UNIVERSITY OF GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL

FACTORS INFLUENCING INTERMITTENT PREVENTIVE TREATMENT OPTIMAL UPTAKE AMONG POSTNATAL WOMEN IN LA-NKWANTANANG MADINA MUNICIPALITY

BY

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A DISSERTATION PROTOCOL SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR MASTER OF PHILOSOPHY IN APPLIED EPIDEMIOLOGY AND DISEASE CONTROL

FEBRUARY, 2022

DECLARATION

I, **Yaa Fosua Kwarteng,** declare that apart from references to other works that I have duly acknowledged, this report is a product of my original work conducted under the supervision of Professor Ernest Kenu and Professor Benedict Calys-Tagoe**.** I further declare that no part or whole of this dissertation has ever been submitted for the award of any academic credit at this University or elsewhere.

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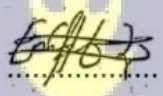
Prof Ernest Kenu		13-12-2023
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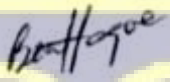
Prof Benedict Calys-Tagoe		13-12-2023
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ABSTRACT

Introduction: In Africa, where malaria is endemic, malaria-causing Low Birth Weight (LBW) kills between 62,000 and 363,000 newborns annually. In Ghana, nearly 5.9 million people were diagnosed with malaria in 2020, a considerable drop from the previous year (2019), which reported 6.7 million such cases. Ghana adopted a new IPTp-SP of MIP policy in 2004, which was updated in 2014, to reflect the updated policy of WHO 2012. In 2017, the uptake of IPTp3 was 43.0%, and IPTp5 was 8.9%, which was below the target of 85%. The study aimed at assessing factors influencing optimal intermittent preventive treatment uptake among postnatal women in the Pentecost hospital and Madina polyclinic in the LaNkwantanang Municipality of Ghana.

Methods: This study was a facility-based, analytical cross-sectional study. The study population was made of postnatal mothers, of which a sample size of 366 was adopted. A simple random sampling was deployed in soliciting responses by administering a questionnaire. Data was gathered using an Open Data Kit (ODK) and analysed using STATA 15.1 for the chi-square test, Micro-Soft Excel for frequency distribution, and JAMOVI version 2.3.2 for regression analysis. Also, ethical approval was attained from Ghana Health Service ethical review board.

Results: The study recruited 366 participants from Pentecost hospital and Madina Kekele Polyclinic in the LaNkwantanang Municipality in the Greater Accra region of Ghana. The optimal uptake of IPTp-SP was 29% (CI:0.385-1.95). Of the respondents, 261 took IPTp-SP 1 and 2, representing 79%, while those who received the optimum dose of IPTp-SP 3 plus was 29%. Also, about 50% of the midwives received training on IPTp-SP for the last two years. The respondent's income was statistically associated with IPTp-SP uptake (X^2=15.7, p-value 0.03). In this study, the odds ratio for patients with optimal IPTp-SP uptake at the Madina Kekele Polyclinic compared to the Pentecost Hospital was 1.02 (95% CI: 0.677-1.56). The

estimated difference in odds for patients optimal IPTp-SP uptake at the Madina Kekele Polyclinic compared to the reference group (Pentecost Hospital) was 0.08 (95% CI: 0.00-0.82). Age: The odds of optimal IPTp-SP uptake were higher for women aged 20-29 years (OR = 0.77, 95% CI = 0.346-1.73) and 30-39 years (OR = 0.86, 95% CI = 0.385-1.95) compared to women aged 10-19 years. However, the odds were significantly lower for women aged 40-49 years (OR = 1.18, 95% CI = 0.506-2.76) compared to women aged 10-19 years.

Conclusion: This study found that optimal IPTp-SP uptake was below the national (85%) targets for IPTp3,4, and 5 among postnatal mothers.

Keywords: *Intermittent Preventive Treatment, Uptake, Postnatal, Antenatal, Sulfadoxine-Pyrimethamine*

DEDICATION

I dedicate this work to my entire family for their support and those who supported me in diverse ways. Thank you all for the support

ACKNOWLEDGEMENT

My gratitude first goes to God Almighty for giving me life, strength, and courage to complete this work. I wish to express my heartfelt appreciation to my academic supervisors, Professor Ernest Kenu and Professor Benedict Calys-Tagoe, for their timely feedback, immense support, and invaluable contribution towards this research work. I am grateful to all my lecturers at the School of Public Health and the management of Pentecost and Madina polyclinic for their cooperation towards data collection. Also, to all respondents, I say God bless you all

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LIST OF ABBREVIATIONS

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
CDC	Centre for Disease Control
CI	Confidence Interval
DHIMS	District Health Information Management System
DM	Diabetes Mellitus
DOT	Directly Observed Therapy
DRC	Democratic Republic of Congo
FANC	Focused antenatal care
G6PD	Glucose-6-phosphate dehydrogenase deficiency
GHS	Ghana Health Service
IPT	Intermittent Preventive Therapy
IPTp-SP	Intermittent Preventive Treatment with sulphadoxine-pyrimethamine
ITN	insecticide-treated bed nets
LBW	Low Birth Weight
LLIN	Long-lasting insecticide-treated nets
MDGs	Millennium development goals
MiP	Malaria in Pregnancy
MIS	Malaria indicator survey
mTOR	Mammalian target of rapamycin
NADPH	Nicotinamide adenine dinucleotide phosphate
NMCP	National Malaria Control Programme
OR	Odds Ratio
PCR	Polymerase chain reaction

RBCs	Red blood cells
RBM	Rollback malaria
RDT	Rapid Diagnostic Test
SCA	Sickle Cell Anaemia
SDG	Sustainable Development Goal
SP	Sulphadoxine- Pyrimethamine
SSA	Sub Saharan Africa
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

- **Optimal IPTp-SP / (IPTp3+):** This refers to more than three (3) doses of IPTp-SP received.
- **Suboptimal IPTp-SP Uptake:** This refers to less than three (3) doses of IPTp-SP received.
- **IPTp-SP1:** This refers to only one (1) dose of IPTp-SP received.
- **IPTp-SP2:** This refers to two (2) doses of IPTp-SP received.
- **IPTp-SP3:** This refers to three (3) doses of IPTp-SP received.

CHAPTER ONE

INTRODUCTION

1.0 Background

About 50 million women living in malaria-endemic countries become pregnant yearly (World Health Organization (WHO) 2018). Of this number, more than 50% live in tropical areas of Africa with high transmission of *Plasmodium falciparum* (WHO 2018). Countries in sub-Saharan Africa (SSA) continue to suffer disproportionally from malaria, with pregnant women and children under age five being the most vulnerable to malaria infection (Badirou et al. 2018; Owusu-Boateng and Anto 2017; WHO 2017). Estimates show that between 3.1 and 3.5 million cases of clinical malaria, including malaria in pregnancy, are reported in public health facilities each year, with considerable seasonal variations (Fullman et al. 2019; Hemingway 2020; Kayentao et al. 2021; Slutsker and Kachur 2021; West et al. 2021). An estimated 10,000 women and 200,000 infants die due to malaria during pregnancy, and severe malarial anaemia contributes to more than half of these deaths (WHO 2018).

Malaria is endemic in Ghana, with some 30 million people exposed to malaria infections (United States Agency for International Development (USAID) 2017; WHO 2018). Seasonal variations exist and are more pronounced in the northern part of the country. About 31.4 % of all patients reporting for outpatient services, 31.3% of all hospital admissions, and 31.7% of all deaths in children under age five reported in Ghana are due to malaria infections (Malaria Indicator Survey (MIS),2019). Available evidence shows that malaria among pregnant women accounts for about 14% of outpatient cases, 11% of hospital admissions, and 9% of deaths (Boateng et al. 2018; GHS 2016; Odjidja, Kwanin, and Saha 2017).

To reduce the burden of malaria in SSA, the Ghana government and development partners have deployed several strategies to deal with the problem, especially among pregnant women, neonates and infants (Mathonga et al. 2018; Snow et al. 2018; WHO 2016). In the 1990s,

malaria prevention during pregnancy in sub-Saharan countries was based on a weekly administration of chloroquine prophylaxis during Antenatal Care (ANC) visits (Steketee et al. 2001). As a result of pregnant mothers' poor adherence to treatment outside of the medical environment and the resistance of the *Plasmodium falciparum* parasite to chloroquine, this strategy became inefficient (Braun et al., 2015; Sirima et al., 2018; Slutsker and Kachur 2018). In 2000, the WHO recommended intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP) in daily or weekly doses as a new strategy for preventing malaria in pregnancy to replace chloroquine chemoprophylaxis for pregnant women attending ANC (Yoder et al. 2015; Hill and Kazembe 2006; WHO 2004, 2005).

Malaria among pregnant women is a significant public health concern, particularly in sub-Saharan Africa (SSA), where malaria exerts the highest health and socio-economic burden (Kwenti, 2018). The primary infection parasite, *plasmodium falciparum*, is responsible for 99% of all malaria cases during pregnancy (Bauserman et al., 2019). In 2018, about 29% (over 11 million) of all malaria cases occurred among pregnant women, with most cases in SSA – West and Central Africa (35%), followed by East and Southern Africa (20%) (Berry et al. 2018). Out of the over 38 million pregnancies in SSA in 2018, over 5.5 million children had low birth rates, and 872,000 were due to malaria infection. About 70% of malaria deaths were recorded among pregnant women and their children under age five. In addition to vector control and prompt diagnosis and effective treatment of malaria, the WHO recommends intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP) - the only antimalarial currently recommended for malaria-endemic areas in Africa (WHO, 2019).

IPTp-SP use is integral to WHO's three-pronged approach to preventing and treating malaria during pregnancy. The package includes insecticide-treated mosquito nets (ITNs) and effective case management (WHO 2015; WHO 2014). Until 2012, IPTp-SP consisted of administering three doses to pregnant women after the first trimester of pregnancy (WHO 2018). In 2012,

however, after research had shown the safety of IPTp-SP, WHO updated its policy and recommended IPTp3 SP for all pregnant women at each ANC visit from the second trimester till delivery, with doses administered at least one month apart (Kayentao et al. 2013; WHO 2014).

According to Clara (2020), about a 48.3% gap existed between IPTp1 and IPTp3 globally, of which 29.3% were from SSA countries. Data from four SSA countries reported that out of a total of 3911 women who were interviewed from March to October 2018, the coverage of at least three doses of optimal IPTp (IPTp3+) was 22% and 24% in DRC project districts; 23% and 12% in Madagascar districts; 11% and 16% in Nigeria local government areas; and 63% and 34% in Mozambique districts. This study reports the baseline estimates of IPTp3+ coverage in four SSA countries where community delivery of optimal IPTp is being evaluated as part of the called TIPTOP project. This assessment was conducted before the implementation of a community IPTp programme. The optimal uptake of IPTp3+ was less than 25% in three of the four study countries, namely DRC, Madagascar and Nigeria. Unexpectedly, in Mozambique, the estimates of optimal IPTp3+ uptake were considerably higher, especially in the Nhamatanda district where it was 63% (before (1st figure) and After (2nd figure). In DRC, Madagascar, and Nigeria, more than two-thirds of women attending at least four antenatal care visits during pregnancy received less than three doses (< 3) of IPTp (suboptimal) (Duran, 2020). As of 2016, 36 African countries had provided IPTp3 to pregnant women (WHO, 2017). However, many countries are still far from achieving their targets for optimal IPTp uptake, generally 80% (PMI, 2018). In 2016, the WHO estimated that IPTp1, 2, and 3 coverage was 56%, 43%, and 19%, respectively (WHO, 2017). The gap between high ANC attendance and the low proportion of eligible pregnant women receiving suboptimal IPTp3 primarily reflects a failure of the health system to provide optimal IPTp-SP at ANC facilities (Andrews, 2016). The decrease in coverage between IPTp-SP1 and subsequent doses are a great concern.

Intermittent Preventive Treatment of malaria in pregnancy (IPTp) is an entire therapeutic course of antimalarial Sulfadoxine-Pyrimethamine (SP) medicine given to pregnant women in their second trimester at routine antenatal care visits, regardless of whether the recipient is infected with malaria (WHO, 2016). In addition to the several maternal morbidities, including anaemia, infants born to mothers with untreated malaria have reduced immunity to malaria and are at increased risk of placental malaria, rapid malaria progression, and death (WHO, 2019). IPTp-SP has several benefits for the mother and her unborn child. These include reducing maternal and fetal anaemia, placental parasitaemia, low birth weight, and neonatal mortality (Eisele, 2016). The objectives of reducing and eliminating the malaria burden are intrinsically linked to most of the Sustainable Development Goals (SDGs). They are central to SDG 3, which seeks to ensure healthy lives and promote well-being for all ages.

Unlike other parts of Africa, countries in North Africa, such as Morocco in 2010 and Algeria in 2019, have eliminated malaria, and other countries, such as Egypt, have attained three consecutive years of zero non-indigenous cases (WHO, 2019). However, malaria is still highly endemic in SSA (WHO, 2019). For instance, over 50% of all malaria cases occurred in countries such as Nigeria (25%), DR Congo (12%), Uganda (5%), Cote d'Ivoire (4%), Mozambique (4%), and Niger (4%). In Ghana and Nigeria, notable cases of increase in malaria (8% and 6%, respectively) were recorded in 2018 (WHO, 2019). The WHO revised the IPTp-SP policy in 2012 and recommended that all areas with moderate to high malaria transmission in Africa should increase access to three doses of IPTp-SP. Since then, several countries have revised their IPTp-SP policy to reflect the new three-dose recommendation. Ghana was the first country in SSA to revise its policy in 2012. Other countries such as Angola, DR Congo, Guinea, Malawi, and Senegal revised their policy in 2013, and most countries adopted the three doses of IPTp-SP policy in 2014 (Henry, 2018). However, progress toward improving the three

doses of IPTp-SP uptake among pregnant women has been inadequate, and country and regional variations have been recorded.

Recent studies still show that the uptake of three or more doses of SP is still low in some countries, even after the new WHO policy. There are still stock-out issues and non-adherence to protocols by healthcare providers. Several other service-related and community factors, such as the unavailability of skilled attendants at ANC, staff's poor attitudes, and travel distance to health facilities, still hinder the implementation of IPTp-SP. Sometimes, the women are given the drug, yet they do not swallow it as it is not always given as Directly Observed Therapy. Reports of low IPTp-SP coverage in many endemic countries in Africa raise concerns about achieving the higher targets in the new WHO policy. In 2012, the median coverage of at least one, two and three doses of SP during pregnancy in SSA was 64% (range 25-85%), 38% (range 10-64%), and 23% (range 2-44%), respectively.

1.1 Problem Statement

Despite the established efficacy of Intermittent Preventive Treatment (IPT) in preventing malaria-related complications during pregnancy, there exists a significant gap in understanding the multifaceted factors influencing the optimal uptake of IPT among postnatal women in the La-Nkwantanang Madina Municipality. Malaria remains a critical public health concern in the region, particularly for postnatal women who are susceptible to the adverse effects of the disease. Current research indicates that despite the availability and accessibility of IPT, its uptake among postnatal women remains suboptimal (WHO, 2019; Ghana Health Service, 2021).

Moreover, while existing literature underscores the importance of antenatal care in promoting IPT, there is a scarcity of research examining the postnatal period's unique dynamics, hindrances, and facilitators associated with IPT adherence (Mbonye et al., 2015; Hill et al., 2020). The transition from antenatal to postnatal care represents a critical juncture, and

understanding the contextual factors influencing IPT uptake during this phase is imperative for designing targeted interventions.

Socioeconomic determinants, cultural beliefs, healthcare infrastructure, and knowledge gaps have been identified as potential barriers to optimal IPT uptake in various settings (GSS, 2018; Ayub et al., 2017). However, the specific nuances of these factors in the La-Nkwantanang Madina Municipality remain unexplored. Addressing this research gap is crucial for tailoring interventions that are contextually relevant and effectively promote IPT adherence among postnatal women, contributing to the overall reduction of malaria-related morbidity and mortality in this vulnerable population.

Therefore, this research aims to comprehensively investigate the factors influencing the optimal uptake of Intermittent Preventive Treatment among postnatal women in the La-Nkwantanang Madina Municipality, providing evidence-based insights for the development of targeted interventions and policy recommendations.

1.2 The Conceptual Framework

The conceptual framework is an overview of some of the factors contributing to the utilization of IPT in the district and how the uptake of IPT influences malaria in pregnancy leading to maternal morbidity, perinatal deaths, and poor birth outcomes. It provides a framework within which this study will be conducted. The socio-demographic factors of the respondents provide their general characteristics such as age, income level, marital status, parity, educational background and occupation. The factors influence the healthcare-seeking attitude of the respondents and may likely affect ANC attendance and IPTp utilization. The obstetric factors of the respondents, such as the parity, gravidity and ANC visits, may also influence the level of uptake of IPTp-SP by pregnant women. Multiparous pregnant women are more likely to adhere to the optimal uptake of higher doses of IPTp-SP compared to nulliparous women. Also, the number of times a pregnant woman visits the ANC units throughout her pregnancy will

likely influence the number of doses of IPTp-SP the woman will take. The individual-based factors of the respondent, such as knowledge of IPT, distance to health facility and side effects of the drug, influence the level of uptake of IPTp-SP by pregnant women. Pregnant women who are well aware of IPT and its importance are likely to go in for higher doses of IPTp-SP compared to pregnant women with little or no knowledge of IPT. Health system factors such as the availability of SP, the practice of Direct Observation Therapy (DOT) and the cost of ANC services may also influence the uptake of IPTp-SP by pregnant women. The availability of SP at various health facilities that provides ANC services is likely to increase the uptake of IPTp-SP by pregnant women compared to health facilities without SP. Using IPTp-SP will reduce the risk of malaria in pregnancy, invariably influencing maternal morbidity, perinatal deaths and poor birth outcomes due to malaria in pregnancy.

(See Fig 1.0 below).

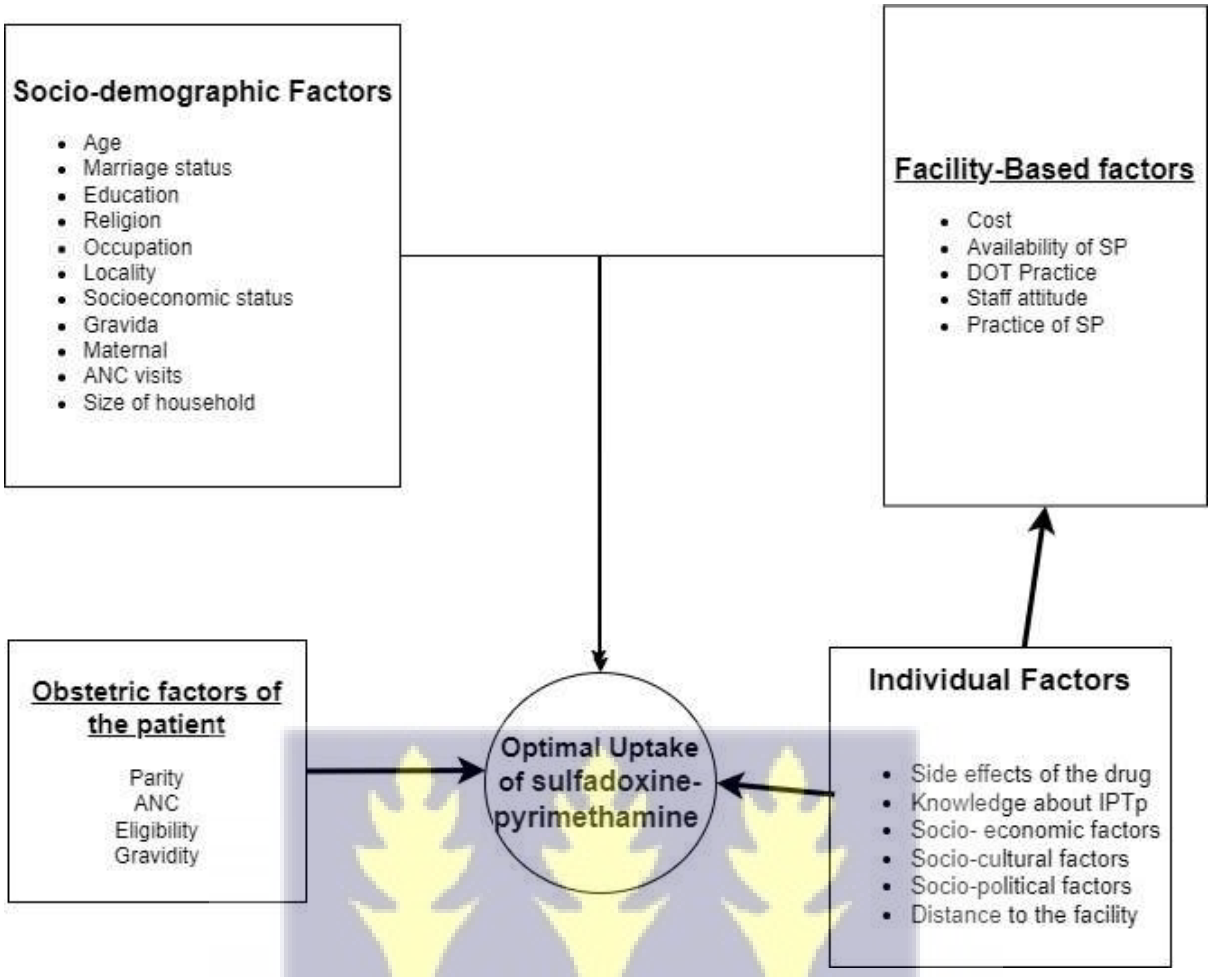

Figure 1: Conceptual framework of IPTp-SP uptake. Source: Adapted and modified from Hein and Hoa (2009)

1.3 Justification of the study

Among the three package interventions fronted by WHO and adopted by Ghana for fighting MiP (NMCP, 2016), a 2015 report on 20 African countries showed that IPTp-SP intervention had the lowest coverage (WHO, 2016). This is evident in Ghana because, four years after the IPTp- SP5 strategy was rolled out, in 2018, IPTp-SP5 coverage was 10.8% (NMCP, 2019). Furthermore, the World Malaria Report (2016) data indicates that one in every five pregnant women did not receive ANC (20%) in 2015. However, among those that received ANC, 30% did not receive even a single dose of IPTp-SP, and many did not complete the full schedule recommended by the WHO.

