 4.5: Based on Occupations

Variable	Frequency	Percentage
Trade	17	16.8%
Business	35	34.6%
Civil Servants	2	1%
Others	47	48.5 %
Total	101	100%

The total above shows that 17 which is 16.8 % of the population in the study are traders, while 35 which is 34% are business women, 2 (1%) are civil servant and 47 which is 48.5 % are

house wives. The majority in the study area are house wives which is 48.5% in the total population.

TABLE 4.6: RELIGION

Variable	Frequency	Percentage
Muslim	82	81.5
Christians	19	18.8
Total	101	100%

The table shows that 82 which is (81.5) of the total population are Muslim and 19 with 18.8% are Christians. The majority in the study area are Muslim with 81.5%.

From the questionnaire 94 respondents which is 93 % know what malaria in the study area while 7 which is 6.9% have no knowledge of malaria. Majority in the total population know malaria which is 93% of the respondents.

From the questionnaire 22 of the respondents which is 21% got their information from their homes, while 20 which is 9% got theirs from school, while 2 which is 1.9% got their information through the mass media and 69 which is 68.3 got there from health centers. The majority in the total number of respondents got their at health centre which is 68.3%.

From the questionnaire 6 which is 5.9% of the respondents in the study believe that house flies is malaria vector, while 91% believe that sand fly and 0% believe in other vector. The majority in the total population believe that mosquitoes are malaria vector which is 91 %.

From the questionnaires, 92% of the respondents know malaria breeding site, while 59% don't know and 1.9% don't have idea on the breeding site. The majority of the respondents know the malaria breeding with 92%.

From the collected data it shows that 9.9% (10) of respondents believe that complication of malaria is Anemia, while 41.5% (42) believe is Abortion, 18.8% (19) believe is premature delivery, 4.9% (5) don't know the complication and 24.7% (25) of the respondents tick all of the above mentioned complication. The majority have knowledge on the complication of malaria during pregnancy in the study which is 24.9%.

From the collected data, it shows that 61 % (62) of the respondents know premature delivery is one of the complications of malaria during labour, which 13% (14) know that post-partum hemorrhage is also of the complication, 26% (27) tick all of the above and 0% (0) don't have any idea on the complication. The majority believe the complication of malaria during labour is premature. The majority believe the complication of malaria during labour is premature delivery with 61% of the total population in the study.

The questionnaire, it shows that 54.5% of the respondents in the study tick labour fever (Puerperal fever) as one of the complication of malaria most common during puerperium period, while 27.7% tick difficulty in lactation, 14.8% tick all of the above and 2.9% don't know any of the complication. The majority of the respondents in the total population believe labour fever is the most common in puerperium period which is 54.5%.

The data collected, it shows that 51 % of the respondents believe fever is the sign and symptom of malaria, which 27.8% believe of headache, 8.9% believe it muscle on pain, 11.8% believe it Nausea (feeling like vomiting) and 0% don't know any sing and symptom of malaria, the majority of the respondents in the total population in the total population 51% who believe it fever.

The data collected shows 66% of the respondents in the study agreed to the use of LLIN (Long Lasting Insecticide Net) as a means of preventing malaria while 31.6 goes for insecticide spray and 1.9 % believe in screened doors & windows, while 0% practices others. Majority of the respondents in the total number of the population used LLIN with 66%

Data collected shows that 85% respondents in the study have heard above anti-malaria free treatment while 14.8% don't have any knowledge on that. That majority of respondents have knowledge of above 85%.

From the data collected, it indicated that 62% of the respondents obtain their anti-malaria from Nearby Pharmacy, while 20.7 from Health Facilities, 0% from shops & Supermarket and 16.8% from other source. This shows that the majority of the respondents obtain their anti-malaria treatment which is 63 (62%) from Nearby Pharmacy.

The data collected shows that 80% of the respondents are able to pay for their treatment, while 19.8% can't, the majority of the respondent in the study that can pay for their treatment is 80%.

From the questionnaires, it shows that 68% of the respondents in the study have mosquito net in their homes and 31.6% don't have. The majority who have mosquito net is 68%.

Data collected showed that 2.9% of the respondents in the study population believe mosquito net is not effective, while 17.8% dislike it, 20.7% believe it not mosquito season and 58% believe it cause discomfort to them. Majority of the respondents in the study believe its causes discomfort of about 58%.

