CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In 2017, malaria resulted in 435,000 fatalities and affected around 229 million individuals globally in 2019.[1] Over the years of global initiatives and research is targeted at improving the malaria prevention, diagnosis, and treatment has culminated in these issues of morbidity and death.[2] In Africa and specifically in the Asian nations, malaria is the utmost widespread disease, with the highest incidence of indigenous cases. The global mortality rate from malaria varies between 0.3% and 2.2%, with severe cases in tropical regions potentially reaching 30%.[3] Multiple studies indicate that since 2015, the incidence of malaria organism infection has increased.[4]

A diminutive protozoan belonging to the Plasmodium species group, with many subspecies, is responsible for malaria. Human disease is induced by certain species of Plasmodium.[4] An inexplicable hemoglobin metabolite, referred to as malaria pigment, is accrued by amoeboid intracellular parasites of the genus Plasmodium, which inhabit several vertebrates; some reside in tissues, while others inhabit red blood cells. Only 5 species of plasmodium out of the 172 can infect the human and affect their health. These include P. ovale, P. knowlesi, P. vivax, P. malariae, and P. falciparum. P. knowlesi.[2] Malaria is a disease that is often instigated by any of the aforementioned Plasmodium species.

However, after the identification of the Plasmodium parasite and the malaria cause in the 1880s–1882s, efforts to stop malaria transmission by either addressing the parasite or the insect vector were launched in the late 1800s. Several successful local initiatives were recorded in various malaria-affected regions of the world in the early 1900s.[5] Owing to its exceptional effectiveness

against malaria vectors, it was used as the primary instrument for the 1955 League of Nations-sponsored malaria eradication effort. In 1978, it was formally abandoned since it had not lived up to the expectations.[5] Later, more expensive insecticides known as pyrethroids were created and intended for use in bed net impregnation. In recent years, an intervention called intermittent preventive therapy (IPT) comprises the giving of a remedial doses of sulfadoxine-pyrimethamine (SP) to the pregnant women for maximum protection against malaria. This intervention is a preventive method against the malaria parasite which protects pregnant women from the disease and its complications. Malaria infection in pregnancy can have dangerous effects on the fetus as well as the pregnant woman, this includes complications like maternal anemia, fetal loss, premature delivery, intrauterine growth retardation, and conveyance of low birth-weight infants (<2500 g or <5.5 pounds), a risk factor for death. The commencement of IPT start at the beginning of the second trimester of pregnancy.

The diseases signs and symptoms are one of the ways to diagnose for malaria diseases. However, since the signs and symptoms of malaria matches with other tropical diseases, hence clinical observation is not the best method for malaria diagnosis.[6] A rapid diagnostic test and microscopic detection which are both malaria parasitological test are the most acceptable method for malaria diagnosis.

Pregnant women who contract malaria may experience no symptoms at all, or may encounter severe anemia, or may even lead to sudden death. Complications, including cerebral malaria, pulmonary edema, and renal failure, are more common in women with lower levels of acquired immunity who live in regions with low malaria transmission. Nevertheless, the total maternal mortality rate in low-transmission regions (0.6–12.5%) is comparable to that in areas where malaria is prevalent (0.5–23%).[7] However, despite the common usage of rapid diagnostic tests

(RDTs) and microscopic tests, they are not sensitive and explicit to malaria parasites. The confines of traditional methods force the development of more accurate, easily measurable, and point-of-care (POC) application-friendly molecular and biosensing-based procedures.

MiP is prevented in malaria-prevalent areas of Africa by combining vector control (avoidance of mosquito exposure) and chemoprevention techniques. World Health Organization advises a combination of chemoprevention and insecticide-treated bed nets (ITNs) to minimize contact with infected mosquitoes.[8] ITNs function by creating a physical barrier that keeps mosquitoes away and either kills or repels vulnerable mosquitoes.

1.2 Statement of the Problem

Approximately 125 million pregnant women globally reside in areas in which they are vulnerable to malaria in pregnancy (MIP), a significant preventable contributor to adverse birth outcomes.[9] While five types of malaria can infect people, Plasmodium falciparum as well as Plasmodium vivax are the two primary species that result in negative effects for both the mother and the fetus during pregnancy. P. falciparum is the major specie found in sub-Saharan Africa, where malaria is accountable for most unfavorable birth outcomes. Nonetheless, as P. falciparum and P. vivax cohabit in Southeast Asia and the Western Pacific, more than half of pregnancies that could be at danger of malaria occur in this region. MIP causes a special concentration of parasites in the placental intervillous space, which at least partially contributes to unfavorable pregnancy outcomes. Placental sequestration is often seen in P. falciparum infections because malaria parasites transfer a protein called VAR2CSA to the red blood cell membrane, which encourages adhesion to chondroitin-sulfate A (CSA) on syndecan-1, which is anchored in placental tissue.

A parasite causes malaria, a severe tropical disease that can occasionally be fatal. Mosquitoes carry the disease. It claims the lives of about 445,000 people per year, most of whom are young Africans.[9] Although malaria has virtually disappeared in the United States, it can still be acquired when visiting rest of the globe. America receives about 1700 cases of malaria annually from immigrants and tourists coming from countries where the disease is more common.[10] Malaria is on the rise in Pakistan. As opposed to 2.6 million between 2021 and 2022, ranging from January and August of 2022, Pakistan reported 3.4 million probable cases of malaria.[11]

In addition, more than 170,000 cases have been found in laboratories; of these, 23% are linked to Plasmodium falciparum, which is mostly associated with most severe and deadly cases, and 77% are related to Plasmodium vivax.[12] P. falciparum causes a higher death rate. Balochistan and Sindh provinces of Pakistan saw an increase in cases after the heavy floods in mid-June 2022; and about 78% cases confirmed has been reported in the 2 regions. The current flood crisis is compromising the capacity of the national health system, hence raising concerns about the associated risks. In August 2022, Sindh Province reported 68,123 confirmed malaria cases, compared to 19,826 cases in the same month the prior year.[12]

Compared to 22,032 confirmed cases in August 2021, the Baluchistan Province reported 41,368 confirmed cases in August 2022.[12] Together, provinces (2) in Pakistan account for 78% of all cases that have been reported as of 2022. Statistics from 62 high-burden areas suggest that there were 210,715 extra cases in September 2022 compared to 178,657 cases in the same districts in August 2022.[11]

In Nigeria, Lagos and Enugu states are one of the states having high prevalence of malaria with 79.5%, also these states have high prevalence of malaria in pregnancy of 52% and 99% respectively.[13] However, unlike Ghana, which experienced a decrease in malaria incidence per

1000 people by 7.8% each year between 2011 and 2018, Nigeria contributes for around 11% of maternal mortality.[14] Malaria complicates between 8.4% and 58.1% of pregnancies in Nigeria.[13] First- or second-time pregnant mothers are more prone to malaria. Low birth weight, intrauterine growth restriction, and intrauterine mortality can develop from placental parasitaemia, which restricts the fetus's access to nutrition and oxygen.[13]

The World Health Organization (WHO) recommended using insecticide-treated nets (ITNs) consistently, administering intermittent preventive treatment in pregnancy (IPTp) for at least two doses after quickening, and managing malaria cases effectively.[15] The most recent guidelines suggest starting IPTp at 13 weeks gestational age, and continuing it at least once every month at each planned prenatal visit until delivery (there is no maximum number of doses).[15] The new Nigerian National Guidelines have not been widely adopted, and the first policy remains in existence in many areas, including the study region.[13]

1.3 Justification of the Study

Previous research indicates that malaria prevalence has not decreased in Nigeria, particularly among pregnant women. Also, the efficiency of intermittent preventive treatment amongst pregnant women at Igbeti is still not known by all pregnant women attending antenatal clinic, this has contributed to the low uptake of IPTp at the health facility. This was due to limited knowledge of the benefits and effectiveness of the intervention. The usage of IPT was uncommon at the project site until the intervention of an implementing partner in the state who focuses on averting malaria among pregnant women through the use of intermittent preventive treatment. The attitude towards the uptake of this intervention was poor due to an unclear understanding of the effectiveness of this treatment. The limited knowledge of this intervention

led to an understanding the effectiveness of intermittent preventive treatment amongst pregnant women attending the ANC clinic at Igbeti.

Intermittent preventative therapy (IPT) in pregnancy is a preventive strategy aimed at reducing maternal morbidity and mortality rates. The adoption of intermittent preventive therapy among pregnant women during prenatal visits in the research area is documented. The study is to evaluate the efficacy of intermittent preventative therapy in pregnant individuals. The efficacy of this intervention (IPT) would enhance healthcare services in the obliteration of malaria among pregnant women.

1.4 Aim and Objectives of the Study

Aim

This study aims to assess the factors influencing the uptake of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

Objectives of the Study

1. To investigate the awareness of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
2. To examine the level of knowledge on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
3. To determine the perception on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
4. To evaluate the attitude towards intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

5. To assess the factors influencing intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

1.5 Research Questions

1. What is the level of awareness of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
2. What is the level of knowledge on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
3. What is the perception on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
4. What is the attitude towards intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
5. What are the factors influencing intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

1.6 Hypotheses

1. There is no significant difference between ethnicity and awareness of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
2. There is no significant difference between educational status and level of knowledge on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.
3. There is no significant difference between religious affiliation and perception of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

4. There is no significant difference between age and attitude towards intermittent preventive treatment among pregnant women attending the antenatal clinics at Igbeti, Oyo State, Nigeria.
5. There is no significant difference between the occupational status and factors influencing intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

1.7 Significance of the Study

Malaria in Pregnancy (MIP) is a primary cause of mortality among pregnant women in Nigeria. Intermittent Preventive Treatment is an intervention meant to eradicate maternal morbidity and mortality rates in Nigeria. This study intends to investigate the uptake of intermittent preventive treatment in pregnant women within the allocated territory. The ultimate goal of this research is to eliminate maternal morbidity and mortality rates in the study area by using the findings to improve the adoption of this intervention among women that are pregnant.

1.8 Scope of the Study

The study was steered among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Etiology of Malaria

Simple malaria is induced by fever, resulting from the rupture of erythrocytes, macrophage phagocytosis of merozoites, and/or the presence of trophozoites exhibiting antigens in the spleen or circulation, which stimulates the generation of TNF-α (tumor necrosis factor α).[1] The frequency of fever associated with malaria infection varies according on the kind of parasite. In P. vivax and P. ovale malaria, schizont progeny mature every 48 hours, resulting in tertian fever, also known as "tertian malaria," in these species. In contrast, P. malariae is linked to quartan fever, sometimes referred to as "quartan malaria," which manifests every 72 hours. In contrast, fever from falciparum malaria may occur every 48 hours, although it often lacks a consistent pattern.

Dinoflagellates are a type of photosynthetic protozoa that give rise to parasitic protozoans in the genus Plasmodium. At least 13 of the approximately 200 distinct species of protozoa that have been found thus far are known to be harmful to humans. There are five recognized parasites that cause malaria in humans: *P. falciparum, P. vivax, P. malariae, P. ovale* (including P. ovale wallikeri and P. ovale curtisi), and *P. knowlesi*. P. falciparum is the most common and harmful species in Africa. Nonetheless, the majority of malaria-endemic areas in Africa exhibit co-infection and the presence of several sympatric species in a single human host or mosquito vector.

In African locations where malaria is endemic, *P. malariae* is the species most frequently seen in sympatry with *P. falciparum*.

A certain group of Anopheles species is responsible for transmitting malaria in each endemic location. Around 400 separate species of Anopheles mosquitoes have been recognized. Nonetheless, just thirty of them are confirmed as malaria carriers. All malaria vectors eat throughout the twilight and dawn hours. In parts of the African continent where malaria is endemic, the distribution pattern of the mosquito species is steady. It is unusual for a single vector species to withdraw from a given location altogether, and introducing a non-indigenous vector raises grave concerns about public health since it can spread fatal epidemics. Even with known vector eradication procedures, native vectors are tough to remove.

2.1.2 Malaria and Pregnancy

The Italian phrase "mal'aria," meaning "bad air," implies malaria, stressing the relationship between the illness and swampy places. Plasmodium protozoan parasites are responsible for this endemic vector-borne parasitic illness, common in tropical and subtropical locations globally.[2] There are more than 200 species of Plasmodium that can infect reptiles, birds, and humans. Malaria parasites generally exhibit host specificity.[2] Five species of Plasmodium—Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale, and Plasmodium knowlesi—cause malaria in humans. But among the five Plasmodium species that cause malaria in humans, P. falciparum is the most serious.[3]

The life cycle of the parasites is complicated and includes both vertebrate hosts and a mosquito vector. Additionally, it reproduces sexually as well as asexually. This makes developing medications and vaccinations tough.

The earliest known usage of qinghai (Latin: Artemisia annua) to treat malaria was in China in the second century BC (168 BC), when it was used to treat fever and chills. Spanish invaders in Peru in the sixteenth century learned that the Cinchona tree bark (Latin Cinchona succirubra) contained remedies that treated malaria. This was the next known trial. The active ingredient of Cinchona succirubra, which has a long history of use in treating malaria and chemoprophylaxis, was identified in 1820 by French researchers Pierre Joseph, Pelletie, and Joseph Bienaimé Caventou. In 1970, a group of Chinese scientists under the direction of Dr. Youyou Tu discovered that the plant Artemisia annua has an active molecule known as artemisinin. This component is effective against malaria.

Worldwide, combination therapy involving artemisinin and its results are effective in treating malaria; nevertheless, resistance is beginning to emerge in certain areas of the world. This involves the quest for innovative anti-malarial medications with high therapeutic value, reduced toxicity, and decreased cost. In the late 1800s, attempts were made to stop the spread of the parasite or deal with the insect vector after Laveran in Algeria identified the origin of malaria and the Plasmodium parasite between 1880 and 1882.[5] Many successful local initiatives were recorded in various malaria-affected regions of the world in the early 1900s. Dichloro-diphenyl-trichloroethane, or DDT, entered the scene. It was revealed to have insecticidal qualities only in 1939, despite having been produced in 1874. It was widely utilized both during and afterward World War II. Because of its great effectiveness against malaria vectors, it was chosen as the primary weapon for the 1955 League of Nations-sponsored malaria eradication effort. However, it was formally abandoned in 1978 since it had fallen short of expectations. Later, more expensive pesticides known as pyrethroids were created specifically for bed net impregnation. Recently, some factors have undermined the effectiveness of long-lasting impregnated nets

(LLINs): mosquito populations have become more resistant to the insecticide, and Anopheles species have become more diverse and exhibit altered behavior due to the fact that some of them are or were early biters and exophagic/exophilic.

2.1.3 Epidemiology of Malaria

The discoveries of DDT and chloroquine during World War II proved to be extremely successful in reducing the worldwide spread of *P. vivax* and *P. falciparum*, so providing benefits to vast regions of the Americas, Europe, and Asia. The first ten years of the twenty-first century saw these amazing advances in the fight in contrast to malaria, but the second decade seems to be more difficult. Since 2014, there has been an increase in cases of malaria in some locations. In 2019, there were an estimated 229 million cases worldwide (from 87 countries where malaria is endemic). More than 94 percent of the 215 million cases that were reported occurred in Africa.[6] Approximately 3% of all malaria cases worldwide were in Southeast Asia. Africa accounted for 94% of the 409,000 malaria-related deaths that were predicted to occur worldwide in that same year.[6] 67% of all malaria deaths in 2019 occurred in children under the age of five, making them the primary victims of the disease.

Malaria is considered to predominantly afflict children under the age of five due to weak immunity. Reduced appetite, a limited social life, and limited play are some of the side effects of fever and illness that cause meager growth. There are currently 85 nations where malaria is endemic, and there were 241 million cases of malaria worldwide in 2021, conferring to the latest malaria data.[7] 95% of the load in this comes from the WHO's African area.[7] According to WHO estimates, Southeast Asian nations contributed 2% of the global burden, with India accounting for 83% of cases.[8] There have been several variations in the malaria trend in India. In the 1950s, malaria reached its height in India, accounting for 75 million cases and 0.8 million deaths

annually. After the National Malaria Control Programme was implemented in 1953, the number of cases drastically decreased to less than 50,000, and there was no fatality (1961). Although it was believed that malaria was almost eradicated, 6.45 million cases were reported in 1976. A number of factors are believed to have contributed to this resurgence, including urbanization and the subsequent favorable environment for vector breeding, interruption of the control program due to war or other skirmishes in the nation, emergence of drug-resistant parasites, and vector resistance to insecticides.[9] A revised action plan was unveiled in 1977 but proved to be ineffective. It was then reintroduced in the middle of 1980 and again in 1995. Since then, India has seen a steady decline in the prevalence of malaria.

The goal of the 2016 National Framework for Malaria Elimination is to stop the spread of cases among native people and become certified malaria-free by 2030. The primary malaria-causing species in India are P. falciparum and P. vivax, both having specific regional distributions. Limited research has been performed on the epidemiology and prevalence of malaria in South India, specifically in Puducherry. Investigating the seven-year trend of malaria in Puducherry, a coastal Union territory in southern India, as well as shifts in the distribution of P. species and the impact of climate and population on the disease.

From the 1930s to the 1960s, malaria was eliminated in most Western European countries and is no longer endemic in numerous prosperous nations. Nevertheless, the disease continues to present challenges for patient treatment, finding, and prevention. Travelers and migrants from endemic areas, tourists from such locations, and military personnel returning from foreign deployments are also possible malaria carriers. Ninety-five percent of introduced malaria cases in mainland France, the industrialized country with the highest incidence, originate from sub-Saharan African states.[8]

In mainland France, imported malaria surveillance is based on a system of approximately 100 hospitals that report cases to the National Reference Center for Malaria (abbreviated CNR in French). over 52% of malaria cases in continental France are recorded by member hospitals; since 2000, over 43,000 cases have been reported. As a result, the estimated 82,000 instances of imported malaria that occurred between 2000 and 2015 exhibit complicated and variable trends. The number of instances decreased by a very large amount (−55%) between 2000 (8060 estimated cases/year) and 2011 (3600 estimated cases/year). A notable rise of almost 30% occurred after that, from 2012 (3600 estimated cases/year) to 2016 (4700 estimated cases/year). This latest surge appears at odds with the 41% decline in malaria infections that the WHO has predicted for prevalent areas since 2000 (−12% in Africa), a decline that has enhanced between 2012 and 2016. On the other hand, more people are now moving between endemic areas of France at the same time. Southern Africa, Eastern Africa (including the islands in the Indian Ocean), and Western Africa have seen increases of 49%, 32%, and 113%, respectively, according to CNR statistics based on data from the French Civil Aviation Authority. For continental France, there has been a noticeable decline in the incidence rate throughout the entire period: 78% fewer instances of imported malaria, with a notable decline between 2000 and 2007 and a constant rate following. In contrast, during the same time period, the global incidence rate of malaria declined consistently by 41% in endemic nations. Many factors likely contributed to the observed trends, such as changes in the populations that contract malaria (type, origin), changes in the way people take preventive medication, changes in travel patterns with different destinations, durations of stay, and repeat visits, and changes in the local malaria epidemic (incidence, geographical distribution, epidemic profile, and resistance of isolates to antimalarials). During the study period,

95% of cases occurred in sub-Saharan Africa, mostly in Ivory Coast, Cameroon, Mali, and Senegal, where the distribution of people who contracted the sickness stayed constant.

Most of the patients were African-born, either permanent residents of France or recent immigrants from Africa; their percentage increased significantly between 2000 (63%) and 2015 (79%) (Fig. 3). Plasmodium falciparum was the primary cause of the majority of cases (85%), followed by *P. vivax* (5%), *P. ovale* (7%), and *P. malariae*. There were additional reports of two cases of Plasmodium knowlesi-related malaria, both of which responded well to chloroquine treatment. For every Plasmodium species, the monthly case diagnosis distribution showed that the detection peaked amongst July and October, with a second, less intense peak in January. This distribution shows when visitors go home following school breaks. 90% of the victims showed signs of illness two months after leaving the endemic area. During the months of October to December and February to March, when there was less activity, there was a larger percentage of non-falciparum cases. This is because *P. vivax* and *P. ovale* malaria have longer incubation periods, and most importantly, because both species have the potential to trigger relapses through the activation of hypnozoites. There were frequent reports of "accidental" transmissions of malaria, such as posttransplant or blood transfusion-induced malaria, or malaria in airports. More concerningly, instances of native malaria were also reported in France, Italy, and, on an isolated basis, Greece. Thus, the mosquito vectors are still there.

The United States had a case death rate of 5.5 per 1000 cases of Plasmodium falciparum malaria from 2008 to 2011. Except for Italy, where there are insufficient statistics, the numbers are relatively similar throughout the major EU nations. Between 2008 and 2012, 21,247 cases of Plasmodium falciparum malaria were described, and these cases were linked to 111 deaths, yielding a case fatality rate of 5.2 per thousand. During the whole period, the case fatality rate in

mainland France remained consistent at 0.4%, primarily affecting adults. On the other hand, the proportion and absolute number of cases with severe P. falciparum malaria is rising, rising from 2.13% (84 cases) in 2000 to 12.4% (295 cases) in 2015. On the other hand, the case death rate for patients who present with severe malaria decreased significantly from 12% to 2%. Since its introduction in 2011, intravenous artesunate treatment has been prescribed for severe malaria in 75% of cases. While the standards used to identify severe malaria over this period remained unchanged, there are a number of plausible explanations for these two opposing trends.

One potential explanation for the rise in imported malaria cases in France could be attributed to a shift in the population, with a greater percentage of subjects of African descent, who have been found to have a lower fatality rate from severe malaria than subjects of Caucasian descent. A further clarification, or a contributing factor to the first one, is that over time, the dispersal of the severe malaria criteria has shifted toward criteria of lesser severity (liver involvement with elevated serum bilirubin has a lower negative prognostic value than respiratory distress or coma, for example). A third reason might be the better handling of severe cases, either by quicker diagnosis or more successful treatment, especially with the steady substitution of intravenous artesunate for intravenous quinine.

In Nigeria, 97% of the population is at risk of catching malaria, making it an endemic country. While transmission lasts no more than three months in the north, it happens year-round in the south. Plasmodium falciparum is the most frequent species of malaria. In the majority of the nation, Anopheles are the main vectors. Anopheles and Coluzzii (59.3%), gambiae (39.5%) of the total Anopheles Gambiae S.L. gathered, alongside Anopheles. In certain parts of Nigeria, funestus serves as a secondary vector.[8]

Nigeria is responsible for the highest amount of the global malaria stress accounting for 27% of indicated cases across the globe and 31% of expected fatalities from the disease, based to the 2022 World Malaria Report. An estimated 55% of West African malaria cases in 2022 were reported to have originated in the nation. The number of cases remained steady from 2021 to 2022, coming in at 306 per 1000 at-risk individuals in 2022 and 305 per 1000 at-risk individuals in 2021.

In the same time frame, the number of deaths fell by 3.3%, from 0.9 to 0.87 per 1000 at-risk individuals.[8]

According to microscopy data from the 2018 Nigeria Demographic and Health Survey (NDHS), 13% of children under five have malaria parasitaemia. The prevalence ranges from 16% in the South and South East Zones to 34% in the North West Zone, demonstrating large regional, rural-urban, and socioeconomic inequalities, despite a drop from 27% in 2015 and 42% in 2010. The frequency is 2.4 times higher in rural areas compared to urban ones (31% vs. 13%). Compared to children in the highest socioeconomic category, the prevalence is seven times higher in the lowest group (38% vs. 6%). To address the malaria epidemic in Nigeria and provide direction for its implementation, the National Malaria Elimination Program (NMEP) created the High Burden High Impact (HBHI) strategy in coordination with the World Health Organization (WHO) and other technical partners. By 2025, the National Malaria Strategic Plan (NMSP) for 2021–2025 seeks to eradicate malaria in Nigeria by bringing parasite prevalence and malaria-related mortality down to less than 50 deaths per 1,000 people and bringing malaria morbidity down to less than 10%.