In 2017 Ghana reported an optimal dose (3+ doses) IPTp uptake of only 38.5%, while ANC visits stood at about 87.3% (Odjidja et al., 2017). Nevertheless, the Ghana antimalarial drug policy requires that IPTp-SP be administered as Directly Observed Therapy (DOT) monthly from pregnancy until delivery (GHS, 2010). According to the NMCP annual report (2018), the Greater Accra region generally had fewer MiP cases than the country on average. However, despite recording fewer MiP cases than any of the regions in Ghana, the Greater Accra region has performed below the national target in optimal IPTp-SP uptake (46.7%, 80%). This is also reflected in the IPTp-SP coverage in La Nkwantanang municipality (DHIMS2, 2019). This influenced the selection of this study area. It seeks to provide evidence-based research regarding the level of optimal IPTp-SP uptake and associated factors among mothers who received ANC services at the different health facility levels in the municipality. Based on the above, the prevalence of the optimal IPTp-SP uptake among Postnatal care mothers in Madina Municipality will be addressed in this study. Also, facility-based factors that could contribute to the optimal IPTp-SP uptake among the respondents as well as patient-related factors that are associated with the uptake between IPTp-SP1 and IPTp-SP3 (suboptimal) will be elaborated on in the study.

1.4. Research questions

1. What is the prevalence of the optimal IPTp-SP uptake among Postnatal care mothers in Madina Municipality?
2. What facility-based factors could associate to the optimal IPTp-SP uptake among the respondents?
3. What could be the patient-related factors that are associated with optimal IPTp-SP uptake?

1.5 General objective

To determine factors influencing the optimal IPTp-SP uptake among women attending postnatal clinic at Pentecost hospital and Madina Polyclinic (Kekele).

1.5.1 Specific objectives

1. To determine the prevalence of optimal IPTp-SP uptake among women attending postnatal clinic at Pentecost hospital and Madina Polyclinic (Kekele).
2. To determine facility-based factors associated with optimal IPTp-SP uptake among the respondents.
3. To determine patient-related factors associated with optimal IPTp-SP uptake among postnatal care mothers.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Malaria in pregnancy (MiP) is a significant public health problem. There is a wealth of evidence showing that malaria (both infection and clinical disease) is higher in pregnant than in non-pregnant women. In endemic countries, malaria in pregnancy (MiP) is a significant public health problem (De Beaudrap et al., 2013). MiP may be due to immunological, hormonal changes or other factors occurring during pregnancy (Tobin-West & Kanu, 2016). Most of the available evidence is on Plasmodium falciparum and P. vivax. However, there is much less information for the latter than for P. falciparum, while little is known about the burden of P. ovale and P. malariae, the other two human malaria species. Where transmission is stable and relatively high, mainly in sub-Saharan Africa, adults have acquired immunity against malaria, including pregnant women who can control but not clear malaria infections despite the immune tolerance occurring during pregnancy (Kwenti, 2018). Therefore, asymptomatic infections are common in this high-risk group, while clinical malaria is rare. A recent review of studies carried out in sub-Saharan Africa between 2000 and 2011 reports that malaria prevalence in pregnant women attending antenatal clinics was 29.5% (95%CI: 22.4 -36.5) in East and Southern Africa, and 35.1% (95%CI: 28.2-41.9) in West and Central Africa, while the prevalence of placenta malaria was 26.5% (95%CI: 16.7-36.4) in East and Southern Africa, and 38% (95%CI: 28.4-47.6) in West and Central Africa (Yaya et al., 2018).

More recently, the reported malaria prevalence was lower, reflecting the recent decrease in malaria transmission in several African countries (Chico et al., 2012). Most of the prevalence estimates were done by microscopy, and they would probably be higher if more sensitive methods like PCR or placental histology were used (Okell et al., 2012; Walker et al., 2017). In addition, blood samples were collected at different times during pregnancy, increasing the

difficulty of comparing different estimates. In areas of low, unstable malaria transmission, mainly the Asia-Pacific region and South America, pregnant women have lower acquired immunity, and malaria infections are more likely to evolve towards clinical disease. In these areas, the number of pregnancies was estimated at 70.5 million in 2007 (Samahidu, 2017). In the Asia-Pacific region, the median proportion of women with peripheral infection has been estimated at 15.3% and that with placenta malaria at 11%. For South and Central America, less data on the burden of malaria in pregnancy is available. In Peru, the cumulative incidence of clinical malaria in pregnant women between January, August 2004 and 2005 was 43.1% compared to 31.6% in non-pregnant women. This study also suggested that subclinical malaria infections may frequently occur among pregnant women in this region, despite the relatively low transmission and that passive surveillance, i.e., data collection at health facilities, may underestimate the actual burden of MiP. In Colombia, malaria prevalence among parturient women attending the local hospital was 13% determined by microscopy and 32% by PCR. In the same study, the prevalence of placenta malaria was 9% by microscopy and 26% by PCR. 2% and 13% of cord blood samples were positive by microscopy and PCR. Maternal factors associated with the risk of malaria in pregnancy include maternal age, parity and gestational age (Alessandro, 2013). (Leke et al., 2010; McClure, 2013; Takem & D'Alessandro, 2013).

2.1 intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine

According to WHO, every effort should be made to integrate IPTp-SP with initiatives promoting focused antenatal care (FANC) services. Also, they recommend a schedule of at least four antenatal care visits. IPTp-SP should be delivered at each scheduled ANC visit (except during the first trimester and with doses given at least one month apart), and compliance with antenatal care should be encouraged as much as possible. It was stated that SP can be given every month until delivery, with doses given at least one month apart. This

will ensure that many women receive at least three doses of SP during pregnancy (World Health Organization, 2014).

Furthermore, it should be made available at antenatal care clinics so that pregnant women have immediate access to IPTp-SP during routine care. Despite the known side effects of sulfonamides, SP for intermittent preventive treatment in pregnancy is generally very well tolerated. Mild and transient side effects, including nausea, vomiting, weakness, and dizziness, have been reported by some women, particularly with the first dose of SP. Studies have demonstrated that side effects tend to decrease with further doses. However, it was stated that side effects should be discussed openly and managed in the ANC.

The World Health Organization's position on IPTp-SP uptake in pregnancy was well understood. WHO proposes at least four visits before a pregnant woman delivers, which is a good call to follow. However, some mothers report late in some communities due to customs, traditional beliefs, societal norms, and religious practices. These factors affect the woman to compliance with the WHO directives. The strength literature is that (World Health Organization 2014) the call for SP availability at all health facilities will help reduce missed opportunities, low SP uptake, and malaria burden among pregnant women. It will also solve the problem of shortages of SP. The above policy calls for programme managers along the supply chain to make the product available at all regional stores for easy access. Again, the WHO document made it clear that the side effect of the drug (SP) should be made known to pregnant mothers at ANC. This call will help address the hesitancies and low uptake and increase SP coverage. However, in some health facilities, some midwives believed that this would rather reduce ANC attendance, thereby do not focus or dwell much on the side effects during health talks. However, this directive does not address issues of handling side events following drug administration in the literature. Despite the known side effects of sulfonamides, SP for IPTp is generally very well tolerated. Mild and transient side effects, including nausea,

vomiting, weakness, and dizziness, have been reported by some women, particularly with the first dose of SP. Studies have demonstrated that side effects tend to decrease with further doses (Clerk et al. 2008, Tagbor et al. 2006). Side effects should be discussed openly and managed in the ANC.

2.2 The coverage of IPTP Sub-Sharan countries

Several African countries adopted the WHO IPTp-SP policy for MIP prevention. A study showed that at least thirty-nine sub-Saharan African countries had policies for MIP prevention (Gomez et al., 2014a; Yaya et al., 2018). The World Malaria Report (2013) showed that only 23% of pregnant women in African countries received at least three doses of IPTp-SP. This was short of the 80% global target for IPTp coverage (Mwandama et al., 2015; Walker et al., 2017)

2.3 IPTp-SP Coverage in Ghana

In 2003, the Ghana NMCP started implementing the IPTp-SP strategy in some districts in the country. Later in 2005, the program was scaled up to all districts in the country (Gbenatey, 2018). It was reported that 44% received two or more doses of IPTp during their then-recent pregnancies Ghana Demographic Health [(DHS, 2008). Even if the NMCP 85% target was never achieved, this showed substantial progress. NMCP also updated its policy in 2014 to reflect WHO's new recommendations (2012) that required all pregnant women to receive at least three doses of SP from sixteen weeks of gestational age monthly until delivery (PMI, 2016). Given these recommendations, it was important for the women to initiate ANC visits early enough to accomplish the required doses of SP (Oppong et al., 2019). Ghana's target to achieve a 55% uptake of at least three doses of SP in 2015 was never achieved, as merely 41.3% of the women took three or more doses of SP (GHS, 2015). There were 942,755 pregnant women recorded in 2017, of which 68.3% received IPTp1, compared to 64.0% in 2016. Compared with 43.0 % in 2017, 36.7% took IPTp3 in 2016. Lastly, in 2017, 83,890 (8.9%)

took up IPTp5 (NMCP, 2018). That same year, Accra's hospital-based research in the capital reported a low IPTp- SP 5 uptake of 14%. (Owusu-Boateng & Anto, 2017).

Ghana's approach to IPTp-SP implementation was laudable during a pilot study like SP. The methods, approach and mechanisms seem to follow how community drug trials should be done. The programme started on a smaller scale. This helps to weigh the impact before a larger implementation takes place. Between 2003 and 2005 (two years), even though it wasn't enough to study drug efficacy, much effort from stakeholders (GHS, MoH, FDA) drove the programme to success. It is also important to note that the paper (DHS, 2008) fails to mention the district which implemented (piloted) this policy.

2.3.1 Socio-demographic factors affecting IPTP-SP uptake

A study by Nkoka et al. (2018) did not observe any strong correlation between socio-demographics and IPTp uptake. Below are other factors and how they were studied.

2.3.2 Age

Generally, studies reported age as a significant predictor of IPTp uptake (Choonara et al., 2015). For instance, WHO (2014) stated that 20 years of age or under is significantly associated with pregnant women not receiving optimal IPTp-SP uptake. According to Kibusi et al. (2015), participants between 30 to 34 and 35 to 39 were more likely than those in other age groups to complete the optimal IPTp dose. However, Okethwangu et al. (2019) revealed that women older than 34 years were linked with decreased chances of taking optimal IPTp-SP doses. As for Bajaria et al. (2019), women's age was not significantly correlated with the IPTp uptake.

The age factor in SP uptake is very important. WHO. (2014) reported that SP uptake is associated with pregnant women in their 20s. The paper fails to give a background on the economy, education and accessibility to a healthcare facility. In areas where education was poor, most young ladies will either get pregnant as teenagers or early 20s.

2.3.3 Marital Status

In a study of Tanzanian origin, married women or those cohabiting were substantially linked with optimal IPTp-SP uptake than women who never married or were divorced (Kibusi et al., 2015). Similarly, in a Kenyan-based study, married women were more likely to take recommended doses of optimal IPTp-SP than unmarried women (Choonara et al., 2015). This could be due to the potential support provided during pregnancy to their partners since women primarily depend on their husbands for financial support in seeking healthcare in most rural settings in Ghana (Amratia et al., 2019). Otherwise, Bajaria et al. (2019) reported no association.

2.3.4 Education

The World Malaria Report (2014) states that having no formal education was significantly associated with pregnant women not receiving optimal IPTp-SP uptake. The same was also reported in a study in Tanzania that has a significant relationship between the level of education and IPTp uptake (Kibusi et al., 2015). Furthermore (Mpogoro et al., 2014), women with a secondary school education or higher were almost twice as likely to have received higher IPTp-SP doses during pregnancy as those who never went to school. In conclusion, these findings informed us that promoting formal education beyond primary school could improve optimal IPTp-SP uptake (Frederico et al., 2018).

2.3.5 Occupation and Religion

IPTp-SP uptake was lower among self-employed participants (30.4%) than in other occupational classes (Choonara et al., 2015). In both studies, Sociocultural practices such as religious beliefs or family support limited ANC attendance; thus, IPTp-SP uptake, too (Bajaria et al., 2019; Yaya, Uthman, Amouzou, & Bishwajit, 2018).

2.3.6 Locality (Residence)

According to Frody (2019), about 41% who live in rural areas are less likely to have completed the uptake of IPTp-SP (Anchang-Kimbi et al., 2020a; Azizi et al., 2020). Even though rural poverty has declined rapidly in recent decades, poverty remains primarily a rural phenomenon, and the poorest in rural areas are at risk of being left behind. The World Social Report 2021 (Lee & Kind, 2021) finds that successes in poverty reduction have not always led to lower rural inequalities or closing the rural-urban divide. Indeed, disparities in access to essential services and opportunities exist within rural areas and between rural and urban areas and can be persistently high for specific population groups, such as indigenous peoples and women. The COVID-19 pandemic has further exacerbated the precarious situation of the rural poor and disadvantaged groups by reducing incomes, limiting mobility and threatening livelihoods and food security. Several financial, administrative, and programme design barriers hinder people's access to social protection in rural areas, even when schemes are available. Few social protection programmes are tailored to rural populations or their specific vulnerabilities and constraints, particularly in developing countries. Beyond ensuring programme availability, understanding these barriers is vital to achieving increased social protection coverage in rural areas.

Financially, a lack of stable and sufficient incomes among rural populations hinders participation in social insurance schemes. Agricultural income is highly seasonal and weather-dependent, especially in low-income countries. This makes a regular contribution to social insurance a challenge. Seasonal workers, for example, may earn their primary incomes in a short period during the year. As a result, making regular monthly contributions will be more difficult, particularly at the end of the off-season. Rather than investing their limited financial resources in pensions or other schemes, many people living in poverty in rural areas must prioritize more immediate needs. For social assistance, the costs associated with travelling to

banks or other sites to collect benefits, being away from work or complying with programme conditions may reduce the potential benefit of the programme to participants.

2.3.7 Parity

There was no significant relationship between pregnancy history and taking the prescribed three or more IPTp-SP doses (Oppong et al., 2019). Those with three or four children may have had some experience with taking SP, especially the drug's side effects with the first dose, and thus may not want to have these encounters leading to lower SP intake (Owusu-Boateng & Anto, 2017). The same conclusion of no association between parity with IPTp uptake was obtained in research by (Bajaria et al., 2019; Ibrahim et al., 2017). So, did Amoran & Ariba (2012) in a study carried out in western Nigeria. On the contrary Tanzanian studies Detected parity as a critical predictor of IPTp uptake (Mwandama et al., 2015). As for Kisibu et al. (2015) and Stephen et al. (2016), low uptake of IPTp was reported by participants with three or more children.

2.4 Number of ANC visits

In a study in South West Cameroon, among 465 study participants, 463 (99.4%) women attended antenatal clinics at least once during pregnancy, but only 61.9% (288) completed the recommended four or more ANC visits. Uptake of adequate SP dosage varied significantly ($p < 0.001$) according to the timing of ANC initiation and the number of clinic visits (Anchang & Kimbi et al., 2014). More than half (53.1%, 199/375) of the participants in a study in the keta district of Ghana had their first ANC visit during the second trimester (13–26 weeks), 44.0% (165/375) during the first trimester and only 2.9% (11/375) had their first ANC visit in the third trimester. The mean gestational age at the first ANC visit was 14.4 ± 6.5 weeks. In the multivariate logistic regression model, after adjusting for characteristics of participants, having ≥8 ANC visits (AOR=4.51) was significantly associated with adherence to IPTp-SP (Vandy et

al., 2019). In a study conducted in Accra by Owusu-Boateng & Anto, (2017), among 255 nursing mothers a Pearson's Chi-square/Fischer's exact test revealed that gestational age at first ANC visit, the total number of visits to the ANC and gestational age at receiving the first dose of SP were significantly associated with uptake of IPTp- SP ($p < 0.001$). None of the socio-demographic characteristics was associated with IPTp-SP uptake ($p > 0.05$). A univariate logistic regression analysis revealed that IPTp-SP uptake of ≥3 doses during pregnancy was six times less among respondents registering their first ANC in the third trimester than in the first trimester (COR = 0.06). Uptake of ≥3 doses was 10.76 times higher among women visiting the ANC for ≥ four times during pregnancy than those visiting the ANC for <4 times (COR = 10.7). The odds of receiving ≥3 doses of SP were five times less in women receiving the first dose in the third trimester than in the second trimester (COR = 0.05). IPTp policy in Ghana indicates IPT should be given to pregnant women only after 16 weeks and not after 36 weeks. IPTp timing is associated with the start of ANC visits among pregnant women. Earlier attendance for ANC through the education of clients and staff can increase the proportion of women receiving at least two doses of IPT with SP (suboptimal). Women who are pregnant for the first time may be anxious about sudden physiological changes that they may experience because of the developing foetus and will attend the hospital earlier than those who have had the experience before.

This schedule is a suggested adaptation of the WHO ANC schedule for countries implementing IPTp; training should highlight that women attending off-schedule should be attended to appropriately and that it is the interval, rather than the specific weeks, that are most critical. It is recommended that the first dose of IPTp-SP be given as early as possible in the second trimester of pregnancy to ensure optimal protection from malaria for the mother and her baby. However, pregnant women who come later in pregnancy can and should receive their first dose anytime (as long as it is not in the first trimester), with the following doses being given at least

1 month apart. When malaria-endemic countries plan their ANC programming, they may wish to add another contact to allow for monthly dosing of IPTp-SP.