CHAPTER FIVE

DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Discussions

The findings from this study reveal that malaria continues to be a pressing public health concern among pregnant women in Sabon Iche Community, Kagarko Local Government Area of Kaduna State. Despite numerous government and non-governmental interventions to curb malaria transmission, the disease remains highly prevalent among women of reproductive age, particularly during pregnancy.

The study discovered that most respondents (93%) were aware of malaria, its symptoms, and its mode of transmission. This high level of awareness aligns with the findings of Okeke *et al.* (2016), who reported that health education and community sensitization have significantly improved malaria-related knowledge among rural women. The majority of respondents correctly identified mosquitoes as the main vector, which demonstrates an understanding of the biological cause of the disease. However, it was also observed that a small proportion still held misconceptions, indicating that knowledge gaps persist and may contribute to poor preventive practices.

Furthermore, education level appeared to influence awareness and preventive behavior. Nearly half of the respondents (48.5%) had no formal education, which might have limited their ability to fully understand or apply malaria prevention information. This observation supports Adebayo

et al. (2015), who emphasized that educational attainment strongly correlates with the proper use of preventive tools such as insecticide-treated nets (ITNs) and adherence to prescribed treatments.

The results also revealed that intermittent preventive treatment in pregnancy (IPTp) and the use of insecticide-treated nets were the most commonly acknowledged malaria prevention strategies. However, while 68% of respondents owned mosquito nets, only 66% reported using them consistently. Many expressed discomfort from heat and a belief that mosquito nets are unnecessary during dry seasons. These findings reflect behavioral and cultural barriers similar to those documented by Eisele *et al.* (2010), who noted that despite wide distribution of ITNs, actual usage remains inconsistent in many malaria-endemic regions due to socio-environmental factors.

The study also highlighted that malaria complications during pregnancy remain widespread. A significant number of respondents recognized anemia, abortion, premature delivery, and low birth weight as possible outcomes of malaria infection. This aligns with previous studies (Desai *et al.*, 2007; WHO, 2014) which identified these complications as leading causes of maternal and neonatal morbidity in sub-Saharan Africa. The knowledge of these complications among respondents demonstrates effective awareness dissemination, likely through antenatal care (ANC) services and community sensitization programs.

Nevertheless, the research found that treatment-seeking behavior among pregnant women is suboptimal. Over 60% of respondents obtained malaria medication from nearby pharmacies

rather than government health facilities. This suggests possible distrust in public health services, inadequate health infrastructure, or convenience-based choices. Such behavior can lead to misuse of drugs, incomplete dosages, and increased risk of drug resistance, echoing the concerns of NMEP (2021).

The results further revealed that economic challenges play a crucial role in malaria persistence. Although 80% of respondents claimed they could afford treatment, the remaining 20% could not, indicating that financial barriers still prevent timely access to proper healthcare. This finding is consistent with Umeh *et al.*, (2015), who reported that low income among rural dwellers limits their ability to afford preventive and curative malaria services.

The findings also draw attention to the role of antenatal care (ANC) as a platform for malaria prevention. Women who regularly attended ANC were more likely to receive health education, ITNs, and IPTp doses. However, attendance levels varied, and some women failed to complete all recommended doses. This underscores the need for increased sensitization and follow-up by community health workers to ensure compliance with WHO guidelines recommending at least three doses of IPTp-SP during pregnancy (WHO, 2022).

Moreover, environmental factors remain a major contributor to malaria transmission in Sabon Iche. The presence of stagnant water and poor sanitation were reported by respondents, creating favorable breeding grounds for mosquitoes. This observation aligns with Becker *et al.*, (2010), who highlighted the significance of vector ecology in malaria transmission. Therefore,

environmental management through community clean-up campaigns and improved waste disposal must complement biomedical interventions for malaria control to be effective.

In summary, this study confirms that while awareness of malaria is high among pregnant women in Sabon Iche Community, preventive practices and treatment adherence remain insufficient. Knowledge has not fully translated into consistent behavior change. This gap between knowledge and practice suggests the need for more culturally appropriate, community-based health interventions that address both behavioral and socio-economic barriers.

The findings of this research support the conclusions of previous scholars, such as Menéndez *et al.*, (2010) and Uneke (2008), who emphasized that malaria during pregnancy continues to pose serious threats in endemic areas despite extensive awareness campaigns. The persistence of malaria among pregnant women in rural Nigeria is therefore not just a matter of knowledge, but also of accessibility, affordability, cultural perception, and the sustainability of intervention programs.