2.1.4 Malaria in Pregnancy

Primarily in extremely endemic areas, malaria in pregnancy (MiP) is one of the world's top causes of illness and mortality among mothers and children.[10] The most prevalent malaria parasite in Africa, where 125 million pregnant women are at risk of getting the disease, is *Plasmodium falciparum*. *Plasmodium vivax* infections are frequent outside of Africa; each year, over 90 million pregnant women are at risk of developing the disease, primarily in the Asia-Pacific area and roughly three million in Latin America.[11] Pregnancy-related malaria infection is linked to a wide range of clinical symptoms, from acute, simple instances to severe ones that result in both mother and child death. Multigravidae infected with P. vivax have been found to have an amplified risk of severe anemia. Additionally, low birth weight, moderate-to-severe anemia, and severe malaria have all been linked to *P. vivax* in Latin America. Out of the

approximately 390,000 clinical cases of malaria that have been recorded in Latin America, there have been reports of a low occurrence of MIP cases (10%), moderate-to-high severe cases (4–9%), and low fatality (0–0.2%).[12] The Thai-Myanmar border has been shown to have a similar incidence of malaria-related mortality; there, the yearly fatal case frequencies for *P. falciparum* and *P. vivax* in pregnant women were calculated to be 0.28 % (12/4158) and 0.023 % (1/4298), respectively.[12]

Understanding the clinical symptoms of malaria during pregnancy has been the emphasis of various study due to its significance for public health. Specifically, research suggests that both the patient's immunological status and the existence of various parasite genotypes influence how the condition manifests clinically in expectant mothers. Nevertheless, these correlations can differ throughout the wide geographic range of the illness. Although research conducted in Thailand, where P. falciparum and P. vivax co-occur, has not revealed a similar pattern, it has been found that pregnant African women infected with P. falciparum have rapidly declining levels of certain antibodies during pregnancy, increasing their vulnerability to MiP complications.[13] In one such study, there was a strong correlation between the quantity of malaria infections and the persistence of high antibody variability across time. Regarding the potential relationship between presence of various parasite genotypes for P. vivax and P. falciparum infections and pregnant women, the issue remains unanswered due to the lack of studies that incorporate parasite genetics. Overall, malaria prevalence in Nigeria was assessed to be 79.5%; during pregnancy, the prevalence was found to be 52% in Lagos State and 99% in Enugu State. The disease has severe effects on expectant mothers, fetuses, and newborns.[14]

2.1.5 Life Cycle of Malaria Parasite

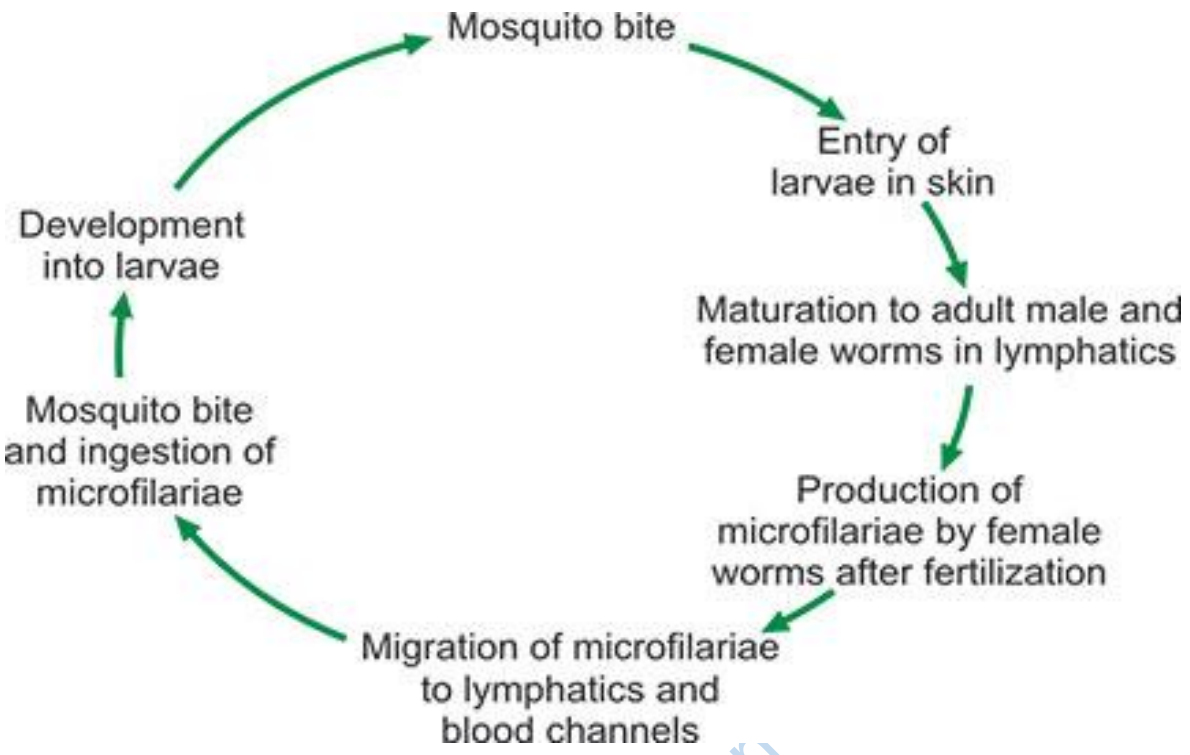


Fig 2.1 Life Cycle of Malaria Parasite (GeeksforGeeks, 2024)

The complex life cycle of the malaria parasite includes both the Anopheles mosquito and a vertebrate body host. The sporozoites found in mosquito saliva enter hepatocytes and initiate an asexual reproduction process after first penetrating the human host's bloodstream and epidermis during the early stages of infection. This phase, also known as the pre-erythrocytic or hepatic phase, occurred when infected hepatocytes ruptured, releasing thousands of merozoites. Some P. vivax and P. ovale infection strains produce dormant hypnozoites that stay inside hepatocytes for months or even four years before emerging and multiplying to initiate a new erythrocytic infection episode.

There is a contact between the merozoites and red blood cells (RBC) in an erythrocytic infection. To align and adhere to the erythrocyte membrane, the merozoite head bends the host cell's surface. In order to do the second asexual reproduction, the parasite then enters the erythrocyte and modifies its cytoskeleton in a way that is brought on by the infection. P. vivax and P. ovale

primarily target younger erythrocytes, but P. falciparum and P. knowlesi attack erythrocytes of any age. P. malariae, on the other hand, favors senescent erythrocytes. However, after entering red blood cells, merozoites develop into trophozoites and schizonts, which leave the erythrocytes to release more merozoites, re-invade fresh RBCs, and begin the asexual reproduction cycle. Furthermore, when a portion of trophozoites mature into gametocytes—male and female sexual descendants—the sexual reproduction cycle of malaria begins. The transmission of the malaria infection from the mammalian host to the mosquito is facilitated by these gametocytes. Anopheles bites will transmit the developing gametocytes to the mosquito's midgut. Inside the midgut, gametocytes develop into viable gametes, and zygotes are subsequently changed into invasive, motile ookinetes. The ookinetes then mature into oocysts in the basal lamina of the midgut. After mature, the oocyst forms sporozoites, which goes to the mosquito's salivary gland. A mosquito bite containing the parasite can transfer it to another mammalian host.

2.1.6 Pathophysiology of malaria in pregnancy

The highly specialized organ known as the placenta controls the exchange of metabolites flanked by maternal blood in the intervillous gaps and fetal blood in the chorionic villi. Placental insufficiency resulting from defective placental development can cause fetal growth constraint (FGR), miscarriage, and stillbirth.[15] Crucially, the process of placental development is both delicate and intricate. The trophoblast, a specialized cell group, differentiates to create a blastocyst during the first trimester, and the trophectoderm, the outer layer, unites to the uterine endometrium to form the primary syncytium. After further division and differentiation, the primary syncytium becomes the outer layer SCT and the inner core of cytotrophoblasts.

The SCT rapidly grows 6–8 weeks after implantation, generating branching villous trees that infiltrate the endometrial glands and maternal intervillous spaces. This allows maternal blood to perfuse the intervillous spaces. The cytotrophoblasts proliferate more during the second trimester, leading to the formation of extravillous trophoblasts that enter the decidua and the mother's uterine spiral arteries. After that, the uterine spiral arteries go through extracellular remodeling, which involves breakdown and reconstruction. This process is essential to making sure the placenta receives enough blood during pregnancy. Numerous immune cells, and uterine natural killer cells, regulatory T cells, and decidual macrophages, along with angiogenic, vascular, and placental growth factors, are involved in this intricate process.[16]

Placentas infected with P. falciparum have been shown to exhibit bilateral uterine artery notching and concurrent vascular resistance, which are indicators of utero-placental hemodynamic disturbance. The placental vascularization starts as eight gestational weeks (GW) however, as a result, infection during and after this time may have an impact on the growth of the placental vasculature and its blood flow. MiP before 15 GW was linked to an increase in diffusion distance in diffusion vessels and a decrease in transport villi volume in placentas from Tanzanian women, indicating a potential impairment of placental vascular development.[17] Additionally, infection prior to 20 GW in primigravids was linked to higher umbilical artery resistance, an indirect indicator of placental resistance flow. These findings were supported by Doppler ultrasound studies. MiP infection between the gestational week of 13 and 23 was linked to dysregulation of several angiogenic factors and metabolic hormones, which are essential for placental vascularization, according to research on a cohort of pregnant women from Malawi.[18] Preeclampsia may result from impaired trophoblast differentiation, which is manifested by

narrow spiral artery development and shallow trophoblast invasion. This can also lead to inadequate placental perfusion and elevated umbilical artery resistance.

Malaria in pregnancy (MiP) prior to 18 GW was linked to decreased in vitro trophoblast invasion and migration, which may indicate a decrease in placental blood flow that could lead to a later pregnancy. Increased uterine artery resistance was similarly linked to MiP infection in later pregnancy, between 32 and 35 GW (Burton *et al.,* 2018). The illness is mostly attributed to wounded trophoblasts and/or their diminished capacity to produce angiogenic factors necessary for rapid fetal growth in the third trimester, as trophoblast invasion is generally completed by 19–20 gestational weeks. Moreover, studies indicated that low placental weight, also a risk factor for fetal growth restriction (FGR), was four times more prevalent in women with preeclampsia (PM).[19] This may be linked to the dysregulation of angiopoietins; in preeclampsia, high levels of Ang-2 have been observed in both peripheral and placental blood after childbirth, and women with elevated Ang-2 levels were found to be at greater risk of having inadequate placental weight.

Regardless of when the infection occurs, irreversible placental damage and aberrant placental anatomy have been described in MiP. The placentas from women who contracted the infection during their first trimester displayed damage upon delivery, such as diminished transport villi, elevated syncytial knotting, and heightened placental lesions. Active infection during delivery was associated with diminished villous area and vascularity, augmented basal membrane thickness, syncytial damage, heightened syncytial knotting, and fibrinoid necrosis.[17] When fibrin builds up in the intervillous gaps and the placenta's angiogenesis is dysregulated, the placenta may not get enough blood, which can lead to necrosis.[17] Placentas infected with PM have been shown to exhibit necrotic cell death, with large syncytial breaches in certain cases resulting in denudation of the villi, vacuolation, and total loss of villous integrity.[17]

Increased phagocyte buildup in the intervillous gaps and sparse villi numbers are indicative of chronic placental infection at delivery, which may impair the placenta's capability to transport proteins and nutrients.[18] The insoluble byproduct of Plasmodium parasites, known as hemozoin, is frequently seen in the intervillous gaps, either inside of maternal macrophages or stuck in fibrin. Hemozoin's immunomodulatory qualities can exacerbate placental damage when it is present in infected placentas. Hemozoin, for example, has been demonstrated to lower phagocytic capability and increase cytokine release in phagocytes that have consumed it, suggesting that it may exacerbate placental inflammation by decreasing parasite clearance. Additionally, hemozoin has been shown in an in vitro study to activate SCT, which results in the production of cytokines and chemokines like TNF-α, IL-8, CCL3, and CCL4. This may maintain an inflammatory response that leads to increased infiltration of inflammatory cells and fibrinoid deposits in the placenta.

In comparison to both healthy and previously treated malaria cases, active P. falciparum-infected placentas showed decreased villous area and vascularity.[19] Although the exact mechanism is still unknown, it is thought that the mother's complement system may be stimulated during infection. The results of the placental blood assay for C5a showed a negative correlation with Ang-1 levels and a positive correlation with Ang-2, vascular endothelial growth factor (VEGF), which is necessary for the formation of early vessels, and sFLt-1, which binds to VEGF to inhibit angiogenesis. These findings suggest that changes in the expression of angiogenic factors may be a factor in low birth outcomes. Sustained Ang-2 levels during gestation may promote the development of new blood vessels instead of their maturation, thereby elucidating the proliferation of fetal arteries noted in infected placentas. A heightened Ang-2:Ang-1 ratio has been documented in women experiencing a positive episode of parasitemia during pregnancy.[20]

In healthy pregnancies, the early branching and subsequent maturation of blood vessels necessary for adequate placental vascular development are facilitated by a progressive increase in Ang-1 levels and a drop in Ang-2 levels throughout the pregnancy.[20]

Dysregulated placental angiogenesis has also been linked to altered L-arginine levels. Nitric oxide (NO), which L-arginine is a precursor to, is essential for stimulating endothelial development and controlling the expression of angiopoietins and placental growth factors.[20] Before 28 GW, MiP in Malawi was linked to reduced L-arginine levels and higher NO inhibitor levels, which were then linked to smaller-than-average gestational age newborns. L-arginine supplementation decreased C5 protein and Ang-2 expression in a mouse model of MiP, but increased Ang-1 level (McDonald et al., 2018). Additionally, as compared to infected controls who did not receive supplementation, L-arginine supplementation increased the overall placental artery segments and small-diameter vessels (<50 μm), and this was associated with an increase in birth weight. Overall, these results point to a possible strategy to enhance placental vascularization, but more research is needed to determine whether L-arginine supplementation benefits expectant mothers.

In areas where malaria is endemic, MiP remain to pose a serious threat to the health of expectant mothers and their growing fetus. The first trimester is when pregnant women are most at danger for MiP, which frequently leads to poor placental growth and irreversible placental structural damage, both of which are factors in poor delivery outcomes. Placental diseases have been linked to dysregulated levels of several soluble mediators, such as growth factors, complement proteins, chemokines, and cytokines. Unfortunately, the pathogenetic pathways in the placenta that we currently understand are either based on animal models, which have their own limitations, or on a particular moment in time during pregnancy typically at birth. Therefore, in order to gain

a more thorough understanding of the etiology of MiP during pregnancy at the early stage and track the disease's course, it is necessary to construct better placenta models.

A rise in body temperature caused by erythrocyte rupture, macrophage consumption of merozoites, and/or the presence of trophozoites presenting antigens in the bloodstream or spleen, which mediates the release of TNF-α (tumor necrosis factor α), are characteristics of the pathophysiology of simple malaria. The type of parasite determines the frequency of fever associated with malaria infection. Often referred to as "tertian malaria," tertian fever is expected in P. vivax and P. ovale malaria because schizont progeny mature every 48 hours. However, P. malariae is associated with quartan fever, sometimes known as "quartan malaria," which occurs once every 72 hours. Falciparum malaria, on the other hand, can induce fever every 48 hours, but it typically doesn't follow a definite pattern.

The key determinant in the pathophysiology of severe malaria is the attachment of growing infected red blood cells to host endothelium cells, a process identified as cytoadherence. P. falciparum's virulence compared to other species can be explained by the expression of genes encoding proteins involved in immune evasion and cytoadherence.

The most well-studied variant surface antigen is Var gene-encoded PfEMP1, which is expressed on the surface of infected erythrocytes and mediates binding to endothelium receptors. The PfEMP1 family inserts itself into and protrudes from the erythrocyte membrane to generate electron-dense protrusions known as knobs on the membrane of parasitized red blood cells (pRBCs). The parasitized erythrocyte attaches itself to other cell surfaces, such as normal red blood cells and endothelium, by knobs.[21]

Parasitic erythrocytes stick to the vascular endothelium in the deep microvasculature of several tissues and organs. The process by which contaminated red blood cells exit the peripheral circulation is known as sequestration, and it is brought on by this attachment. It has been determined that several host molecules, including thrombospondin (TSP), cluster of differentiation 36 (CD36), intercellular adhesion molecule-1 (ICAM1), P-selectin, chondroitin sulfate A (CSA), and protein C receptor, are receptors that attach pRBC to the endothelium. 38 PfEMP1 on infected red blood cells, for example, sequesters cerebral malaria by binding to host receptors including ICAM-1 and CD36 on brain endothelial cells.

In addition, pRBCs may attach to healthy RBCs, impede microcirculation, and result in hypoxia. Rosettes are the term for the spontaneous attachment of healthy red blood cells to red blood cells infected with malaria. CR1, CD36, heparan sulfate-like glycosaminoglycans (HS-GAGs), complement receptor 1 (CR1), and blood group antigens A and B are the five receptors on red blood cells that have been found to be involved in the production of rosettes.

Toxins, which are chemicals generated from parasites, are also linked to the pathophysiology of severe malaria. When combined with protein in either free or linked form, glycosylphosphatidylinositol (GPI) glycolipids cause macrophages to overproduce TNF and interleukin I (ILI). When produced in lower quantities, cytokines play an important role in protecting against microorganisms, including the malaria parasite. However, overproduction of cytokines can result in high fever, increased expression of endothelial receptors, and increased production of nitric oxide, which can cause local damage and suppress the bone marrow's ability to produce erythrocytes.

2.1.7 Intermittent Preventive Treatment

The World Health Organization (WHO) supports sulfadoxine-pyrimethamine (SP) as part of intermittent preventive treatment (IPT) to minimalize the risk of pregnancy-related sickness and poor outcomes for mothers and babies.[22] Nonetheless, from the twelfth week of pregnancy until delivery, pregnant women should take at least three dosages of SP at antenatal care (ANC). In most African nations, IPT with sulfadoxine/pyrimethamine is currently included in the national malaria preventive program because of its effectiveness in lowering the incidence of pregnancy-associated malaria.[23] On the other hand, sulfadoxine/pyrimethamine resistance is rising throughout Africa.

The overall prevalence of IPTp was 76.0% in Nigeria. Moreover, there were differences across geopolitical zones: North Central (71.3%), North East (76.9%), North West (78.2%), South East (76.1%), South South (79.7%) and South West (72.4%) respectively. Furthermore, the prevalence of LLIN was 87.7%% in Nigeria. Also, there were differences across geopolitical zones: North Central (89.1%), North East (91.8%), North West (90.0%), South East (77.3%), South South (81.1%) and South West (69.8%) respectively.[24] Women who have access to media use, married, educated and non-poor were more likely to uptake IPTp. On the other hand, rural dwellers and those with media use were more likely to use LLIN. Conversely, married, educated, non-poor and women aged 25–34 and 35+ were less likely to use LLIN.

Although these findings are based on studies pregnant women in their first pregnancies, IPTp appears to be beneficial in lowering low birthweight in babies as well as malaria infections and anemia in pregnant women. Women who have previously given birth may not see these results from the program. Although it is unclear how the program will affect mother and newborn mortality, it stands to reason that fewer cases of malaria would result in fewer deaths.

2.1.8 Intermittent Preventive Treatment and Pregnancy

In tropical regions where Plasmodium falciparum is present, malaria is more severe. Fundamentally, a parasite infection causes severe, occasionally fatal fever symptoms. Because pregnancy weakens the immune system, pregnant women are among the most susceptible groups. The World Health Organization (WHO) suggests three strategies to combat malaria in pregnant women: first, vector control using long-lasting insecticidal nets (LLINs); second, intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP), which protects both the mother and the fetus; and third, early diagnosis of all suspect cases to start treatment.[24] All African countries where malaria is endemic have implemented these WHO-recommended strategies, which are intended to be administered in conjunction with reproductive health systems and malaria control initiatives through at minimum four targeted antenatal (ANC) visits during pregnancy. A clinically-proven strategy to stop the negative effects of malaria in pregnancy (MiP) on the mother, her fetus, and the newborns is intermittent preventive therapy in pregnancy (IPTp) using sulfadoxine-pyrimethamine (IPTp-SP).[24] IPTp programs for pregnant women have been implemented in most sub-Saharan African countries within the last ten years. However, there has been little progress in expanding IPTp coverage, and there are significant socioeconomic and regional differences in the use of this incredibly affordable service.

Poor prenatal attendance (together with concurrently intermittent preventative medication) is linked to lower birth weight kids and a higher rate of neonatal fatalities among pregnant mothers in sub-Saharan Africa. Primigravidae seem to be more affected by these effects. In comparison to the WHO's recommended three doses, preventive therapy using three or more doses of sulfadoxine-pyrimethamine (SP) was linked to a lower risk of low birth weight and a higher average birth weight in newborns. Pregnant women who completed the IPTp-SP attendance had

a lower proportion of low Apgar scores, according to research, and low birth weight (LBW < 2500 g) was linked to an increased risk of low fifth-minute Apgar scores.[23]

Additionally, Gabon's (a country in central Africa) health system is underdeveloped, with a birth rate of 3.26 per woman. The performance of healthcare providers has improved, nevertheless, and this includes the timing of each IPTp medication for expectant mothers. Gabon has an average prevalence of 30% of malaria cases, which is a result of the country's warm, humid equatorial climate, which encourages mosquito growth. The nation has implemented the 2-IPTp-SP dose, which was advised by the WHO in 2003, to combat malaria in pregnant women [25]. Infection rates have significantly decreased as a result of these actions, particularly in the most vulnerable populations—pregnant women and children under the age of five. The WHO recommended 3-IPTp-SP dosages or higher in 2012. The Ministry of Health in Gabon has implemented these tactics, and participation in IPTp-SP has been linked to a reduction in plasmodial infection in expectant mothers as well as the avoidance of low birth weight and early birth.

The incidence of malaria in peripheral and placental blood was 5.3% and 6.7%, respectively, in Libreville, the country's capital, and its environs.[25] Since 2017, the Gabonese State has offered free antenatal care (antenatal check-ups, IPTp-SP courses, LLINs), childbirth, and post-delivery care in all public health structures to all pregnant women with NHIF. This initiative aims to promote the health of women and children. Presenting three ANC visit certificates, given per quarter during the nine ANC suggested by the Gabonese Ministry of Health, is a requirement for receiving free birthing and postpartum treatment. The whole population of Gabon is eligible for a free insurance policy subscription.

Low coverage and differences in utilization rates are indicative of inadequate implementation and enforcement of IPTp rules, despite the fact that around 37 nations have so far implemented such policies. A 2009 review study found that there were notable regional and socioeconomic differences in the rates of antimalarial medicine use among pregnant women, with rates ranging from less than 2% to over 60%.[25]

In addition to healthcare and financial obstacles, prior research has documented a range of barriers related to individuals and the community that can hinder the use of IPTp-SP. These barriers include delayed antenatal care attendance, inadequate knowledge and awareness of MiP and preventive measures, shortages of free IPTp-SP, and marital discord. In response to this circumstance, the American Society of Tropical Medicine and Hygiene organized a global "Call to Action" event in 2014, bringing together delegates from multiple SSA nations to explore prospects for expanding IPTp coverage.[26] However, as more nations in Asia and South America move closer to eradicating the disease and as international donor funding for malaria programs becomes more limited, countries in Sub-Saharan Africa (SSA) face a challenge in carrying on the fight against malaria and addressing the ongoing barrier to population adoption of preventive measures. Undoubtedly, reaching the goal of universal coverage for IPTp is a massive undertaking that requires the application of more creative and pro-poor initiatives to lower the obstacles to usage related to affordability and accessibility, for which data from population-based studies is vital. To this goal, we conducted the current study using secondary data from Malaria Indicator Surveys (MIS) carried out in a few SSA countries where malaria is endemic. The primary goals were to present current data on the IPTp utilization prevalence and look into the potential impact of socioeconomic factors on the use status.

A public health technique called intermittent preventive treatment in pregnancy (IPTp) is used to shield expectant mothers from malaria, particularly in malaria-endemic areas like Nigeria. Pregnancy-related malaria carries serious hazards for the mother and the developing child, including low birth weight, early delivery, maternal anemia, and even death. By giving antimalarial medications at predetermined intervals throughout pregnancy, IPTp seeks to reduce these risks.[26]

2.1.9 Knowledge of Malaria

The parasitic protozoa of the genus *Plasmodium* that cause malaria are single-celled parasitic illnesses that cannot exist without their host. *P. falciparum* is the species of malaria that is most frequently found in sub-Saharan Africa. It is also the primary cause of malaria-related fatalities globally. Compared to *P. falciparum*, the other species are not as deadly. Additionally, large populations of *P. vivax*, the second most significant species, can be found in Southeast Asia and Latin America. Moreover, the dormant liver stages of *Plasmodium ovale* and *P. vivax* can both reawaken and manifest clinical symptoms in the absence of a mosquito bite. *Plasmodium malariae* and *P. ovale* are the cause of extremely few diseases.[27]

Asexual hosts, such as vertebrates, and sexual hosts, such as mosquitoes, comprise the two stages of Plasmodium's intricate life cycle. The parasite's sexual phase of life occurs in mosquitoes, its carriers. Humans go through the asexual stage of the life cycle and are the intermediate host for malaria. Malaria can only be spread to humans by female Anopheles mosquitoes. It takes half an hour for the blood to circulate before it reaches the hepatocytes, and the parasite enters the human bloodstream as sporozoites after being bitten by an infected female mosquito.[28] Before turning into erythrocytes, hepatocytes go through the first phase of Plasmodium asexual development. All Plasmodium species cause erythrocyte rupture. *P. falciparum* is the commonest

species in Africa, whereas *P. vivax* and *P. malariae* are the most common in the Americas and Europe.[28]

Malaria symptoms overlap with those of typhoid fever, dengue fever, yellow fever, Lassa fever, pneumonia, and other illnesses, so self-medication during illness should be avoided as it may have unfavorable effects. Nonetheless, it is commendable that malaria chemoprophylaxis be promoted in endemic areas.[29] The belief that malaria is a fatal illness did not correspond with appropriate measures to avoid mosquitoes and seek treatment. However, to improve adherence to preventive measures such as using integrated bed nets, health education programs should take into account the socioeconomic implications of malaria. The key companies in the health industry need to work hard to make the Internet easily accessible and reasonably priced so that students may afford it.