2.5 Individual-based factors

If pregnant women are educated about IPTp and their level of knowledge increases, it will influence them to attend the ANC and receive SP regularly. Their best and most viable source of this knowledge is at the ANC, where health workers are supposed to educate them. In a study conducted in the Keta district of Ghana, over half of the respondents (52.0%) had a fair knowledge of malaria and Malaria in Pregnancy (MiP), 42.8% had poor knowledge, and only 5.2% had good knowledge about malaria and MiP. The majority (83.5%, 308/375) of respondents knew the optimal IPTp-SP and its benefits. The main source of information on malaria was from ANC/Health facilities, followed by the media. Pregnant women's knowledge of IPTp-SP (AOR=2.74) was significantly associated with adherence to higher doses of IPTp-SP (Vandy et al., 2019). In a study conducted in the Tema metropolis, among 323 respondents, the only service-related factor was found to be significantly associated with the uptake of IPTp-SP. Among those who indicated that they were given prior education/counselling on SP, 31.9% took ≥ 3 doses compared to those who were not given any education/counselling on SP (13.6%) (p=0.001) (Amankwah & Anto, 2019). Maheu-Giroux & Castro (2014) conducted a study exploring the determinants of uptake for both ITNs and IPTp-SP by pregnant women and the role that personal knowledge and socioeconomic status play. A logistic regression model found that attendance at health education sessions was the only factor that predicted IPTp-SP use (OR 1.8). At the same time, high knowledge of malaria predicted the use of ITNs (OR 2.3). It was concluded that individual knowledge of malaria was important for ITN uptake but not for IPTp-SP use. When both interventions were used, severe anaemia postpartum was reduced by 69%. Two hundred ninety-three women were studied in a cross-sectional survey at Kibaha district hospital, Tanzanian, an ethnography study involving two administrative regions in Ghana; the

cost of ANC services was found to influence ANC visits and, invariably, the uptake of IPTp-SP. Women who could afford maternal healthcare and MiP services and those who had previously benefitted from such services were happy to access uninterrupted services. Women who could not afford maternal healthcare services resorted to visiting other sources of health care, delaying ANC and skipping scheduled ANC visits. Consequently, some clients did not receive the recommended 5+ doses of SP, others did not obtain LLINs early, and some did not obtain treatment for MiP. Healthcare providers felt frustrated whenever they could not provide comprehensive care to women who could not afford comprehensive maternal and MiP care (Aberese-Ako, Magnussen, Gyapong, Ampofo, & Tagbor, 2020).

2.5.1 Maternal, ANC health-seeking behaviour

Maternal health-seeking behaviour is among the few attributes that could influence IPTp-SP uptake. Generally, the number of women utilizing maternal healthcare services has been downward since the turn of the millennium, with many women dying due to maternally related problems. Low utilization of institutional health facilities before delivery (antenatal care), during child delivery (institutional delivery), and after child delivery (postnatal care) is one of the primary reasons that explain the high maternal, infant and child mortality rates in Zimbabwe (Grossman, 2018). Despite increased efforts to reduce maternal-related deaths, such as increasing the number of healthcare centres that provide free maternal health services and removing user fees in most public health institutions, maternal mortality is unacceptably higher than WHO permissible levels of 71 deaths per 100 thousand live births. With such high levels of maternal mortality, some countries could find it challenging to achieve Sustainable Development Goal (SDG) Goal 3 after failing to achieve the Millennium Development Goal 5 target of 185 per 100 thousand live births (World Health Organization, 2015).

2.5.2 IPTp-SP and LLIN (Intervention)

According to Patricia (2014), about five countries (protocol reviewed) had national documents promoting IPTp-SP, LLINs and MIP case management (Gomez et al., 2014). WHO guidance from 2004 frequently was not reflected: four countries recommended the first dose of IPTp-SP at 20 weeks or later (instead of 16 weeks), and three countries restricted the first and second IPTp-SP doses to specific gestational weeks. Documents from four countries provided conflicting guidance on MIP prevention for HIV-positive women, and none provided complete guidance on managing uncomplicated and severe malaria during pregnancy. Inconsistencies between NMCPs and RH programmes on the timing or dose of IPTp-SP were documented in all countries, as was the mechanism for providing LLINs. Inconsistencies also were found in training documents from NMCPs and RH programmes in a given country. Outdated, inconsistent guidelines can confuse and lead to incorrect practices among health workers who implement MIP programmes, contributing to low coverage of IPTp-SP.

2.5.3 IPTp-SP and LLINs.

Placental malaria is thought to occur via *Plasmodium* avoidance of spleen clearance through the expression of the VAR2CSA protein that binds to the chondroitin sulfate A (CSA) in the placental intervillous space (Rogerson SJ, 2017). Placental malaria accumulates these infected RBCs in the intervillous space and subsequent maternal monocytes/macrophages (McDonald, 2015). Prominent inflammatory infiltration by monocytes/macrophages causing massive chronic intervillositis is related to severe placental malaria. Inflammatory response to placental malaria inhibits critical mTOR signalling. Intervillositis due to placental malaria was associated with increased autophagosome formation but decreased autophagosome/lysosome fusion leading to autophagosome accumulation in syncytiotrophoblasts blocking placental amino acid uptake (Dimasuay, 2017). In mothers with placental malaria, autophagy-related genes were downregulated, leading to autophagy dysregulation and impeding transplacental

amino acid transport. Also, blockage of mTOR signalling due to placental malaria leads to decreased placental amino acid uptake. Recently, it was found that placental malaria stimulates placental expression of inflammasomes linked to placental secretion and maturation of IL-1β, a pro-inflammatory cytokine that causes diminished nutrient transporter expression (Reis, 2020). In primigravid women, the proportion of anti-inflammatory maternal vs fetal macrophages showed opposite trends in the setting of placental malaria (Noguchi et al., 2020; Sangho et al., 2021).

On the other hand, compared with primigravid women, multigravida women had higher IL-27 and IL-28A, inducing the secretion of protective cytokines against malaria. The influence of the timing of infection changes according to gravidity, as primigravidas with early asymptomatic infection and multigravidas experiencing parasitaemia later in pregnancy, have higher rates of placental malaria (Djontu, 2018). Other than these, a study in Sudan proposed the female fetus's carriage as a novel risk factor for placental malaria (Adam, 2017).

Increased pro-inflammatory cytokines, oxidative stress (Megnekou, 2017), and apoptosis lead to pathological changes in the placenta and poor pregnancy outcomes (Sharma, 2017). It has been shown that histopathological changes and placental malaria enhance the risk of preeclampsia in pregnant women, especially in primigravidas. Histopathological changes during placental malaria include hemozoin, perivillous fibrin deposition, syncytial knot formation, and a decrease in villous surface area. These pathologic alterations in the placenta may limit the exchange of nutrients between mother and foetus, increasing the risk of fetal growth restriction and low birth weight babies (Odorizzi, 2018). Placental malaria decreases the abundance of megalin and DAB2 in syncytiotrophoblasts, which may be associated with low birth weight (Ahenkorah, 2019). Increased placental mitochondrial DNA copy number in Papua demonstrated a relationship with reduced birth weight. Malaria infection during early pregnancy leads to alterations in the vascular structure of the placenta, such as a decrease in

transport villi volume and an increase in diffusion distance and diffusion vessel surface, which influence birth weight and gestational length. Plasmodium infection mid-pregnancy has been linked to an increased risk of pre-term birth, possibly due to angiogenic, metabolic, and inflammatory changes (Moeller, 2019).

Summary and Identification of gaps

Since the approval of the introduction of IPTp-SP in 2005 in Ghana, scientists worldwide have tried to study SP at all levels. This is evident in the previous pages of the literature review. Nevertheless, there are some pertinent issues of concern that previous studies on this intervention have not yet addressed. A critical evaluation of the literature review reveals that most studies focusing on factors contributing to or predicting IPTp-SP uptake were quantitatively aimed at evaluating the drug. More than 17 years have elapsed since the SP was introduced in Ghana. Yet little is known about the perceptions of women of reproductive age towards the uptake of SP in a qualitative study, Experiences of the women with SP, and also these social-cultural and economic factors that influence accessibility and acceptability of the drug. This constitutes a knowledge gap. Also, most literature in this study stated that studies were carried out in health facilities settings. I, however, believe that the study's generalisation will be limited by the fact that not all who attend hospitals in a given area are from the same community.

CHAPTER THREE

METHODS

3.0 Study Design

An analytical cross-sectional study was adopted in this study. It was a facility-based study.

3.1 Study Areas

3.1.1 Pentecost Hospital

Pentecost Hospital Madina, formerly Alpha Medical Centre, was established in May 1997 by the Church of Pentecost to provide health care to the people in the immediate Madina catchment area and beyond. The hospital was approved by the Government of Ghana and registered with the Christian Health Association of Ghana (CHAG) in 1999. It was also approved as a Budget Management Centre (BMC) by the Ministry of Finance in 2006. The National Health Insurance Scheme Board has duly accredited Pentecost Hospital, Madina. It is designated as La Nkwantanang Madina Municipal Hospital and receives referrals from the clinics and health centres in the municipality and beyond. The facility has a total workforce of 398. The hospital's mission is to be an excellent holistic Christian healthcare institution, providing affordable and quality health care. The hospital's vision is "Healthy Community, Christ's Love and Healing Ministry Fulfilled." The hospital is located at Madina Estate. Pentecost Hospital, Madina, has twenty-three (23) full-time medical officers, including eight (8) specialists. The specialists comprise Obstetricians and Gynaecologists, Paediatricians, Family Physicians, Ophthalmologists, and Radiologists. It has ninety-six (96) nurses. Services provided include; ultrasound scans, MCH clinics, TB, special Diabetics, hypertension, ENT, and eye and dental clinics. The facility has a 58-bed capacity.

3.1.2 Madina Polyclinic (Kekele)

The clinic started as a child welfare clinic near the old Assembly building. The client numbers increased, and the three nurses who started it saw the need for a bigger space. They, therefore, decided to relocate to kekele Park, as it used to be called in the early 90s. Clinical care became necessary, especially for the babies who attended the welfare clinic. The mothers of Madina carried sand and stones from their various houses and, with assistance from the assembly, constructed a building for child welfare and the treatment of minor illnesses.

As the numbers increased, there was a need for more staff, such as medical officers and nurses. The clinic expanded over the years in containers. These containers were used as consulting rooms, offices, antenatal units and other units. All disciplines of nursing care, such as maternal and child health, increased over time. In 2009 the facility was accredited by NHIS.

Madina polyclinic kekele shares boundaries with Adenta Municipal to the North, South and East by Tataana Sub-district and to the West by Social Welfare Sub-district. It comprises one static clinic, Madina polyclinic kekele (Atima), and Eight CHPS zones, namely, Redco Dela CHPS, Redco Warehouse CHPS, Aviation CHPS, Doku CHPS, Central Mosque CHPS, Nkwatanang1 and Nkwantanang 2 CHPS zones. All CHPS ZONES are fully operational. (100%) The facility is sited in a strategic location, making assessing the facility less difficult; clients come as far as Dodowa, Oyibi, Aburi, Abokobi Teiman, Ashongman, Agboba, Dome, Kwabenya, Santor, Ashaiman, Botwe, Spintex, East Legon, Okponglo, Bawaleshie Shiashie.

3.2 Study Population

The study included all eligible women (postnatal) who delivered in the past three years and consented to the study and all ANC health care workers. Again, all healthcare workers involved in SP administration were interviewed (census) using a semi-structured questionnaire. The average number of postnatal mothers at Pentecost hospital was 2808, while in Madina Polyclinic (Kekele) was 1960 (2019 to 2021 years)

3.3. Inclusion criteria

1. All mothers who delivered at the hospital in the past three years and were 18 years and above.
2. Also, the study included postnatal mothers who had registered their children at the CWC six weeks after delivery.

3.4 Exclusion Criteria

The following was excluded from the study.

1. Mothers who did not attend ANC at the hospital.
2. Mothers with G6PD deficiencies who were not required to take SP.
3. All postnatal and ANC mothers who were without their ANC records.
4. Mothers receiving Cotrimoxazole prophylaxis throughout pregnancies.

3.5 Sample Size

A total sample size of 370 postnatal mothers from all health facilities was used. This was derived from Cochran's sample size formula, as shown below (Cochran, 1972).

3.5.1 Definition of Variables in the Formula

$$n=\frac{z^2p(1-p)}{d^2}$$

n = minimum sample size required

z = confidence level (95% level of confidence = 1.96

P = (uptake of IPTp-SP in the district) =40.5%=0.405

d = the margin of error (5% = 0.05).

$$n=\frac{1.96^2 * 0.405(1-0.405)}{0.05^2} = \mathbf{370}$$

3.5.2 Gaps and yearly coverages of the health facilities under study.

Table 3.1: Gaps in IPTp-SP uptake

Pentecost Hospital	IPTp1	IPTp3	Gap	Coverages	Mean	% Coverages
2019	1455	985	470	38%	37%	40.5%
2020	1236	890	346	37%		
2021	2326	1560	766	36%		
Madina Polyclinic (Kekele)	**IPTp1**	**IPTp3**	**gap**	**Coverages**	**Mean**	
2019	4544	2646	1898	55%	44%	
2020	3173	1457	1716	36%		
2021	1450	755	695	41%		

3.5.3 Quota distribution of respondents per facility

Table 3.2:Quota distribution of respondents

Pentecost Hospital	Registrants	Total Participants	Respondents
2019	2625		
2020	2624		
2021	3176		**222**
Average	**2808**		
Madina Polyclinic (Kelele)	**Registrants**	**370**	**Respondents**
2019	2264		
2020	1869		**148**
2021	1747		
Average	**1960**		
Total	**4768**		**370**

3.6 Study Variable

Table 3.3: Study Variables and their operational definitions

Variables	Operational Definitions	Type of Variable	Measurement Scale	Source of Data
Dependent Variables				
Optimal IPTp-SP Uptake	Three (3) or more doses of IPTp-SP received during pregnancy	Categorical	Nominal (Dichotomous)	ANC record Book/ Antenatal register
Independent Variable				
Socio-demographic factors				
Age	Age at as last birthday	Continuous	Ratio	ANC record Book/ Antenatal register
Marital Status	Single, married, divorced, Widow	Categorical	Nominal	ANC record Book/ Antenatal register
Educational Background	No formal education Primary, JHS, SHS/ vocational, Tertiary	Categorical	ordinal	ANC record Book/ Antenatal register
Occupation	Formal or informal work or non	Categorical		ANC record Book/ Antenatal register
Income level	The income level of the mother (Low, High)	Categorical	Ordinal	Data Collection Instrument
Parity	Number of children one had ever given birth to	Discrete	Ratio	ANC record Book/ Antenatal register
Other independent variables				
Client-related factors				
Awareness of SP	Low (unaware) or high (aware)-level of awareness	Categorical	Ordinal	Data Collection Instrument
ANC attendance	Number of ANC visits	Discrete	Ratio	ANC record Book/ Antenatal register

Male (Husband) Involvement	Number of times client was escorted by their partner for the ANC visits	Discrete	Ordinal	ANC record Book/ Antenatal register
Side effects of SP	Any adverse drug reaction following SP administration	Categorical	Nominal	ANC record Book/ Antenatal register
Knowledge of SP and MIP	Good, Poor	Categorical	Ordinal	Data collection instrument
Gestational age at first ANC	Number of months at which the client first visited the hospital	Continuous	Ratio	ANC record Book/ Antenatal register
Gestational age during the first SP dose	Number of months at which client received first SP dose	Continuous	Ratio	ANC record Book/ Antenatal register
Facility factors				
a. Health staff factors				
Level of education	Diploma, Undergraduate and Tertiary	Categorical	Ordinal	ANC record Book/ Antenatal register
Level of knowledge about MIP/IPTp-SP	Low, middle and high (what is the dose, how many doses and when to give them)	Categorical	Ordinal	Survey instrument
Perception towards IPTp-SP	Do they believe IPTp-SP was effective or not	Categorical	Nominal	Survey instrument
DOT policy	Do they observe as clients swallow the medication and record it in the client's ANC book?	Categorical	Nominal	MiP Policy SOP
Health care worker-patient relationship	How do clients perceive attitudes about staff	Categorical	Nominal	Survey instrument
b. Health facility factors		Categorical		
Health care worker to patient ratio	Average Health Care Provider-Patient Ratio on ANC Clinic	Continuous	Ratio	Survey instrument

Drinking water availability	availability of a water dispenser or drinking water at the ANC clinic	Categorical	Nominal	Survey instrument
Distance to the health facility	Accessibility of the health facility	Continues	Nominal	Survey instrument
Training status for practitioners	IPTp-SP training for ANC Staff	Categorical	Nominal	
Availability of SP monitoring Chart	Availability of the SP chart and whether it is put into use	Categorical	Nominal	MiP Policy SOP
Documentation of SP Doses administered.	Is documentation done will in both ANC card and Register	Categorical	Nominal	MiP Policy SOP

3.7 Data Collection Technique

Data was collected using a structured questionnaire in a face-to-face interview with participants, coupled with a review of maternal health record booklets of the participants. Research assistants were recruited and trained to assist in the data collection. The questionnaire was interpreted into the appropriate local languages (specifically Twi and Ga) to women who did not understand English language.

The questionnaire collected data on socio-demographic and health facility-related factors. The independent variables included educational status, age, antenatal visits, and maternal occupation; whereas the data retrieved from the maternal health records review included; parity, gravida, ANC booking, number of ANC visits, Hemoglobin level at ANC booking, 36 weeks pregnancy and birth, number of IPTp-SP taken and existing conditions.

IPTp-SP-related practices such as DOT, water availability, and IPTp-SP posters were observed in the ANC units. The dependent variable was the uptake of SP. Information was also collected on delivery out-comes (still birth, low birth weight and pre-term delivery).

3.8 Sampling approach

Data collection was conducted at two health facilities: Pentecost Hospital and Madina Kekele Polyclinic. These health facilities were purposively selected due to their high patient inflow and the diversity of pregnant women who visit for antenatal care.

Regarding study participants selection, simple random sampling technique was employed. This method involves selecting individuals from the larger population purely by chance, with each individual chosen independently of the others.

To begin the selection of participants, a list of postnatal women at both health facilities for the current year 2022 was retrieved from the postnatal register (the sampling frame).

Unique identifiers for each postnatal woman in the sampling frame were assigned. This was done consecutively based on the order in which names of the women appeared in the postnatal register.

Randomization technique was used to select the first and subsequent participants from the list until the sample size was reached. This method ensured that every postnatal woman in the sampling frame had an equal chance of being included in the sample.

After, the researcher reached out to the randomly selected postnatal women via phone calls, explained the purpose of the study, and sought their consent for participation in the study.

3.9 Pre-testing of the instrument

Pre-test of the research instrument was conducted at Madina polyclinic (Rawlings circle) and Legon Hospital, among 40 postnatal women (10% of the sample size). This preliminary phase was crucial in identifying and rectifying potential issues with the questionnaire. One significant modification was made concerning the respondents' age. Initially, the questionnaire had an open-ended question about age, but it was observed that most respondents were hesitant to disclose their actual age. To address this, the age parameter was categorized into different age groups. This enabled respondents to choose an age range that they were comfortable with,

thereby increasing the response rate for this particular question. This amendment, along with other minor modifications that addressed ambiguous questions in the questionnaire were made, and further modified to suit the actual survey setting. These changes were aimed at improving the clarity of the questionnaire, increasing the response rate, and ensuring the collection of accurate and reliable data for the study. The revised questionnaire was then used for the main study conducted at the Pentecost Hospital and the Madina Kekele Polyclinic.

3.9 Data Quality Control

The questionnaire was pretested at Madina polyclinic (Rawlings circle) and Legon Hospital. These health facilities were chosen because of similarities (geographical settings, language of the people, common practice) between them.

3.9.1 Training of Research Assistants

Training of Research Assistant before the pre-testing phase, a crucial step was undertaken to train the research assistants involved in the study. A total of four research assistants were thoroughly trained over a single day, for about 8hours to ensure the integrity and accuracy of the data collection process. The training was comprehensive, covering various aspects such as understanding the objectives of the study, familiarizing themselves with the questionnaire, ethical considerations, and effective communication techniques. This was done to ensure that the research assistants were well-prepared to administer the questionnaire and handle any potential issues that might arise during the data collection process. This rigorous one-day training played a significant role in enhancing the reliability of the study and ensuring that the collected data was both valid and consistent.

3.9 Data Processing and Analysis

The forms that were added to the database were approved by the principal investigator (PI). The PI ensured that all items were crossed-checked for completeness and accuracy. The whole

database was downloaded in an excel sheet at the end of data collection. The data was cleaned in Microsoft Excel, including variable coding, scoring and other manipulations. Stata version 15, SPSS, and JAMOVI version 2.3.2 were used to analyse the data. To address the first objective, frequencies and percentages described the prevalence of IPTp-SP uptake. The data were summarised in frequency tables, graphs, percentages, mean and standard deviation. Chi-Square Test, Fischer Exact, and logistic regression analysis were used to measure the significance level and the association between all variables and IPTp-SP uptake and pregnancy outcome to address the factors of clients and health facilities. However, Crude odds ratios measured the strength of the association between independent variables, IPTp-SP uptake, and pregnancy uptake. All variables found to be statistically significant in simple logistic regression were again assessed in multiple logistic regression to obtain adjusted odds ratios. A p-value of <0.05 and a 95% confidence interval were the levels of statistical significance to establish the association with the optimal uptake of IPTp-SP.

