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UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT DURING PREGNANCY AND ITS INFLUENCE ON THE BIRTH WEIGHT OF NEWBORNS IN MAAMOBI GENERAL HOSPITAL IN GHANA.

BY

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DECLARATION

I EMMANUEL BAFFO, declare that this research is my own work produced from research undertaken under supervision. Parts of works used from other researchers have been duly referenced. This dissertation, either in whole or part has not been presented anywhere else for the purpose of another degree.

..... Date: 17/10/2019

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DEDICATION

This research is dedicated to Mr. Sampson K. Baffo, my father.

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ABSTRACT

Background

Malaria in pregnancy is an enormous public health challenge with at least 50 million pregnant women living in malaria-endemic areas most especially sub-Saharan Africa. One of the most effective methods of preventing malaria in pregnancy is "Intermittent Preventive Treatment in Pregnancy with Sulfadoxine –Pyrimethamine" (IPTp-SP). Malaria in pregnancy leads to complications which have a negative effect on the mother, fetus and the infant. The uptake of doses of IPTp-SP3+ has been found to increase birth weight and reduce the risk of adverse birth outcomes. However, reports suggest that the proportion of pregnant women who received IPTp-SP3+ in the Greater Accra Region in DHS (2014) was 35.3%. The purpose of this study is to assess the uptake of IPTp-SP and its effect on birth weight and to measure IPTp-SP indicators in the Maamobi General Hospital in Ghana.

Objectives

The general objective of this study was to assess the uptake of IPTp-SP and its influence on the birth weight of newborns in the Maamobi General Hospital in Ghana. Specifically, the study sought to measure indicators such as the coverage of IPTp-SP3+ among postpartum women during their most recent pregnancy.

Methods

The study was cross-sectional descriptive, hospital-based research carried out among 380 postpartum women attending postnatal or CWC in Maamobi General Hospital during the period of data collection. A structured questionnaire was employed to interview participants and a complementary qualitative component involving in-depth interview was conducted to explore the challenges related to the implementation of IPTp-SP in the hospital from healthcare **workers'** perspective. The quantitative data were analyzed with Microsoft Excel 2013 and STATA version 15, whiles the qualitative component involved a thematic analysis.

Results

The mean age of respondents was 28.9 years (SD=5.5). The average birth weight was 3.03kg (SD=0.52). The uptake of IPTp-SP3+ was 72.1% whiles the uptake of less than IPTp-SP3+ was 27.9%. The prevalence of LBW was 12.6%, whiles the proportion of the adequate and

inadequate stock of IPTp-SP was 41.7% and 58.3% respectively. Respondents who took IPTp-SP3+ had reduced odds of LBW (AOR=0.12; [95% CI, 0.06-0.26]).

Conclusion

The uptake of IPTp-SP3+ was 72.1% in Maamobi General Hospital which was higher than the reported 35.3% in the GDHS 2014. Additionally, higher doses of IPTp-SP had a reduced risk of LBW with a statistically significant association.

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LIST OF ABBREVIATIONS

ANC	Antenatal Clinic
AIDS	Acquired Immunodeficiency Syndrome
A.M.A	Accra Metropolitan Assembly
CHIM	Central Health Information Management
CWC	Child Welfare Clinic
DOT	Direct Observed Therapy
DM	Diabetes Mellitus
G6PD	Glucose 6 Phosphate Dehydrogenase
GTS	Global Technical Strategy for Malaria
HIV	Human Immunodeficiency Virus
HCW	Health Care Worker
IPT	Intermittent Preventive Therapy
IPTp-SP	Intermittent Preventive Treatment in Malaria with Sulfadoxine-Pyrimethamine
ITN	Insecticide Treated Net
LBW	Low Birth Weight
MGH	Maamobi General Hospital
MIP	Malaria in Pregnancy
MIS	Malaria Indicator Survey
M&E	Monitoring and Evaluation
NMCP	National Malaria Control Programme
OPD	Outpatient Department
P.falciparum	Plasmodium Falciparum
RMB	Roll Back Malaria
UNDP	United Nations Development Programme
UNICEF	United Nations Children Education Fund
WHO	World Health Organization

DEFINITION OF TERMS

Acquired Immunity: This is the immunity that develops after exposure to an agent.

DOT: A pregnant woman receiving and swallowing SP during antenatal care visit under the direct observation of a qualified healthcare worker.

Gestational age: This is a measure of the age of a pregnancy which is taken from the woman's last menstrual period

Gravidity: This refers to the number of times a woman has been pregnant, regardless of whether the pregnancies were interrupted or resulted in a live birth.

Low birth weight: The newborn baby with a bodyweight of less than 2.5kg

IPT: Administering anti-malarial drugs at predefined intervals to clear presumed malaria parasites from the blood of a pregnant woman. This is based on the notion that every pregnant woman who lives in a highly stable malaria transmission area has malaria parasite in her blood.