Ethiopia is among the African nations where malaria species co-occur, including *Plasmodium vivax* and *P. falciparum*.[30] Malaria remains one of the top ten diseases causing morbidity and mortality in Ethiopia, despite the efforts undertaken by the government.[31] Furthermore, resistance to pesticides, newly developing vectors, the negative health impacts of irrigation and hydropower containers, and dynamic weather conditions pose challenges to the nation's progress in combatting malaria. People's perceptions of their danger of infection can affect how they behave. Low risk perception scores further confirm that Personal Protective Behaviors (PPBs) are strongly anticipated to offer an effective preventive capacity for vector-borne illnesses such as malaria.[32] Low risk perception scores also result in the application of low preventive measures.

Malaria poses a threat to global health, and in many underdeveloped nations, it is the primary cause of morbidity and mortality.[33] 93% of malaria deaths happened in the African Region, which also had the highest percentage of cases (92%).[29] With a pooled prevalence of 13.61%,

there were around 1,530,739 confirmed cases of malaria in Ethiopia, along with 356 recorded deaths from the disease.[34] As a result, schools are the ideal location for community services that support healthy habits, such as exchanging important traits like experience, cultural background, and preventive behavior, which enhances their credibility as a source of information and helps to lessen the impact of malaria.[35] Peer Learning and Education Approach (PLEA) programs, which were implemented in primary schools in the Jimma zone, are being considered. These programs primarily addressed educating people about the proper usage of insecticide-treated nets (ITNS), when and how to seek medical attention for malaria, how to use high-quality anti-malaria medications appropriately, how to accept insecticide residual spray (IRS), and how to drain potential breeding sources in the villages.

2.1.10 Prevention Practices of Malaria in Pregnancy

Malaria Chemoprophylaxis

A medicine that is active against the pre-erythrocytic (liver stage) malaria parasite is utilized for casual prophylaxis.[36] After departing the place where malaria is endemic, these medications can be stopped. On the other hand, suppressive prophylaxis refers to the use of medications that attack erythrocytic (asexual blood-stage) parasites. Unlike casual prophylaxis, these medications duty be administered for a minimum of 4 weeks after leaving the area in order to eradicate asexual parasites that emerge from the liver weeks after exposure. Suppressive prophylaxis is advised in regions where P. falciparum malaria is common, notably in sub-Saharan Africa. However, causative prophylaxis is advised in places where P. vivax exists either alone or in conjunction with P. falciparum.

It is underlined by the Centers for Disease Control that no antimalarial treatment can totally avert malaria. Therefore, employing personal protective equipment will boost prophylaxis. Atovaquone/proguanil, chloroquine, doxycycline, and mefloquine are the four drugs that are currently licensed for use as chemoprophylaxis against malaria.[37] Pregnancy, medical diseases such as renal impairment and cardiac conduction problems, cost, preferred frequency of administration, acceptability, and local resistance profile are all taken into account when making the selection.

Vector Control

The two effective malaria vector control strategies currently advised by the WHO are insecticide-treated nets (ITNs) and indoor residual spraying (IRS).[37] The bed nets offer a complete physical barrier against insects regardless of whether they are spewed with insecticide. It offers additional protection when coated with insecticide, which kills insects that come into contact with the net. Bed nets were solely treated with pyrethroid insecticides, such as deltamethrin and permethrin.

Pyrethroid–piperonyl butoxide (PBO) discovery is required due to the rise of pyrethroid-resistant anopheles. PBO and pyrethroids work together in harmony to suppress the actions of parasitic metabolic enzymes such as mixed-function oxidases, which sequester and detoxify insecticides.

IRS is used to keep mosquitoes out of a residence by applying insecticide to the walls and floors. An insecticide's effects persist for a few months. WHO recommends using five chemical classes pyrethroids, organochlorines, carbamates, organophosphates, and neonicotinoids for IRS because they fulfill the safety and efficacy level specified by the WHO prequalification. However, the prequalified list does not contain DDT, an organochlorine pesticide.[38]

Malaria Vaccine

The demand for the creation of a potent malaria vaccine emerged from the parasite's resistance to antimalarial drugs and the toxicity connected with chemoprophylaxis.[39] Researchers have been working on developing vaccines lately, and thus far, one candidate has made it to a sizable Phase III trial. Investigations are also being conducted on other promising prospects. Generally speaking, vaccinations against malaria can be classified according to where in the parasite life cycle they target as pre-erythrocytic, erythrocytic, or transmission-blocking vaccines.

A monovalent recombinant protein vaccine called RTS, S/AS01 has been shown to effectively prevent *P. falciparum* sporozoite and has moved to advanced clinical trials.[40] It stimulates an immune reaction against the circumsporozoite protein (PfCSP), a protein that covers the surface of sporozoites. Consequently, it triggers a robust T-cell (CD4+) response and an immunoglobulin G (IgG) antibody reaction against the citrate synthase (CS) protein region.

The World Health Organization presently advises against using RTS, S/AS01 on children in sub-Saharan Africa and other areas of the globe where *P. falciparum* transmission is moderate to high. Children as young as five months old should begin receiving it according to a schedule of four doses. This choice is based on the outcomes of the continuing pilot program that has been covering 800,000 children since 2019 in Ghana, Malawi, and Kenya.[40] The benefit of giving the fourth dose and the long-term effects on child fatalities will continue to be investigated by the pilot programs in these three nations. Likewise, among the immunizations in development, PAMAVAC is a potential blood-stage malaria vaccine.

2.2 Theoretical Review

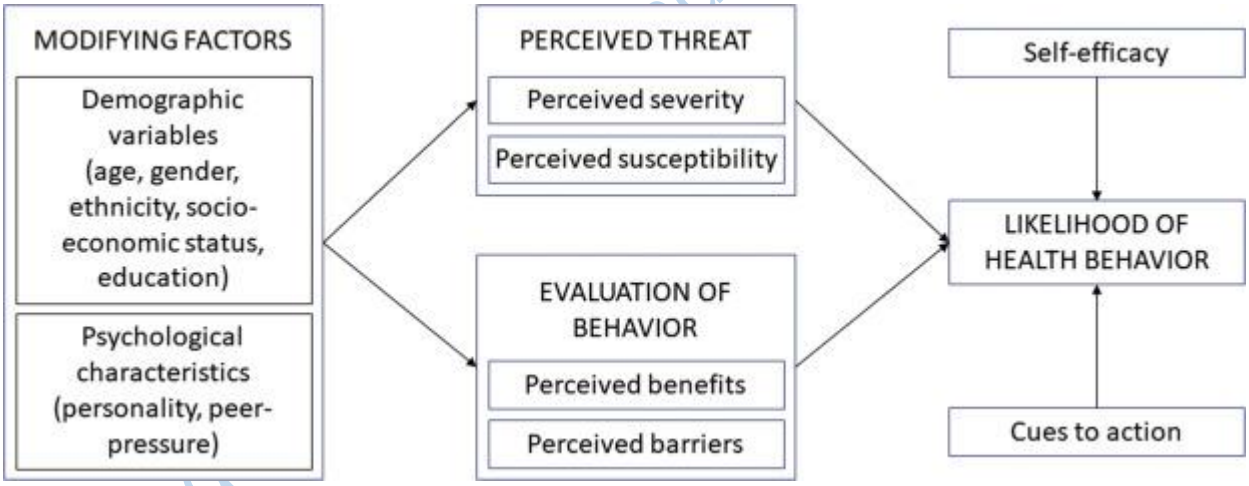


Fig 2.2: Health Belief Model (SBCC, 2016)

The Health Belief Model (HBM) is a psychological paradigm that emphasizes an individual's attitudes and beliefs to explicate and envisage health behaviors. It is frequently utilized to

comprehend health-related behaviors and create solutions. A Health Belief Model specifically designed for Intermittent Preventive Treatment in Pregnancy (IPTp) can be developed here

A vital public health strategy called intermittent preventive treatment in pregnancy (IPTp) aims to lower the prevalence of malaria in expectant mothers, especially in areas where the disease is prevalent. Antimalarial medications are usually given to pregnant women at predetermined intervals, whether or whether the woman exhibits signs of malaria. This method helps shield the fetus and mother from difficulties caused by malaria. To increase IPTp's uptake and efficacy, it is crucial to comprehend how different people perceive it. The following are some salient features of people's perceptions of IPTp:

Individual Perception

Expectant mothers value the health advantages of IPTp, which include a lower chance of malaria, fewer difficulties throughout pregnancy, and better results for their unborn children. Women who have faith in their healthcare professionals are more likely to have a positive opinion of IPTp. They are more likely to follow the treatment plan and have faith in the guidance provided by medical professionals. Pregnant women typically view IPTp favorably in communities where the treatment is well-understood and supported. Peer and family support as well as social standards might improve acceptance.

However, lack of knowledge of some women might affect the awareness of the advantages of IPTp, which could cause them to have misconceptions and be reluctant to take part. Poor health education is one of the causes of this problem. Women may be reluctant to accept IPTp due to worries about possible adverse effects of antimalarial medications. Their choices may be influenced by unpleasant experiences or rumors about unfavorable reactions.

People's opinions may suffer if they have trouble getting to medical facilities or if a treatment is not always available. Common obstacles include stock-outs of medication, long travel times to clinics, and high transportation expenditures. The acceptability of IPTp may be at odds with some cultures' traditional views and customs around pregnancy and illness. Traditional medicine may be preferred by women over biological treatments. Mistrust and a reluctance to follow IPTp advice might be caused by past unfavorable experiences with the healthcare system, including perceived maltreatment or neglect on the part of healthcare professionals.

There are number of moderating factors affecting the uptake and efficacy of intermittent preventative treatment in pregnancy (IPTp). Individual, healthcare system, and sociocultural factors can be used to group these factors:

Individual Factor

An appreciation of the goals and advantages of IPTp can have a big impact on whether or not it is accepted. Expectant mothers are more likely to stick with their treatment if they are aware of the hazards of malaria and how IPTp can protect them. Women are more likely to use IPTp if they think they are at high risk of contracting malaria or if they think the disease poses a major harm to both their own and their unborn child's health. Views may be influenced by one's own or witnessed experiences with IPTp or malaria. Adherence may be boosted by favorable results from prior IPTp use or unfavorable experiences with malaria. Women's adherence to medical advice regarding IPTp may be influenced by their level of trust in the skill and motivations of healthcare professionals. It's essential to be able to comprehend and act upon health information, especially IPTp directives. Better adherence is typically the result of higher health knowledge.

Socio-Cultural Factors

Conventional wisdom regarding conception, disease, and therapy can either help or hurt the acceptability of IPTp. Traditional treatments may be favored above biological ones in some societies. A community's health practices can be greatly impacted by social norms as well as the influence of peers, family, and community leaders. Communities that are supportive can promote IPTp adoption. False beliefs regarding the necessity or safety of IPTp might lead to stigma and decrease adoption of the program. It is essential to address these myths through focused education.

Socioeconomic Factor

Better health-seeking behaviors and higher IPTp adherence are typically linked to higher income and education levels. Barriers may include inadequate educational attainment and financial limitations. It may be difficult for women to attend ANC visits and follow IPTp schedules if they have extended work hours or other major responsibilities.

Programmatic and Policy Factors

Increasing the acceptance, supportive policies should provide free or subsidized access to IPTp and incorporate it into national malaria control initiatives.

Health Promotion Campaigns: Succeeding public health initiatives that alleviate obstacles to IPTp adoption and increase knowledge of its significance have the power to alter attitudes and actions.

Environmental Factor

There may be a greater perceived need for IPTp in areas with high malaria transmission, which may favorably impact uptake. On the other hand, perceived risk may be lower in low-transmission areas, which would lessen the perceived need for IPTp.

Likelihood of Action

Several tactics can be used to affect the likelihood of action in order to address pregnant women's uptake of intermittent preventative therapy in pregnancy (IPTp). A helpful framework for comprehending and fostering health behaviors, such as IPTp uptake, is provided by the Health Belief Model (HBM). According to the concept, an individual's perceptions of four essential elements susceptibility, severity, advantages, and barriers as well as cues to action and self-efficacy, all influence their chance of implementing a recommended health intervention. To increase IPTp absorption, these factors can be addressed as follows:

Strategies for Perceived Susceptibility:

Through mass media campaigns and community-based education initiatives, raise awareness of the risk of malaria during pregnancy. During antenatal care (ANC) appointments, medical professionals should advise each pregnant woman about her unique risk of contracting malaria.

Inform expectant mothers about the serious health effects of malaria on the growing fetus and mother, including the possibility of stillbirth, low birth weight, and anemia in the mother. However, to highlight the possible severity, share first-hand accounts and testimonies from women who have had malaria during pregnancy.

Strategies for Perceived Benefits:

Clearly state the benefits of IPTp in reducing malaria and enhancing the quality of pregnancies. Emphasize the achievements and favorable results of women who have finished the IPTp program.

Strategies for Cues to Action:

In reminding pregnant women of their impending ANC appointments and IPTp dosages, use reminder systems like text messages, phone calls, or visits from community health workers. To encourage IPTp uptake and foster a positive atmosphere, include leaders and influencers in the community. Run advertisements on radio, television, and social media to consistently highlight the value of IPTp.

These all-inclusive approaches can greatly increase the possibility that pregnant women will take action to improve IPTp uptake, which will benefit mothers and their unborn children in malaria-endemic areas.

2.3 Review of Empirical Studies

One year prior, the incidence of malaria in pregnancy in Cameroon was stated to be 39.8%. The 2022 World Malaria Report detailed over 13 million malaria cases in pregnancy worldwide.[41] There are rare infections that result in symptoms of malaria among pregnant women living in stable malaria transmission zones. However, in asymptomatic individuals, malaria infections result in unfavorable pregnancy outcomes such as low birth weight, infant death, and maternal morbidity like anemia.[42] Malaria correlates with anemia, causes severe acute syndromes in mothers, increases the risk of severe outcomes, including abortion and low birth weight babies at delivery, and increases fetal mortality in low transmission areas where women of childbearing age have not developed an immunity to the disease.[42]

Primiparous women are more likely to contract malaria in places with high transmission rates, and the number of pregnancies decreases the parasite density. Additionally, it has been noted that submicroscopic infections are widespread in areas with minimal malaria transmission and may be the cause of maternal anemia and placental pathology.

2.3.1 Malaria in Pregnancy

Pregnant women with malnutrition are more likely to have a poor birth result if they have malaria in pregnancy (MiP).[43] Using individual patient data from 14,633 births in Africa and the Western Pacific, a meta-analysis carried out between 1996 and 2015 found that 35% of mothers had experienced either malnutrition or malaria, indicating that these exposures were prevalent. Compared to pregnant women with either one of those risk factors, LBW was more prevalent in those with both malaria and malnutrition. Preclinical models and dietary survey data suggest that L-arginine supplementation may reduce preterm birth and enhance fetal viability, placental vascularization, and birth weight. Recent data indicate that reduced L-arginine consumption is a pathway via which malnutrition is associated with low birth weight.

The clinical signs of malaria in pregnant women vary from asymptomatic cases to death and severe anemia. Women with diminished acquired immunity living in low-transmission regions are more susceptible to reproductive failure, pulmonary edema, and cerebral malaria. Nonetheless, the overall maternal death rate in low-transmission areas varies from 0.5% to 23%, comparable to that in malaria-endemic regions.[44] The current data on malaria-associated pregnant mortality is limited and conflicting; therefore, further investigation is advised.

A key indicator of MIP is maternal anemia. Plasmodium induces anemia through hemolysis, increased splenic erythrocyte clearance, and reduced red blood cell synthesis. Malaria may have a major influence, even while severe anemia during pregnancy (hemoglobin <7 g/dL) is often

multifactorial with critical dietary components. According to one estimate, 26% of pregnant women in sub-Saharan Africa had severe anemia attributable to malaria.Epidemiological modeling predicts that malaria-induced anemia will be responsible for nine maternal fatalities per 100,000 live births in endemic areas when the baseline incidence of severe anemia is 5%.[45] On the other hand, malaria was found to be either minor or unrelated to anemia during pregnancy in a population-based study conducted in the Democratic Republic of the Congo.

Severe malaria is three times more likely to strike pregnant women. Severe anemia, hypoglycemia, acute respiratory distress syndrome, renal failure, and brain malaria are among the symptoms that can indicate severe malaria. The median death rate with severe MIP is 39% (range 8–100%).[45] To lower mortality, severe malaria needs to be treated right away with parenteral antimalarial drugs and intensive care.

However, when acute malaria is not treated promptly and effectively during pregnancy in nonimmune women, there is a significant chance of death for both the mother and the fetus. However, malaria parasites preferentially sequester in the placenta of pregnant women who are semi-immune, with little increase in overt clinical illness. Maternal anemia and low birth weight are both caused by malaria during pregnancy; in malaria-prone locations, malaria is responsible for up to 35% of avoidable low birth weight cases. Conversely, low birth weight is a known risk factor for infant death. This is a problem that mostly affects first- and second-time pregnant women in the majority of populations living in high-transmission areas of malaria.[45]

2.3.2 Intermittent Preventive Treatment for Malaria in Pregnancy

Malaria during pregnancy is a serious public health issue in sub-Saharan Africa, where it affects over 11 million expectant mothers.[29] Maternal illness, anemia, early birth, stillbirth, low birthweight (LBW), and associated death are brought on by Plasmodium falciparum infection 46.

The World Health Organization (WHO) advocates adopting insecticide-treated nets (ITNs) and giving effective case treatment in addition to intermittent preventive therapy with sulfadoxine-pyrimethamine (IPTp-SP) to avoid malaria in pregnancy. In sub-Saharan Africa, the high occurrence of P. falciparum resistance to sulfadoxine-pyrimethamine (SP) impairs the efficacy of IPTp-SP.

In Cameroon, where the disease is constantly spreading, placental infections during pregnancy have been documented in the forest and the southern coastal districts. However, Plasmodium vivax has been previously identified in Cameroon's low transmission western highlands, where there have also been occurrences of malaria and placental infections during pregnancy [42]. This study sought to determine the prevalence of placental infections, IPTp coverage, and factors related to maternal anemia and newborn weight among HIV-1 negative mothers in Dschang, West Cameroon. The final purpose was to make an effort to promote a more thorough knowledge of the epidemiology of submicroscopic infections and placental malaria, as well as IPTp coverage during normal use. The intensity of MIP is determined by maternal, parasite, and environmental factors.

Primagravidae bear the majority of the malarial burden in sites with high transmission, but all gravidities are in danger in places with low transmission. Primigravidae acquire antibodies against the VAR2CSA protein, which is created by malaria parasites, and have some protection during subsequent pregnancies in high transmission areas; this is not often the fact in low transmission areas. Pregnant women generally have little to no immunity to malaria, reside in low or unstable (episodic) transmission zones, and are two to three times more likely to suffer from severe disease than non-pregnant controls.[47] While P. vivax is more likely to develop in a woman with low acquired immunity, P. falciparum is often connected to more severe MIP than P.

vivax. The severity of MIP is strongly determined by the age and gravidity of the mother. In high-transmission regions, such as sub-Saharan Africa, primigravidae and secundigravidae are more likely than multigravidae to experience severe malaria infection; in low-transmission regions, where multigravidae have not acquired immunity or had previous exposure to malaria, this is not the case. Younger parents are more likely to suffer from severe malaria infection than older women, who seem to be marginally shielded from the sickness.

2.3.3 Knowledge of Malaria

Perceptions of malaria risk were positively impacted by higher levels of malaria knowledge. Consistent with our results, additional research has demonstrated the impact of malaria knowledge on risk perception in west Ethiopia, Cameroon, Nigeria, Iran, and West Ethiopia. This is explained by the fact that exposure to various types of information and understanding about health issues affects how risk is perceived. Furthermore, the explanation might be that individuals with higher knowledge levels may have received malaria-focused instruction, and even those with higher education levels can read materials in various languages and comprehend the written content that emphasizes malaria risk prevention strategies. This result confirmed that information about health issues is the most significant tool for helping people combat infectious diseases, such as malaria, and make the best decisions for themselves and their families.[48]

2.3.4 Perception of Malaria

In the Mokola Community of Ibadan, Oyo State, Nigeria, Muhammad and Dipeolu investigated the knowledge and perception of malaria among Hausa Married Men.[49] They discovered that the research group had a very poor perception of the disease. The authors state that 84.1% of respondents still thought that prolonged sun exposure may induce malaria, 85.4% thought that fatigue could cause the illness, and 66.9% of respondents thought perception that malaria may be

brought on by rain. Therefore, only 9.9% of respondents correctly believed that bites from an infected Anopheles mosquito are the cause of malaria.[49]

A study conducted by Nnaji in 2023 demonstrated the direct and beneficial relationship between malaria risk perception and malaria prevention practices. This result is consistent with the findings of a study conducted in rural Nigeria and Ethiopia, which found that individuals who were believed to be more susceptible to malaria infection had sought out healthy preventive behaviors.[50] This may be the case since engaging in specific health behaviors is closely associated with the perceived threat, the perceived advantages and disadvantages of the recommended behavior change, the self-efficacy, and the cues to take action. There may be a favorable correlation between obtaining medical attention and having a positive perception of health issues. This study suggests that by encouraging positive perspectives against the health event, health-seeking behaviors can be improved. Additionally, the successful implementation of peer learning education in schools on perceived malaria susceptibility and severity would greatly aid in increasing preventive measures that are essential in lowering malaria morbidity and mortality, such as the use of bed nets, appropriate anti-malarial drug use, the disposal of standing water from around the home, and the periodic use of indoor residual spray within students' families.

2.3.5 Attitude towards the use of Intermittent Preventive Treatment

Different diverse beliefs influence their attitude toward health and healing, different cultural groups hold different beliefs than the Western biomedical approach of medicine. Various disease models, wellness/illness paradigms (such as Chinese medicine, magico-religious thinking), diseases and disorders specific to particular cultures, attitudes toward medical professionals, the pursuit of Westernized healthcare, and the application of customary and native medical

procedures and methods.[51] In a traditional civilization where the concept of illness is rooted in magical or religious elements, a group of people's belief system is deeply embedded, and they appear to have greater faith in the therapeutic abilities of traditional healers than in the western medical facilities that treat patients. This is true since the culture and values of the community shape the course of illness and medical treatment. As a result, the development and utilization of health services are significantly influenced by the values that a society places on health care. Prior to the development of modern medicine, every ethnic group had a well-established system for regulating their health. Different social exchanges, such as communication and attitude, have an impact on health-seeking behaviors.

The social belief, which emphasizes the environment and life circumstances of the populace as factors influencing the perception and occurrence of illnesses, can also be utilized to conceptualize patterns of sickness. This fact basically dictates the type of medical treatment that is provided (i.e., whether it should take the form of curative, preventive, or interventional care) as well as the pattern of utilization.

Many traditional beliefs, superstitions, and mythologies are ingrained in our civilizations, and a people's culture directly influences how they seek health care. For example, the Tiv people of Benue State think that illness results from Mbatsav (witchcraft) including the cooperation of mother's and father's people hence resulting to low uptake of Intermittent preventive treatment in pregnancy.[52] People generally assume that Mbatsav causes illness when it's dark. Stated differently, the belief held by the Tiv people is that individuals possessing supernatural abilities, known as Mbatsav, cause and suffer from illnesses that are frequently uncurable when treated with traditional methods. Tiv people's general and Tiv women's specific health-seeking behaviors are influenced by this idea. A lot of sick people first seek treatment from various traditional

healers before going to western-style hospitals. Because traditional healers are more approachable and because they are said to possess the talents of sorcery or witchcraft, which can solve any ailment, people tend to have more faith in their therapeutic abilities.[53]

2.3.6 Awareness about Intermittent preventive treatment

The effectiveness of pregnant women to avoid malaria, especially in areas where malaria is endemic, knowledge of intermittent preventative therapy in pregnancy (IPTp) is essential. Raising awareness entails educating women on the advantages, security, and requirements of IPT.