The optimal IPTP-SP uptake was tested using an independent Pearson Chi-square model to test the hypothesis between two variables (dependent and independent). Jamovi (a product of R-Studio), STATA, SPSS, and Excel were used to run the model. The formula; ***X^2 (N= # of participants, df) = Chi-square stat, P= p-value*** guided the calculation.

3.10 Ethical Consideration

Ethical approval for the research was obtained from the Ghana Health Service Ethical Review Committee (GHS-ERC: 045/09/22) before the commencement. Permission was sought from the district health directorate, La Nkwantanang Madina, and each health facility's Medical Director. Verbal informed consent was received from every study participant before data collection. This was done after the purpose of the study. The benefits and rights of the participants were explained to them in a language best understood. Participation in the study

was voluntary. All respondents were assured of the confidentiality of every information they provided to the data collectors.

3.10.1 Possible Benefits and Risks

There was no risk associated with this study. However, the items in the questionnaire caused the participants to unravel a few of their privacy issues. The participants did not directly benefit from the study. The study findings helped strengthened services rendered at the ANC. There was no monetary gain in this study.

3.10.2 Informed Consent

The researchers provided all the needed information, and the participant's consent was also sought. The researcher again informed the participant to ask more questions to understand the procedure before the administration of the instrument began.

3.10.3 Confidentiality

Personal data collected was not shared with anyone (third part). The participants were informed that their information was kept secret. Their right was again respected during and after the data collection.

3.10.4 Data Storage

The data that was generated was kept under lock (password). The result was made known to the hospital directors and heads of the various units and presented at a DHIM meeting.

3.10.5 Proposal and Funding Information

There was no sponsoring agency in this study. The researcher was responsible for financing the research from her resources.

3.10.6 Compensation

The participants were not given any money for their time. However, they were gratefully thanked at the end of the data collection.

3.10.7 Voluntary Participation

Neither the principal investigator nor the assistants forced the participants to respond to the questionnaire.

3.10.8 Conflict of Interest

There was no conflict of interest in this study.

3.10.9 Compensation

Respondents did not receive any form of compensation, and this was made known to them before they consented to be part of the study.

3.10.10 Risk and benefits

No risk, cost, or direct benefit was associated with participating in the study. However, the respondents spent time answering the questions. Again, the study's findings helped contribute to policy decisions that improved the quality of healthcare delivery in the facilities.

3.10.11 Safety Considerations

There was no physical or social harm in participating in the study. Research assistants ensured that study participants were stable before engaging them to respond to the questionnaire.

CHAPTER FOUR

RESULT

4.0 Socio-demographic Characteristics of Respondents

Results indicated that, of the total number of respondents, 60% (222/370) were from Pentecost hospital. A greater proportion 37% (136/370) of the respondents were between the ages 20-29 years. Majority of the respondents 96% (355/370) were from Urban communities and most of them 61% (225/370) were married.

Again, a greater percentage 65% (242/370) of respondents had primary education with a significant proportion 61% (227/370) being self-employed. More than half of the respondents 54% (201/370) earned between 300 – 1000 cedis as income with majority 68% (250/370) stating that they were Christians. Also, a greater number of the respondents 92% (340/370) had their children born in an institution with just a few 47% (175/370) having NHIS insurance. Details are found in table 4.1 and 4.2 below.

Table 4.1: Respondent's Socio-demographic data

Demographic Variables	Frequency (n=370)	Percentage (%)
Health Facility Type		
Madina Kekele Polyclinic	148	40.0
Pentecost Hospital	222	60.0
Age Category		
10-19years	29	7.8
20-29years	136	36.8
30-39years	124	33.5
40-49years	81	21.9
Residence		
Rural	15	4.1
Urban	355	95.9
Marital Status		
Co-habiting	17	4.6
Divorced	9	2.4
Married	225	60.8
Prefer not to say	20	5.4
Separated	1	0.3
Single	97	26.2
Widowed	1	0.3

Level of education		
No formal education	34	9.2
Primary Education	242	65.4
Senior High Education	66	17.8
Tertiary Education	28	7.6
Occupation		
Government Sector Employee	25	6.8
Non- Government sector employee	31	8.4
Self-employed	227	61.4
Unemployed	87	23.5
Income level		
300-1000 cedis	201	54.3
Dependent	23	6.2
Less than 300 cedis	12	3.2
More than 1000 cedis	14	3.8
No regular income	120	32.4
Religion		
African Traditional	25	6.8
Christianity	250	67.6
Islam	60	16.2
Prefer not to say	35	9.5
Ethnicity		
Akan	73	19.7
Ewe	54	14.6
Ga-Dangme	82	22.2
Northern tribes	161	43.5
NHIS status		
Insured	175	47.3
No health insurance	195	52.7
Place of delivery		
Home delivery	30	8.1
Institutional delivery	340	91.9
Gravidity(pregnancy)		
Four	74	20.0
Five	37	10.0
One	65	17.6
Three	103	27.8
Two	91	24.6
Parity(deliveries)		
Five	73	19.7
Four	35	9.5
One	71	19.2
Three	93	25.1
Two	98	26.5
Reported malaria pregnancy		
No	328	88.6
Yes	42	11.4

IPTp-SP doses received		
One	91	24.6
Two	178	48.1
Three	40	10.8
Four	24	6.5
Five	37	10.0
Ever heard about IPTp-SP?		
No	7	1.9
Yes	363	98.1
Bed net use		
No	348	94.1
Yes	22	5.9
ANC visit		
1st Trimester	162	43.8
2nd Trimester	200	54.1
3rd Trimester	8	2.2

4.1 Facility based factor that affects optimal IPTp-SP uptake.

Majority of the respondents 87% (323/370) stated that the health personnel in charge of IPTp-SP administration were very helpful. Details can be seen in *fig.4.1* below.

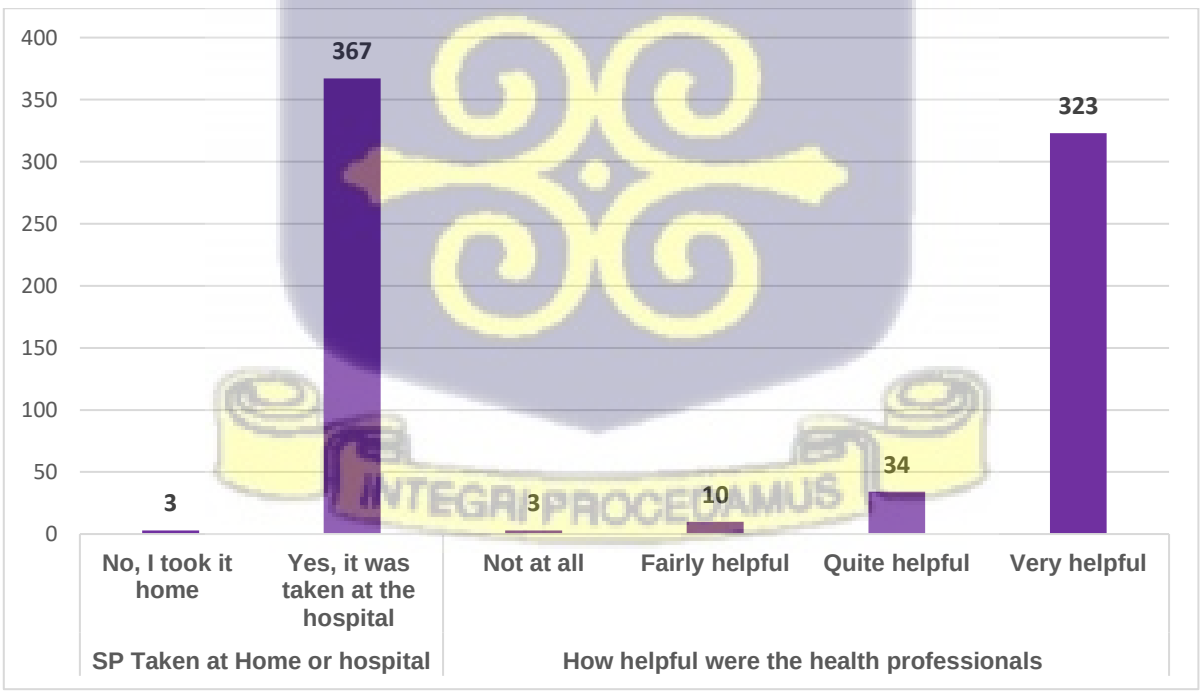

Figure 4.1: How helpful were the health professionals.

4.2 Monitoring of Patient Adherence to the IPTp-SP course by Health workers

A significant proportion of respondents 57% (211/370) stated that health workers quite strictly monitored their adherence to IPTp-SP administration. Details can be seen in *fig.4.2* below.

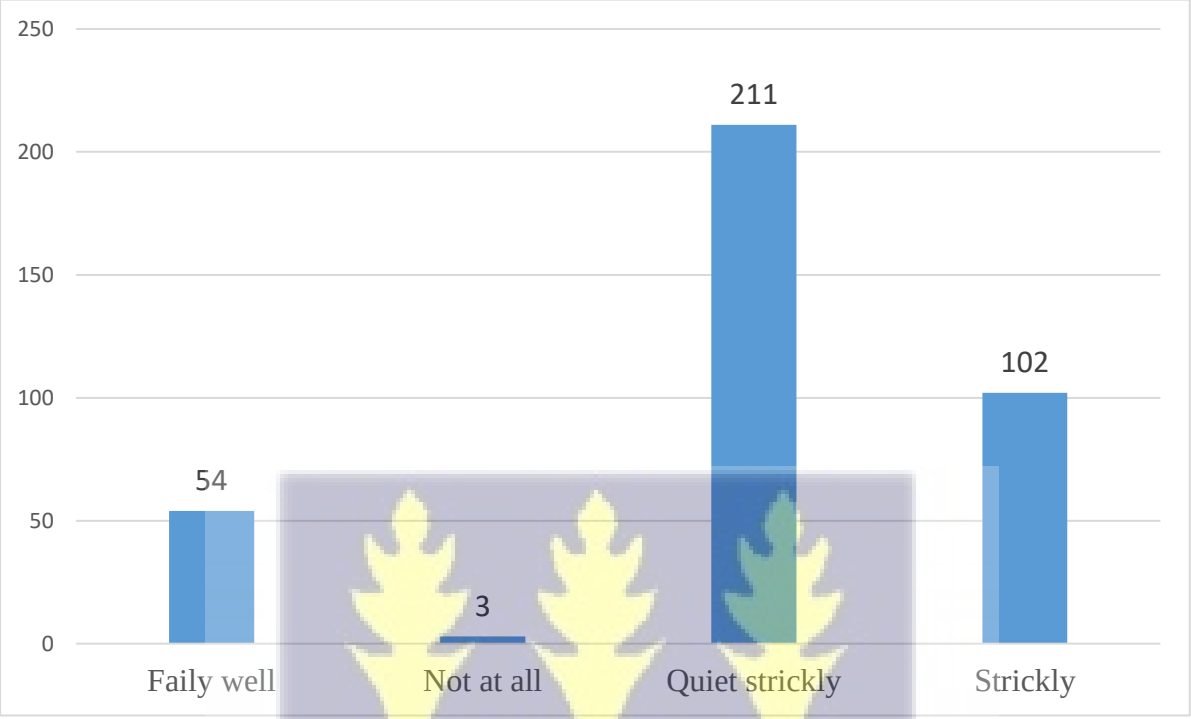

Figure 4.2: How well did the health workers monitor your adherence to the course?

4.3 The uptake of IPTp-SP among pregnant women

About 1.4% (5/370) of the respondents said they paid for the IPTp-SP that was administered with majority 63% (233/370) stating that IPTp-SP had significant effect on their pregnancies. Details are found in table 4.2 below.

Table 4.2: Uptake of IPTp-SP among pregnant women

IPTp-SP UPDATE	Frequency (n=370)	Percentage (%)
Did you pay for the IPTp-SP drug at the hospital?		
No	365	98.6
Yes	5	1.4
Have you had a prior pregnancy without being put on the IPTp-SP drugs?		
No	362	97.8
Yes	8	2.2
To what extent do you think the IPTp-SP has positively affected your health status throughout pregnancy		
Average effect	157	42.4
Not at all	43	11.6
Significant effect	170	46.0
To what extent has the IPTp-SP positively affected your health status during prenatal and postnatal stages?		
Average effect	130	35.1
Not at all	7	1.9
Significant effect	233	63.0

4.4 Respondent's Knowledge of IPTp-SP up-take

All the respondents 100% (370/370) indicated that IPTp-SP was available at all scheduled times during their ANC. However, only 1% (3/370) of the respondents stated that IPTp-SP was not administrated under DOT throughout. Details are found in table 4.3 below.

Table 4.3: The Respondent's Knowledge of IPTp-SP uptake

Parameters	Frequency (n=370)	Percentage (%)
Was SP available at all scheduled times during your ANC?		
Yes	370	100.0
No	0	0.0
Did you have to pay for the SP at any point?		
Yes	0	0.0
No	370	100.0
Were you prescribed SP to purchase?		
Yes	0	0.0
No	370	100.0
Was IPTp-SP administered under DOT throughout?		
Yes	367	99.2
No	3	0.8

4.5 Pay-out-of-pocket services.

Most of the respondents 94% (349/370) paid out of pocket (pop) for services such as laboratory investigations. Details are found in table 4.4 below.

Table 4.4: Pay-out-of-pocket services.

Services	Responses	Percentage (%)
Laboratory investigations	349	94.3
Ultrasound scan	188	50.8
Other medication	363	98.1

4.6 Maternal health records review data extraction form

The maternal health record booklet and other services regarding IPTp-SP uptake were reviewed. All (100%) of the health parameters were available and updated. Details can be seen in table 4.5 below.

Table 4.5: Sulphadoxine Pyrimethamine assessment

Parameter	MPC/ Kekele	Pentecost Hospital	Remarks
Presence of water for sale for DOT	Yes (100%)	Yes (100%)	Free, but some mothers come with their water
SP available at ANC over the past 6 months	Yes (100%)	Yes (100%)	No shortages were recorded in both physical observation and inspecting the bin cards.
Presence of posters of IPTp/MIP on the wall	Yes (100%)	Yes (100%)	It is available but was not updated at the time of the visit.
Presence of ANC Monthly Data returns form	Yes (100%)	Yes (100%)	Monthly returns were available with all portions filled and signed before the 5th of the following month (completeness, timeliness)
SP given is recorded in ANC Report Book	Yes (100%)	Yes (100%)	Both ANC record books and Register have used the document the SP
Presence/Record of Adverse Event forms for SP	Yes (100%)	Yes (100%)	It was seen at the ANC SECTION. After filling it out, the staff then submit it to the pharmacist.
Was recording done in both ANC Record book and Register	Yes (100%)	Yes (100%)	Both ANC record books and Register have used the document the SP.

4.7 Haemoglobin level among respondents

From the maternal health record booklet for all respondents, it was observed that about 28% of the respondents from Pentecost hospital had normal haemoglobin levels (11g/dl). Details can be seen in *fig 4.3* below.

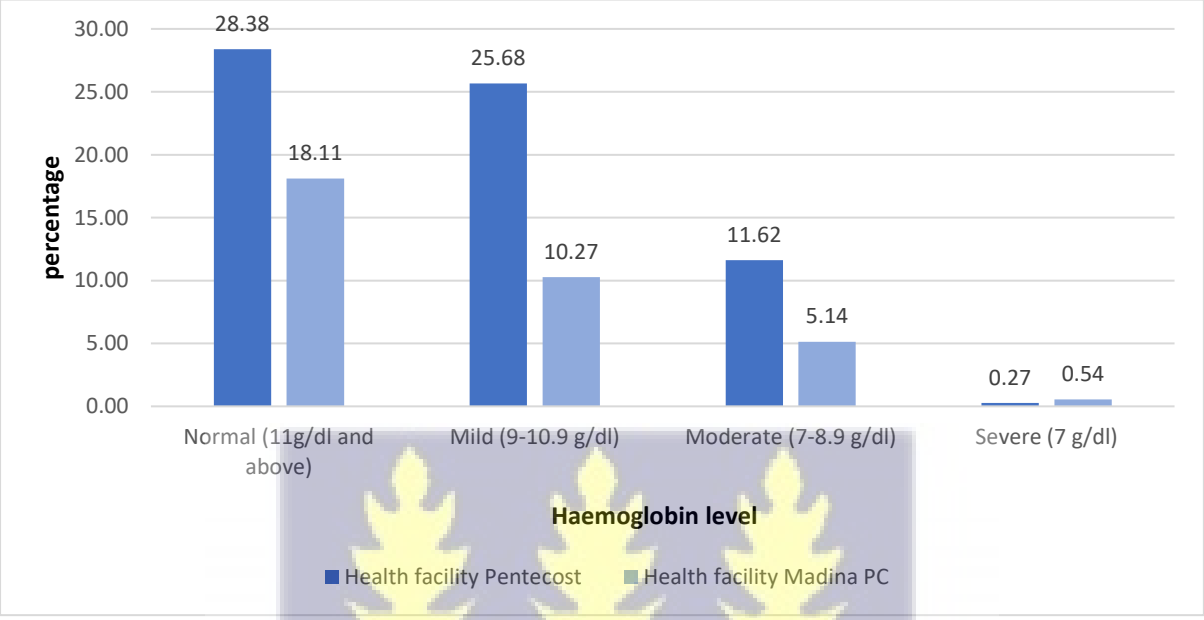

Figure 4.3 Haemoglobin level among respondents

4.8 Assessment of ANC Staff

The mean age for the health staff in Madina Polyclinic was 38 years, whereas that for Pentecost Hospital was 42 years. 45 was the maximum. Details can be found in table 4.6 below.

Table 4.6: Assessment of health staff

Characteristics	No. staff assessed	Madina Polyclinic	Pentecost Hospital
No staff assessed	Four (4)	2	2
Age (in complete years)	(31, 45) =MPC (36, 48) = PH	***mean= 38***	***Mean= 42***
Category of staff	Four (4)	Midwife (100%)	Midwife (100%)
Number of years of practice (please specify)			
Less than 5 years	2	0	1
Five (5) Years and Above	2	2	1
Do you give health education on malaria during pregnancy?	4	100%	100%
Have you received training on IPTp-SP?	4	50%	50%
When was the last time you received such training? (Probe for year/month)			
Less than two (2) years	2	50%	50%
More than Two (2) years and above	2	50%	50%

4.9 How malaria is transmitted

Fig 4.4 below, shows that most of the respondents 96% (354/370) stated that malaria was mainly transmitted by bites from mosquitoes. Details can be seen in *fig4.4* below.

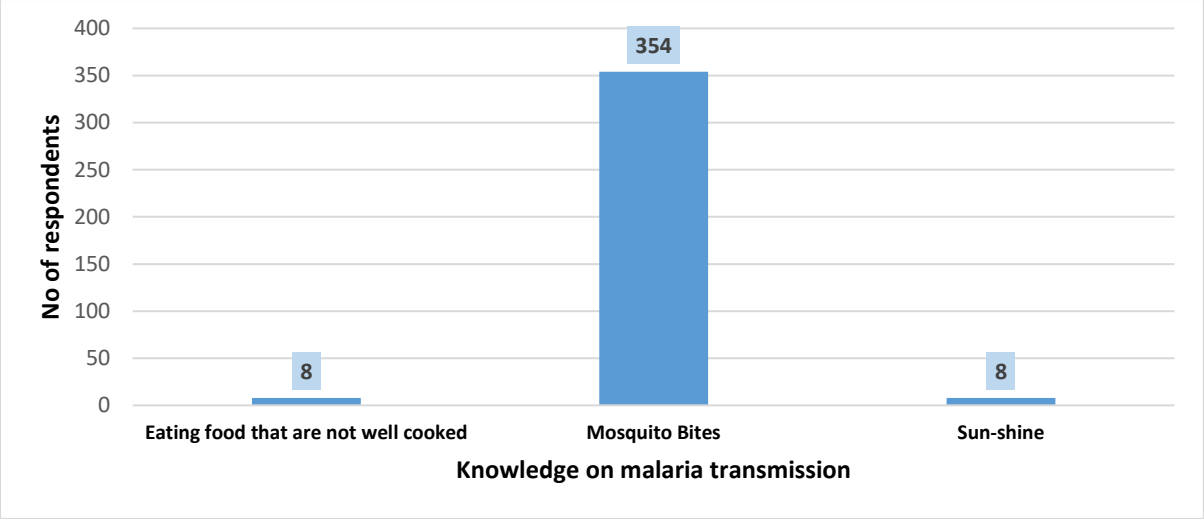

Figure 4.4: How is malaria transmitted.