IPTp-SP coverage: The percentage of pregnant women who received IPTp-SP by DOT out of all pregnant women visiting the ANC in a particular facility or district.

IPTp-SP uptake: The process by which SP is taken by pregnant women at the ANC clinic as a means of intermittent preventive treatment for malaria.

IPTp-SP1: The percentage of pregnant women who received one dose of SP during their most recent pregnancy

IPTp-SP2: The percentage of pregnant women who received two doses of SP during their most recent pregnancy.

IPTp-SP3: The percentage of pregnant women who received three doses of SP during their most recent pregnancy.

IPTp-SP3+: The percentage of pregnant women who received three or more doses of SP during their most recent pregnancy.

> IPT3: The percentage of pregnant women who received less than three doses of SP

≥IPT3: The percentage of pregnant women who received three or more doses of SP during their most recent pregnancy.

Primigravida: This is a woman who is pregnant for the first time or has been pregnant one time.

Postpartum: This period begins after the birth of a child, and the mother's body including hormone levels and uterus size, returns to a non-pregnant state.

Multigravida: This is a woman who has been pregnant multiple times

Secundigravid: This is a woman who is pregnant for the second time.

1st Trimester: This is the week one to the 12th week of pregnancy.

2nd Trimester: This is the period between the 13th weeks to 28th week of pregnancy

3rd Trimester: This is the period between the 29th weeks to 38th week of pregnancy

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Malaria accounts for the largest cause of death in Africa, with 90 percent of worldwide malaria fatalities happening in the region, according to the World Malaria Report 2016. It accounts for 9% of the illness burden in Africa and accounts for 25% of deaths below five. During gestation, the vulnerability to malaria is increased by up to 3 times, putting pregnant women in a vulnerable group. (Nwaefuna, Afoakwah, Orish, Egyir-yawson, & Boampong, 2015). The fourth highest cause of death in children is malaria, contributing to 10% of child mortality in sub-Saharan Africa. Recent reports indicate that the episodes of malaria globally are projected to be 214 million and 88% of all cases occurred in the WHO African Region. In addition, the incidence rate is reported to be 246 per 1000 at risk of malaria in sub-Saharan Africa. The mortality rate is globally estimated at 19 per 100 000 at risk of malaria and most of that mortality in 2015 were in WHO Africa Region representing 90% of total deaths that occurred. In essence, the genus Plasmodium has five species of parasites that cause malaria in humans and four of them – P.ovale, P.malariae, P. vivax, and P. falciparum – malaria species in humans are spread from individual to individual by the bite of female Anopheles mosquitoes. (Hakorimana, 2016).

Globally, it is estimated that a significant 3.2 billion individuals out of 97 nations are at danger of malaria parasite infection and obtain the disease from which 1.2 billion individuals are at high risk. (WHO 2014). Low and medium-income nations are primarily impacted by malaria, particularly in the poorest and most ostracized groups. Sub-Saharan Africa, Asia, and Latin America have the largest malaria instances, and to a lesser extent, the Middle East and part of Europe are also affected. Around 25 million pregnant females are at danger of

becoming infected with P.falciparum in Africa every year (2014 WHO). ("malaria," 2014).In a review of studies in Southern Africa and Eastern Africa, the prevalence of malaria in women attending clinics were as follows: 32% for peripheral malaria and 38.2% for placental malaria (Chico, 2012). Furthermore, in low transmission areas of the African continent, placental and peripheral parasitaemia have been found to be 6.7% and 13.7% respectively, while in low transmission zones outside Africa, placental infection is slightly higher (9.6%) than peripheral infection (6.2%). Reportedly 1 in every 4 pregnant women has evidence of placental or peripheral infection with malaria parasites in areas of stable transmission in sub-Saharan Africa. (Desai et al., 2007)

It is noted that adult females do not have a significant amount of immunity in regions with low and epidemic malaria transmission and will develop the clinical disease if they have parasitaemia. Pregnant women without immunity may die from serious malaria disease and/or face spontaneous abortion, premature delivery, low birth weight or death. All pregnant females are at danger of malaria infection regardless of parity, but the prevalence and intensity of malaria infection during pregnancy in females infected with HIV are greater. (WHO 2014).). In addition, low birth weight risk is doubled by placental malaria. In itself, low birth weight is a high-risk factor for neonatal deaths, but low birth weight caused by malaria is expected to account for 3 to 17 fatalities per 1000 live births. It is also estimated that 5.7% of infant and neonatal deaths in endemic malaria areas in Africa can be caused by low birth weight owing to malaria in pregnancy. In addition, stillbirths, spontaneous abortion, fetal anemia may also be an outcome of maternal parasitaemia. Placental malaria diminishes fetal cellular and antibody reaction to P.falciparum making infants vulnerable to malaria. (Desai et al., 2007).