The majority of pregnant women are familiar with the term "IPTp-SP" and have a basic understanding of how it is used to prevent malaria in pregnant women. Despite many of them having a negative opinion of IPTp-SP, the majority of the pregnant women had taken three or more doses of the drug.[54] Since nursing women with university education consumed three or more doses of IPTp-SP in pregnancy, education was linked to a larger intake of the supplement. Therefore, especially in malaria-endemic areas like Nigeria, pregnant women are advised to get more education about the significance of IPTp-SP for both maternal and fetal/newborn health.[55] In the interim, additional research is required to completely comprehend the distinct elements that impact IPTp-SP consumption in order to improve policy choices for the prevention of malaria-associated pregnancy.

2.3.7 Factors affecting the use of Intermittent preventive treatment

Factors such as the belief about the underlying cause of a problem, health education, and accessibility to various healthcare facilities, influence a person's decision to seek treatment.[55] Malaria can also be treated with a variety of herbal remedies, which can be made at home or administered by herbalists; medications bought from pharmacies, drug stores, and drug vendors;

and contemporary medical facilities. Using either contemporary medications or traditional remedies, home therapy is frequently the first choice. The delay in getting the right care, which frequently ends in a child's death, is a serious worry. This becomes much more urgent when a youngster already exhibits convulsions, which are typically linked to spiritual origins and are thought to be incurable by contemporary medical procedures.[47]

Religious Belief

Due to the importance of morals and religion in daily life, the pursuit of health always crosses over into these areas. The rural population holds nosological and cosmological beliefs that attribute the causes of illnesses and sickness to beings who exist far outside the reach of the stethoscope. They think the doctor is all-knowing and capable of curing everyone, given the correct circumstances. Therefore, illnesses categorized as "common" or "ordinary" are treated with a combination of allopathic and traditional medicines, whereas illnesses categorized as "severe" or "extraordinary" typically call for specialized (traditional) care.[53]

The prevailing idea of explanation holds that there is a supernatural component to a serious sickness. Anger at ancestors is the agency that is most usually aroused. The African cosmology's orderly structure includes ancestor spirits. Discord and sickness result from upsetting the ancestors, which disrupts this order. According to African philosophy, reality is not about a person's relationship with objects, but rather a person's relationship with other people and all living things in harmonious interactions with the gods and spirits. This kind of interaction is attributed to the essential forces that each organism produces. When man and his surroundings are in perfect harmony, there is a condition of health.

However, disease and other misfortunes can also stem from a breakdown in the interaction between man and his social and spiritual surroundings, or from forces controlled by sorcerers, witches, wizards, evil spirits, or enraged ancestors due to transgressions of totemic principles. According to the widely held belief that "people do not just suffer from illness by chance," major illnesses are said to have a fundamental supernatural cause. Biomedical explanations based on the existence of viruses, germs, parasites, cancer, or high blood pressure, on the other hand, are easily accepted as secondary causes. The concept of primary causation explains why these infectious agents only affect a specific person and no other members of the group.

Traditional African Medicine (TAM)

In times of illness, they turn first to TAM since it has been a part of rural communities' lives for many centuries and because orthodox medicine is frequently scarce. However, when all else fails, healthcare center becomes the last option [56]. Essential elements of sickness management in Traditional Asian Medicine (TAM) include divination (visiting the oracles), confession, ceremonial sacrifices, incantations, and medicines created from plant and animal parts.[57] These are intended to neutralize the impact of evil forces and/or return the patient to a harmonious relationship with his surroundings. When an illness is determined to be the result of an angry ancestor spirit, there is typically an antisocial act committed by the person suffering from the illness.

Cultural Beliefs

Cultural ideas and traditions often impact self-care, home remedies, and consultation with traditional healers in rural areas; the views of the older women in the home are particularly significant and should not be ignored. These variables, which are more prevalent in women, lead

to delays in seeking treatment, not only for their own health but also for illnesses afflicting their children. In addition to age, gender, and marital status, factors such as family size and parity, educational attainment, and the occupation of the family head are linked to health-seeking behavior.[58] Nonetheless, cultural customs and beliefs have persisted across age groups, household socioeconomic status, and educational attainment. They also have an impact on gender, service acceptability, availability, and awareness of the severity of the condition.

Women's Autonomy

When it comes to assessing a woman's health needs, men are crucial. Men determine where and when a woman should seek medical attention since they are the ones who make decisions and have access to all the resources. Compared to men, women who are ill report seeking medical attention less frequently. Women's low status inhibits them from identifying and communicating their health needs. Typically, women are not permitted to choose whether to pay for their own medical care or to visit a hospital or healthcare provider alone. Women therefore typically do not have access to emergency medical care. There is no doubt that this has a negative impact on the women's and their children's general and overall self-respect as well as their health. Even though women are frequently the primary caregivers in the family, they do not always have access to comprehensive health treatments and basic health information. Because they hold a subordinate status in the family, women and children in Nigeria must ask the male family members or the head of the home for permission to get healthcare services. Women rely on men for social acceptance, and this need is reinforced when they have little financial power. Her reputation and acknowledgment in the home care industry have always been undercut by the family and the community as institutions.

Economic Factors

The lack of a social security system and societal economic polarization make the poor more susceptible to changes in health care costs and provider options. Poverty increases health disparities because it prevents people from participating in decisions that impact their health and denies them access to the advantages of the health care system. The possession of domestic goods, livestock, land for agriculture, and kind of housing not only indicates a family's socioeconomic standing but also paints a picture of their way of life. Undoubtedly, one of the biggest obstacles to receiving proper medical treatment in rural Nigeria has been cost. The entire cost of therapy ends up being high because not only do consultation fees and medication costs need to be included, but also the cost of traveling to the institution. As a result, rural residents' financial situation restricts their options and opportunities for receiving medical attention.

Accessibility

A primary healthcare facility's accessibility is envisioned as a fundamental social right. When consumers are dissatisfied with primary care services in either sector, they frequently turn to health shops or higher-level hospitals, which results in significant inefficiencies and a loss of control over the effectiveness and quality of care.[59] However, when inadequate roads and a lack of mobility are added, the impact of distance on service utilization increases and visits become more expensive. The accessibility of transportation, the facility's physical location, and the travel duration all surely affect people's decision to seek medical attention and how often they use its services. Patients' and consumers' distance from the closest medical facility has been noted as a significant deterrent to use, especially in rural locations.

2.4 Theoretical Framework

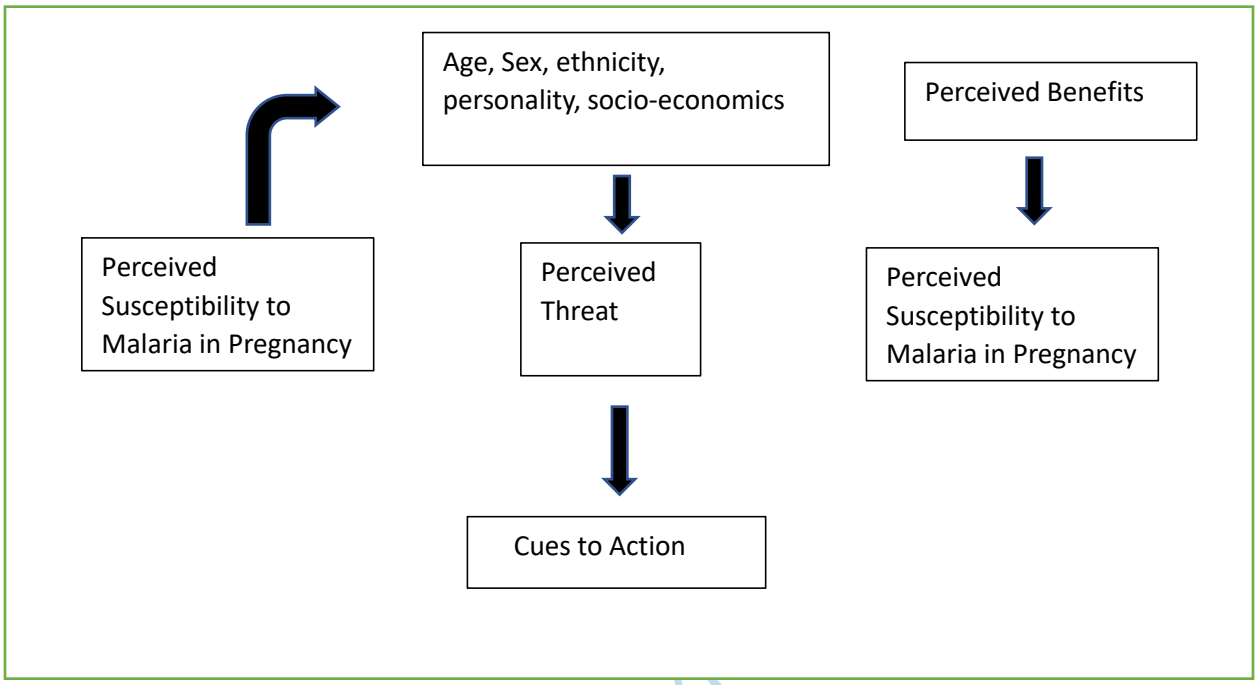


Fig 2.3 Health Belief Model (Researcher, 2025)

Perceived Susceptibility

Expectant mothers should be aware of their increased vulnerability to malaria and that pregnancy itself raises that risk. The community's most vulnerable populations are young children under five and expectant mothers. This is because a pregnant woman gives birth and must nourish her unborn child; as a result, she may weaken and become more susceptible to malaria. Another factor raising the risk of malaria is the weakened immune system that occurs during pregnancy. Younger pregnant women may not have had as many personal encounters with malaria, leading to a lower perceived vulnerability. Adults who have suffered from malaria or seen its impact on others may perceive themselves as more vulnerable, prompting more proactive prevention measures.

Perceived Severity

Knowledge of the serious effects of malaria during pregnancy, which include, among other things, hypoglycemia, unconsciousness, and severe anemia. Pregnant women should be informed about possible outcomes such miscarriage, stillbirth, preterm birth, and serious maternal disease. On the other hand, educating expectant mothers about the ways in which IPT enhances maternal health, lowers the risk of malaria, and promotes better birth outcomes will empower them. Realizing the advantages of IPTp for the health of the unborn child as well as throughout pregnancy. Cultural perceptions of illness symptoms can influence how severe malaria is considered. In some communities, symptoms like fever and chills might be seen as common and not warranting serious concern. Social norms dictate the collective attitude towards malaria. In regions where malaria is endemic and common, it might be perceived as an unavoidable part of life rather than a severe health threat.

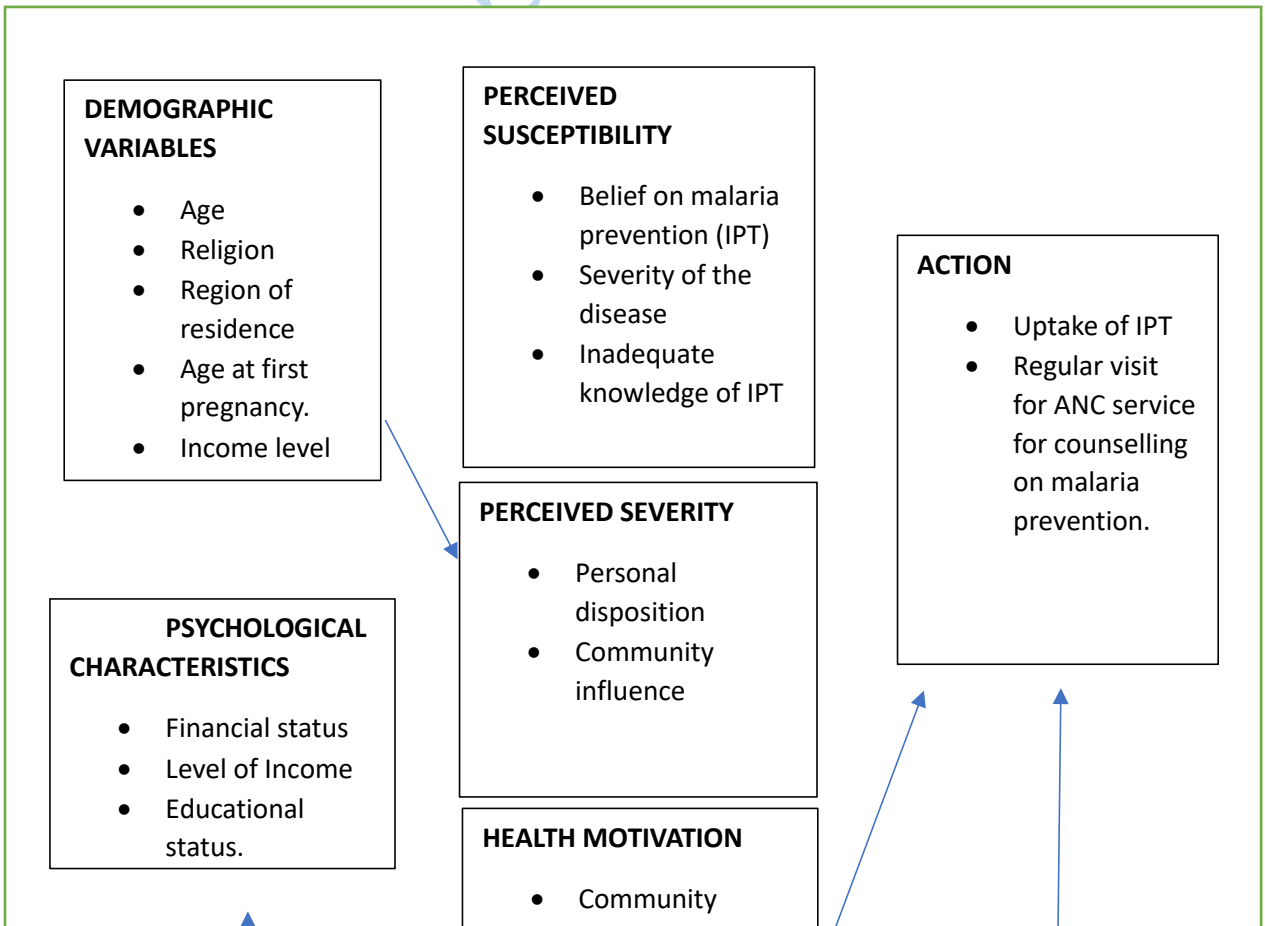
Perceived Barriers

Resolving apprehensions and misunderstandings regarding the security and adverse consequences of SP may mitigate the issue.

Access and Availability: Addressing problems with IPTp access, including cost, availability of medications, and distance to medical institutions. Factors pertaining to supply and demand in a wide or general health service context are relevant. The Sulphadoxine Pyrimethamine (SP) medication for IPTp intervention has been made more widely known and accessible in Nigeria due to the President Malaria Initiative for States (PMI-s) project, which has an impact on the target audience.

Cue to Action

Delivering frequent, understandable information on the significance of IPTp through media campaigns, community health workers, and prenatal care visits. Increasing pregnant women's confidence to take IPTp by teaching them how to take the drug and deal with any negative effects. Reminding pregnant women of their IPTp doses through follow-up visits, community reminders, and the use of mobile health technologies can all help to enhance the uptake of IPT and thus lower the rate of maternal death. Additionally, urging community leaders and family members to advocate adherence to IPTp, ensuring that women have the community, family, and medical professionals' support in adhering to IPTp. Also, strengthening the relationship between healthcare providers and the community through culturally competent care can improve trust and encourage the use of preventive and treatment services. Collaborating with religious leaders to promote malaria prevention can leverage their influence to enhance community acceptance and adherence to preventive measures.



communicate IPTp effectively, and reassure patients about the safety and effectiveness of SP. This contributes to enhancing their ability to recognize and lessen obstacles to IPTp adherence.

Furthermore, it has been demonstrated that community engagement—involving leaders and influencers in the community to support IPTp and address cultural myths and beliefs—is a successful strategy for raising pregnant women's involvement in the program's uptake (Solanke et al., 2021). Call community gatherings and workshops to talk about IPTp's role in preventing malaria.

Access and logistics work together to guarantee a steady supply of SP and enhance access to medical services. Additionally, of mobile clinics or transportation assistance in far-off places can help obstacles to IPT uptake. Better health outcomes can be achieved by treatments to the unique beliefs, barriers, and motivators of pregnant ealth Belief Model's components into IPTp programs.

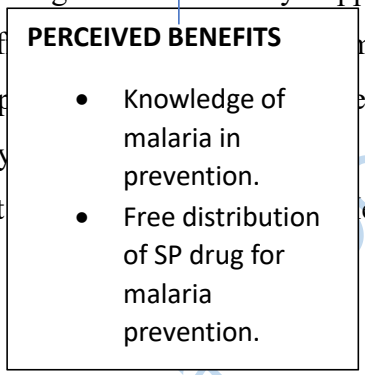


Fig 2.4: Application of Health Belief Model to promote Intermittent Preventive Therapy (Researcher, 2025)

2.5 Gaps in Literature.

Malaria has a major impact on perinatal and neonatal death, postpartum morbidity, maternal anemia, intrauterine growth retardation, intrauterine death, stillbirth, early delivery, and low birth weight (LBW). In Sub-Saharan Africa, poor nutrition, micronutrient imbalances (especially those involving vitamin A, zinc, iron, and folate), co-infection with HIV, poverty, and inadequate access to emergency obstetric services and high-quality primary healthcare exacerbate the effects of malaria during pregnancy. Cerebral malaria, hypoglycemia, pulmonary edema, and severe hemolytic anemia are particularly serious conditions for women. It has been observed that in non-immune mothers with malaria, fetal and neonatal loss can reach 60–70%. These issues are more common in primigravidae than in multigravidae.

The three-pronged strategy to treating malaria in pregnancy is the result of a renewed focus on protecting and strengthening the health of both mothers and children. The first is the use of insecticide-treated nets by all pregnant women, and the second is the efficient care of malaria sickness and anemia. Intermittent Preventive Treatment of pregnancy (IPTp) entails delivering therapeutic dosages of an antimalarial medicine to a population at risk, whether or not they are known to be infected, at predetermined point intervals, usually to minimize morbidity and mortality.

To prevent malaria in pregnant women in Africa, the World Health Organization (WHO) devised a strategic framework in 2002. The document advises against chemoprophylaxis due to a variety of concerns, including the difficulties of implementing this strategy, low adherence to weekly drug administration, and an increasing rate of resistance to most chemoprophylaxis regimens, including chloroquine. Instead, it proposes that pregnant women take at least two doses of sulphadoxine-pyrimethamine (SP) as intermittent preventive medication during the second and third trimesters during the standard antenatal appointment. IPT has recently taken its place after it was proved to be superior to malarial chemoprophylaxis.

Studies on the impact of IPT on pregnant women have been conducted since the World Health Organization announced its strategic plan to combat malaria in Africa. However, alternative malaria prevention measures, including using a long-lasting insecticidal net (LLIN), are well recognized as a result of several studies that have been conducted on the subject. In certain regions of the nation, the efficacy of IPT for pregnant women remains poorly understood, which contributes to skepticism and hesitancy to reap the benefits of the program. On the other hand, raising pregnant women's awareness of intermittent preventative treatment (IPT) use would benefit from an understanding of the treatment's efficacy. Further research is necessary to

comprehend the reasons behind certain pregnant women's noncompliance with the recommended three doses of SP, nevertheless. Studies examining various adherence-improving interventions such as educational campaigns, rewards, and community health worker initiatives are required. There aren't many studies that examine how well IPTp works in various epidemiological contexts and geographical areas. Research comparing the efficacy of IPTp in urban and rural environments may shed light on how best to customize interventions for certain situations.[42]

However, it is imperative to address these gaps in the literature in order to optimize IPTp regimens and enhance the health outcomes of mothers and newborns. Prospective investigations ought to adopt a multidisciplinary methodology, integrating perspectives from epidemiology, sociology, health economics, and implementation science to design all-encompassing and situation-specific remedies for averting malaria during pregnancy.

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CHAPTER THREE

METHODOLOGY

3.1 Research Design

This study utilized a cross-sectional descriptive research design to evaluate the effectiveness of intermittent preventive treatment for pregnant women attending antenatal clinics at Igbeti Oyo State, Nigeria. A cross-sectional survey design is appropriate because it enables the gathering of information on the variables of interest at a certain moment in time.

3.2 Population of the Study

The study was conducted at Igbeti town located in the northern part of Oyo State, Nigeria. It is situated in the Olorunsogo Local Government area, one of the thirty-three local governments in Oyo state with an 81,000 total population at the 2006 census.[1] The study was conducted at the antenatal clinics at Igbeti, Oyo State, Nigeria. The study population are pregnant women in the community with 13 weeks gestation age and above as they are eligible for IPT uptake who attend various antenatal clinics at Igbeti. The antenatal clinics provide services, such as regular

examinations, health education, distribution of necessary prescriptions and dietary supplements, and administration of malaria preventive medicine for eligible pregnant women. It is anticipated that a sizable number of pregnant women from various socioeconomic and demographic backgrounds was used in the clinic.

Inclusion Criteria

The pregnant women were recruited from antenatal clinics at Igbeti after written informed consent is obtained according to the Ethical Boards of the Ministry of Health, Oyo state. Only pregnant women with a pregnancy age ≥ 13 weeks were recruited. This is because the administration of Sulphadoxine Pyrimethamine (SP) for IPT intervention commences at a gestational age of 13 weeks. However, those who have understood the study and are willing among the pregnant women to participate in the study were included.

Exclusion criteria

Pregnant women with co-morbidities were excluded. Pregnant women with <13 weeks gestational age was also excluded, the administration of SP to pregnant women commences at 13 weeks gestational age hence any pregnant women with less than 13 weeks gestational age were excluded in this study.

3.3 Sample and Sample Techniques

The sample size was calculated using Leslie Fischer's formula. To determine the sample size for the study, the formula for a population greater than 10,000 was used, which is $n=z^2pq/d^2$.

Where,

n = the minimum sample size when the population is more than 10, 000

z = the standard normal deviation was set at 1.96, corresponding to a 95% confidence level.

d = degree of accuracy, set at 0.05 for this study

P = the uptake of IPT in Nigeria is 40.4%.[2]

P= 0.40

q = 1–*P* = 0.60

$n = 1.96^2 \times 0.40 \times 0.60 / 0.05^2$

n = 368.7

number of initial sample sizes is approximately 369.

The attrition rate in research refers to the percentage of participants who drop out or are lost to follow-up during a study. It is an important factor to consider as it can affect the validity and reliability of the study results.

Attrition Rate = (Initial sample size – Sample size)/ (Initial sample size) ×100

During the study, if 10 participants dropped out 5 participants had incomplete responses and 3 participants were excluded based on predefined criteria.

This means

Initial sample size = 369 participants

Dropouts= 20 participants

Incomplete responses= 10 participants

Exclusion based on criteria= 5 participants.

Sample size = Initial sample size – (Dropouts + incomplete responses + exclusions)

Sample size = 369 – (20+10+5)

= 369 –35

Sample size = 334.

Using,

Attrition Rate = (Initial sample size – Sample size)/ (Initial sample size) ×100

Attrition Rate = (369-334)/369 ×100

Attrition Rate = (35/369) ×100

Therefore, the attrition rate is 9.5%.

The attrition number = (9.5/100) ×369

Attrition number = 35

In conclusion, Final sample size = (Initial sample size + Attrition number)

Final sample size = (369 + 35)

Final sample size = 404.

This study utilized a multistage sampling technique, the sampling was carried out in stages, moving from larger groups to smaller ones, until the final study participants were chosen. A simple random sampling was used to pick Igbeti out of the 33 towns in Oyo State. Also, a simple random sampling was used to pick of 7 Antenatal clinics out of 17 in the town. Moreover, a simple random sampling was used to pick 404 pregnant women out of the total number (1312) who are 13 weeks pregnant and are willing to partake in the study.

The list of pregnant women who attend the antenatal clinic was assessed in the National Health Management Information System (NHMIS) antenatal register. The monthly antenatal attendance data in the health facility selected for this study was retrieved from the District Health Information System (DHIS2).

HEALTH FACILITY	**MONTHLY ANC ATTENDANCE**
Igbeti General Hospital	381
Oke Abe PHC	31
Oke Ibukun PHC	231
Owode PHC	45
Oju Oja PHC	20
Oguntela Nla PHC	270
Ologbon PHC	334
TOTAL	**1312**

Table 3.1: *Monthly ANC Attendance.* ***Source:*** *DHIS2*

3.4 Description of the Research Instrument

In this research, socio-demographic characteristics are essential for understanding the composition of the sample and ensuring it represents the broader population, this is Section A. The list of common socio-demographic characteristics to consider collecting include; age, marital status, educational level, ethnicity/race, household size, employment status, religion, and income level.