4.10 The dangers of malaria to a pregnant woman (Patient factor)

Results show that most of the respondents 91% (338/370) stated that malaria can cause anaemia cases in pregnant women. Details can be found in table 4.7 below.

Table 4.7: What are the dangers of malaria to a pregnant woman.

Opinions	Responses	Percentage (%)
What are the dangers of malaria to a pregnant woman?		
Can cause anaemia	338	91.4%
Preterm labour	337	91.1%
Can cause maternal illness	294	79.5%
Can cause maternal death	370	100.0%
What are the dangers of malaria to the unborn baby?		
Prematurity	352	95.7%
Low birth weight	366	99.5%
Intra Uterine Death	318	86.4%
Spontaneous Abortion	356	96.7%
By what other means can one prevent malaria in pregnancy?		
Drain stagnant water	342	92.9%
Sleep under an insecticide-treated net	333	90.5%
Use mosquito repellent	336	91.3%
Wear protective clothing	367	99.7%

4.11 Respondents views on when to take IPTp-SP (Patient factor)

Most respondents 52% (193/370) did not know when a pregnant woman should start taking IPTp-SP. Also, a significant proportion of respondents 48% (179/370) stated that IPTp-SP should be administered 4 - 5 times during pregnancy at the ANC. Details can be found in table 4.8 below.

Table 4.8: Respondents' views on dosing regimen and effect of IPTp-SP

Variable	Freq (n=370)	Percentage (%)
When should a pregnant woman start IPTp -SP?		
16weeks and above	31	8.38
After 24 weeks	15	4.05
Before 16 weeks	131	35.41
I Do not know	193	52.16
How many times is IPTp-SP given during pregnancy at the ANC?		
2-3 times	52	14.05
4-5 times	179	48.38
Most 7 times	72	19.46
Do not know	15	4.05
Once	52	14.05
At what regular interval should IPTp-SP be given?		0.00
Do not know	4	1.08
Monthly	363	98.11
Weekly	3	0.81
How were you informed about SP?		0.00
Radio	7	1.89
Television	8	2.16
Through staff at ANC	355	95.95
What are the consequences of not taking SP as a pregnant woman? (y/n)		
Anaemia	370	100.00
Death	220	59.46
Malaria	288	77.84
Effects on the foetus	280	75.68

4.12 Respondent's knowledge of IPTp-SP

Out of a total of 370 respondents, 296 (80%) have good knowledge of IPTp-SP while 74 (20%) have poor knowledge. (See *fig 4.5* below). This was based on a scale score of one to four.

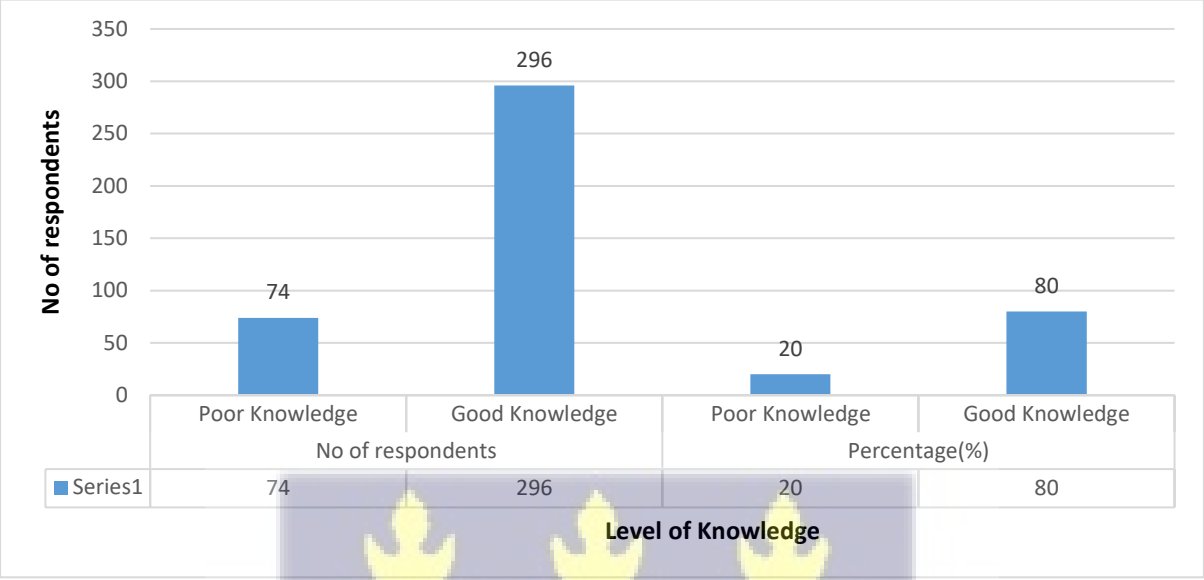

Figure 4.5: Respondent's knowledge of IPTp-SP

4.13 IPTp-SP Uptake among Postnatal care women

Majority of respondents 81.62% (302/370) of the respondents stated IPTp-SP above 16 weeks of gestation. Only 70(18.92%) pregnant women took the first dose of SP at 16 weeks of gestation. At each time SP was given to respondents, 246(66.49%) were given under DOT. Also, among the respondents, IPTp-SP uptake was 169(45.68%) that is, Optimal; above 3 doses. Again, most respondents spent more than 30 minutes before accessing the healthcare facility 280(75.68%), and most 219(59.19%) spent more than ten (10) Ghana cedis on transport before getting to the health facility. Most respondents 195(52.70%) find getting transport to the health facility very difficult, and 336(90.81%) said they seek permission before attending antenatal and other healthcare services. Some mothers 62(16.76%) experienced side effects after taking SP, which range from vomiting (8), weakness (8), and nausea (6) were among the allergic reactions. (See **Table 4.9** and below)

Table 4.9: IPTp-SP Uptake among Postnatal care women

Variables	Frequency (n=370)	Percentage age 100%
Gestational age (months) at first SP intake (ANC)		
At 16 weeks	70	18.92
>16 weeks	302	81.62
Were you given IPTp-SP under DOT each time?		0.00
No	124	33.51
Yes	246	66.49
IPTp-SP uptake		
Optimal (Above 3 doses)	169	45.68
Sub Optimal (Below 3 doses)	201	54.32
Were you served water to take medicine?		0.00
No	140	37.84
Yes	230	62.16
Did you have to buy the water?		0.00
No	266	71.89
Yes	104	28.11
DISTANCE TO HEALTHCARE CENTRE		0.00
How far is your residence from the health facility?		0.00
Far (more than 30 minutes' walk)	280	75.68
Near (within 30 minutes' walk)	90	24.32
How much do you spend on transportation to and from the health facility?		0.00
Between 5 to 10 cedis	113	30.54
less than 5 cedis	23	6.22
More than 10 cedis	219	59.19
No money spent	15	4.05
How difficult is it to access transport to the health facility?		0.00
Not difficult	175	47.30
Yes (Very difficult)	195	52.70
Do you need to seek permission before attending ANC?		0.00
No	34	9.19
Yes	336	90.81
Did you experience any side effects after taking the dose(s) of SP		0.00
No	308	83.24
Yes	62	16.76

4.14 Type of Side Effects Respondents Experience

Respondents intimated that they had some side effects after taking the medication SP. Vomiting was the greatest side effect. Details can be seen in *fig 4.6* below.

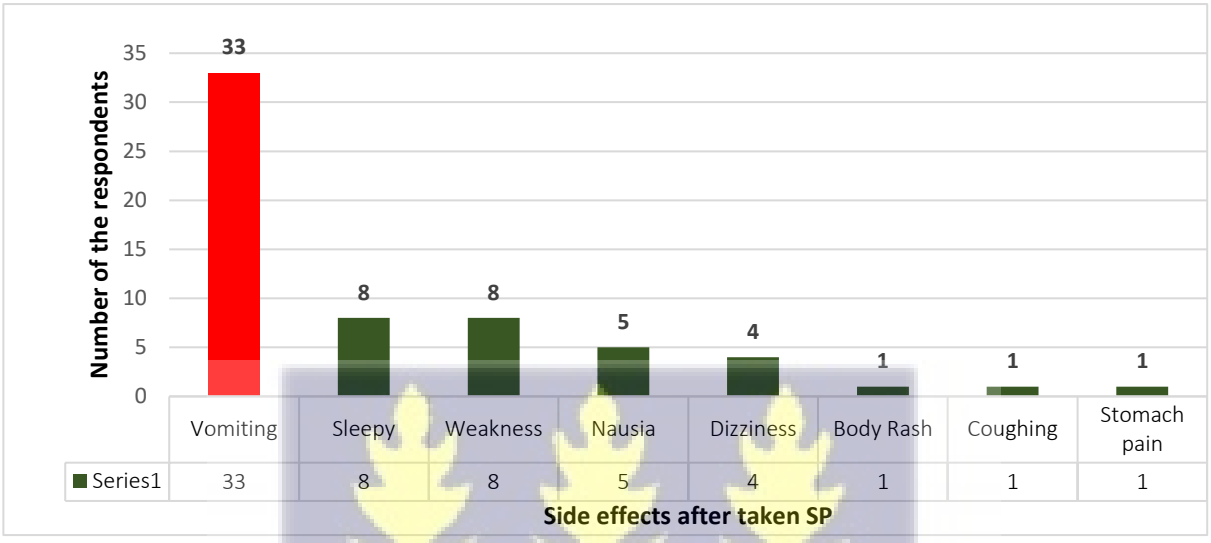

Figure 4.6: Type of side effects respondents experience after taking the SP.

4.15 Association Between Respondent Demography and IPTp-SP Uptake in Pregnancy

Table 4.10 below shows that respondent income was statistically associated with optimal IPTp-SP uptake. Also, respondent occupation (X^2 = 8.59, p-value, 0.035) was statistically associated with optimal IPTp-SP uptake among the respondents. Other demographic variables showed no statistical associations with optimal IPTp-SP uptake. See Table 4.10 below.

Table 4.10: Association between socio-demographic factors and IPTp-SP uptake in pregnancy

Variables	N	Optimal (≥3 doses)	Suboptimal (<Below 3 doses)	χ^2 Tests	p-value
Health Facility					
Madina Polyclinic	**150**	67 (44.7%)	83 (55.3%)	0.00121	0.927
Kekele				0.916	
Pentecost Hospital	**220**	100(45.5%)	120(54.5%)		0.339
Residence					
Rural	**15**	5 (33.3%)	10 (66.7 %)		
Urban	**355**	162 (45.6%)	193 (54.4%)		
				0.341	0.952
Educational Level					
No formal education	**34**	16 (47.1%)	18(52.9%)		
Primary Education	**242**	107 (44.2%)	135(55.8%)		
Senior High Education	**66**	30(45.5%)	36(54.5%)		
Tertiary Education	**28**	14(50.0%)	14(50.0%)		
				15.7	**0.003**
Income level					
300-1000 cedis	**201**	97(48.3%)	104(51.7%)		
Dependent	**23**	13(56.5%)	10(43.5%)		
Less than 300 cedis	**12**	3(25.0%)	9(75.0%)		
More than 1000 cedis	**14**	0(0.0%)	14(100.0%)		
No regular income	**120**	54(45.0%)	66(55.0%)		
				12	0.063
Marital Status					
Co-habiting	**17**	9(52.9%)	8(47.1%)		
Divorced	**9**	3(33.3%)	6(66.7%)		
Married	**227**	109(48.0%)	118(52.0%)		
Prefer not to say	**18**	2(11.1%)	16(88.9%)		
Separated	**1**	0(0.0%)	1(100.0%)		
Single	**97**	44(45.4%)	53(54.6%)		

Widowed	**1**	0(0.0%)	1(100.0%)		
				8.59	**0.035**
Occupation					
Government Sector Employee	**25**	5(20.0%)	20(80.0%)		
Non- Government sector employee	**31**	18(58.1%)	13(41.9%)		
Self-employed	**227**	104(45.8%)	123(54.2%)		
Unemployed	**87**	40(46.0%)	47(54.0%)		
				3.55	0.315
Religion					
African Traditional	**25**	9(36.0%)	16(64.0%)		
Christianity	**250**	119(47.6%)	131(52.4%)		
Islam	**60**	22(36.7%)	38(63.3%)		
Prefer not to say	**35**	17(48.6%)	18(51.4%)		
NHIS status				0.0076	0.931
Insured	**175**	79(45.1%)	96(54.9%)		
No health insurance	**195**	88(45.1%)	107(54.9%)		
				1.59	0.902
Gravidity					
Five	**74**	32(43.2%)	42(56.8%)		
Four	**37**	20(54.1%)	17(45.9%)		
One	**58**	22(37.9%)	36(62.1%)		
Three	**103**	46(44.7%)	57(55.3%)		
Two	**91**	42(46.2%)	49(53.8%)		
				0.552	0.814
Place of delivery					
Home delivery	**30**	13(43.4%)	17(56.7%)		
Institutional delivery	**340**	154(45.3%)	186(54.7%)		

Gravidity					
Five	**76**	32(42.1%)	44(57.9%)		
Four	**37**	20(54.1%)	17(45.9%)		
One	**63**	27(42.9%)	36(57.1%)		
Three	**103**	46(44.7%)	57(55.3%)		
Two	**91**	42(46.2%)	49(53.8%)		
				1.59	0.902
Parity					
Five	**75**	31(41.3%)	44(58.7%)		
Four	**35**	20(57.1%)	15(42.9%)		
One	**69**	30(43.5%)	39(56.5%)		
Three	**93**	40(43.0%)	53(57.0%)		
Two	**98**	46(46.9%)	52(53.1%)		
				2.91	0.714
ANC visit					
1st Trimester	**164**	70(42.7%)	94(57.3%)		
2nd Trimester	**200**	93(46.5%)	107(53.5%)		
3rd Trimester	**6**	4(66.7%)	2(33.3%)		
				1.51	0.471

4.16 Bivariate Analysis of the respondent's knowledge of IPTp-SP and IPTp-SP Uptake

The uptake of IPTp-SP was associated with respondent knowledge "Ever heard about IPTp-SP" IPTp-SP, (X^2 = 6.0, p-value, 0.0014), the time of pregnancy SP was taken (X^2 = 8.63, p-value, 0.013), "How helpful was the health professionals in helping you follow the program," (X^2 =10.40, p-value, 0.016), Did you pay for the lTPp-SP drug at the hospital, (X^2 =4.26, p-value, 0.039) and "Have you had a prior pregnancy without being put on the IPTp-SP drugs?"

(X^2 =6.88, p-value, 0.005) all showed statistically significant associations. However, some variables showed no associations. (Ref to Table 4.11 below).

Table 4.11: Bivariate Analysis of the respondent's knowledge of Optimal IPTp-SP and Suboptimal IPTp-SP Uptake

Characteristics	Optimal (≥3 doses)	Suboptimal (<Below 3 doses)	Total	χ^2 Tests	p-value
Reported with malaria in pregnancy				2.91	0.088
No	155(47.3%)	173 (52.7%)	328		
Yes	14 (33.3%)	28 (66.7%)	42		
Total	169	201	370		
				6.0	**0.0014**
Ever heard about IPTp-SP?					
No	0(0.0%)	7(100.0 %)	7		
Yes	169(46.5%)	194(53.4%)	363		
Total	*169*	*201*	*370*		
Bed net use				1.81	0.178
No	162(46.6 %)	186(53.4 %)	348		
Yes	7(31.8 %)	15(68.2%)	22		
Total	*169*	*201*	*370*		
SP drug given to you to swallow				0.186	0.667
No, I took it home	1(33.3%)	2(66.75 %)	3		
Yes, it was taken at the hospital	168(45.8 %)	199(54.2 %)	367		
Total	169	201	370		
What time of pregnancy did you take the SP?				8.63	**0.013**
1st Trimester	2(12.5 %)	14(87.5 %)	16		
2nd Trimester	162(47.8)	177(52.2 %)	339		
3rd Trimester	5(33.3%)	10(66.7 %)	15		
Total	*169*	*201*	*370*		

How helpful were the health professionals in helping you follow the program?				10.04	**0.016**
Fairly helpful	3(30.0 %)	7(70.0 %)	10		
Not at all	0(0.0 %)	3(100.0 %)	3		
Quite helpful	23(67.6 %)	11(32.4 %)	34		
Very helpful	143(44.3 %)	180(55.7 %)	323		
Total	169	201	370		
How well did the health workers monitor your adherence to the course?				3.93	0.269
Fairly well	24(44.4 %)	30(55.6 %)	54		
Not at all	0(0.0 %)	3(100.0 %)	3		
Quite Strictly	93(44.1 %)	118(55.9 %)	211		
Strictly	52(51.0 %)	50(49.0 %)	102		
Total	169	201	370		
How helpful were the health professionals in helping you follow the program?				10.4	0.016
Fairly helpful	3(30.0 %)	7(70.0 %)	10		
Not at all	0(0.0 %)	3(100.0 %)	3		
Quite helpful	23(67.6 %)	11(32.4 %)	34		
Very helpful	143(44.3 %)	180(55.7 %)	323		
Total	169	201	370		
Did you pay for the ITPp-SP drug at the hospital?				4.26	**0.039**
No	169(46.3 %)	196(53.7 %)	365		
Yes	0(0.0 %)	5(100.0 %)	5		
Total	169	201	370		
To what extent has the IPTp-SP positively affected your health status throughout pregnancy?				4.66	0.097
Average effect	67(42.6 %)	90(57.3 %)	157		

Not at all	15(34.9 %)	28(65.1. %)	43		
Significant effect	87(51.2 %)	83(48.8 %)	170		
Total	169	201	370		
				6.88	**0.009**
Have you had a prior pregnancy without being put on the IPTp-SP drugs?					
No	169(46.7 %)	193(53.3 %)	362		
Yes	0(0.0 %)	8(100. 0%)	8		
Total	169	201	370		
To what extent has the IPTp-SP positively affected your health status during prenatal and postnatal stages?				0.979	0.613
Average effect	55(42.3 %)	75(57.7 %)	130		
Not at all	3(42.9 %)	4(57.1 %)	7		
Significant effect	111(46.2 %)	122(52.7 %)	233		
Total	169	201	370		

4.17 Bivariate analysis of client characteristics and uptake of IPTp-SP

The respondent's characteristics toward IPTP-SP uptake saw no statistical associations between client elements and SP uptake. None of the variables was statistically significant. (Ref Table 4.12 below).