5.2 Conclusion

Malaria is still the Major public health problem among pregnant women in Sabon Iche community. Lack of education and non-usage of ITNs were the major factors associated with an increased risk of malaria infection. The control measures available in the area should be reviewed and emphasis should be placed on adequate sensitization usage of ITNs. Early attendance and participation in focused antenatal care services should be encouraged among

all pregnant women especially the primigavidae, in order to reduce the risk of malaria infection in pregnancy. Again, awareness on malaria prevention measures during pregnancy should be target young women even before marriage preferable at schools, social and religious gatherings.

5.3 Recommendations

Maternal Child Health Center Sabon Iche (MCH) is where most pregnant women attend; therefore it is a good avenue to implement health policies that affects women and their children. Mass enlightenment on the importance of environmental hygiene and local means of vector control has to be intensified. Such campaign should be included during routine antenatal talks by health personal. Capacity building of health providers has to strengthen in order to give adequate health talks on malaria, use and application of ITMNs. Government should make ITMNs available to the pregnant women at an affordable price if not free. Vector control including use of aerial spray of insecticide and prompt refuse disposal will greatly reduce the burden of malaria infection. Adequate supply of anti-malaria drug should be included in free antenatal drugs in order to ensure prophylaxis care to the pregnant women.

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APPENDIX

My name is Kingsley Henry, Department of Biology a final year student of Usmanu Danfodiyo University, Sokoto. I am seeking you to furnish me with your opinion on the facts about effect and complication of malaria on pregnancy in Sabon Iche Community Kagarko Local Government Area of Kaduna State. Please kindly fill the below questionnaire.

The questionnaire is made up of two sections, "A" elicited response as regards to the biological data of the respondents, while section "B" consist of question that elicited response from the respondents.

SECTION A BIO DATA

Please Tick In the box (✓) where approximate

1. AGE: A. 15 - 24() B. 25 - 34 () C. 35 - 44() D. 45 and above ()
2. GENDER: A. Male () B. Female ()
3. MARITAL STATUS: A. Single () B. Married () C. Other specify
4. EDUCATIONAL LEVEL: A. Primary () B. Secondary () C. Tertiary ()
D. Other specify
5. OCCUPATION: A. Trader () B. Business () C. Civil servants () D. Others
specify
6. RELIGION: A. Muslim () B. Christianity () C. Other specify

SECTION B

Please Tick the box (✓) where appropriate

To determine the knowledge of pregnant woman of the determinants of malaria.

7. Do you know what malaria is? A. Yes () B. No ()

8. If yes, what is the source of your information?
 A. Home () B. School () C. Mass media () D. Health facilities () E. Other specify
9. What is malaria vector? A. House flies () B. Mosquitoes () C. Sand fly ()
 D. Other specify
10. Do you know malaria breeding site? A. Yes () B. No () C. Don't know ()

To determine the effect of malaria among pregnant woman attending ANC in Sabon Iche.

11. What are the complications of malaria during pregnancy?
 A. Anemia () B. Abortion () C. premature delivery, still birth () D. Don't know ()
 E. All of the above
12. What are the complications of malaria during labor?
 A. premature delivery () B. Post-partum hemorrhage () C. All of the above ()
 E. Don't know ().
13. Which complication of malaria is most common during puerperium period?
 A. Labor fever (puerperal pyrexia) () B. Difficulty in lactation () C All of the above ()
 E. Don't know ().
14. What are the signs and symptoms of malaria? A. Fever () B. Headache ()
 C. Muscle pain () D Nausea/ vomiting () E Don't know.

To determine the knowledge of pregnant woman on the control measures taken to prevent malaria disease.

15. How do you prevent yourself from mosquito? A. Long lasting insecticide net LLIN()
 B. Insecticide spray () C. Screened doors & windows () D. Others specify
16. Have you heard about anti-malaria free treatment? A. Yes () B. No ()
17. If No, from where do you obtain anti-malaria treatment?
 A. Nearby pharmacy () B. Health care centers () C. Shops & Supermarket
 () B. Other specify

18. If yes, are you able to pay for treatment? A. yes () B. No ()
19. Do you have treated mosquito nets in your home? A. Yes () B. No ()
20. If the answer is no, why not?
- A. It is not effective () B. I dislike it () C. Not mosquito season () D. Discomfort ()