Section B is on awareness of IPT among pregnant women with questions such as the source of information about IPT, awareness of the medication used, where to access the medicine, and who is eligible to use the medicine.

Section C is on level of knowledge of IPT among pregnant women. This section will assess the characteristics such as the number of IPT sections attended, how knowledgeable they are about IPT, understanding of IPT purpose, benefits of IPT, and knowledge of side effects.

Section D contains the perception of intermittent preventive treatment amongst pregnant women which includes the religious affiliation toward the use of IPT, and cultural beliefs of pregnant women towards the use of IPT. Also, this section aims to obtain data on key characteristics that

can help evaluate the perceived importance of IPT such as the perceived effectiveness of IPT, malaria test positivity rate, beliefs, culture, and experiences.

Section E aims to get data on attitudes towards IPT. The characteristics include the belief towards the importance of IPT for pregnant women and the level of trust in IPT intervention. The data on attitudes towards the IPT among pregnant women would help in discovering the beliefs of pregnant women and their attitude towards the intake. It is also to assess the attitude such as the age of the pregnant women and its influence on the attitude of acceptance of IPT.

Section F focuses on factors influencing intermittent preventive treatment among pregnant women which include the social and cultural factors and its influence on IPT, how occupation status affect/influence the IPT intervention.

3.5 Validity of Research Instrument

A research instrument's validity is essential to getting results that are precise and reliable. The degree to which a tool measures what it is projected to measure is referred to as validity. However, in the context of a survey evaluating factors influencing the uptake of intermittent preventative treatment (IPT) among pregnant women, there are many types of validity and procedures to ensure.

Content Validity:

A review of the body of literature to determine all pertinent study objectives is necessary to guarantee that the instrument captures every facet of the idea being measured. In order to make sure all pertinent information is included, expert consultation with medical professionals, researchers, and specialists in maternal health will be consulted.

Construct Validity:

Construct validity is the guarantee that the tool measures the theoretical construct it is supposed to measure precisely. To ensure that every question is in line with the constructions, it is necessary to define the constructs (such as knowledge, attitudes, perception, factors influencing, and sociodemographic characteristics) precisely. To determine whether the instrument performs as predicted, hypothesis testing based on the theoretical framework is also required.

Face Validity:

This concerns the degree to which the writings, paper content, and arrangement appear to measure what they are supposed to measure. Also, this aim is to ensure that the respondents have an understanding of the measurement tools such as surveys, questionnaires, or tests appears to measure what they are supposed to measure.

3.6 Reliability of the Research Instrument

The consistency and dependability of a research tool are referred to as reliability. Reliability guarantees that an instrument producing a survey on the efficacy of intermittent preventative therapy (IPT) for pregnant women produces consistent results over time and among various groups. Additionally, creating items that are clear and consistent, such as making sure survey questions are understandable, unambiguous, and consistently perceived by participants.

However, to identify any problems with the questions, pilot research with a small sample of the target population was carried out. 10% of the final sample size (404) was used for a pilot study, this is a total number of 40 pregnant women. This aimed to assess the feasibility and refine the methodology for the main study on the effectiveness of IPT among pregnant women. The pilot study was conducted at Ibrahim Taiwo Primary Health Care, Ogbomosho, Oyo State, Nigeria. However, for a reliable result, internal consistency was considered by using the questionnaire

used to measure the effectiveness of IPT, showing a Cronbach's alpha of 0.85, indicating high internal consistency. Based on the input received, the instrument was revised and improved. Reliability testing, however, was conducted using statistical techniques following data collection. For example, to evaluate internal consistency, compute Cronbach's alpha. The enumerators were trained in utilizing the same coding scheme because the survey contains open-ended questions that need to be interpreted.

Furthermore, by doing these actions, it is thought that the study tool can accurately and consistently measure how effective IPT is for pregnant women. To provide credible and repeatable study outcomes, credible instruments are necessary.

3.7 Data Collection

The research is quantitative, which requires fieldwork for data collection. The Igbeti Health facilities were visited with a designed questionnaire to collect data. In this study, data collection was carried out using KoboToolbox, an open-source digital data collection platform developed by the Harvard Humanitarian Initiative. KoboToolbox is widely used in public health and humanitarian research due to its ability to support both online and offline data collection, making it highly suitable for fieldwork in areas with limited internet connectivity. The tool enabled the design of structured questionnaires that included various question types such as multiple-choice, numeric, and text-based responses. Data were collected using the KoboToolbox mobile application installed on Android devices, which facilitated real-time entry and minimized errors associated with paper-based surveys. All responses were securely stored on the KoboToolbox server and later exported into Microsoft Excel and SPSS for cleaning, coding, and statistical analysis. The use of KoboToolbox enhanced data accuracy, ensured efficiency in handling large

datasets, and provided a reliable platform for monitoring and managing the quality of data collected.

Four research assistants were used in collecting data in this study using their mobile phones, since the KoboToolbox application was used as a means of data collection. However, since 404 sample sizes have been calculated to be used for this study with an attrition rate of 9.5%, a period of four weeks was used in the data collection process. Knowing that antenatal days occur once a week (every Wednesday), this means that the data will be collected four times. Each respondent is expected to spend 20 minutes attending to the questionnaire administered by the research assistant. Spending quality time during data collection helps prevent sharp practices that may affect the result of the study.

3.8 Data Analysis

Data collected were entered and analyzed using SPSS version 25. Descriptive data such as socio-demographic parameters, perception, level of education, age group, and other variables were presented using frequency tables and charts. The measurement of variable on items in level of knowledge among pregnant women was analyzed using scoring systems by categorizing knowledge level in Likert scale i.e. the categorization, which includes High (≥ 4), moderate (3), and low (≤2). Also, means was calculated for continuous variables. Descriptive statistics, which describe the main features of a dataset, were used; these measures the central tendency such as the mean, median, and mode. A graphical representation that gives visual understanding and easy interpretation of data was used, they include a bar chart which can be used in comparing different groups or categories, and a line chart for showing the frequency distribution of a single quantitative variable. The Pearson chi-square was used to describe the significant differences between two categorical variables.

3.9 Ethical Approval

Ethical Approval was obtained from Ethical Boards of the Ministry of Health, Oyo State, Nigeria and Lead City University, Ibadan, Nigeria. The research was done by gaining informed consent from participants, maintaining their anonymity and confidentiality, avoiding deceptive methods when planning the research, and providing them with the ability to withdraw at any time. Informed consent entails participants' understanding that they are engaging in the research and what the research demands of them. This involves knowing the aim of the research, methods employed, possible outcomes, and associated demands, discomforts, inconveniences, and hazards.

A further pragmatic aspect of research ethics is safeguarding confidentiality and anonymity. Volunteers only divulge information if the researcher guarantees confidentiality. However, not all data collected from study participants needs to be kept confidential or anonymous. Disclosure of the name and views of persons at various phases of the research process may be essential, but approvals were requested before such confidential information is revealed.

Avoiding deceptive practices is crucial in this research, as it can sometimes be necessary for concealed research where the observer's distinctiveness and/or the research's purpose are not known to participants.

However, barring covert observation where it is not practical to let everyone in a given study environment know what the researcher is doing, research participants will always have the right to withdraw from the research process. There were no coercion or pressure on the participants to refrain from withdrawing. However, by following these ethical principles, one can ensure that the research adheres to the highest standards of research ethics and contributes to the quality of its findings.

Endnote

[1] A.E., Ajetunmobi P., Alausa, S.K., Coker, J.O., David, T.W., Talabi, A.T., Oladujoye, H.T., and Olojede, S.K. 2022b. "*Measurement of Activity Concentrations of Rock Samples from Rocks- Surrounded Town in Igbeti, Oyo State, Nigeria."* **Scientia Africana** 21 (1): 183–94. doi:10.4314/sa.v21i1.16.

[2] National Population Commission - NPC/Nigeria and ICF. *Nigeria demographic and health survey 2018.* Abuja and Rockville: NPC and ICF; 2019.

CHAPTER FOUR

RESULT AND DISCUSSION OF FINDINGS

4.1 DEMOGRAPHIC DATA ANALYSIS

Most (52%) of the pregnant women in this study are aged 26-35, followed by those aged 18-25 (27%), and a smaller percentage (21%) aged 36 and above (the mean age of the respondents is 30.2). A large majority (78.7%) are married, with smaller percentages being single (13.9%), cohabiting (3.0%), divorced (1.7%), or widowed (2.0%). The majority of the pregnant women have completed secondary education (39.1%), while fewer have only primary education (24.8%) or no formal education (17.6%). A small percentage have tertiary education (OND/HND - 15.3%, Bachelor's - 3.2%). However, out of the 404 respondents, the majority are Yoruba (66.8%), with smaller representations of Hausa (16.6%), Fulani (13.6%), and Igbo (3.0%). The household sizes of the pregnant women vary, with the majority having 3 members (34.4%) or 4 members (25.5%). Nearly half (45%) are self-employed, while 16.8% are employed full-time, 18.1% part-time, and 14.9% unemployed. Also, among the respondents, there are Muslims (62.9%), with 36.6%

identifying as Christian, and only 0.2% identifying as non-religious. In Conclusion, a high proportion (75.2%) earn below #100,000, with fewer earning #100,000 - #500,000 (24.5%) and very few above #500,000 (0.2%) (Table 4.1).

Table 4.1: Sociodemographic Characteristics of Pregnant Women Attending Antenatal Clinics at Igbeti, Oyo State

Item		Frequency	Percent
Age	18 - 25	109	27.0
	26 - 35	210	52.0
	36 and above	85	21.0
Marital Status	Single	56	13.9
	Married	318	78.7
	Divorced	7	1.7
	Cohabiting	12	3.0
	Widowed	8	2.0
	Prefer not to say	3	0.7
Level of Education	Noformal education	71	17.6
	Primary	100	24.8
	Secondary	158	39.1
	OND/HND	62	15.3
	Bachelor's degree	13	3.2
Ethnicity	Yoruba	270	66.8
	Igbo	12	3.0
	Hausa	67	16.6
	Fulani	55	13.6
Household Size	1	4	1.0
	2	53	13.1
	3	139	34.4
	4	103	25.5
	5	64	15.8

	6	41	10.1
	Employed Full time	68	16.8
	Employed part-time	73	18.1
Employment Status	Self-employed	182	45.0
	Student	17	4.2
	Unemployed	60	14.9
	Other	4	1.0
	Christian	148	36.6
Religion	Muslim	254	62.9
	Non-Religious	1	0.2
	Others	1	0.2
	Below #100,000	304	75.2
Income Level	#100,000 - 500,000	99	24.5
	Above #500,000	1	0.2

4.2 Presentation of Data

4.2.1 Research Questions

Research Question 1: What is the level of awareness of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

Data revealed that 63.6% of respondents are fully aware of the medication for IPT (Sulfadoxine-pyrimethamine), while 26.7% identified it incorrectly. A small percentage (9.7%) were unsure or lacked knowledge, indicating a need for further education or information dissemination. This indicates good awareness among the majority. 61 respondents (15.1%) reported receiving their information about the medication from community health programs. 98 respondents (24.3%) got their information from family or friends. Also, 226 respondents (55.9%) identified healthcare providers as their source of information, making it the most common source. 19 respondents (4.7%) obtained their information through media channels. Table 4.2 shows that 2.2% of respondents were dissatisfied with information about Intermittent Preventive Treatment (IPT), 13.6% were neutral, 30.9% satisfied, and 52.7% were very satisfied, with the largest group being 213 respondents. However,

the IPT guidelines is part of the counselling session the pregnant women receive before commencement of IPT administration. Out of the respondents 73.3% of them are aware of the IPT guidelines while 26.7% of the respondents are not aware. Also, 80.7% of the respondents are aware of the purpose of IPT while 19.3% are not aware (Table 4.2).

Table 4.2: Awareness of Intermittent Preventive Treatment Among Pregnant Women

Item		Frequency	Percentage
Awareness of IPT	Yes	404	100
	No	0	0.0
Awareness of Medication Used	Correct medication	257	63.6
	Incorrect medication	108	26.7
	Unsure/Don't know	39	9.7
Sources of Information	Community Health Programs	61	15.1
	Family/Friends	98	24.3
	Healthcare providers	226	55.9
	Media	19	4.7
Satisfaction on the information received	Very Satisfied	213	52.7
	Satisfied	125	30.9
	Neutral	55	13.6
	Dissatisfied	9	2.2
	Very Dissatisfied	2	0.5

Awareness of IPT guidelines	Yes, aware	296	73.3
	No, not aware	108	26.7
Awareness of purpose for taking IPT	Yes, aware	326	80.7
	No, not aware	78	19.3

Research Question 2: What is the level of knowledge of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

The analysis of research question 2 showed that 44 respondents (10.9%) believe IPT is intended to cure malaria. Also, 296 respondents (73.3%) correctly understand that the purpose of IPT is to prevent malaria during pregnancy. 64 respondents (15.8%) are unsure or don't know the purpose of IPT. Also, 25 respondents (6.2%) reported having no knowledge of the IPT (Intermittent Preventive Treatment) guidelines. 140 respondents (34.7%) indicated they were partially aware of the IPT guidelines. However, 239 respondents (59.2%) were fully and correctly aware of the IPT guidelines. 232 respondents (57.4%) correctly identified the schedule for IPT (Intermittent Preventive Treatment). Also, 148 respondents (36.6%) incorrectly identified the IPT schedule and 24 respondents (5.9%) were unsure or did not know the correct schedule (Table 4.2). Out of 404 respondents, 227 respondents (56.19%) reported that they have no knowledge of the side

effects of IPT (Intermittent Preventive Treatment). 177 respondents (43.81%) indicated that they are aware of side effects and can list some of them (Table 4.3).

Table 4.3: Knowledge of Intermittent Preventive Treatment Among Pregnant Women

Item		Frequency	Percentage	Cumulative Percentage
Understanding of IPT purpose	To cure malaria disease	44	10.9	10.9
	To prevent malaria disease	296	73.3	84.2
	Unsure/don't know	64	15.8	100.0
Knowledge of IPT guidelines	Correct	239	59.2	59.2
	Partially Correct	140	34.7	93.9
	No	25	6.2	100.0
Knowledge of IPT schedule	Correct frequency (commence at 13week)	232	57.4	57.4
	Incorrect frequency	148	36.6	94.1
	Unsure/don't know	24	5.9	100.0
Knowledge of Side Effects of IPT-SP	Yes, and can list some	177	43.8	43.8

No	227	56.2	100.0

4.3.1: Level of Knowledge of Intermittent Preventive Treatment

The pregnant women's level of knowledge about the intermittent preventive treatment intervention was measured on a 5-point rating scale, which queried about their malaria prevention practices. Four items were measured, with a value of ≥ 4 as the highest and ≤ 2 as the lowest. The mean score for the level of knowledge about the malaria preventive practice was 3.4 (Table 4.3.1). The categorization, which includes High (≥ 4), moderate (3), and low (≤2) showed that pregnant women in the study have a moderate knowledge level of IPTp with a high proportion of pregnant women (45.3%) fall under the 3-score range, which is a moderate level.

Table 4.3.1: Level of Knowledge of Intermittent Preventive Treatment

Knowledge of IPTp	Score Range	Frequency (n)	Percentage (%)

High	≥ 4	164	40.6
Moderate	3	183	45.3
Low	≤2	57	14.1
Total		404	100.0
Mean ±SD		**3.40 ± 1.04**	

Research Question 3: What is the perception of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

Data analysis revealed that 73.8% of respondents believe the primary benefit of Intermittent Preventive Treatment (IPT) is the prevention of malaria during pregnancy. However, a smaller group (9.4%) finds IPT only "somewhat important," suggesting they may not fully understand its significance. A total of 233 respondents perceives IPT as "very effective," with 57.7% viewing it as "effective."

The data shows that 71.3% of respondents reported not having malaria in the past two weeks, and 121 respondents (30%) did not receive SP within the last four weeks. However, 14.1% of pregnant women strongly agree that the benefits of IPT outweigh any potential risks. 225 respondents (55.7%) strongly believe that IPT is important for pregnant women, while 33.2% agree that it is important, though without the same level of conviction (Table 4.4).

Also, 217 respondents (53.7%) reported feeling very comfortable with taking IPT medications during pregnancy, while 35.9% felt somewhat comfortable. However, 31 respondents (7.7%) felt neutral about taking IPT, suggesting they may lack strong opinions or knowledge about it. Only

2.7% of respondents expressed discomfort, highlighting a very small group that may need further education or reassurance.

However, 47 respondents (11.6%) expressed strong trust in the safety and efficacy of IPT medications, but 26.3% are skeptical of IPT's safety and efficacy. 132 respondents (32.7%) strongly believe that IPT can significantly reduce the risk of malaria during pregnancy. 172 respondents (42.6%) agree that IPT reduces malaria risk during pregnancy, with 75.3% holding a positive view. 55 respondents (13.6%) do not believe IPT significantly reduces malaria risk, suggesting an opportunity for targeted education on IPT's benefits (Table 4.4).

Table 4.4: Perception of Intermittent Preventive Treatment Among Pregnant Women

Item		Frequency	Percentage
Perceived Benefits of IPT	Prevent malaria in pregnancy	298	73.8
	Protect the baby from harm	13	3.2
	Treat malaria and typhoid	61	15.1
	Unsure/don't know	32	7.9
Adherence to IPT Schedule	Always	220	54.4
	Sometimes	170	42.0
	Never	14	3.6
Consultation with Healthcare Provider	Always	148	36.6
	Sometimes	236	58.4
	Never	20	5.0
Perceived Importance of IPT to your health and the fetus	Very important	231	57.2
	Important	134	33.2
	Somewhat important	38	9.4
	Not important	1	0.2

Perceived Effectiveness of IPT	Very effective	233	57.7
	Effective	128	31.7
	Somewhat effective	41	10.1
	Not effective	2	0.5
Have malaria in the last 2 weeks	Yes	116	28.7
	No	288	71.3
Receive SP in the last 4 weeks	Yes	283	70.0
	No	121	30.0
Comfortability of taking IPT medication	Very comfortable	217	53.7
	Somewhat comfortable	145	35.9
	Neutral	31	7.7
	Somewhat uncomfortable	10	2.5
	Very uncomfortable	1	0.2

Research Question 4: What is the attitude towards intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

The analysis showed that 236 respondents (58.4%) reported that they had taken IPT (Intermittent Preventive Treatment) during a previous pregnancy. 168 respondents (41.6%) indicated they had never taken IPT during a previous pregnancy. Out of 236 respondent who had previously taken IPT, the majority of them reported positive experiences 54.6% had and 43.7% had a "very positive" experience. This combined 98.3% shows that most respondents with IPT experience found it beneficial. Very few respondents had negative (0.2%) or neutral (0.7%) experiences with IPT, indicating that dissatisfaction with IPT is extremely rare. Furthermore, concerning side effects and management, 129 pregnant women (31.9%) reported experiencing side effects from IPT medications, while the remaining 275 pregnant women (68.1%) did not report any adverse

reactions. However, among the respondents who experienced side effects from the use of IPT, 41 pregnant women (31.7%) sought advice or treatment from healthcare professionals. A larger group, 84 pregnant women (65.1%), opted to use home remedies to alleviate their symptoms, possibly reflecting either limited access to healthcare or a preference for traditional methods. A small portion, 4 pregnant women (3.1%), discontinued IPT altogether due to side effects. Cultural beliefs appear to significantly influence perceptions of IPT among pregnant women, with 237 (58.7%) reporting that certain cultural beliefs or attitudes affect their views on IPT. In contrast, 167 pregnant women (41.3%) did not identify cultural influences as a factor. In conclusion, 298 (73.7%) of the respondents are willing to take IPT as recommended while 14 (3.5%) are not willing to continue (Table 4.5).

Table 4.5: Attitude Towards Intermittent Preventive Treatment Among Pregnant Women at Igbeti, Oyo State

Item	Responses	Frequency	Percent
IPT received during a previous pregnancy	No	168	41.6
	Yes	236	58.4
If yes, Experience with IPT in previous pregnancies	Negative	1	0.4
	Neutral	3	1.3
	Positive	129	54.6
	Very Positive	103	43.7
Have you experienced any side effects from IPT medications in this or previous pregnancies?	Yes	129	31.9
	No	275	68.1
If you experienced side effects, how did	Consulted healthcare provider	41	31.7

you manage them?	Took home remedies	84	65.1
	Stopped taking IPT	4	3.1
Cultural beliefs or attitudes in your community that affect your attitude toward IPT?	Yes	237	58.7
	No	167	41.3
Are you willing to continue taking IPT as recommended?	Yes	298	73.7
	No	14	3.5
	Unsure	92	22.7

Research Question 5: What are the factors influencing intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

The majority of respondents (54.7%) live between 1-5 kilometers from the nearest health facility (Table 4.6). A smaller group (17.3%) live within 1 kilometer of a health facility. A significant minority (28.0%) live more than 5 kilometers away from a health facility, which could pose challenges for accessing healthcare, including receiving IPT. Most respondents (64.9%) use public transportation to reach the health facility. A substantial portion of respondents (28.2%) walk to the health facility and only a small percentage (6.9%) of respondents have access to private vehicles. A large majority (78.2%) of respondents are influenced by family members, friends, or community leaders in their decision to use IPT while a smaller portion (21.8%) of respondents do not feel influenced by these social actors. As shown in Table 4.6 nearly half of the respondents (48.8%) cited their husband or partner as the most influential person in their decision to use IPT while Friends (15.1%) and parents (7.9%) also play significant roles in

influencing the decision. Community leaders (4.5%) and in-laws (2.0%) have less influence compared to other social actors. A slight majority (55.4%) of respondents reported that their occupation permits them to easily access health facilities for IPT uptake while (44.6%) of respondents face difficulties in visiting health facilities due to their occupation. In conclusion, table 4.6 indicates that 60% of the respondents experienced a cultural barrier to using IPT while 40% of the respondents did not experience such a barrier.

Table 4.6: Factors Influencing Uptake of Intermittent Preventive Treatment Among Pregnant Women at Igbeti, Oyo state

Item		Responses	Frequency	Percent
1	How far is the nearest health facility from your home	1-5 km	221	54.7
		Less than 1 km	70	17.3
		More than 5 km	113	28.0
		Total	404	100
2	How do you usually travel To the health facility	Private Vehicle	28	6.9
		Public transport	262	64.9
		Walking	114	28.2
		Total	404	100
3	Do family members, friends or community leaders influence your decision to use IPT	No	88	21.8
		Yes	316	78.2
		Total	404	100

4	Who influences your decision the most	Community leaders	18	4.5
		Friends	61	15.1
		Husband/Partner	197	48.8
		In-laws	8	2.0
		Parents	32	7.9
5.	Does your occupation allow you to easily visit health facilities for IPT			
		No	180	44.6
		Yes	224	55.4
		Total	404	100
6.	Have you ever experienced any cultural or religious barriers to using IPT?	Yes	241	59.6
		No	163	40.4

4.2.2 HYPOTHESIS

H_o1: There is no significant difference between ethnicity and awareness of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria

The Pearson Chi-Square test assessed whether there is a statistically significant association between ethnicity and awareness of correct IPT medication as the Yoruba group has the highest awareness level among the other ethnic group. Chi-Square Value: 31.613, df = 6, p-value = .000. Phi Value: 0.280; Cramer's V: 0.198, with a p-value of 0.000.