Table 4.12: Bivariate analysis of client characteristics and uptake of IPTp-SP

Characteristics	Optimal (≥3 doses)	Suboptimal (Below 3 doses)	Total	χ^2 Tests	p-value
When should a pregnant woman start IPTp - SP?					
16 weeks and above	14(48.3%)	15(51.7 %)	**29**		
After 24 weeks	7(46.7 %)	8(53.3 %)	**15**		
Before 16 weeks	57(43.5%)	74(56.5 %)	**131**		
I Do not know	91(46.7%)	104(53.3%)	**195**		
Total	**169**	**201**	**370**	0.409	0.938
How many times is IPTp-SP given during pregnancy at the ANC?					
2-3times	24(48.0%)	26(52.0 %)	50		
4-5 times	80(44.7%)	99(55.3 %)	179		
Most 7 times	41(55.4%)	33(44.6 %)	74		
Do not know	5(33.3 %)	10(66.7 %)	15		
Once	19(36.5%)	33(63.5 %)	52		
Total	169	201	370	5.67	0.225
At what regular interval should IPTp-SP be given?					
Do not know	1(50.0 %)	1(50.0 %)	2		
Monthly	166(45%)	199(54.5%)	365		
Weekly	2(66.7 %)	1(33.3 %)	3		
Total	169	201	370	0.553	0.758
Radio	4(80.0 %)	1(20.0 %)	5		
Television	3(36.5 %)	5(62.5 %)	8		
Through staff at ANC	162(45%)	195(54.6%)	357		
Total	169	201	370	2.6	0.272
What are the consequences of not taking SP as a pregnant woman?					
Anaemia	37(45.1 %)	45 (54.9%)	82		
Death	35(48.6 %)	37	72		

		(51.4 %)			
Effects on the foetus	34(47.2 %)	38	72		
		(52.8 %)			
Malaria	63(43.7 %)	81	144		
		(56.3 %)			
Total	169	201	370	0.545	0.909
Were you given IPTp-SP under DOT each time?					
No	56	68	124		
	(45.2 %)	(54.8 %)			
Yes	113	133	246		
	(45.9 %)	(54.1 %)			
Total	169	201	370	0.019	0.888
Gestational age (months) at first SP intake					
<16 weeks	34	34	68		
	(50.0 %)	(50.0 %)			
>16 weeks	135	167	302		
	(44.7 %)	(55.3 %)			
Total	169	201	370	0.628	0428
Were you given IPTp-SP under DOT each time?					
No	56(45.2%)	68(54.8 %)	124		
Yes	113(50.0 %)	133(50.0 %)	246		
Total	169	201	370	0.0199	0.888
Were you served water to take medicine?					
No	70(50.0 %)	70(50.0 %)	140		
Yes	99(43.0 %)	131(57.0 %)	230		
Total	169	201	370	1.7	0.193
How far is your residence from the health facility?					
Far (more than 30 minutes' walk)	125(45.0%)	153(55.0%)	278		
Near (within 30 minutes' walk)	44(47.7 %)	48(52.3 %)	92		
Total	169	201	370	0.228	0.633
How much do you spend on transportation to and from the health facility?					
Between 5 to 10 cedis	54(48.6 %)	57(51.4 %)	111		
More than 10 cedis	101(46.7%)	120(53.3%)	221		
No money spent	4(26.7 %)	11(73.3 %)	15		

less than 5 cedis	10(43.5 %)	13(56.5 %)	23		
Total	169	201	370	2.62	0453
How difficult is it to access transport to the health facility?					
No	85 (48.6 %)	90 (51.4 %)	175		
Yes	84 (43.1 %)	111 (56.9 %)	195		
Total	169	201	370	1.12	0.289
Do you need to seek permission before attending ANC?					
No	18 (52.9 %)	16 (47.1 %)	34		
Yes	151 (44.9 %)	185 (55.1 %)	336		
Total	169	201	370	0.797	0.372
Did you experience any allergy after taking the dose(s) of SP					
No	141 (45.8 %)	167 (54.2 %)	308		
Yes	28 (45.2 %)	34 (54.8 %)	62		
Total	169	201	370	0.00794	0.929

4.18 Socio-demographic factors influencing IPTp-SP uptake

In this study, the odds ratio for patients receiving optimal IPTp-SP uptake at the Madina Kekele Polyclinic compared to the Pentecost Hospital was 1.02 (95% CI: 0.677-1.56). The p-value for this comparison was 0.898, suggesting no significant difference in odds between the two medical facilities. The estimated difference in odds for patients receiving optimal IPTp-SP uptake at the Pentecost Hospital compared to the reference group (Madina Kekele Polyclinic) was 0.08 (95% CI: 0.00-0.82).

Age: The odds of optimal IPTp-SP uptake were higher for women aged 20-29 years (OR = 0.77, 95% CI = 0.346-1.73) and 30-39 years (OR = 0.86, 95% CI = 0.385-1.95) compared to women aged 10-19 years. However, the odds were significantly lower for women aged 40-49

years (OR = 1.18, 95% CI = 0.506-2.76) compared to women aged 10-19 years. Residence: Women living in urban areas had higher odds of optimal IPTp-SP uptake (OR = 1.71, 95% CI = 0.575-5.13) compared to women living in rural areas. Marital status: The odds of optimal IPTp-SP uptake were lower for divorced women (OR = 0.44, 95% CI = 0.08-2.38) compared to co-habiting women. The odds were also lower for women who preferred not to disclose their marital status (OR = 0.22, 95% CI = 0.05-0.94) compared to co-habiting women. The odds were higher for married women (OR = 0.83, 95% CI = 0.31-2.24) and single women (OR = 0.73, 95% CI = 0.26-2.07) compared to co-habiting women. Education level: Women with tertiary education had higher odds of optimal IPTp-SP uptake (OR = 1.12, 95% CI = 0.41-3.06) than women without formal education. The odds were similar for women with primary education (OR = 0.92, 95% CI = 0.44-1.89) and senior high education (OR = 0.93, 95% CI = 0.40-2.15) compared to women with no formal education. Occupation: Women employed in the non-government sector had higher odds of optimal IPTp-SP uptake (OR = 5.53, 95% CI = 1.64-18.61) than women employed in the government sector. The odds were also higher for self-employed women (OR = 3.50, 95% CI = 1.27-9.66) and unemployed women (OR = 3.40, 95% CI = 1.17-9.89) compared to women employed in the government sector. Religion: Women who preferred not to disclose their religion had higher odds of optimal IPTp-SP uptake (OR = 1.67, 95% CI = 0.586-4.81) than women practising traditional African religion. The odds were similar for women practising Christianity (OR = 1.66, 95% CI = 0.71-3.92) and Islam (OR = 1.02, 95% CI = 0.39-2.72) compared to women practising African traditional religion. Income level: Women with no regular income had higher odds of optimal IPTp-SP uptake (OR = 1.23, 95% CI = 0.535-3.33) compared to women with a regular income. (Ref to Table 4.13 below) ……

Table 4.13: Un-adjusted (COR) and Adjusted (AOR) Regression model to determine the statistical association between respondent demography and IPTp-SP uptake.

Predictor	Number N=370	Optimal (≥3 doses)	Suboptimal (below 3 doses)	cOR(95%CI) p-value	aOR(95%CI) p value
Health facility:					
Madina Kekele (Ref)	**148**	67(45.27%)	81(54.73%)	REF	REF
Pentecost hospital	**222**	102(45.95%)	120(54.05%)	1.02(0.677-1.56)0.898	0.08(0.00-0.82)**0.04**
Age categories					
10-19 years (Ref)	**24**	17(70.83%)	7(29.17%)	REF	REF
20-29years	**119**	46(38.66%)	73(61.34%)	0.26(0.09-0.67) 0.01	0.21(0.04-0.95)**0.04**
30-39years	**137**	61(44.53%)	76(55.47%)	0.33(0.129-0.848)0.02	0.47(0.03-6.57)0.58
40-49years	**90**	45(50.00%)	45(50.00%)	0.41(0.156-1.09)0.07	20.92(0.99-44.42)**0.05**
Residence:					
Rural (Ref)	**15**	5(33.33%)	10(66.67%)	REF	REF
Urban	**355**	164(46.20%)	191(53.80%)	0.58(0.195-1.738) 0.33	2.21(0.65-7.54)0.20
Marital status:					
Co-habiting (Ref)	**17**	9(52.94%)	8(47.06%)	REF	REF
Divorced	**9**	3(33.33%)	6(66.67%)	0.44 (0.08-2.38) 0.35	0.72(0.11-4.73)0.73
Married	**225**	109(48.44%)	116(51.56%)	0.83 (0.31-2.24) 0.72	2.08(0.52-8.21)0.29
Prefer not to say	**20**	4(20.00%)	16(80.00%)	0.22(0.05-0.95) 0.04	0.24(0.04-1.21)0.09
Single	**97**	44(45.68%)	53(54.64%)	0.73 (0.26-2.07) 0.56	0.60(0.17-2.17)0.44
Highest level of education:					
No formal education (Ref)	**34**	16(47.06%)	18(52.94%)	REF	REF
Primary Education	**242**	109(45.04%)	133(54.96%)	0.92 (0.44-1.89)0.83	1.33(0.43-4.12)0.61
Senior High Education	**66**	30(45.45%)	36(54.55%)	0.94(0.41-2.15) 0.88	0.58(0.15-2.18)0.42

Tertiary Education	**28**	14(50.00%)	14(50.00%)	1.13 (0.41-3.06)0.82	2.46(0.64-9.38)0.19
Occupation:					
Government Sector Employee (Ref)	**25**	5(20.00%)	20(80.00%)	REF	REF
Non- Government sector employee	**31**	18(58.06%)	13(41.94%)	5.53(1.64-18.61) 0.01	3.38(0.77-14.81)0.11
Self-employed	**227**	106(46.70)	121(53.30%)	3.50(1.27-9.66) 0.02	7.64(1.35-43.24)**0.02**
Unemployed	**87**	40(45.98%)	47(54.02%)	3.40(1.17-9.89) 0.02	8.78(1.70-4.50)**0.01**
Religion:					
African traditional (Ref)	**25**	9(35.00%)	16(64.00%)	REF	REF
Christianity	**250**	121(48.40%)	129(51.60%)	1.67(0.71-3.92) 0.24	1.81(0.55-5.91)0.33
Islam	**60**	22(36.67%)	38(63.33%)	1.02(0.39-2.72) 0.24	0.33(0.07-1.50)0.15
Prefer not to say	**35**	17(48.57%)	18(51.43%)	1.67(0.59-4.81) 0.33	2.18(0.45-1.05)0.33
Income level:					
300-1000 cedis (Ref)	**201**	99(49.25%)	102(50.75)	REF	REF
Dependent	**23**	13(56.52%)	10(43.48%)	1.33(0.56-3.20) 0.51	241.73(7.44-78.57) <**0.01**
Less than 300 cedis	**12**	3(25.00%)	9(75.00%)	0.34(0.09-1.31) 0.12	0.66(0.10-4.06)0.66
More than 1000 cedis	**14**	0(0.00%)	14(100.00%)	1	
No regular income	**120**	54(45.00%)	66(55.00%)	0.84(0.54-1.33) 0.46	20.13(1.491-27)**0.02**
Ethnicity (tribe)					
Akan (Ref)	**73**	36(49.32%)	37(50.68%)	REF	REF
Ewe	**54**	20(37.04%)	34(62.96%)	0.60(0.29-1.24) 0.17	0.56(0.14-2.21)0.41
Ga-Adangbe	**82**	44(53.66%)	38(46.34%)	1.19(0.63-2.24) 0.59	0.36(0.07-1.74)0.21
Northern tribes	**161**	69(42.86%)	92(57.14%)	0.77(0.44-1.34) 0.36	0.14(0.03-0.59) <**0.01**
NHIS status:					
Insured (Ref)	**175**	70(45.14%)	96(54.86%)	REF	REF
No health insurance	**195**	90(46.15%)	105(53.85%)	1.04(0.69-1.57) 0.85	0.92(0.45-1.88)0.84
Place of delivery					
Home delivery (Ref)	**30**	13(43.33%)	17(56.67%)	REF	REF

Institutional delivery	**340**	156(45.88%)	184(54.12%)	1.10(0.52-2.35) 0.79	0.41(0.12-1.37)0.15

COR crude odds ratio, *AOR* adjusted odds ratio, *95% CI*, 95% confidence interval, and Significant p-values are in bold.

4.19 Multivariate analysis with the uptake of IPTp-SP

Uncentered variance inflation factor (VIF) was performed as an assumption check for potential collinearity; a value of 3.56 was obtained, which falls below the cut-off of 10. There the model was accepted. The respondent who takes SP within the 2nd trimester is 6.40 times more likely to complete all regimens of SP than respondents who take SP in the third trimester (COR=1.82, p-value = 0,015. All other variables had not shown any associations.

crude odds ratio, ed odds ratio, 95% confid al, and Significa s are in bold.

Table 4.14: Multivariate analysis of some patient factors with the uptake of IPTp-SP

Variable	Number N=370	Optimal (≥3 doses)	Suboptimal (Below 3 doses)	cOR (95%CI) p-value	aOR(95%CI) p-value
Reported malaria pregnancy					
No	**328**	155(47.26%)	173(52.74%)	REF	REF
Yes	**42**	14(33.33%)	28(66.67%)	0.56(0.28-1.10) 0.091	0.5162(0.24-1.08) 0.08
Bed net use					
No	**348**	162(46.55%)	186(53.45)	REF	REF
Yes	**22**	7(31.82%)	15(68.18%)	0.54(0.21-1.35) 0.184	0.45(0.17-1.17) 0.10

Was SP drug given to you to swallow					
No, I took it home	**3**	1(33.33%)	2(66.67%)	REF	REF
Yes, it was taken at the hospital	**367**	168(45.78%)	199(54.22%)	1.68(0.15-18.77) 0.67	2.722(0.34-1.23) 0.99
What time of pregnancy did you take the SP?					
3rd Trimester	**16**	2(12.50%)	14(87.50%)	REF	REF
1st Trimester	**3339**	162(47.79%)	177(52.21%)	0.86(0.385-1.95)0.70	0.47(0.03-6.57)0.58
2nd Trimester	**15**	5(33.33%)	10(66.67%)	6.40(1.43-28.62) **0.015**	3.010(0.46-19.61) 0.25
How helpful were the health professionals in helping you follow the program?					
Fairly helpful	**10**	3(30.00%)	7(70.00%)	REF	REF
Quite helpful	**34**	23(67.651%)	11(32.35%)	4.87(1.05-22.57) 0.04	4.20(0.65-26.82) 0.13
Very helpful	**323**	143(44.27%)	180(55.73%)	1.85(0.47-7.30) 0.37	1.04(0.20-5.17) 0.97
Not at all	**3**	0(0.00%)	3(100%)	Inf	Inf
To what extent do you think the IPTp-SP has positively affected your health status throughout pregnancy					
Average effect	**157**	67(42.68%)	90(57.32%)	REF	REF
Not at all	**43**	15(34.88%)	28(65.12%)	0.72(0.35-1.45) 0.359	0.9928(0.43-2.29) 0.99
Significant effect	**170**	87(51.18%)	83(48.82%)	1.40(0.91-2.18) 0.124	1.608(0.86-3.01) 0.14
To what extent has the IPTp-SP positively affected your					

health status during prenatal and postnatal stages?					
Average effect	**130**	55(42.31%)	75(57.69%)	REF	REF
Not at all	**7**	3(42.86%)	4(57.14%)	1.02(0.22-4.76) 0.977	0.77(0.14-4.26)0.77
Significant effect	**233**	111(47.64%)	122(52.36%)	1.24(0.80-1.91) 0.329	0.83(0.43-1.62)0.59

CHAPTER FIVE

DISCUSSION

5.0 The uptake of IPTp-SP in Postnatal Mothers

In this hospital-based cross-sectional study, the respondent rate of the study was 370(100%), of which 109 (29%) respondents had taken three (3+) doses and above (optimal IPTp-SP uptake was 29%), which was consistent with 28.7% reported in Tanzania (Madziyire et al., 2017), 27% in Zimbabwe (Kibusi et al., 2015). However, this uptake of IPTp-SP 3 in this study was far lower than the 85% NMEP annual target. This study is in contrast to a study in Cameroon (95.3%) (Diengou et al., 2020) and Ningo Prampram, Ghana (94%) (Nashira, 2021), which reported < 3 IPTp-SP uptake above the national target. This gap could be due to the low level of education among the respondents (primary education and below 66.4%). Also, the long distance to the health facility and some respondents had no regular income as some depend on their husbands and family members for monitory assistance before accessing health care.

3 IPTp uptake was consistent with the 31% reported in Ghana's multicounty malaria indicator survey (Quakyi et al., 2019; Yaya et al., 2018). Again, this was still lower than 87.5% reported (Owusu-Boateng & Anto, 2017) or 93.24% in Sierra Leone (Buh et al., 2019), Malawi 42%, Kintampo 32.4% (2015), Cameroon 54.9%, and Uganda 18%, probably because the studies were carried out in different settings such as rural communities, slam and farming communities (Ameyaw, 2022; Azizi, 2020; Diengou et al., 2020a; Oppong et al., 2019).

A study by Bonsu (2019) reported an optimal IPTp-SP uptake of 26.3%, similar to this study. Also, Bonsu's (2019) study was conducted in Mamprobi polyclinic in the Greater Accra region. The two studies are similar regarding the respondents' geographical location, occupation, and educational background.

Health facility factors in this study showed that there was enough SP at the facility (100%). Water (100%), there was the presence of MIP postal in all the facilities. Health systems are

strengthened to deliver safe, quality services to improve health outcomes. According to the Demographic Health Survey (Atindama et al., 2019), 13.8% of pregnant women still do not have access to ANC. Late presentation to ANC clinics also significantly influences low IPT uptake (Yenealem & Niberet, 2019). A study found that the median gestational age for first ANC visits was 3.6 months, with rural dwellers dipping even further to 3.7 months.

Given that IPTp is administered after the first trimester of pregnancy, late presentation thereof will affect the achievement of IPT 3+ uptake. Existing relationships between providers and clients, together with the perceived low quality of ANC services, influence users' choice and target of ANC (Nyongesa et al., 2018). A study in the Ashanti region of Ghana found that pregnant women's preference for seeking care from traditional birth attendants (TBAs) was due to perceived unfriendly and rude behaviour on the part of professional health workers, compared to welcoming TBAs (Gross et al., 2012). (Sangho et al., 2021) indicate that although SPs were available in primary health facilities, the absence of essential utilities such as disposable cups and clean drinking water constrained IPT implementation as a DOT.

5.1 IPTp-SP uptake

The suboptimal uptake in this study could be attributed to poor documentation of SP doses by Health Care Workers (HCWs).

Quality data audit showed that the source data (472, ANC register) did not tally with that of the Monthly report (424, midwifery) and DHIMS2 data (420) for the month of June 2022. Also, in communities whose main source of income is petty trading, side effects from the SP like vomiting, loss of appetite, nausea, and weakness, though small in real numbers, could contribute to the gaps as identified earlier in Ghana (Naghavi et al., 2017; Sumankuuro et al., 2017).

5.2 SOCIAL DEMOGRAPHIC FACTORS AFFECTING IPTP UPTAKE

Factors such as respondents' income (χ^2 Tests=15.7, p-valve-0.003) and occupation (χ^2 = 8.59, p-valve, 0.035) are associated with IPTp-SP uptake among postnatal mothers. Similar results were reported in Malawi, Tanzania and Ghana (Azizi, 2020; Bajaria et al., 2019; Stephens et al., 2017). This finding seems strange because it was widely expected that self-employed would take more doses of IPTp due to the knowledge gained from past pregnancies about the importance of preventing malaria during pregnancy and the benefits of optimal IPTp-SP and also because they have the luxury of time to attend ANC. Contrarily, to this finding, according to Dairo et al. (2019), in 2008, more women in employment (5.2%) took optimal IPTp-SP than those who were unemployed (4.4%). This may be due to the women's earning power in employment, which made them more comfortable visiting antenatal clinics for proper malaria management during pregnancy. In Tanzania, Exavery et al. (2014) identified factors affecting the uptake of optimal doses of SP by pregnant women. It was found that 52.7% of employed pregnant women took optimal doses of IPTp-SP. Onyeneho et al. (2013) also reported that 54.8% of pregnant women with paid employment had statistically significant compliance with the recommended doses of IPTp-SP. Hence, those with high incomes were more likely to seek care for malaria from health facilities instead of choosing self-treatment or a traditional healer, mostly visited by those with no or low income.

According to Dairo et al. (2019), the uptake of at least 2 doses of IPTp-SP increased significantly with an increase in socioeconomic status for the poorest, proper and middle class and 2.7% for the richest class) and 2008 (1.2% for the poorest, 2.4% for the poorer, 5.9% for the middle and 9.6% for the richest categories). This resulted from the high socioeconomic status of the women in the middle, richer and richest categories, which gives them greater affordability to register at and visit antenatal clinics for proper management of malaria during pregnancy. It also allows them to use the recommended doses of SP compared to women of

lower socioeconomic status. A study supports this in Tanzania (Kibusi et al., 2015), where it was found that 50.2% of individuals of higher socioeconomic status took at least 2 doses of IPTp-SP, while 72.4% of the pregnant women in the poorest categories took fewer than 2 doses of IPTp-SP. There was also an increase in the proportion of pregnant women who took the recommended 2 doses of IPTp-SP from the poorest to the richest categories (Onyeneho et al., 2013). About 78.6% of the richest pregnant women were compliant with the recommended doses, while only 35.4% of the poorest pregnant women showed compliance toward the optimal uptake of IPTp-SP. The higher the wealth index of the pregnant women, the higher the compliance with malaria prevention programmes ($\chi 2=34.861$; $P<0.001$). This implies that wealth plays an important role in reducing the burden of malaria during pregnancy.

It should be noted that Dairo's (2019) report purges the IPTp optimal dose at 2 doses and above. However, NMEP, per the strategic document, stated that IPTp-SP3 should be considered the optimal dose. Every pregnant woman should take at least 3 doses of SP before delivery. The 2011 Multiple Indicator Cluster Survey (MICS) from Ghana demonstrates the challenges in moving along the pathway toward malaria elimination. It is important to recall that the Roll Back Malaria indicators were for endemic countries (including Ghana) to achieve 80% coverage on basic malaria interventions by 2010 and sustain these to achieve Millennium Development goals by 2015 and then move on to pre-elimination of the disease where less than 1/1000 people at risk in a country experienced malaria. Again, the 2011 Ghana MICS reports on the standard RBM indicator of two doses of intermittent preventive treatment (IPTp-SP) with sulphadoxine-pyrimethamine (SP) during antenatal care (ANC), although Ghana has for some time aimed at three doses. Also, the current WHO guidance for IPTp-SP recommends IPTp-SP in stable endemic countries at one dose for every antenatal care visit at 16 weeks, which could mean three or four times. The 2011 MICS shows that 83% of recently pregnant women surveyed got one dose of IPTp-SP during ANC, while only 65% received two.