Table 4.7: Ethnicity and Awareness of Medication used IPT among pregnant women attending antenatal clinic at Igbeti, Oyo state

	Awareness of Medication	P-value

		Correct medication (e.g., Sulfadoxine-pyrimethamine)	Incorrect medication	Chi-square value	df	
Ethnicity	Count	257	108	31.613[a]	6	0.000
	Expected Count	257.0	108.0			
	% within Ethnicity	63.6%	26.7%			

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.280	.000
	Cramer's V	.198	.000
N of Valid Cases		404	

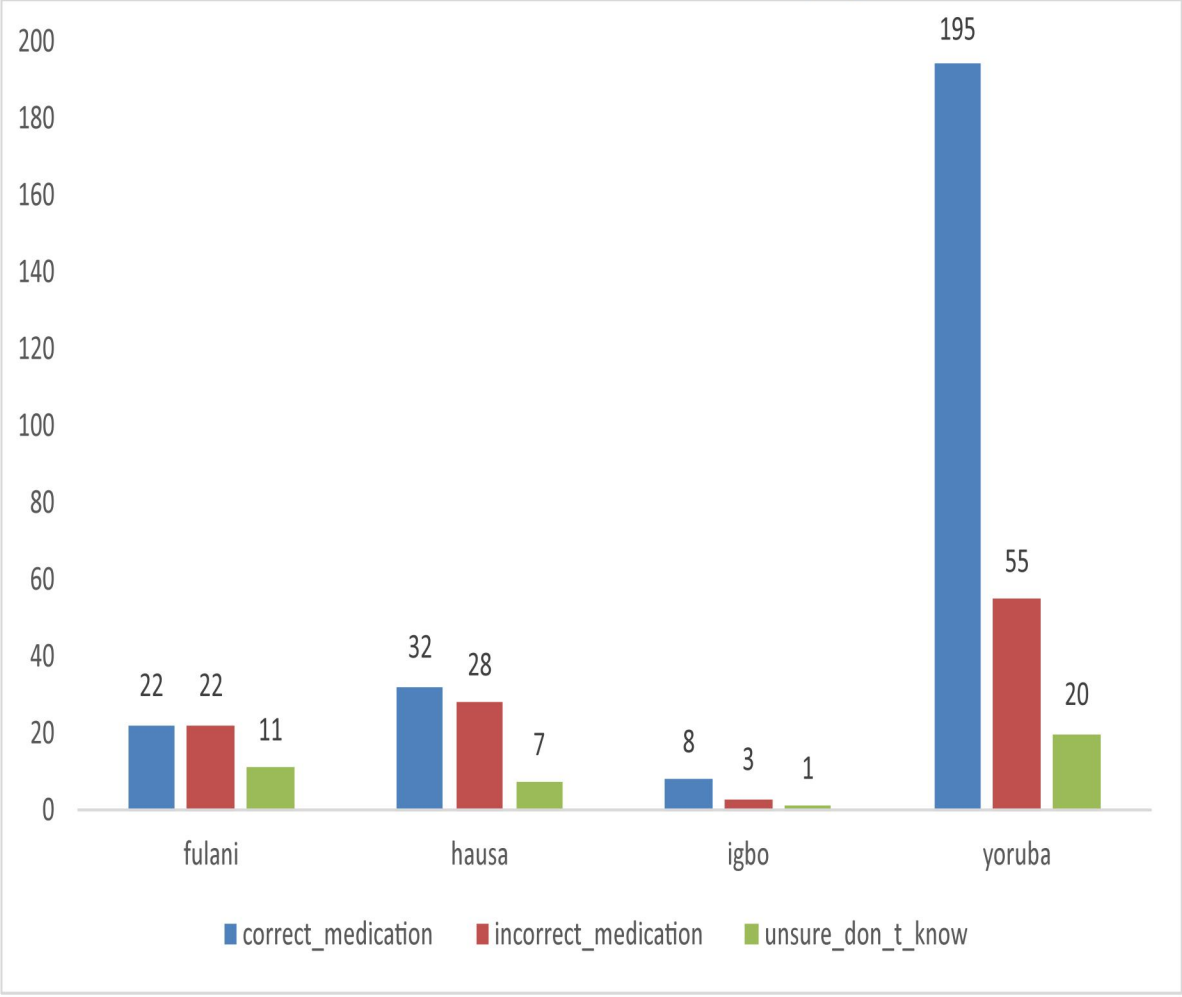

Figure 4.15: Ethnicity of the respondents and awareness of medication for IPT

H_o2: There is no significant difference between educational status and level of knowledge on intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

The analysis of the second hypothesis using the Pearson Chi-Square Value: 10.437, df = 8, p-value = 0.236. Phi Value: 0.161; Cramer's V: 0.114, with a p-value of 0.236.

Table 4.8: Educational level and knowledge on IPT purpose among pregnant women attending antenatal clinic at Igbeti, Oyo state

		Knowledge of IPT Purpose				
		To cure malaria	To prevent malaria	Chi-square value	df	P-value
Education	Count	44	296	10.437[a]	8	0.236
	Expected Count	44.0	296.0			
	% within Education	10.9%	73.3%			

Symmetric Measures

	Value	Approximate

			Significance
Nominal by	Phi	.161	.236
Nominal	Cramer's V	.114	.236
N of Valid Cases		404	

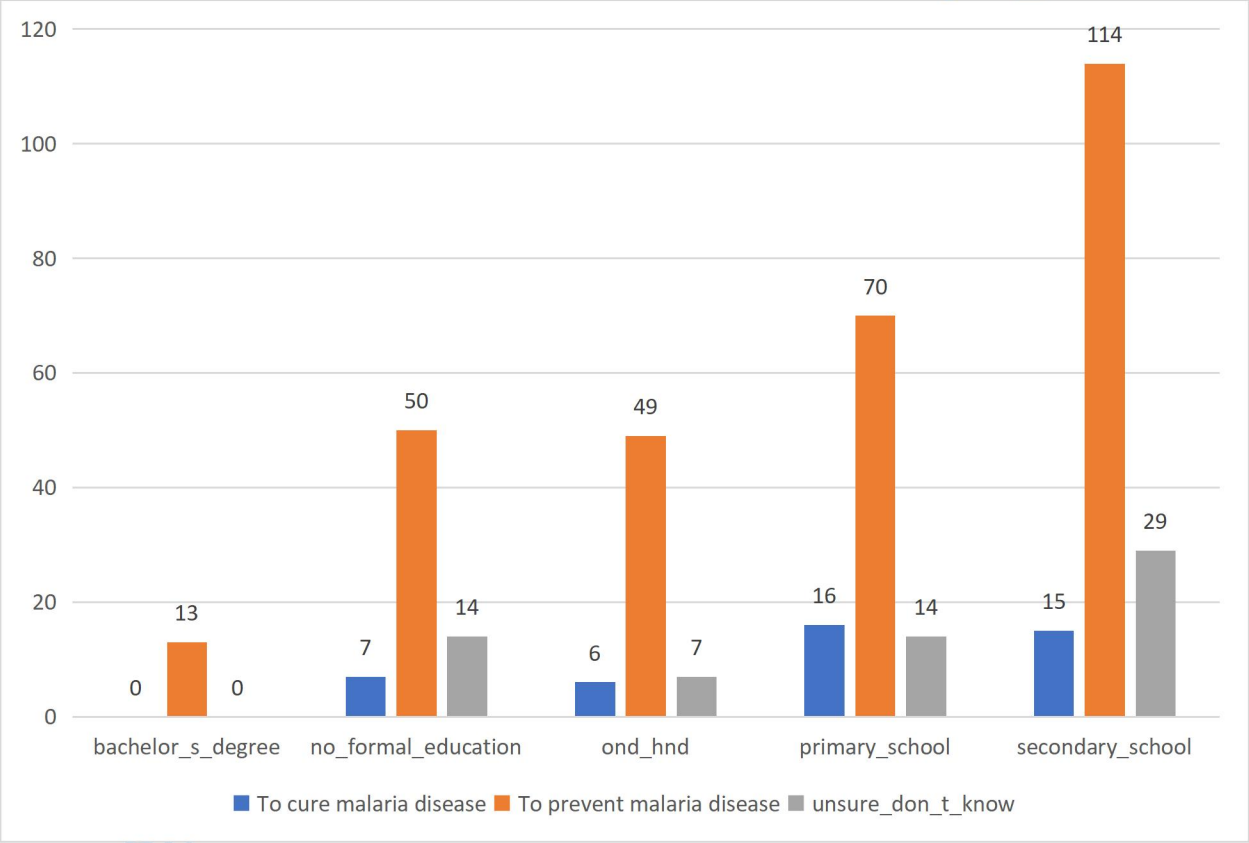

Figure 4.16: Educational level of the respondent and knowledge on IPT purpose

H_o3: There is no significant difference between religious affiliation and perception of intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

The Pearson Chi-Square test evaluates whether there is a statistically significant association between religion and the perceived importance of IPT. Chi-Square Value: 14.771, df = 9, p-value = 0.097. Phi Value: 0.191; Cramer's V: 0.110, both with a p-value of 0.097(Table 4.10).

Table 4.9: Religion and Perception of IPT among pregnant women at Igbeti, Oyo State

		Perceived Importance of IPT:				Chi-square value	P-value
		Important	**Not important**	**Somewhat important**	**Very important**		
Religion	Count	134	1	38	231	14.771[a]	0.097
	Expected Count	134.0	1.0	38.0	231.0		
	% within	33.2%	0.2%	9.4%	57.2%		

	Religion

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.191	.097
	Cramer's V	.110	.097
N of Valid Cases		404	

$H_0$4: There is no significant difference between age and attitude towards intermittent preventive treatment among pregnant women attending the antenatal clinics at Igbeti, Oyo State, Nigeria.

The Pearson Chi-Square Value: 17.744[a], df = 8, p-value = 0.023. Phi Value: 0.191; Cramer's V: 0.110, both with a p-value of 0.023 (Table 4.11).

Table 4.10: Age and attitude towards intermittent preventive treatment among pregnant women at Igbeti, Oyo State

	How comfortable are you with taking IPT medications during pregnancy?					
	Neutral	Somewhat comfortable	Somewhat uncomfortable	Very comfortable	Very uncomfortable	P-value
Total Count	33	178	5	187	1	0.023
Expected Count	33.0	178.0	5.0	187.0	1.0	404.0
%Within age	8.2%	44.1%	1.2%	46.3%	0.2%	100.0 %

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.210	.023
	Cramer's V	.148	.023
N of Valid Cases		404	

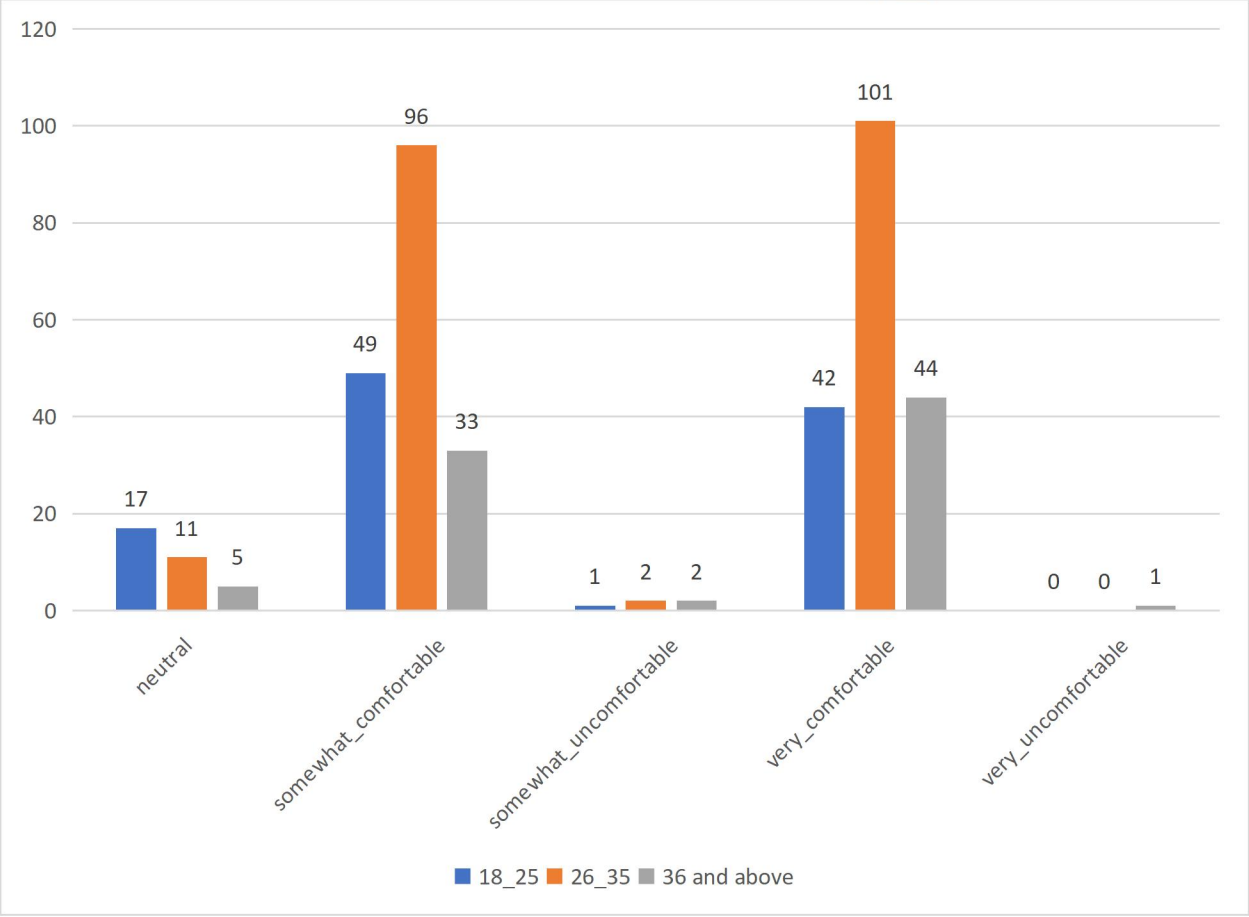

Figure 4.17: Age of the respondents and the attitude toward IPT

H_o5: There is no significant difference between occupational status and factors influencing intermittent preventive treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State, Nigeria.

The Chi-Square test evaluates the statistical significance of the association between employment status and ease of accessing health facilities. Pearson Chi-Square Value: 27.377, df = 5, p-value = 0.000.

Table 4.11: Occupational status and factors influencing uptake of intermittent preventive treatment among pregnant women at Igbeti, Oyo State

		Occupation allow you to easily visit Health Facility for IPT				
		No	Yes	Chi-square value	df	P-value
	Count	180	224	27.377[a]	5	0.000
	Expected Count	180.0	224.0			
	% within Occupation	44.6%	55.4%			

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	.260	.000
	Cramer's V	.260	.000
N of Valid Cases		404	

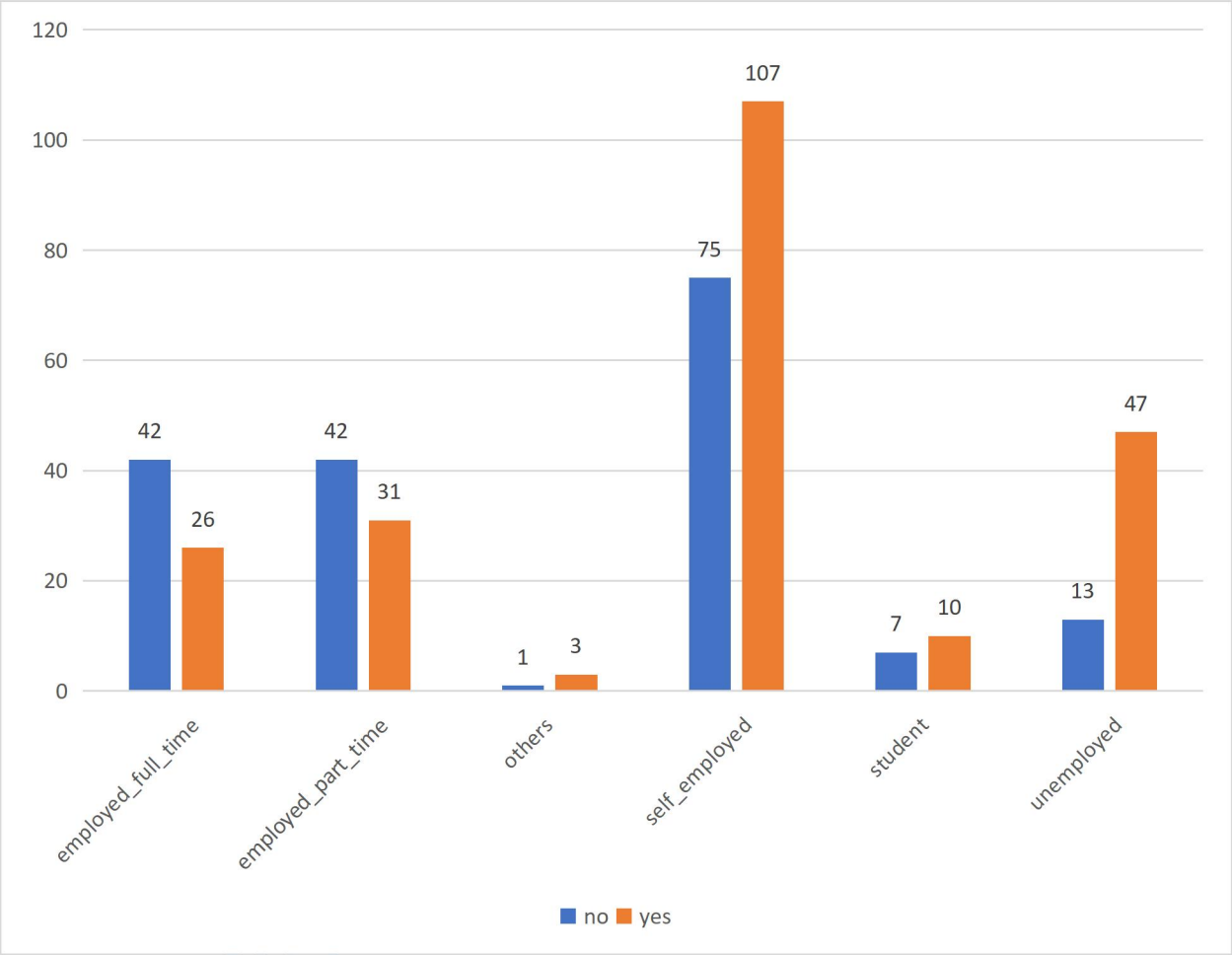

Figure 4.18: Occupational status of respondents and factors influencing IPT uptake

Table 4.12: Logistic Regression Results (Factors Influencing IPTp Uptake)

Dependent Variable: Uptake of IPTp (Yes vs No)

Predictors: Health system and socio-cultural factors

Predictor	Adjusted Odds Ratio (AOR)	95% CI (Lower–Upper)	p-value
Distance to facility			
(≤5km) (Ref)	1.00	**	**
(>5km)	2.10	1.18 – 3.75	0.012 *
Transport availability			
(Yes)	1.65	1.01 – 2.71	0.045 *
(No) (Ref)	1.00	**	
Family support for IPTp			
(Yes)	2.85	1.67 – 4.85	<0.001 ***
(No) (Ref)	1.00	**	
Occupation			
Skilled	1.48	0.90 – 2.44	0.121
Unskilled (Ref)	1.00		
Cultural/religious beliefs			
Barrier	0.74	0.41 – 1.32	0.301

Predictor	Adjusted Odds Ratio (AOR)	95% CI (Lower–Upper)	p-value
Distance to facility			
No Barrier	1.00		

Model Fit:

- Hosmer–Lemeshow p = 0.41 (good fit)
- Nagelkerke R^2 = 0.33
- Overall Classification Accuracy = 76%

Interpretation

- **Distance to facility:** Women living closer (≤5km) were 2.1 times more likely to take IPTp compared to those living farther away (p=0.012).
- **Transport availability:** Reliable transport increased uptake odds by 65% (p=0.045).
- **Family support:** The strongest predictor women with family support were 2.85 times more likely to take IPTp (p<0.001).
- **Cultural beliefs:** Showed a negative but not significant association (p=0.301).

4.3 Discussion of Findings

4.3.1 Sociodemographic Characteristics of the Respondents

The data reveals that the majority of respondents (52%) are between 26 and 35 years old, suggesting that this age group might be more represented or actively participating in this survey

or research context. The cumulative percentages confirm that the frequency distribution accurately covers all respondents across the defined age ranges.

The study also demonstrates that the majority of respondents have attained "Secondary" education, totaling 39.1% of the total respondents. The "Primary" education category is the second most substantial group, with 24.8% of responses. Conversely, the "bachelor's degree" category has the lowest representation, with a comparatively low rate of 3.2%. These findings highlight disparities in educational backgrounds among the respondents.

The ethnic distribution shows that the majority of the respondents are Yoruba, accounting for 270 (66.8%) of the sample. The "Hausa" group follows with little representation with 67 (16.6%) of the respondents. The Fulani group represents 55 (13.6%) of the respondents whereas the "Igbo" category indicates a relatively low number of 12 (3%). The Igbeti community is a Yoruba land which justifies the higher percentage (66.8%) of the Yoruba group among the respondents.

The most frequent household size is 3 members, with 139 respondents (34.4%). This result indicates that smaller household units are common among respondents, indicating a trend toward nuclear family structures or smaller living arrangements. These smaller sizes might indicate respondents who are single, elderly or live with one other person. Households with 6 members are progressively less frequent, comprising a small percentage of the sample. For instance, by including 4-member households, we reach a cumulative percentage of 74%, indicating that nearly three-quarters of respondents live in households with 4 or fewer members.

4.3.2 Awareness of Intermittent Preventive Treatment (IPT)Among Pregnant Women

The data indicates that every respondent (404 individuals) is aware of Intermittent Preventive Treatment (IPT). This suggests that IPT is widely known among the study population, this is due to widespread healthcare education about malaria prevention during pregnancy by the healthcare provider since the respondent's major source of information is 55.9% of healthcare providers. This suggests that healthcare professionals play a critical role in disseminating accurate health information and are trusted by the population. Given the full awareness (100%) of IPT among the respondents, it can be inferred that awareness about the existence of IPT is well disseminated within the surveyed population. This could be a strong foundation for promoting IPT uptake, as all respondents are familiar with it. This high level of awareness is similar to the study conducted by Nkunzimana in 2020 which reveals high usage (83.8%) of SP among pregnant in Muramvya Health District, Burundi.[1]

Also, with the information provided about IPT, more than half of the respondents (52.7%) felt "very satisfied" and over 80% were generally satisfied. This suggests that most respondents feel well-informed and content with the quality and clarity of the information provided. The low percentage in this category shows that the cost of medication is not a barrier to IPT uptake. It was noted that the Sulphadoxine Pyrimethamine (SP) drug for IPT is supplied free of charge to all Secondary and Primary Health Centers in the study area for the pregnant women attending the ANC clinics at Igbeti. However, the result still indicates that a small proportion of respondents purchase the drug hence the reason for the campaign for free medication. The data highlights that respondents perceive improved education and healthcare access as the primary strategies for overcoming barriers to IPT uptake, with 71% and 59% support, respectively. This suggests that awareness campaigns and infrastructure improvements could be central to

increasing IPT uptake. These insights can help inform targeted, culturally sensitive strategies to improve IPT uptake among different communities.

However, there is still a small group of individuals who are either neutral or dissatisfied, which could indicate areas for improvement in communication or information delivery. The result of the hypothesis is statistically significant since the $p<0.05$, suggests that awareness of correct IPT medication differs by ethnicity. This result is unlikely due to chance, indicating that ethnicity plays a role in the level of medication awareness among respondents (Table 4.7). These measures provide additional insight into the strength of the association. Cramer's V (0.198) suggests a moderate association between ethnicity and awareness, indicating that while ethnicity affects awareness levels, other factors likely also play a role.

However, the hypothesis test indicates that awareness of correct IPT medication differs by ethnicity since the chi-square = 31.613, df=6, p-value =0.00. This result is unlikely due to chance, indicating that ethnicity plays a role in the level of medication awareness among respondents as Yoruba pregnant women are the most likely to correctly identify the medication, with 72.2% accuracy, well above the expected count.

4.3.3 Knowledge on intermittent preventive treatment among pregnant Women

The majority of respondents (73.3%) understand that IPT is intended for malaria prevention, but a small percentage (10.9%) mistakenly believe it is a treatment for malaria. This highlights the need for improved communication on its preventive role. The majority (73.3%) understand that IPT prevents malaria during pregnancy, which is encouraging as it reflects a high level of awareness about its preventive benefits, but further education is needed to address knowledge

gaps. The increase in knowledge of IPT is similar to the study conducted by Adeyemo in 2024 in Osogbo which confirms the high level of knowledge of IPT among pregnant women.[2] Also, In a similar study by Ikpeama in 2017, the majority of the respondents had good knowledge of IPTp generally.[3] Another study indicated that 65% of knowledge about IPT was discovered among the respondents in similar research conducted in Somalia.[4] A significant minority (15.8%) is unaware of IPT's purpose, indicating a need for better education. Health education campaigns are effective, but further emphasis on clear messaging is needed. However, there was a contradicting result presented Uchechukwu in 2021, stating that the low emphasis placed by the healthcare professionals who treated the women during antenatal care visits on IPT on women's health was primarily the cause of the pregnant women's inadequate understanding of the choice of SP [5]. In this study, most of the respondents received knowledge and awareness of IPT from the healthcare provider. In a related study, Ikpeama in his research observed that their urban study environment contributed to their good understanding of IPT [3]. The same might have applied to our research, which was conducted in Igbeti, one of the geopolitical zones in Oyo state. However, as a reflection of the source of information about IPT from the respondent in this study and the low emphasis on IPT by the healthcare provider reported by Uchechukwu in his study, this explains the need for continuous dissemination of IPT information to the pregnant women in the community.[5]

The IPT (Intermittent Preventive Treatment) guidelines were unknown to 25 responders (6.2%). Of those surveyed, 140 (34.7%) said they knew something about the IPT guideline. The IPT guidelines were accurately and completely understood by 239 respondents (59.2%). The majority of respondents (59.2%) correctly identified the IPT guidelines, suggesting that most people are aware of how to utilize IPT appropriately. This is a good sign of general awareness. About one-

third (34.7%) of respondents only know a portion of the guidelines, indicating that although they do know something, it might be insufficient in certain areas. More instruction or explanation of the rules would be beneficial for this group. The IPT rules are relatively unknown to only 6.2% of respondents. The majority of respondents (59.2%) are aware of the IPT guidelines, with 34.7% having partial knowledge. However, targeted education efforts should focus on the 6.2% who are unaware and 34.7% who have partial knowledge. While a majority (57.4%) of respondents correctly know the IPT schedule, there is still a significant portion (36.6%) who have incorrect knowledge. This indicates a need for targeted education efforts to reduce misinformation and ensure more people are accurately informed. Additionally, the 5.9% who are unsure represent an opportunity for improvement through awareness campaigns. Overall, the focus should be on enhancing understanding of the correct schedule among those who are incorrect or unsure.

The data demonstrates that a majority of respondents (51.2%) are "Very Knowledgeable" about IPT, which is an encouraging indicator for IPT awareness and potential uptake in this population. Combining those who are "Very Knowledgeable" and "Somewhat Knowledgeable," a total of 72.7% have at least a moderate level of understanding, suggesting that IPT information has reached a substantial portion of the respondents. The 24.8% who are only "Slightly Knowledgeable" and the small percentage who are "Not Knowledgeable" indicate areas where further education and awareness efforts could be beneficial. Targeted education for these groups could help close the knowledge gap, potentially leading to increased IPT adoption.

However, the majority of respondents (56.19%) are unaware of the side effects of Intermittent Preventive Treatment (IPT). This lack of knowledge is a concern, as it affects informed decision-making and early identification of adverse reactions. Despite 43.8% knowing the side effects of

IPT, the majority still lack knowledge of it, highlighting the need for comprehensive education to ensure safe and informed use of IPT. The test in (Table 4.8) is not significant since the p-value is 0.236, which is ≥ 0.05 (Chi-square = 10.437, P= <0.236). This means there is no significant association or relationship between educational status and understanding the IPT purpose. This means that understanding the IPT's purpose is independent of the educational level.

The overall mean score of the level of knowledge of IPTp among the respondents was 3.40 ± 1.04, indicating a generally moderate level of knowledge. A higher proportion of respondents (45.3%) fell within the moderate knowledge category, followed by 40.6% with high knowledge, and only 14.1% with low knowledge. This distribution suggests that while most pregnant women were reasonably aware of IPTp, there remains a significant proportion with suboptimal knowledge, highlighting the need for continuous health education and targeted interventions to improve awareness.

4.3.4 Perception of intermittent preventive treatment among pregnant women

The majority of respondents (73.8%) believe Intermittent Preventive Treatment (IPT) is primarily for preventing malaria during pregnancy. However, a small group (15.1%) believes it treats both malaria and typhoid, indicating a misunderstanding. Only 3.2% believe IPT protects the baby from a syndrome, indicating confusion or misunderstanding about the specific benefits of IPT. 7.9% are unsure of IPT's benefits, and this indicates a need for further health education. While general awareness is high, targeted information campaigns are needed to correct misconceptions and improve understanding.

Respondents (90.4%) perceive that IPT important or very important in preventing malaria during pregnancy and protecting maternal and fetal health. A smaller group (9.5%) considers it only

"somewhat important," suggesting a lack of understanding. Only 0.2% believe IPT is not important, indicating a strong consensus on its importance.

The study shows that a majority of respondents (57.7%) consider Intermittent Preventive Treatment (IPT) to be very effective in preventing malaria during pregnancy. The remaining respondents (31.7%) view it as "effective," with a small percentage (10.1%) stating it is only "somewhat effective." The data suggests a high level of trust in IPT, with a small minority (0.1%) expressing skepticism. Further promotion could help address these doubts among pregnant women. However, 236 women (58.4%) consult healthcare providers occasionally, meaning that they may receive guidance intermittently rather than consistently. This is the largest group, indicating that most women engage with healthcare providers on an irregular basis. This trend suggests potential barriers to frequent consultation, such as accessibility to health facilities and inadequate understanding of consultation. Also, the data reveal that 20 women (4.9%) reported never consulting healthcare providers. While this is a small portion, it highlights a group potentially missing out on essential health guidance and support, which could impact their decision on health services. However, addressing the factors behind inconsistent consultation may improve adherence to healthcare guidance and ultimately improve health outcomes for both the mothers and their babies.

In this study, 53.7% of the respondents feel very comfortable with taking IPT medications during pregnancy, indicating strong confidence in their safety and benefits. However, a small percentage (7.7%) feel neutral or uncomfortable, suggesting they may need further education to understand its importance in malaria prevention. Only 2.7% expressed discomfort, indicating a need for further education and support to address concerns and increase overall comfort with IPT usage during pregnancy. The data also indicate a strong perception of IPT's effectiveness, with 89.4%

of respondents considering it either "very effective" or "effective." A small portion (10.1%) sees it as only "somewhat effective," while skepticism is minimal. These findings highlight a high level of trust in IPT, although efforts to further promote its proven effectiveness could help address lingering doubts among the small minority who are unsure of its full benefits.

The data shows a divided perception among respondents, with a majority (60%) viewing IPT as beneficial but a significant 40% expressing reservations. In research conducted by Ogba in 2023 on the perception of SP use among pregnant women in sub-Saharan Africa, He found that although pregnant women in sub-Saharan Africa are well-informed about malaria and its effects, this does not always result in higher IPTp-SP uptake.[6] It is disturbing to note that some pregnant women (from 2 research) did not believe that SP use is advantageous, and some participants (from 4 studies) were unsure or did not regard the substance as a successful intervention. Many pregnant women fear SP affects them their spouses, or their unborn children.[6] The majority of respondents (60%) have a positive opinion of the usage of IPT, hence this result runs counter to our findings. Similar research was also carried out in 2013 in Nigeria's Cross Rivers state by Diala, who found that low uptake and adherence were caused by a combination of systemic issues (stockouts, provider ignorance of IPT protocols) and individual women's beliefs. Many pregnant women are reluctant to seek care for an illness they do not have. Although individuals who seek treatment at a clinic have faith in their doctors and are willing to take the prescribed medication, people with malaria frequently opt to self-medicate using pharmacies or herbal remedies.

Addressing these concerns through education or addressing specific fears could be beneficial in strengthening overall acceptance and adherence to IPT. The p-value of 0.097 is above the conventional threshold of 0.05, meaning that the association between religion and IPT perception

is not statistically significant. Thus, it cannot be concluded that religion has a significant effect on perceptions of IPT importance among the respondents. Phi Value: 0.191; Cramer's V: 0.110, both with a p-value of 0.097 (Table 4.10). These values provide insight into the strength of the association. Both Phi (0.191) and Cramer's V (0.110) suggest a weak association between religion and IPT importance perception, supporting the finding that religion does not significantly affect IPT perception in this sample.

The study revealed that 91.7% of respondents who did not have malaria received Sulphadoxine Pyrimethamine (SP) in the last four weeks, indicating a strong association between receiving SP and not having malaria. According to this, receiving SP greatly lowers the risk of getting malaria, demonstrating its efficacy as a preventive measure. The p-value of 0.097 is above the conventional threshold of 0.05, meaning that the association between religion and IPT perception is not statistically significant. Thus, it cannot be concluded that religion has a significant effect on perceptions of IPT importance among the respondents.

The chi-square test result shows a statistical significance since the p-value is 0.00, which is ≤ 0.05 and this means there is a significant association or relationship between malaria and the use of SP among pregnant women. Receiving SP is linked to a decreased incidence of malaria. This emphasizes how crucial SP is to preventing malaria. Also, the hypothesis test shows that there is no association between the religion of the respondent and the perception of intermittent preventive treatment (Chi-square=14.771, df=9, p-value=0.097). The Chi-Square analysis indicates that these differences are not statistically significant, suggesting that while the distribution of responses varies somewhat by religion, these variations could be due to random chance rather than a meaningful difference influenced by religious background.

The study reveals a mixed perspective on IPT medication safety and efficacy. While nearly half (47.5%) of respondents trust or strongly trust IPT medications, a significant portion (26.3%) distrust or strongly distrust them, and 26.2% remain neutral. This distribution suggests that while there is a base of confidence, there is also notable ambivalence and concern. Efforts to address the doubts and provide more information on IPT's safety and efficacy could help improve trust levels, especially among those who are neutral or distrusting. Furthermore, concerning the perceived effectiveness of IPT, the data shows a strong overall belief in IPT's effectiveness, with 75.3% of respondents agreeing or strongly agreeing that it reduces malaria risk during pregnancy. A smaller segment (18%) disagrees or strongly disagrees, indicating skepticism or concerns that may need to be addressed. The neutral group (6.6%) also suggests an opportunity for targeted education on IPT's benefits. This data highlights a generally positive perception of IPT, with some room to further increase confidence in its effectiveness among the undecided or skeptical groups.

4.3.5 Attitude toward intermittent preventive treatment among pregnant women

The study found that 58.4% of respondents had taken Intermittent Preventive Treatment (IPT) during a previous pregnancy, indicating that over half of the study population has experience with this preventive treatment. However, those who have used IPT experience positive outcomes, with 31.9% and 25.5% reporting very positive experiences. A significant portion (41.6%) had no prior experience, indicating a potential gap in IPT exposure. Expanding access and educating those without prior experience could improve uptake and positive health outcomes in future pregnancies.

89.1% of the respondents believe that Intermittent Preventive Treatment (IPT) is important for pregnant women, with 54.2% agreeing and 34.9% strongly agreeing. This overwhelming

majority reflects a high level of support and recognition of the value of IPT in protecting pregnant women from malaria. A smaller percentage (10.6%) is neutral, suggesting they may benefit from further education. However, there is still room for targeted education to ensure all individuals understand its role in malaria prevention during pregnancy.

Overall, 90.4% of respondents revealed they are comfortable visiting the health institution for IPT medicine during pregnancy (46.3% very comfortable, and 44.1% somewhat comfortable). This suggests that IPT drug use at the clinic is widely accepted, as most responders are either extremely or moderately comfortable with it. In similar research by Mohamoud in 2022, the research revealed that 57% of the respondents feel convenient to take IPT-SP medication [4].

However, only 8.2% of those surveyed feel neutral regarding taking IPT drugs at the hospital. This group could not feel strongly about either side, which could be a result of their lack of knowledge or experience with IPT during pregnancy.

Additionally, regarding side effects and their management, 129 pregnant women (31.9%) reported suffering bad effects from IPT drugs, whilst the remaining 275 pregnant women (68.1%) did not report any negative reactions. This indicates that while a majority of women tolerated IPT effectively, a significant number encountered difficulties with side effects. Comprehending the characteristics of these side effects and their management can yield significant insights regarding IPT compliance. Among the respondents who had side effects from IPT, 41 pregnant women (31.7%) consulted healthcare specialists for guidance or treatment. This proactive strategy may reflect a degree of trust in healthcare personnel and an inclination to comply with the IPT regimen, provided that side effects are tolerable. A larger group, 84 pregnant women (65.1%), opted to use home remedies to alleviate their symptoms of side effects of IPT, reflecting either limited access to healthcare or a preference for traditional methods.

The majority of respondents (58.7%) think that their opinions on intermittent preventive treatment (IPT) during pregnancy are influenced by cultural attitudes and beliefs. This implies that more than half of the population places importance on cultural issues, which may influence their propensity to adopt IPT methods. Nonetheless, a sizable minority (41.3%) do not believe that cultural values influence their viewpoint, indicating that culture has a greater influence on judgments. The influence of peer opinions and cultural beliefs on IPT perception highlights the need for community-based initiatives that encourage open discussions about IPT, address cultural concerns, and empower women to share positive experiences. Additionally, the high percentage of women willing to recommend IPT suggests that, if adequately supported and informed, they could serve as advocates for IPT within their communities, potentially increasing uptake and acceptance.

Hypothetically, the p-value (0.023) is less than the conventional threshold of 0.05, indicating a statistically significant association between the age of the respondent and the attitude towards IPT. The analysis reveals a statistically significant but modest association between age and comfort with taking IPT medications. The age group 36 and above has the highest percentage of respondents who are "Very comfortable" (51.8%), while the 18-25 and 26-35 groups show similar levels of comfort. This pattern suggests that as age increases, respondents may feel increasingly comfortable with taking IPT. However, the weak-to-moderate strength of the association (Phi = 0.210) suggests that while age plays a role, other factors may also contribute to the attitude toward the use of IPT.

4.3.6 Factors Influencing Uptake of Intermittent Preventive Treatment

A lesser percentage (17.3%) reside less than 1 km from a health facility, suggesting that they have easy access to medical care, which probably makes routine examinations and treatments

possible. A sizable minority (28.0%) reside more than five kilometers from a medical facility, which may make it difficult for them to receive healthcare including IPT. However, a sizable portion (28.0%) reside more than 5 km away, potentially making access to healthcare services difficult. More than half of the respondents (54.7%) live within 1–5 km of a health facility, making access relatively accessible. Pregnant women (78.2%) use IPT due to social influence from family members, friends, or community leaders. This highlights the importance of social networks in health decisions, particularly regarding maternal healthcare. However, 21.8% of respondents do not feel influenced, suggesting personal preference, medical advice, or individual factors may influence their decisions. In a similar study by Ogba in 2022 on facilitators to access the uptake of IPT among pregnant women in Nigeria, He found that the lack of essential commodities for sulphadoxine-pyrimethamine administration in clinics are significant barrier to IPTp-SP use.[7] However, this is contrary to our findings since essential commodities for sulphadoxine-pyrimethamine are readily available across all the health facilities in the study area, however, the pregnant women in the study area see access to the health facility as a barrier to using IPT. Also, in research conducted by Darteh in 2021 on factors influencing the uptake of IPT among pregnant women in sub-Saharan Africa, He concluded that higher educational level, exposure to media, low parity, and higher age cohort were the protective factors of optimal IPTp-SP uptake.[8]

The study found that a higher percentage of pregnant women (48.8%) cited their husband or partner as the most influential person in their decision to use intermittent preventive treatment (IPT). This implies that male involvement in the uptake of IPT among pregnant women is crucial since it is a great factor that influences pregnant women to patronize the health facility for IPT. Male involvement in antenatal care, especially in encouraging intermittent preventative treatment

(IPT) uptake for malaria, is critical for the health of pregnant women. In malaria-endemic areas, IPT is a preventive treatment that helps protect pregnant women and their unborn children from the detrimental effects of malaria, such as anemia, low birth weight, and increased risk of infant mortality. However, the success of IPT uptake typically hinges on the quantity of support that women receive from their male partners as seen in the study. However, when males are actively engaged and informed on the necessity of IPT, they are more likely to encourage their partners to visit prenatal clinics regularly and adhere to IPT schedules. Male engagement can resolve some of the frequent challenges to IPT uptake, such as financial constraints, lack of transportation, or misconceptions regarding the medicine. Furthermore, when men understand the benefits of IPT, they become advocates within the family and community, establishing a supportive atmosphere for maternal health practices. Involving males in discussions about IPT also helps overcome knowledge gaps, as men can better comprehend pregnancy-related risks and the need of preventive measures. Programs that incorporate men in antenatal health education and decision-making can dramatically boost IPT uptake, contributing to higher pregnancy outcomes and reduced malaria prevalence among pregnant women. Friends (15.1%) and parents (7.9%) also played significant roles in decision-making. Community leaders and in-laws had less influence. A proportion (21.8%) stated that no one influences their decision, indicating they may rely on their judgment or personal factors. Interventions to promote IPT should involve spouses and close family members.

The majority (55.4%) of pregnant women have flexible jobs that allow them to easily access health facilities for IPT uptake during pregnancy. However, (44.6%) face difficulties due to work-related constraints, such as rigid schedules or long hours. This highlights the need for workplace policies that accommodate pregnant women's healthcare needs, such as flexible hours

or mobile clinics. However, with a p-value of 0.000 (less than the typical threshold of 0.05), the result is statistically significant, meaning that there is a meaningful association between employment status and the ability to visit a health facility for IPT uptake. The data suggests that employment status, particularly full-time employment, is associated with reduced flexibility for IPT uptake visits, while unemployment, self-employed, and student status are associated with greater ease of access. Employment type influences the IPT uptake at the health facility.

This Chi-square analysis (Pearson Chi-Square Value: 27.377, df = 5, p-value = 0.000) indicates a statistically significant association between employment status and the factors influencing the uptake of IPT. Full-time and part-time employees reported the most difficulty in visiting health facilities, while unemployed individuals (78.3%) had the highest rate of ease of visiting health facilities for IPT uptake. This suggests that employment-related factors such as hours and flexibility could be barriers for those employed full-time or part-time. In contrast, unemployed respondents may have greater flexibility, making health facility access more manageable. The moderate strength of association suggests that employment status is a notable factor but not the only determinant of access to health facilities for IPT uptake.

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CHAPTER FIVE

CONCLUSION

5.1 Summary of Findings

The study reveals that 52% of respondents are between 26 and 35 years old, indicating a higher representation of this age group. The majority have secondary education, with 39.1% of respondents having it. The ethnic distribution is Yoruba, with 270 respondents (66.8%), followed by Hausa, Fulani, and Igbo. The most frequent household size is 3 members, with 139 respondents (34.4%), indicating a trend towards smaller living arrangements. Households with 6 members are less frequent, with 74% of respondents living in 4-member households.

The study reveals that 404 respondents are aware of Intermittent Preventive Treatment (IPT), indicating widespread healthcare education about malaria prevention during pregnancy.

Healthcare professionals play a critical role in disseminating accurate health information, and the full awareness of IPT is 100%. Over half of respondents felt "very satisfied" with the information provided about IPT, and over 80% were generally satisfied. The cost of medication is not a barrier to IPT uptake, as the Sulphadoxine Pyrimethamine (SP) drug is supplied free of charge to all secondary and primary health centers. Respondents perceive improved education and healthcare access as primary strategies for overcoming barriers to IPT uptake, with 71% and 59% support, respectively. However, a small group of individuals remain neutral or dissatisfied, indicating areas for improvement in communication or information delivery. Ethnicity plays a role in the level of medication awareness among respondents, with Yoruba pregnant women being the most likely to correctly identify the medication.

The majority of respondents (73.3%) understand that Intermittent Preventive Treatment (IPT) is intended for malaria prevention during pregnancy, but a small percentage (10.9%) mistakenly believe it is a treatment. This highlights the need for improved communication on IPT's preventive role. The majority (73.3%) have good knowledge of IPT, but a significant minority (15.8%) is unaware of its purpose. Health education campaigns are effective, but further emphasis on clear messaging is needed. The IPT guidelines were unknown to 25 respondents (6.2%), and 59.2% of respondents correctly identified the guidelines. However, a significant portion (36.6%) have incorrect knowledge, indicating a need for targeted education efforts to reduce misinformation.

The study reveals that a majority of respondents (73.8%) believe Intermittent Preventive Treatment (IPT) is primarily for preventing malaria during pregnancy. The high use of IPT among pregnant women affirms the findings of previous studies conducted in Ghana by Tackie in 2020. However, a small group (15.1%) believes it treats both malaria and typhoid, indicating a

misunderstanding. Only 3.2% believe IPT protects the baby from a syndrome, indicating confusion. A small percentage (9.5%) is unsure of IPT's benefits, indicating a need for further health education. The majority (57.7%) consider IPT very effective in preventing malaria during pregnancy, while a small percentage (10.1%) sees it as only "somewhat effective." The data also shows that 58.4% of women consult healthcare providers occasionally, suggesting potential barriers to frequent consultation. The majority (53.7%) feel very comfortable with IPT during pregnancy, but a small percentage (7.7%) feels neutral or uncomfortable, suggesting further education is needed.

The study found that 58.4% of respondents had taken Intermittent Preventive Treatment (IPT) during a previous pregnancy, with 31.9% and 25.5% reporting very positive experiences. However, 41.6% had no prior experience, indicating a potential gap in IPT exposure. 89.1% of respondents believe IPT is important for pregnant women, with 54.2% agreeing and 34.9% strongly agreeing. Most respondents are comfortable visiting health institutions for IPT during pregnancy, with 90.4% feeling comfortable visiting clinics. However, only 8.2% feel neutral about taking IPT drugs at the hospital. A significant number of pregnant women experienced side effects, with 31.7% consulting healthcare specialists for guidance or treatment. A larger group used home remedies to alleviate symptoms. 58.7% believe their opinions on IPT are influenced by cultural attitudes and beliefs, with a sizable minority not believing cultural values influence their viewpoint. The study suggests the need for community-based initiatives to encourage open discussions about IPT, address cultural concerns, and empower women to share positive experiences. A statistically significant association was found between age and comfort with IPT, with the age group 36 and above having the highest percentage of respondents feeling very comfortable.

Factors affecting IPT adoption include proximity to medical facilities, social pressure from friends, family, or local authorities, and the influence of spouses or partners. A majority of pregnant women (48.8%) believe their spouse or partner has the biggest influence on their decision to use IPT, while parents (7.9%) and friends (15.1%) also play important roles. This shows that male involvement in healthcare services such as antenatal service has a significant impact in influencing pregnant women to take the IPT which in turn helps in reducing malaria morbidity and mortality rate. A study in the Bungoma East district of Kenya by Mutulei in 2013 confirmed that women who received support from their partners during antenatal care were 8.2 times more likely to take subsequent IPT-SP doses after the first one. Also, a study in Kenya conducted by Choonara in 2015 found that married women were more likely to use SP than unmarried women. Married women may get financial and psychosocial support from their spouses to attend the ANC clinic to receive adequate IPT-SP. Flexible work arrangements are more likely to facilitate IPT access, but work-related limitations like strict scheduling or long hours cause problems for 44.6% of pregnant women.

5.2 Conclusion

The study shows a higher representation of the age group (26-35) this shows the most age range of women accessing the health facility, with 39.1% having secondary education. The ethnic distribution is Yoruba, followed by Hausa, Fulani, and Igbo, with the most frequent household size being 3-member.

High optimum IPT awareness was discovered in the research area. Regular health education and publicity on IPT are required to maintain this. However, to optimize IPT, this study shows that

pregnant women's awareness and understanding of malaria in pregnancy preventive measures must be raised through intensive, focused health education and other behavior change communication techniques.

It is important to intensify the knowledge of the pregnant women in the community as the majority lack knowledge of the side effects of using SP. The unclear understanding of the side effects might lead to reluctance to use IPT. Early and more frequent ANC visits should be the focus of efforts. The lack of knowledge was a result of lack of personal and institutional updates on new interventions in preventing malaria during pregnancy in the study area or even from the gap in quite some health workers who might not have enough time to explain to all the pregnant women during ANC visit(s).

The survey indicates that a majority of respondents (73.8%) peceived Intermittent Preventive Treatment (IPT) as predominantly utilized for malaria prevention during pregnancy, whereas a minority (15.1%) believe it addresses both malaria and typhoid. A little proportion (9.5%) is uncertain about the advantages of IPT, while 58.4% seek advice from healthcare experts intermittently. The majority are at ease with IPT; nonetheless, additional knowledge is required.

The study reveals that over half of pregnant women have experience with intermittent preventative therapy (IPT), with 58.4% having used it during a previous pregnancy. However, a significant percentage (41.6%) had no prior experience, suggesting a need for increased availability and education. 89.1% of respondents believe IPT is crucial for pregnant women, with 58.7% believing cultural attitudes and beliefs impact their views.

The study has shown that partners is a major factor that influences pregnant women to use IPT. One of the key determinants of the successful uptake of IPT among pregnant women is male

involvement. In the study area, men often hold decision-making power in households, including over health matters. Engaging men in health decisions related to pregnancy and preventive care is thus essential for ensuring that women receive timely and consistent IPT treatments.

5.3 Recommendation

1. The research population's awareness of prophylactic measures to prevent malaria was a significant factor in determining their use of IPT. Pregnant women must be fully informed about the risks of pregnancy-related malaria and receive the relevant preventative and treatment therapy at the right time to use IPT-SP. Pregnant women must thus be regularly made aware of the advantages and applications of SP.

2. Programs for raising awareness should be created to reach various age groups of pregnant women in the community and at antenatal clinics. In order to overcome the lost opportunity and knowledge gap about IPT among pregnant women, training should be directed toward healthcare workers. Posters and flyers about IPT just like nutrition, immunization, and other programs should be made and given to pregnant women. They should also be prominently displayed on the walls of ANC clinics.

3. There is a need for male involvement to increase pregnant women's adoption of IPT. Male involvement in the uptake of IPT among pregnant women should be encouraged to reduce the burden of malaria in pregnancy and improve maternal and child health outcomes.