However, progress in IPTp-SP coverage between 2008 Demographic and Health Survey and the 2011 MICS saw a jump from 44% to 65% for the two doses, and progress was acknowledged.

Respondents aged (20-29 years) showed a statistically significant IPTp-SP uptake (p-value, 0.04), and the confidence interval (CI) of 95% was 0.04819-0.952. The odds (AOR) of taking SP were 0.214. This study is similar to what was reported in Sierra Leone. The report showed that optimal IPTp-SP uptake tended to be higher in women aged 25–29 and those who had given birth twice than their fellows (Buh, Kota, Bishwajit, & Yaya, 2019). However, (Oppong et al., 2019; Yaya et al., 2018) reported that higher age groups were associated with the uptake of adequate doses of optimal IPTp-SP. Also, a study from Uganda reported that pregnant women older than 34 years were less likely to take optimal doses of IPTp-SP (Okethwangu et al., 2019).

For the source of information, Okethwangu et al. (2019) reported high IPTp-SP uptake association with exposure to radio messages. However, in this study, about 95.95% of information regarding SP was sought from health workers, whiles only 3% was obtained from social media. Nevertheless, this study showed no relationship between education and IPTp-SP uptake. However, education was expected because it can empower women to make better and more informed decisions concerning their health issues, and employment makes one financially independent, thus easily covering ANC-related expenses when needed. These could be contributing to adequate uptake of healthcare services like optimal IPTp-SP uptake. Another study in Ghana reported that unemployment was associated with suboptimal IPTp-SP uptake yet education was not linked to it (Stephen et al., 2016).

On the other hand, Azizi (2020) reported no association between education and occupation with IPTp uptake, and Bajaria et al. (2019) only reported no association between education

level and IPTp uptake. Surprisingly, a study in Sierra Leone reported the opposite. Women with higher education had a lower chance of receiving optimal IPTp-SP uptake than women without education (Buh et al., 2019). In summary, health workers play a vital role in IPTp uptake. The source of adequate information, addressing misconceptions, misinformation and factors that could affect the SP uptake could be addressed by the health care provider (midwife). In Nigeria, a study conducted in Abuja showed that health workers are a better source of information for IPTp uptake than any sources of information (p-value <0.001). It was also reported in Malawi (p-0.02), Pakistan (p-0.012), Zambia (P-0.001) and Tanzania (0.031). This high source of information among health workers was due to the annual and bi-annual knowledge transfer of malaria in pregnancy (MIP) training organized for health workers across the country. Also, IPTp materials were available at the health facility, which the NMEP supplied.

Nearly all mothers had attended ANC at least once. Comparable findings of 96% were reported in Malawi and Cameroon (Anto et al., 2019; Gross et al., 2012; Mwandama et al., 2015). This may be due to them being hospital-based research, the general high awareness about ANC relevance by women in recent years, relatively good community sensitization and mobilization at using maternal health service than ever by the health sector. Regarding gestation at first ANC, despite the WHO's recommendation to have the first ANC visit within the first 16 weeks, two in every five mothers made their first ANC visit late during their last pregnancy (WHO, 2012). The National Health Insurance Scheme (NHIS) was formed to ensure equitable distribution of health since it exempts pregnant women from premium payments and provides most ANC services freely to mothers in Ghana. Despite this, the second most mentioned reason in the current study was the lack of health insurance. Those who had NHIS also complained about the indirect costs one incurs even when insured; thus, financial costs remained a significant barrier to ANC. Other reasons could be low ANC knowledge and awareness, lack

of support from partners, cultural limitations, and inaccessibility to the health facilities due to long queues in getting transport.

Meanwhile, the result was relatively lower in comparison to studies in Ethiopia, 81.5 % and 52.5% (late first ANC prevalence was reported, 60.5% in Ghana, 79.5% in Cameroon, 67.3% in Nigeria (Ejeta et al., 2017; Fagbamigbe et al., 2017; Njim, 2016; Weldemariam et al., 2018; Wolde, Tsegaye, & Sisay, 2019). This could be because of the classification of the outcomes, Wolde et al. (2019) classified women as late ANC booking when they come after 12 weeks of gestation, while the current study classified late ANC attendance gestation after 16 weeks. Other rationales could be the socio-demographic differences between the study sites and ANC-related information sources. Only 23% of the mothers achieved the recommended 8 ANC visits, higher than 13% reported in the same region (Amankwah & Anto, 2019). This could be attributed to time differences between the studies since time comes with better awareness about ANC and better access to health facilities. Another reason could be because our study was in public and CHAG facilities. Nevertheless, these findings fell short of the WHO target, and this might be due to the financial situation of the population since the more ANC visits, the more costs attached, low partner support and this policy/protocol being a relatively new distance to ANC provider, transport difficulties, and cultural influence (Sumankuuro et al., 2017).

5.3 HEALTH FACILITY FACTORS

The two health facilities had no stock out. This was because there was a constant supply of SP to the health facility from the district level. However, SP stock-out status was reported earlier in Ghana and in a review that acknowledged out-of-stock as contributing to low coverage of IPTp (Diengou et al., 2020b; Roman et al., 2019).

The SP is a program drug; thus, not sold but given to eligible pregnant women for free. However, some mothers said they paid for the SP at their facility. At some ANC, other medical interventions that are not free are paid for (routine screening). In cases whereby, the mothers

have to pay for free drugs, its inconsistent with NMEP policy. However, further investigation showed that women who said they paid for SP had rather paid for bottled water and others sold sachet water. This indicates that mothers bought sachet water at that price thought they indirectly paid for SP. Also, mothers were made to pay for ANC book covers and bottles for protein in urine tests. This has been reported in other studies in northern Nigeria (Akpa et al., 2022), Ethiopia (Adeniran et al., 2018), and Rwanda (Karema et al., 2020).

Paying out-of-pocket is not a new thing in Ghana. However, regarding NMEP activities, all commodities are free, including Rapid Diagnostics test Kits (RDT). It was reported that some facilities made patients pay for some services due to non-payment or delay in NHIS payment. For instance, clients pay for consultation (75%) and drugs (68.5%), the basic services that NHIS covers. The average amount they paid out-of-pocket was GHS33.00. Nonetheless, 55% pay between GHS1.00 and GHS40.00. This level of out-of-pocket payment is confirmed in previous studies where NHIS clients paid between an average of GHS13–17.50 out-of-pocket when seeking treatment (Abuosi et al., 2015; Dalinjong et al., 2018).

There were regional differences in out-of-pocket payments, with those in the Ashanti region reporting more out-of-pocket payments than those in the Northern region. The variation reported between the two regions could be attributed to the general poverty level variations between these two regions (Ghana Statistical Service, 2018; GSS, 2018). Generally, the Ashanti region is considered more economically vibrant than the Northern region, a situation that puts the people in the Ashanti region in a better economic position than their counterparts in the Northern region. Therefore, service providers will be more inclined to expect out-of-pocket payments from clients in Ashanti than from clients in the Northern region.

Paying for services is attributed to the unavailability of prescribed drugs or drugs not covered by the NHIS. The hospitals usually procure medical supplies and drugs on credit and pay suppliers later. This is a common practice based on the original design of the NHIS, which

reimburses service providers some weeks after service provision when claims have been submitted to the National health insurance authority for payment (Ministry of Health, 2004). However, the chronic delay in claims payment means regular stock-out of drugs or deliberate reluctance of service providers to give drugs to NHIS patients who visit their facilities (Agyepong & Nagai, 2011; Kibusi et al., 2015; Sodzi-Tettey et al., 2012). Therefore, service providers often make NHIS clients pay for drugs to keep their health facilities operational as a coping strategy. The reasons for paying consultation fees were to cover the administrative expenses of the health facilities.

Finally, this study showed that about 28.11% pay for drinking water for other drugs, including SP administration. A Doku et al. (2016) study suggests that those who pay for water are less likely to take optimal doses of IPTp. This means that an additional cost one has to incur at the facility, thus could discourage some women, especially those who may not have money to buy the water, thus leading to low IPTp uptake.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The study looked at factors that influence the gap in optimal IPTp-SP uptake among postnatal mothers at Pentecost hospital and Madina polyclinic (Kekele) in the La-Nkwantanang Municipality of Ghana. The study recruited 370 mothers from different ethnic groups through a cross-sectional design. The result showed in this study that IPTp-SP 3 uptake was 29%, considering that most mothers took IPTp-SP 1 and 2.

Several facility-based factors can contribute to the low IPTp-SP uptake (suboptimal) in this study, including, Limited health worker knowledge: Health workers may not be familiar with IPTp-SP or the recommended administration regimen, which can lead to incorrect administration or underutilization of the drug. It was observed that about 50% of the midwives had in-service training on IPTP-SP for the last two years. Stigma and fear of side effects: Women may be discouraged from using IPTp-SP due to rumours or misconceptions about the drug and its potential side effects. However, in this study, most respondents complain of vomiting after taking Sulfadoxine-Pyrimethamine (SP). Also, women are not adequately informed about the benefits of IPTp-SP; they may not understand the importance of the treatment and choose not to take it. Long waiting times in getting transport to the health facilities. Addressing these facility-based barriers can improve IPTp-SP uptake and help reduce the burden of malaria in pregnancy. Also, the Cost or inability to pay for the treatment was determined in this study. Some mothers pay for the maternity booklets, and others pay for water and some pay for the cover of the maternity booklet.

6.2 Limitations of the Study.

This study highlighted factors influencing optimal IPTp-SP uptake however available data did not articulate the hinderances to optimal IPTp-SP uptake (suboptimal) Also, it was realized that some of the information provided by mothers was inaccurate, leading to the need for a review of their ANC records. Recall bias was a limitation of the study, as some respondents had difficulty recalling details from their ANC visits. Participants were administered a dose of SP during the interviews to elicit their reactions to the medication and to improve their recall of events during the ANC visit.

To prevent the spread of illness during the COVID-19 pandemic, data collection was conducted with precautions, including using face masks by participants. This, however, led to reduced audibility during the interviews. The number of eligible mothers was lower than expected, which resulted in an extension of the data collection period.

Some participants provided inaccurate responses due to fear of reporting HCWs. To ensure that participants felt free to express themselves, the interviews were conducted outside the health facility. Also, to accommodate language barriers, research assistants fluent in Dangbe, Ga, and Twi were utilized to conduct interviews with women who could not speak English. This resulted in a delay in the data collection and the extension of the scheduled time.

6.3 Recommendations

6.3.1 Health Facility-Based (Both health facilities)

The unit head of the ANC department should ensure more midwives participate in yearly training programs by NMEP. Also, health staff should inform the caregivers about free services and those they must pay for. The in-charges should ensure that indirect payment of SP through the purchase of water, and ANC book cover, should be avoided.

Lastly, there should be a monthly record review at department and facility levels to bridge the gaps of data discrepancies between source data and other secondary data platforms (DHIMS).

6.3.2 District, regional and National Levels

There should be adequate workshops for health staff especially all midwives on IPT-SP. This will help the staff to gain more knowledge on IPTp-SP. The district should ensure that the staff selection to participate in the IPTp-SP training should be evenly distributed across all years of experience.

References

Acquah, A. A. K. (2009). Controlling malaria in pregnancy: Investigating the factors influencing intermittent preventive treatment services uptake in Ghana's Nzema-east district.

Agbozo, F., Abubakari, A., Der, J., & Jahn, A. (2016). Prevalence of low birth weight, macrosomia, and stillbirth are associated with maternal risk factors in Hohoe Municipality, Ghana. Midwifery, 40, 200–206.

Ahorlu, C. S., Adongo, P., Koenker, H., Zigirumugabe, S., Sika-Bright, S., Koka, E., Tabong, P. T.-N., Piccinini, D., Segbaya, S., & Olapeju, B. (2019). Understanding the gap between access and use: A qualitative study on Ghana's barriers and facilitators to insecticide-treated net use. Malaria Journal, 18(1), 1–13.

Amratia, P., Psychas, P., Abuaku, B., Ahorlu, C., Millar, J., Oppong, S., Koram, K., & Valle, D. (2019). Characterizing local-scale heterogeneity of malaria risk: A case study in Bunkpurugu-Yunyoo district in northern Ghana. Malaria Journal, 18(1), 1–14.

Anchang-Kimbi, J. K., Kalaji, L. N., Mbacham, H. F., Wepnje, G. B., Apinjoh, T. O., Sumbele, I. U. N., Dionne-Odom, J., Tita, A. T., & Achidi, E. A. (2020a). Coverage and effectiveness of intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine (IPTp-SP) on adverse pregnancy outcomes in the Mount Cameroon area, South West Cameroon. Malaria Journal, 19(1), 1–12.

Anchang-Kimbi, J. K., Kalaji, L. N., Mbacham, H. F., Wepnje, G. B., Apinjoh, T. O., Sumbele, I. U. N., Dionne-Odom, J., Tita, A. T., & Achidi, E. A. (2020b). Coverage and effectiveness of intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine (IPTp-SP) on adverse pregnancy outcomes in the Mount Cameroon area, South West Cameroon. Malaria Journal, 19(1), 1–12.

Anders, K., Marchant, T., Chambo, P., Mapunda, P., & Reyburn, H. (2008). Timing of intermittent preventive treatment for malaria during pregnancy and the implications of current policy on early uptake in northeast Tanzania. Malaria Journal, 7(1), 1–7.

Anto, F., Agongo, I. H., Asoala, V., Awini, E., & Oduro, A. R. (2019). Intermittent preventive treatment of malaria in pregnancy: Assessment of the sulfadoxine-pyrimethamine three-dose policy on birth outcomes in rural Northern Ghana. Journal of Tropical Medicine, 2019.

Ayub, R. A., Oduro, A. R., Mensah, B. A., & Bockarie, A. S. (2017). Cultural factors influencing antenatal IPTp adherence in a rural Ghanaian district. Journal of Malaria Research, 2017, 3205125. doi: 10.1155/2017/3205125

Azizi, H., Davtalab-Esmaeili, E., Farahbakhsh, M., Zeinolabedini, M., Mirzaei, Y., & Mirzapour, M. (2020). Malaria situation in a clear area of Iran: An approach for the better understanding the health service providers' readiness and challenges for malaria elimination in clear areas. Malaria Journal, 19(1), 1–10.

Bajaria, S., Festo, C., Mrema, S., Shabani, J., Hertzmark, E., & Abdul, R. (2019). Assessment of the impact of availability and readiness of malaria services on uptake of intermittent preventive treatment in pregnancy (IPTp) provided during ANC visits in Tanzania. Malaria Journal, 18(1), 1–10.

Bauserman, M., Conroy, A. L., North, K., Patterson, J., Bose, C., & Meshnick, S. (2019). An overview of malaria in pregnancy. 43(5), 282–290.

Berry, I., Walker, P., Tagbor, H., Bojang, K., Coulibaly, S. O., Kayentao, K., Williams, J., Oduro, A., Milligan, P., & Chandramohan, D. (2018). Seasonal dynamics of malaria in West Africa: Evidence for carriage of infections acquired before pregnancy until first contact with antenatal care. The American Journal of Tropical Medicine and Hygiene, 98(2), 534.

Chico, R. M., Mayaud, P., Ariti, C., Mabey, D., Ronsmans, C., & Chandramohan, D. (2012). Prevalence of malaria and sexually transmitted and reproductive tract infections in pregnancy in sub-Saharan Africa: A systematic review. Jama, 307(19), 2079–2086.

Choonara, S., Odimegwu, C. O., & Elwange, B. C. (2015). Factors influencing the usage of different malaria prevention methods during pregnancy in Kenya. African Health Sciences, 15(2), 413–419.

Dada-Adegbola, H. O., Brown, B. J., & Labaeka, A. A. (2018). Prevalence of malaria and performance of a rapid diagnostic test for malaria in febrile children with sickle cell disease. Pediatric haematology-oncology Journal, 3(2), 42–45.

Dang, Y., Hao, S., Zhou, W., Zhang, L., & Ji, G. (2019). The traditional Chinese formulae Ling-gui-zhu-gan decoction alleviated non-alcoholic fatty liver disease via inhibiting PPP1R3C mediated molecules. BMC Complementary and Alternative Medicine, 19(1), 1–11.

Darteh, E. K. M., Buabeng, I., & Akuamoah-Boateng, C. (2021). Uptake of intermittent preventive treatment in pregnancy for malaria: Further analysis of the 2016 Ghana Malaria Indicator Survey. Journal of Public Health, 29(4), 967–978.

De Beaudrap, P., Turyakira, E., White, L. J., Nabasumba, C., Tumwebaze, B., Muehlenbachs, A., Guérin, P. J., Boum, Y., McGready, R., & Piola, P. (2013). Impact of malaria during pregnancy on pregnancy outcomes in a Ugandan prospective cohort with intensive malaria screening and prompt treatment. Malaria Journal, 12(1), 1–11.

Diengou, N. H., Viyoff, V. Z., & Nkfusai, N. (n.d.). Malaria in Pregnancy: Intermittent Preventive Treatment Coverage Among Women of the Bamenda Health District, Cameroon.

Doku, D. T., Zankawah, M. M., & Adu-Gyamfi, A. B. (2016a). Factors influencing dropout rate of intermittent preventive treatment of malaria during pregnancy. BMC Research Notes, 9(1), 1–7.

Doku, D. T., Zankawah, M. M., & Adu-Gyamfi, A. B. (2016b). Factors influencing dropout rate of intermittent preventive treatment of malaria during pregnancy. BMC Research Notes, 9(1), 1–7.

Doku, D. T., Zankawah, M. M., & Adu-Gyamfi, A. B. (2016c). Factors influencing dropout rate of intermittent preventive treatment of malaria during pregnancy. BMC Research Notes, 9(1), 1–7.

Eijla, A., Ayisi, G., & Kuile, F. (2002). Implementation of IPT with SP for control of malaria in Kisumu, Kenya. Malar J, 265–266.

Frederico, M., Michielsen, K., Arnaldo, C., & Decat, P. (2018). Factors influencing abortion decision-making processes among young women. International Journal of Environmental Research and Public Health, 15(2), 329.

Gardner, R. V. (2018). Sickle cell disease: Advances in treatment. Ochsner Journal, 18(4), 377–389.

Gbenatey, J. (2018). The utilization of Intermittent Preventive Treatment during Pregnancy in the Awutu Senya East Municipality, A Case Study at the Kasoa Polyclinic.

Gomez, P. P., Gutman, J., Roman, E., Dickerson, A., Andre, Z. H., Youll, S., Eckert, E., & Hamel, M. J. (2014a). Assessment of the consistency of national-level policies and guidelines for malaria in pregnancy in five African countries. Malaria Journal, 13(1), 1–13.

Gomez, P. P., Gutman, J., Roman, E., Dickerson, A., Andre, Z. H., Youll, S., Eckert, E., & Hamel, M. J. (2014b). Assessment of the consistency of national-level policies and

guidelines for malaria in pregnancy in five African countries. Malaria Journal, 13(1), 1–13.

González-Silva, M., & Rabinovich, N. R. (2021). Some lessons for malaria from the Global Polio Eradication Initiative. Malaria Journal, 20(1), 1–13.

Gutman, J., Kovacs, S., Dorsey, G., Stergachis, A., & Ter Kuile, F. O. (2017). Safety, tolerability, and efficacy of repeated doses of dihydroartemisinin-piperaquine for prevention and treatment of malaria: A systematic review and meta-analysis. The Lancet Infectious Diseases, 17(2), 184–193.

Katsuragawa, T. H., Gil, L. H. S., Lima, A. A. de, Freitag, E. M., Santos, T. M. dos, Nascimento Filha, M. T. do, Santos Júnior, A. P. J. dos, Silva, J. M. da, Rodrigues, A. de F., & Tada, M. S. (2013). Selective intermittent preventive treatment of vivax malaria: Reducing malaria incidence in an open cohort study in Brazilian Amazon. Malaria Research and Treatment, 2013.

Kayentao, K., Garner, P., van Eijk, A. M., Naidoo, I., Roper, C., Mulokozi, A., MacArthur, J. R., Luntamo, M., Ashorn, P., & Doumbo, O. K. (2013). Intermittent preventive therapy for malaria during pregnancy using two vs three or more doses of sulfadoxine-pyrimethamine and risk of low birth weight in Africa: Systematic review and meta-analysis. Jama, 309(6), 594–604.

Kibusi, S. M., Kimunai, E., & Hines, C. S. (2015). Predictors for uptake of intermittent preventive treatment of malaria in pregnancy (IPTp) in Tanzania. BMC Public Health, 15(1), 1–8.

Kwenti, T. E. (2018). Malaria and HIV coinfection in sub-Saharan Africa: Prevalence, impact, and treatment strategies. Research and Reports in Tropical Medicine, 9, 123.

Lee, Y., & Kind, M. (2021). World Social Report 2021: Reconsidering Rural Development. United Nations.

Leke, R. F., Bioga, J. D., Zhou, J., Fouda, G. G., Leke, R. J., Uchida, V., Megnekou, R., Fogako, J., Sama, G., & Gwanmesia, P. (2010). Longitudinal studies of Plasmodium falciparum malaria in pregnant women living in a rural Cameroonian village with high perennial transmission. The American Journal of Tropical Medicine and Hygiene, 83(5), 996.

Lutgen, P. (2018). Alcohol and malaria. Pharm Pharmacol Int J, 6(4), 310–311.

Marchant, T., Nathan, R., Jones, C., Mponda, H., Bruce, J., Sedekia, Y., Schellenberg, J., Mshinda, H., & Hanson, K. (2008). Individual, facility and policy levels influence national coverage estimates for intermittent preventive treatment of malaria in pregnancy in Tanzania. Malaria Journal, 7(1), 1–8.

McAllister, D. A., Liu, L., Shi, T., Chu, Y., Reed, C., Burrows, J., Adeloye, D., Rudan, I., Black, R. E., & Campbell, H. (2019). Global, regional, and national estimates of pneumonia morbidity and mortality in children younger than 5 between 2000 and 2015: A systematic analysis. The Lancet Global Health, 7(1), e47–e57.

McClure, E. (2013). Plasmodium falciparum malaria in pregnancy and fetal, newborn, and maternal outcomes among a cohort of pregnant women in coastal Kenya, 2006-2009.

Min, M., Bunt, C. R., Mason, S. L., & Hussain, M. A. (2019). Non-dairy probiotic food products: An emerging group of functional foods. Critical Reviews in Food Science and Nutrition, 59(16), 2626–2641.

Monroe, A., Asamoah, O., Lam, Y., Koenker, H., Psychas, P., Lynch, M., Ricotta, E., Hornston, S., Berman, A., & Harvey, S. A. (2015). Outdoor-sleeping and other night-time activities in northern Ghana: Implications for residual transmission and malaria prevention. Malaria Journal, 14(1), 1–12.

Mpogoro, F. J., Matovelo, D., Dosani, A., Ngallaba, S., Mugono, M., & Mazigo, H. D. (2014). Uptake of intermittent preventive treatment with sulphadoxine-pyrimethamine for

malaria during pregnancy and pregnancy outcomes: A cross-sectional study in Geita district, North-Western Tanzania. Malaria Journal, 13(1), 1–14.

Mubyazi, G., Bloch, P., Kamugisha, M., Kitua, A., & Ijumba, J. (2005). Intermittent preventive treatment of malaria during pregnancy: A qualitative study of knowledge, attitudes and practices of district health managers, antenatal care staff and pregnant women in Korogwe District, North-Eastern Tanzania. Malaria Journal, 4(1), 1–10.

Munisi, D. Z., Nyundo, A. A., & Mpondo, B. C. (2019). Knowledge, attitude and practice towards malaria among symptomatic patients attending Tumbi Referral Hospital: A cross-sectional study. Plos One, 14(8), e0220501.

Mwandama, D., Gutman, J., Wolkon, A., Luka, M., Jafali, J., Ali, D., Mathanga, D. P., & Skarbinski, J. (2015). The use of intermittent preventive treatment in pregnancy and insecticide-treated bed nets for malaria prevention by women of childbearing age in eight districts in Malawi. Malaria Journal, 14(1), 1–10.

Ndwigah, S., Stergachis, A., Abuga, K., Mugo, H., & Kibwage, I. (2019). Availability and prices of antimalarials and staffing levels in Embu County, Kenya health facilities. East and Central African Journal of Pharmaceutical Sciences, 22(1), 26–34.

Nkoka, O., Chuang, T.-W., & Chen, Y.-H. (2018). Association between timing and number of antenatal care visits on uptake of intermittent preventive treatment for malaria during pregnancy among Malawian women. Malaria Journal, 17(1), 1–11.

Noguchi, L., Grenier, L., Kabue, M., Ugwa, E., Oyetunji, J., Suhowatsky, S., Onguti, B., Orji, B., Whiting-Collins, L., & Adetiloye, O. (2020). Effect of group versus individual antenatal care on uptake of intermittent prophylactic treatment of malaria in pregnancy and related malaria outcomes in Nigeria and Kenya: Analysis of data from a pragmatic cluster randomized trial. Malaria Journal, 19(1), 1–8.

Okell, L. C., Bousema, T., Griffin, J. T., Ouédraogo, A. L., Ghani, A. C., & Drakeley, C. J. (2012). Factors determining the occurrence of submicroscopic malaria infections and their relevance for control. Nature Communications, 3(1), 1–9.

Okethwangu, D., Birungi, D., Biribawa, C., Kwesiga, B., Turyahabwe, S., Ario, A. R., & Zhu, B.-P. (2019). Multidrug-resistant tuberculosis outbreak associated with poor adherence and delayed treatment: Arua District, Uganda, 2013–2017. BMC Infectious Diseases, 19(1), 1–10.

Omer, S. A., Idress, H. E., Adam, I., Abdelrahim, M., Noureldein, A. N., Abdelrazig, A. M., Elhassan, M. O., & Sulaiman, S. M. (2017). Placental malaria and its effect on pregnancy outcomes in Sudanese women from Blue Nile State. Malaria Journal, 16(1), 1–8.

Parise, M. E., Ayisi, J. G., Nahlen, B. L., Schultz, L. J., Roberts, J. M., Misore, A., Muga, R., Oloo, A. J., & Steketee, R. W. (1998). Efficacy of sulfadoxine-pyrimethamine for preventing placental malaria in Kenya with a high prevalence of malaria and human immunodeficiency virus infection. The American Journal of Tropical Medicine and Hygiene, 59(5), 813–822.

Piccin, A., Murphy, C., Eakins, E., Rondinelli, M. B., Daves, M., Vecchiato, C., Wolf, D., Mc Mahon, C., & Smith, O. P. (2019). Insight into the complex pathophysiology of sickle cell anaemia and possible treatment. European Journal of Haematology, 102(4), 319–330.

Rogerson, S. J., Chaluluka, E., Kanjala, M., Mkundika, P., Mhango, C., & Molyneux, M. E. (2000). Intermittent sulfadoxine-pyrimethamine in pregnancy: effectiveness against malaria morbidity in Blantyre, Malawi, 1997–1999. The Royal Society of Tropical Medicine and Hygiene Transactions, 94(5), 549–553.

Rogerson, S. J., Desai, M., Mayor, A., Sicuri, E., Taylor, S. M., & van Eijk, A. M. (2018a). Burden, pathology, and costs of malaria in pregnancy: New developments for an old problem. The Lancet Infectious Diseases, 18(4), e107–e118.

Rogerson, S. J., Desai, M., Mayor, A., Sicuri, E., Taylor, S. M., & van Eijk, A. M. (2018b). Burden, pathology, and costs of malaria in pregnancy: New developments for an old problem. The Lancet Infectious Diseases, 18(4), e107–e118.

Sangho, O., Tounkara, M., Whiting-Collins, L. J., Beebe, M., Winch, P. J., & Doumbia, S. (2021). Determinants of intermittent preventive treatment with sulfadoxine-pyrimethamine in pregnant women (IPTp-SP) in Mali, a household survey. Malaria Journal, 20(1), 1–11.

Shulman, C., Dorman, E., Cutts, F., Kawuondo, K., Bulmer, J., Peshu, N., & Marsh, K. (1999). Intermittent sulphadoxine-pyrimethamine to prevent severe anaemia secondary to malaria in pregnancy: A randomized placebo-controlled trial. The Lancet, 353(9153), 632–636.

Suthar, B., & Bhargava, A. (2021). Biosensor application of one-dimensional photonic crystal for malaria diagnosis. Plasmonics, 16(1), 59–63.

Tackie, V., Seidu, A.-A., & Osei, M. (2021). Factors influencing the uptake of intermittent preventive treatment of malaria among pregnant women: A cross-sectional study. Journal of Public Health, 29(5), 1205–1213.

Takem, E. N., & D'Alessandro, U. (2013a). Malaria in pregnancy. Mediterranean Journal of Hematology and Infectious Diseases, 5(1).

Takem, E. N., & D'Alessandro, U. (2013b). Malaria in pregnancy. Mediterranean Journal of Hematology and Infectious Diseases, 5(1).

Tobin-West, C. I., & Kanu, E. N. (2016). Factors influencing malaria prevention methods among women of reproductive age in peri-urban communities of Port Harcourt City, Nigeria. Nigerian Postgraduate Medical Journal, 23(1), 6.

Uneke, C. J. (2007). Impact of placental Plasmodium falciparum malaria on pregnancy and perinatal outcome in sub-Saharan Africa: Introduction to placental malaria. The Yale Journal of Biology and Medicine, 80(2), 39.

Verhoeff, F. H., Brabin, B. J., Hart, C. A., Chimsuku, L., Kazembe, P., & Broadhead, R. L. (1999). Increased malaria prevalence in HIV-infected pregnant women and its implications for malaria control. Tropical Medicine & International Health, 4(1), 5–12.

Walker, P. G., Floyd, J., Ter Kuile, F., & Cairns, M. (2017a). Estimated impact on birth weight of scaling up intermittent preventive treatment of malaria in pregnancy given sulphadoxine-pyrimethamine resistance in Africa: A mathematical model. PLoS Medicine, 14(2), e1002243.

Walker, P. G., Floyd, J., Ter Kuile, F., & Cairns, M. (2017b). Estimated impact on birth weight of scaling up intermittent preventive treatment of malaria in pregnancy given sulphadoxine-pyrimethamine resistance in Africa: A mathematical model. PLoS Medicine, 14(2), e1002243.

Wang, J., Xu, C., Wong, Y. K., He, Y., Adegnika, A. A., Kremsner, P. G., Agnandji, S. T., Sall, A. A., Liang, Z., & Qiu, C. (2020). Preparedness is essential for malaria-endemic regions during the COVID-19 pandemic. The Lancet, 395(10230), 1094–1096.

Weiss, D. J., Lucas, T. C., Nguyen, M., Nandi, A. K., Bisanzio, D., Battle, K. E., Cameron, E., Twohig, K. A., Pfeffer, D. A., & Rozier, J. A. (2019). Mapping the global prevalence, incidence, and mortality of Plasmodium falciparum, 2000–17: A spatial and temporal modelling study. The Lancet, 394(10195), 322–331.

World Health Organization. (2014). WHO policy brief for implementing intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP). World Health Organization.

World Health Organization. (2015). Trends in maternal mortality: 1990-2015: Estimates from WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. World Health Organization.

Yameny, A. A. (2017). The evolving schistosomiasis agenda 2017-2020 in Egypt: Moving from control toward final elimination. Journal of Bioscience and Applied Research, 3(2), 48–54.

Yaya, S., Uthman, O. A., Amouzou, A., & Bishwajit, G. (2018). Use of intermittent preventive treatment among pregnant women in sub-Saharan Africa: Evidence from malaria indicator surveys. Tropical Medicine and Infectious Disease, 3(1), 18.

World Health Organization. (2019). World Malaria Report 2019. Geneva: WHO. Retrieved from https://www.who.int/publications/i/item/9789241565721

Ghana Health Service. (2021). Annual Report on Maternal and Child Health. Accra: GHS. Retrieved from https://www.ghanahealthservice.org/downloads/Annual_Report_on_MCH_2021.pdf

Mbonye, A. K., Bygbjerg, I., Magnussen, P., & Intermittent Preventive Treatment of Malaria in Pregnancy (IPTp) Study Group. (2015). Intermittent preventive treatment of malaria in pregnancy: a new delivery system and its effect on maternal health and pregnancy outcomes in Uganda. Bulletin of the World Health Organization, 93(3), 233-239. doi: 10.2471/BLT.14.141349

Hill, J., Kayentao, K., Achieng, F., Diarra, S., Dellicour, S., Diawara, S. I., ... & Webster, J. (2020). Access and use of interventions to prevent and treat malaria among pregnant

women in Kenya and Mali: a qualitative study. PLoS ONE, 15(1), e0227832. doi: 10.1371/journal.pone.0227832

Ghana Statistical Service (GSS). (2018). Ghana Demographic and Health Survey 2017. Accra: GSS. Retrieved from https://dhsprogram.com/pubs/pdf/FR307/FR307.pdf

APPENDIX A
QUESTIONNARE

CODE----------

Name of your facility? [ ] Madina Kekele Polyclinic [ ] Pentecost Hospital

SECTION1: SOCIO-DEMOGRAPHIC FACTORS

1. **Age**: ----------
2. **Residence**

   [ ] Urban
   [ ] rural
3. **Marital Status:**

   [ ] Married
   [ ]Single
   [ ]Co-habiting
   [ ]Widowed
   [ ] Divorced
   [ ] Separated

4. **Highest level of education:**
   [ ]Tertiary
   [ ]SHS
   [ ]JHS
   [ ]Primary
   [ ] No formal education

5. **Occupation:**

   [ ] Government Sector Employee
   [ ] Non- Government sector employee
   [ ] Self-employed
   [ ] Unemployed

6. **Income level:**
   [ ] More than 1000 cedis
   [ ] 300-1000 cedis
   [ ] Less than 300 cedis
   [ ] No regular income
   [ ] Dependent

7. **Religion:**
   [ ]Christianity
   [ ]Islam

[ ]African Traditional
[ ]Other, specify: ……

8. **Ethnicity (Tribe)**……..

9. **NHIS status**:
[ ] Insured
[ ] Non-insured

10. **Place of delivery:**
[ ] Home delivery
[ ] Institutional delivery

11. **Gravidity: …….**

12. **Parity:** …….

13. **Reported malaria pregnancy**
[ ] No
[ ] Yes

14. **IPTp doses received:**
[ ] One
[ ] Two
[ ] Three
[ ] Four
[ ] Five and above

15. **Ever heard about IPTp-SP:**
[ ] No
[ ] Yes

16. **Bed net use:**
[ ] No
[ ] Yes

17. **ANC visit**
[ ] 1st Trimester
[ ] 2nd Trimester
[ ] 3rd Trimester

IPTP-SP UPDATE AMONG PREGNANT WOMEN

18. Was the SP drug given to you to swallow at the hospital, or was it given to you to be taken home?
[ ] No, I took it home
[ ] Yes, it was taken at the hospital

19. **What time of pregnancy did you take the SP?**
[ ] 1st Trimester
[ ] 2nd Trimester
[ ] 3rd Trimester

20. **How helpful were the health professionals in helping you follow the program?**

[ ] Not at all
[ ] Fairly helpful
[ ] Quite helpful
[ ] Very helpful

21. **How well did the health workers monitor your adherence to the course?**

[ ] Not at all
[ ] Fairly well
[ ] Quite Strictly
[ ] Strictly

22. **Did you pay for the lTPp-SP drug at the hospital?**
[ ] No
[ ] Yes

23. **Have you! had a prior pregnancy without being put on the IPTp-SP drugs?**
[ ] No
[ ] Yes

24. **To what extent do you think the IPTp-SP has positively affected your health status throughout pregnancy?**

[ ] Not at all
[ ] Average effect
[ ] significant effect

25. **To what extent do you think the IPTp-SP has positively affected your health status during prenatal and postnatal stages?**
[ ] Not at all
[ ] Average effect
[ ] significant effect

FACILITY-BASED FACTORS THAT COULD CONTRIBUTE TO THE UPTAKE OF IPTP-SP AMONG PREGNANT WOMEN

26. **Was SP available at all scheduled times during your ANC?**

[ ] No
[ ] Yes

27. **Did you have to pay for the SP at any point?**
[ ] No
[ ] Yes

28. **Were you prescribed SP to purchase?**
[ ] No
[ ] Yes

29. **Did you make out-of-pocket payment for the following healthcare services during pregnancy? (*Please tick all that apply*).**

[ ] Laboratory investigations
[ ] Ultrasound scan
[ ] Other medication
[ ] None

30. **Was IPTp-SP administered under DOT throughout?**
[ ] No
[ ] Yes

Facility observation

No	Parameter	Response
31.	Presence of water for sale for DOT	[ ] No [ ] Yes
32.	SP available at ANC over the past 6 months	[ ] No [ ] Yes
33.	Presence of posters of IPTp/MIP on the wall	[ ] No [ ] Yes
34.	Presence of ANC Monthly Data returns form	[ ] No [ ] Yes

35.	SP given is recorded in ANC Report Book	[ ] No [ ] Yes
36.	Presence/Record of Adverse Event forms for SP	[ ] No [ ] Yes
37.	Was recording done in both ANC Record book and Register	[ ] No [ ] Yes

PATIENT-RELATED FACTORS THAT COULD CONTRIBUTE TO THE UPTAKE OF IPTP-SP UPTAKE AMONG POSTNATAL CARE MOTHERS.

Knowledge of malaria in pregnancy

38. How is malaria transmitted?.....

39. What are the dangers of malaria to a pregnant woman? (Tick all that apply)
[ ] Can cause anaemia
[ ] preterm labour
[ ] Can cause maternal illness
[ ] Can cause maternal death

40. What are the dangers of malaria to the unborn baby? (Tick all that apply)
[ ] Spontaneous Abortion
[ ] Intra Uterine Death
[ ] Low birth weight
[ ] Prematurity

41. By what other means can one prevent malaria in pregnancy? (Tick all that apply)
[ ] Drain stagnant water
[ ] Sleep under insecticide-treated net
[ ] Use mosquito repellent
[ ] Wear protective clothing

Knowledge of IPTp-SP

42. When should a pregnant woman start IPTp -SP?
[ ] Before 13 weeks
[ ] 16weeks and above
[ ] After 24 weeks
[ ] I Do not Know

43. How many times is IPTp-SP given during pregnancy at the ANC?
[ ] Once
[ ] 2-3times
[ ] 4-5times
[ ] Several as applicable
[ ] Do not know

44. At what regular interval should IPTp-SP be given?
[ ] Weekly
[ ] Monthly
[ ] Bi-monthly
[ ] Do not know

45. How were you informed about SP?

[ ] Through staff at ANC
[ ] Radio
[ ] Television
[ ] Mobile health service van

46. What are the consequences of not taking SP as a pregnant woman?
[ ] Malaria
[ ] Anaemia
[ ] Death
[ ] Effects on the foetus

IPTp-SP uptake in pregnancy
47. Gestational age (months) at first SP intake……
48. How many doses of SP were taken in pregnancy? Tick all that apply [ ] IPT1
[ ] IPT2
[ ] IPT3
[ ] IPT4
[ ] IPT5
[ ] More than 5

49. Were you given IPTp-SP under DOT each time?
[ ] Yes
[ ] No
[ ] Sometimes

50. Were you served water to take medicine?

[ ] Yes
[ ] No

51. Did you have to buy the water?
[ ] Yes
[ ] No

Distance to Healthcare Centre
52. How far is your residence from the health facility?
[ ] Less than 30 mins
[ ] 30min-1 hour
[ ] More than 1 hour

53. How much do you spend on transportation to and from the health facility?
[ ] No money spent
[ ] less than 5 cedis
[ ] 5 to 10 cedis
[ ] More than 10 cedis

54. How difficult is it to access transport to the health facility?
[ ] No need for transport
[ ] Readily accessible
[ ] Difficult to access

55.a. Do you need to seek permission before attending ANC?
[ ] Yes
[ ] No

56.b. If yes, from who?
[ ] Spouse/partner
[ ] Work

57. Side effects of SP
Did you experience any allergy after taking the dose(s) of SP
[ ] Yes
[ ] No
If yes, please specify……

1. G6PD test result (please refer to ANC book) ……