4. Community sensitization should be carried out to break down cultural barriers in the community.

5. There is a need to create more primary health centers in the community to break the distance barrier in taking IPT among pregnant women.

6. Further education and awareness campaigns are needed to ensure everyone is aware of IPT's importance in preventing malaria during pregnancy.

5.4 Contribution to Knowledge

Male involvement in ANC is crucial for improving maternal and child health outcomes through improved ANC attendance and pregnant women's adherence to medications and medical advice. Also, collaboration with partners in the community-based intervention such as the AnRin project will strengthen the intervention. Male participation in ANC is key to overcoming cultural, informational, and systemic barriers affecting IPT uptake in communities bringing social and behavioral change.

5.5 Implications of Findings to Public Health

The findings of this study have important implications for public health practice and policy. Understanding the factors influencing the uptake of intermittent preventive treatment in pregnancy (IPTp) provides valuable insights for designing targeted interventions to improve maternal and child health outcomes. Low uptake of IPTp, despite its proven effectiveness in preventing malaria-related morbidity and mortality, highlights the need for strengthened antenatal care (ANC) services, consistent availability of sulfadoxine-pyrimethamine (SP), and improved community awareness campaigns. Addressing barriers such as inadequate health worker counseling, and socio-cultural misconceptions can increase coverage and compliance with IPTp protocols.

From a policy perspective, the results support the integration of IPTp uptake indicators into routine health monitoring systems and the prioritization of malaria prevention strategies within

maternal health programs. Enhanced training for healthcare providers and targeted outreach in underserved communities could significantly contribute to achieving the WHO's target of at least three IPTp doses during pregnancy, thereby reducing malaria burden and improving pregnancy outcomes at the population level.

5.6 Limitations of the Study

This study has some limitations that should be considered when interpreting the findings. First, the data are based on self-reported information from pregnant women, which may be subject to recall bias and social desirability bias, particularly regarding the number of IPTp doses received during pregnancy. Second, as a cross-sectional design was employed, it captures associations at a single point in time and therefore cannot establish causality between the independent variables and IPTp uptake. Third, the study was conducted in selected health facilities and communities, which may limit the generalizability of the findings to other regions with different socio-cultural or health system contexts. Finally, unmeasured confounding factors, such as provider knowledge and drug stock-outs, may have influenced the uptake of IPTp but were not fully assessed.

5.7 Suggested Areas for Further Research

Exploring how cultural beliefs about the seriousness of malaria in pregnancy influence the uptake of IPT can be conducted to discover further the effect of cultural beliefs in accessing healthcare services. Also, examining the preference for traditional medicine in communities and its impact on adherence to IPT and other malaria prevention methods can be conducted. This

study indicates that 15.1% of pregnant women believe that IPT-SP is used to treat both malaria and typhoid, indicating a misunderstanding. However, investigating how the quality of information and knowledge including counseling on IPT affects its uptake. In this study, 28.0% of the respondents live more than 5 kilometers away from a health facility, which could pose challenges for accessing healthcare, including receiving IPT. Studying how the distance from a pregnant woman's home to the nearest healthcare facility influences her likelihood of adhering to IPT guidelines can be conducted and the conclusion can be used for advocacy or policy change to have more PHC in a community.

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Appendix I

Informed Consent Form

Informed consent for "Factors influencing the uptake of Intermittent Preventive Treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State"

This informed consent form is for pregnant women attending antenatal clinics at Igbeti, Oyo State participating in the research titled "Factors influencing the uptake of Intermittent Preventive Treatment among pregnant women attending antenatal clinics at Igbeti, Oyo State''

Names, Affiliations and Positions of the researchers conducting the study:

a. Name: **Ayilara Olabode Paul**

Affiliation: Lead City University, Ibadan, Nigeria.

Position: Principal Investigator

b. Name: **Dr. Adeniji Oluwakemi**

Affiliation: Lead City University, Ibadan, Nigeria.

Position: Supervisor

You will be given a copy of the full Informed Consent Form

Part 1: Information Sheet

My name is Ayilara Olabode Paul, and presently, I am a postgraduate student of the Department of Public Health, Lead City University, Ibadan. I am conducting a study to understand factors influencing the uptake of IPT among pregnant women attending antenatal clinics at Igbetic, Oyo State. The research requires a questionnaire to understand your experience and views based on the factors that influence you to take preventive medicine to prevent malaria in pregnancy.

You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. If there happens to

be any word you need clarification on, you can ask me or any research assistant around and we will definitely take our time to explain to the best of your understanding.

Purpose of the Research

Previous research indicates that malaria prevalence has not decreased in Nigeria, particularly among pregnant women. Also, the effectiveness of intermittent preventive treatment amongst pregnant women at Igbeti is still not known by all pregnant women attending antenatal clinic, which has contributed to the low uptake of IPTp at the health facility. This was due to limited knowledge of the benefits and effectiveness of the intervention. The usage of intermittent preventive treatment was uncommon at the project site until the intervention of an implementing partner in the state, which focuses on averting malaria among pregnant women through the use of intermittent preventive treatment. The attitude towards the uptake of this intervention was poor due to an unclear understanding of the effectiveness of this treatment. The limited knowledge of this intervention led to an understanding the effectiveness of intermittent preventive treatment amongst pregnant women attending the ANC clinic at Igbeti. The purpose is to understand the factors that influence pregnant to take the intermittent preventive treatment to prevent malaria

Participant Selection

The pregnant women attending antenatal clinics at Igbeti, Oyo State will be recruited.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice to choose whether to

participate or not. Whether you choose to participate or not, all the services you receive at this clinic will continue and nothing will change. You may change your mind later and stop participating even if you agreed earlier.

Duration

The research will take place over a period of 4 weeks.

Risks

There is no known risk involved in participating in this research

Benefits

There may not be any immediate and direct benefit for you but your participation will help us find the answer to the research questions.

Confidentiality

We will not be sharing the identity of participants of this research. Any information that we collect from this research project will be kept confidential. Participants information will be coded with numbers which only the researchers will have access to and it won't be shared except with necessary stakeholders.

Sharing the Results

Only what is permitted by law and research ethics will be shared, participants of the research will be notified through meetings in their ANC centers after which results will be published in academic journals for academics.

Contact Information

Who can I contact about this study? If I have questions or concerns about this research

Study, whom can I call?

You can call us with your questions or concerns. Our telephone numbers are listed below. Ask questions as often as you want

Mr. Ayilara Olabode Paul,

Department of Public Health,

Lead City University, Ibadan

+2348138335640

ayilarabode@gmail.com

If you want to speak with someone involved in this research study, please contact:

Dr. Adeniji Oluwakemi

Department of Public Health,

Lead City University, Ibadan

+2348023321735

adenijioluwakemi87@gmail.com

You can talk to them about:

1. Your rights as a research subject

2. Your concerns about the research

3. A complaint about the research and also, if you feel pressured to take part in this research study, or to continue with it, they want to know and can help.

When you call or write about a concern, please provide as much information as possible, including the name of the researcher, the Ethics Committee number (at the top of this form), and details about the problem. This will help Ethics Committee officials to look into your concern. When reporting a concern, you do not have to give your name unless you want to.

Informed Consent Form for Study Participants on "Factors Influencing the Uptake of Intermittent Preventive Treatment Among Pregnant Women Attending Antenatal Clinics at Igbeti, Oyo State"

Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant _____

Signature of Participant _____

Date _____

If illiterate

A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb-print as well.

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness _____ AND Thumb print of participant

Signature of witness _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that participants will be asked to fill a questionnaire to assess their experience and views on contraceptive use.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this Informed Consent Form has been provided to the participant.

Print Name of Researcher/Person taking the consent _____

Signature of Researcher /Person taking the consent _____

Date _____

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Lead City University (LCU)

Motto: Knowledge for Self-reliance

Lagos - Ibadan Expressway, Toll Gate Area, Ibadan, Oyo State, Nigeria
Email: lcu.hrec@lcu.edu.ng

NHREC

University Research Ethics Committee

PROJECT TITLE: **FACTORS INFLUENCING THE UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINICS AT IGBETI, OYO STATE, NIGERIA.**

PROJECT NUMBER: **LCU-REC/24/055**

APP ROVAL DATE: **01/09/2024**

EXPIRY DATE: **01/09/2025**

APPROVAL LETTER

The above-named proposal has been adequately reviewed; the protocol and safety guidelines satisfy the conditions of *LCU-REC* policies regarding experiments that use human subjects. Therefore, the study under its reviewed state is hereby approved by the LCU-Research Ethics Committee.

Prof. Olusola Ladokun

Name of LCU-REC Chairman .....

RESEARCH ETHICS COMMITTEE • LCU • APPROVAL Sign: Date:

Dr. Folahanmi Akinsolu

Name of LCU-REC Secretary .....

This approval is given with the investigator's Declaration as stated below;

By signing below, I agree/certify that:

1. I have reviewed this protocol submission in its entirety and that I am fully cognizant of, and in agreement with all submitted statements.

2. I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate apparent immediate hazard to a given research subject.
   - I will notify the LCU-REC promptly of any change in research procedures necessitated in the interest of the safety of a given research subject.
   - I will request and obtain LCU-REC approval of any proposed modification to the research protocol or informed consent document(s) prior to implementing such modifications.

TELEGRAMS..... TELEPHONE.....

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to the Honorable Commissioner quoting

Our Ref. No. AD 13/479/559

Date 30th SEEPTEMBER, 2024

NAME OF PRINCIPAL INVESTIGATOR: AYILARA OLABODE

TITLE OF STUDY: FACTORS INFLUENCING UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINICS AT IGBETI, OYO STATE, NIGERIA.

RESEARCH INSTITUTION: LEAD CITY UNIVERSITY, IBADAN.

NREC ASSIGNED NUMBER: NHREC/OYOSHRIEC/10/11/22

DATE OF RECEIPT OF VALID APPLICATION: 10/09/2024

NOTIFICATION OF EXECUTIVE APPROVAL OF PROTOCOL

This is to notify you that the Oyo State Ministry of Health Research Ethics Committee (HREC) has concluded to give executive approval to your research proposal after necessary reviews and corrections under the regulations guiding experiment in human subjects.

2. This approval is for a period of (1) one year from 26th September, 2024 to 26th August, 2025. If there is hindrance in starting this research, please inform the Oyo State HREC so that dates of approval can be adjusted accordingly. Note that no activity related to this research may be conducted outside these dates. No changes are permitted in the research without prior approval by Oyo State HREC.

3. All forms and questionnaires used in this study must carry the HREC assigned number and the duration of HREC approval. You are to note further that the National Code of Health Research Ethics requires you to comply with all Institutional guidelines, rules and regulation of the codes. Please ensure that any adverse effect from your study is quickly reported to the HREC Oyo State Ministry of Health, Ibadan.

4. You are expected to submit a report to this committee every three (3) months from the date of this approval. The Oyo State HREC reserves the right to conduct compliance visit on your research sites without previous notification.

5. I thank you.

OYO STATE RESEARCH ETHICAL REVIEW COMMITTEE

Signature & Date

Dr. [illegible] Gbolahan
Director, Planning, Research & Statistics
Secretary, Oyo State Research Ethics Review Committee

Lead City University

Faculty of Public Health

Motto: Redefining Health

Questionnaire

Factors Influencing the Uptake of Intermittent Preventive Treatment Among Pregnant Women Attending Antenatal Clinics at Igbeti, Oyo State

Dear Respondent,

I am a postgraduate student of Lead City University, carrying out research on the above topic.

Acceptance to answer the questionnaire will be taken as consent to participate in the study. All information will be treated confidentially, and your name is not required on the questionnaire.

Ayilara Olabode Paul.

SECTION A: SOCIO-DEMOGRAPHIC DATA

1. **Age**:
    - What is your age?
        - 18 - 25
        - 26 - 35
        - 36 and above
2. **Marital Status**:
    - What is your marital status?
        - Single
        - Married
        - Divorced
        - Widowed
        - Cohabiting
        - Prefer not to say
3. **Education Level**:
    - What is the highest level of education you have completed?
        - No formal education
        - High school diploma

        - Some college
        - Bachelor's degree
        - Master's degree
        - Doctoral degree
        - Other: _____
4. **Ethnicity**:
    - How do you identify your ethnicity?
        - Yoruba
        - Hausa
        - Igbo
        - Other: _____
        - Prefer not to say

5. **Household Size**:
    - How many people live in your household? [……].

6. **Employment Status**:
    - What is your current employment status?
        - Employed full-time
        - Employed part-time
        - Self-employed
        - Unemployed
        - Student
        - Retired
        - Other: _____
7. **Religion**
    - What is your religious affiliation?
        - Christian
        - Muslim
        - Traditionalist
        - Non-religious
        - Other: _____
        - Prefer not to say
8. **Income Level**:
    - Below #100,000
    - #100,000 - #500,000
    - Above #500,000

SECTION B: KNOWLEDGE-BASED CHARACTERISTICS

9. **Understanding of IPT Purpose**:
    - What do you understand is the purpose of IPT during pregnancy?
        - To prevent malaria

        - To boost the immune system
        - Unsure/Don't know

10. Knowledge of IPT Guidelines:

- Are you aware of the guidelines for taking IPT (e.g., number of doses, timing)?
    - Yes, correctly aware
    - Partially aware
    - No

11. **Knowledge of IPT Schedule**:
    - How often should IPT be taken during pregnancy?
        - Correct frequency (e.g., once in the second and third trimesters)
        - Incorrect frequency
        - Unsure/Don't know

14. Knowledge of Side Effects:
    - Are you aware of any side effects of IPT?
        - Yes, and can list some
        - Yes, but cannot list
        - No

SECTION C: AWARENESS OF INTERMITTENT THERAPY

15. Awareness of IPT:
    - Have you heard about intermittent preventive treatment (IPT)?
        - Yes
        - No

16. Awareness of Medication Used:
    - Which medication is used for IPT?
        - Correct medication (e.g., Sulfadoxine-pyrimethamine)
        - Incorrect medication
        - Unsure/Don't know

17. Sources of Information:
    - Where did you first hear about IPT?
        - Healthcare providers
        - Media (TV, radio, internet)
        - Family or friends
        - Community health programs

18. How satisfied are you with the information you receive about IPT?
        - Very satisfied
        - Satisfied
        - Neutral
        - Dissatisfied
        - Very dissatisfied

19.What do you perceive as barriers to taking IPT? (Select all that apply)

- Lack of information
- Fear of side effects
- Access to healthcare facilities
- Cultural or religious beliefs
- Cost of medication
- Other (please specify)

20. **How do you think these barriers can be overcome?**

- Improved education and awareness
- Better access to healthcare facilities
- Subsidized or free medication
- Community support programs
- Other (please specify)

SECTION D: PERCEPTION OF INTERMITTENT PREVENTIVE THERAPY

21 . Perceived Benefits of IPT:

- **What benefits do you believe IPT provides?**
  - Prevents malaria
  - Protects the baby
  - Reduces complications during pregnancy
  - Unsure/Don't know

22.Previous Use of IPT:

- **Have you taken IPT in previous pregnancies?**
  - Yes
  - No

23.Adherence to IPT Schedule:

- **How regularly do you take IPT as recommended?**
  - Always
  - Sometimes
  - Never

24.Perceived Importance of IPT:

How important do you think IPT is for your health and the health of your baby?

- Very important
- Important
- Somewhat important
- Not important

25. Perceived Effectiveness of IPT:

How effective do you believe IPT is in preventing malaria during pregnancy?

i. Very effective
ii. Effective
iii. Somewhat effective
iv. Not effective

27.Do you have malaria in the last 2 weeks:

Yes
v. No

28.Did you receive SP in the last 4 weeks:

vi. Yes
vii. No

29.Perceived Benefits vs. Risks:

Do you believe the benefits of taking IPT outweigh the potential risks?

viii. Strongly agree
ix. Agree
x. Disagree
xi. Strongly disagree

30.Do you believe IPT is important for pregnant women?

b. Strongly agree
c. Agree
d. Neutral
e. Disagree
f. Strongly disagree

31.How comfortable are you with taking IPT medications during pregnancy?

g. Very comfortable
h. Somewhat comfortable
i. Neutral
j. Somewhat uncomfortable
k. Very uncomfortable

32.Do you trust the safety and efficacy of IPT medications?

l. Strongly trust
m. Trust
n. Neutral
o. Distrust
p. Strongly distrust

33.Do you think taking IPT can significantly reduce the risk of malaria during pregnancy?

q. Strongly agree
r. Agree
s. Neutral
t. Disagree

u. Strongly disagree

SECTION E: ATTITUDE TOWARDS INTERMITTENT PREVENTIVE THERAPY.

34. Have you ever taken IPT during a previous pregnancy?

- Yes
- No

35. If yes, what was your experience with IPT in previous pregnancies?

- Very positive
- Positive
- Neutral
- Negative
- Very negative

36. **Do you believe IPT is important for pregnant women?**

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

37.Do you trust the safety and efficacy of IPT medications?

- Strongly trust
- Trust
- Neutral
- Distrust
- Strongly distrust

38. Cultural Beliefs and Attitudes:

- Are there any cultural beliefs or attitudes in your community that affect your perception of IPT?
  1. Yes (please specify)
  2. No

39. Influence of Peer Opinions:

- How much do the opinions of other pregnant women influence your perception of IPT?
  1. A lot
  2. Somewhat
  3. Not much
  4. Not at all

43.Personal Experiences with IPT:

- Have you personally experienced any benefits or side effects from taking IPT in previous pregnancies?
    1. Yes, positive experience
    2. Yes, negative experience
    3. No experience

45.Overall, how satisfied are you with IPT?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied
- Slight improvement
- No improvement

46.How likely are you to recommend IPT to others?

- Very likely
- Likely
- Neutral
- Unlikely
- Very unlikely

SECTION F: FACTORS INFLUENCING INTERMITTENT PREVENTIVE THERAPY

47. How far is the nearest health facility from your home?
    - Less than 1 km
    - 1-5 km
    - More than 5 km
48. How do you usually travel to the health facility?
    - Walking
    - Public transport
    - Private vehicle
    - Other (please specify): _____
49. Do family members or community leaders influence your decision to use IPT?
    - Yes
    - No
50. If yes, who influences your decision the most? (check all that apply)
    - Husband/partner
    - Parents
    - In-laws
    - Community leaders

- Other (please specify): _____

51. Does your occupation allow you to visit Health Facility for IPT.
    - Yes
    - No

52. Have you ever experienced any cultural or religious barriers to using IPT?
    - Yes
    - No

53. If yes, please describe the barriers: _____

Biodata

A. Personal Data

Full name: Ayilara Olabode Paul

Address: 16, Sabalemotu Adeeyo close, Alakia, Ibadan, Oyo State

E-mail Address: ayilarabode@gmail.com

Phone no: 08138335640

Date of birth: 16th of September, 1994

Place of birth: Iwo, Osun State

Nationality: Nigeria

Marital Status: Married

Name of Next of Kin: Ayilara Yetunde

Address of Next of Kin: 16, Sabalemotu Adeeyo close, Alakia, Ibadan, Oyo State

B. Educational Background

Educational Institutions Attended with Dates and Qualification:

First leaving School Certificate 1999- 2005

Alama Rohm Nursery and Primary School, Iwo, Osun State.

West African Senior School Certificate

Oluponna Community High School 2005- 2011

Bachelor of Technology; (Anatomy) 2014-2019

Ladoke Akintola University, Ogbomosho, Oyo State.

Masters of Public Health 2022- current

Lead City University, Ibadan, Ibadan, Oyo State.

C. Work Experience

Malaria Consortium **2022-2024**

Seasonal Malaria Chemoprevention Project in Oyo State (SMC)

Designation: Technical Consultant (Ogbomosho North & Surulere LGAs)

- I monitored and supervised the data collector ensuring the data collection protocol was followed.
- I ensured compliance of the data enumerators to all guidelines emphasized during the outlet survey training exercise by the data enumerators.
- I participated in building the capacity of the data collectors to use tools such as the survey CTO app for data collection.
- I ensure data collectors comply with the research methodology (focus group discussion) and adhere to the Malaria Consortium safeguarding policy and ethical principles.
- I provided supervisory support, ensuring data quality assurance for qualitative interviews and quantitative surveys during fieldwork.
- I ensured the collection of data following the study protocol and compliance with expected ethical standards.
- I write a comprehensive and accurate report on the data collection process, showcasing the best practices, the lessons learned, andthe challenges faced during the activity.

State MEL Consultant (Monitoring, Evaluation & Learning) **2025**

National Hypertension Control Initiative Project (Ogun State)

Project HOPE, Nigeria

- Design and implement M&E plans, frameworks, and tools aligned with project goals and objectives.
- Oversee the configuration, deployment, and utilization of electronic data collection tools such as Kobo Collect, ODK, and other relevant platforms.

- Establish systems to track project progress, adherence to protocols, and key performance indicators (KPIs).
- Provide timely data for the preparation of routine and periodic programmatic reports.
- Contribute to the development of information products, briefs, and success stories for dissemination to stakeholders.
- Provide training and technical support to relevant officers at sub-national and national levels.
- Undertake onsite monitoring of program activities, verify the accuracy of data/reports, and provide capacity development support.
- Contributed to the design of the M&E framework and plan for the project.
- Conduct regular Data Quality Audits (DQA) to validate accuracy, completeness, and consistency of data.
- Perform statistical analysis using tools such as SPSS, Excel, Power BI and Tableau to generate insights, identify trends, and support decision-making.
- Support MEL-related deliberation and ensure effective result-driven stakeholder engagement processes

MEAL Officer Jan 2023- Dec 2024

Association for Reproductive and Family Health, Oyo, Nigeria

U.S President's Malaria Initiative Project (USAID-PMI-s Project)

- I provide technical leadership and guidance for M&E activities on the Malaria Project.
- I conducted capacity building/training on case management and developed a monitoring checklist for programevaluation.
- I supported the SMEP/SMOH in the implementation of all case management activities, in line with grant targets and deliverables
- I develop a work plan and M&E plan activities for the project. I develop a tracking system for easy monitoring to denotethe performance of KPIs
- I oversee data collection and data management for the project, including developing data collection tools and ensuringquality and timely reporting.
- I lead in performing data analysis from data obtained from DHIS2, interpretation, and data processing using Excel, Stata,SPSS, Power Bi, and Tableau for Dashboards (Data Visuals) which tell stories about project performance and are alsoused for informed decision-making.
- Engage actively in Technical Working Group meetings with Government of Nigeria stakeholders and otherimplementing partners for improved service delivery.
- I conduct routine monitoring and supportive supervisory visits to project sites providing support to health facilities including capacity building on malaria case management, conduct of data verification and validation, and data quality assessments (DQAs) using standard checklists.

Monitoring and Evaluation Officer 2021-2023

Management Science for Health, Oyo, Nigeria

U.S President's Malaria Initiative Project (USAID-PMI-s Project)

- Conduct Quarterly Data Quality Assessment (DQA).
- I review data entries and run quality data checks on the project database (DHIS2).
- I supervise regular data collection across implementing entities and ensure quality of the data by scheduled verifications and validations.
- I conducted data validation (DVM): Identification of poor and incomplete data, and ensuring proper corrections aremade on DHIS2.
- I develop data collection tools and forms, guidelines standard operating procedures, and training manuals and materialsfor various project reporting needs
- Conduct Supportive Supervision: Targeted monitoring & mentoring visits to Health facilities to monitor their activitiesand check the NHMIS tools and also build the capacity of the MROs.

Research Officer **(FEB– APR, 2024)**

Brooks Insights, Abuja (Impact Project).

- I supervised the qualitative research (household-based) on impact project
- I coordinated house mapping for research purposes.
- Oversee implementation of M&E systems (data reporting templates) through regular field monitoring visits and tracking of Key Performance Indicators as approved by the donor.
- I ensured that all data from the field are entered into the designated databases; Ensured that the data generated was used to support evidence-informed programming;
- I participated in writing a comprehensive report on the field activities conducted.

DATA OFFICER **(OCT-DEC 2022)**

Oyo State Ministry of Health
Department of Health Planning Research & Statistics (DPRS)

- I provided on-site training and technical support to the medical record officer atLGA level.
- I reviewed the quality of data and performed quality checks to ensure appropriate data collection meets the needs ofthe evaluation process.
- I conduct a qualitative study with implementing partners in the state.
- I conduct focus group discussions and in-depth interviews for qualitative research.
- I analyzed data sets and presented findings to the overall project team.
- I monitored data processes and worked with the project team to maintain data integrity.

The University Compliance Certification

This is to certify that this thesis by **Ayilara Olabode Paul**, with the Matriculation Number **LCU/PG/004016** in the Department of Public Health, Faculty of Applied and Health Sciences, Lead City University, Ibadan is in full compliance with the approved University format.

_____ _____

Signature Date