Many interventions have been suggested by the World Health Organization (WHO 2014) to control malaria and its impacts during pregnancy. This involves promoting and using insecticide-treated net (ITN), administering intermittent preventive treatment with Sulfadoxine-Pyrimethamine (IPTp-SP) during pregnancy, and appropriate case management through timely and effective malaria treatment in pregnant women. (Health, 2014). IPT is the serving of regular dosage of Sulfadoxine-Pyrimethamine (SP) to all asymptomatic pregnant women. The IPT with SP should be given as part of a complete antenatal package with other drugs like anti-helminthics and haematinics and to control maternal anaemia in pregnancy. IPT is based on periodic SP administration after quickening to clear the presumed parasite burden. IPTp-SP of malaria during pregnancy is based on the assumption that every pregnant female residing in high malaria transmission areas has malaria parasites in her placenta or blood, regardless of whether or not she has signs of malaria. (Manual & Health, 2005).

The poor utilization and coverage of IPTp-SP is a serious concern for malaria prevention and eradication for national governments and health NGOs in sub-Saharan Africa. In addition, it is believed that there is a failure of healthcare systems to stimulate maternal healthcare services utilization due to persisting infrastructural, financial and sociocultural burden. (Sanni Yaya, Olalekan A. Uthman, Agbessi Amouzou, 2018). The WHO Global Technical Strategy for Malaria 2016-2030 (GTS) and the Roll Back Malaria (RBM) stress on malaria surveillance, monitoring and evaluation as a critical component in achieving the objectives of interventions used to curtail malaria. (Policy & Committee, 2016) . Monitoring and Evaluation are essential in accelerating the execution of malaria interventions as it evaluates whether programme aims or targets have been achieved, intervention-related challenges are documented, the availability and use of resources are

monitored, and to learn what has worked and not worked. This helps to inform policymakers and program managers so that a more effective and efficient programme can be designed or an effective design replicated. Different and or multiple data sources are needed in monitoring and evaluation of malaria interventions, including health facility and household surveys, sentinel sites, routine information systems and other special data collection efforts as needed to measure the effectiveness of malaria interventions. Additionally, the generation and reporting of data is one key factor in monitoring programme success and evaluation of program impact, as well as the efforts invested by different stakeholders in the fight against malaria. For instance, malaria indicators have shown a key role in programming and management among stakeholders. (Boerma, Abouzahr, Evans, & Evans, 2014) .

WHO says that monitoring the programmatic efficiency and effectiveness of IPTp-SP provision within the ANC is essential for ensuring the safety of pregnant females from the adverse effects of malaria during gestation (WHO 2013).In a study by WHO, IPTp-SP3+ was found to lead to fewer low birth weight and higher mean birth weight than two doses of IPTp-SP. Based on the evidence from the review, the WHO restructured the recommendations on IPTp-SP in October 2012 recommending that the last dosage of IPTp-SP could be given up to the period of delivery without any safety issues in order to upsurge the uptake of IPTp-SP during pregnancy. (Health, 2014). Subsequently, the NMCP in Ghana also updated its IPTp-SP policy and endorses at least five doses of SP. Achieving the three dosage goal set out in the old policy was problematic as IPT3 coverage was largely low over the years throughout the country. Several studies in Ghana reported low uptake of IPT3 in the country. For example, according to Tutu et al 2011, a 37% IPT3 uptake in the Ashanti Region was recorded in their study, whiles (Hommerich et al., 2007) reported 26% IPT3

uptake in the southern sector. Another study in the northern sector also reported a 46% IPT3 uptake in the Tamale Metropolis. (Doku, Zankawah, Boateng, & Gyamfi, 2016)

The aim of the current study was to assess the level of IPTp-SP uptake during pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital by collecting and measuring the indicators for the implementation of IPTp-SP.

1.1 Problem Statement

Despite the efforts to scale-up IPTp-SP, it is reported that the coverage of IPTp-SP of malaria in pregnancy is significantly below targets. Although IPTp-SP is free, the general prevalence of appropriate IPTp-SP uptake is extremely small, as less than a quarter of females reported taking at least three doses of SP during their last pregnancy. This falls short significantly of the target of 80% coverage of IPTp-SP3+. (Tutu, Lawson, & Browne, 2011). Malaria infection during the first trimester of pregnancy was found to be statistically associated with a higher risk of low birth weight. (Valea et al., 2012). Among the factors contributing to the low uptake of IPTp are health system ineffectiveness such as non-availability of IPTp guidelines and inadequate stock of SP. Additionally, the background characteristics of women such as education and parity have being found to influence the uptake of IPTp.

The WHO defines low birth weight as below 2500g or 2.5kg birth weight. Low birth weight remains a significant public health issue worldwide and has implications. It is estimated that low birth weight is between 15% and 20% of the world's births, which is around 20 million births per year.

The WHO recommends monitoring through regular surveillance systems and household surveys of the implementation of the new IPTp-SP policy. To guarantee the safety of pregnant women against malaria complications during pregnancy and to collect and evaluate

indicators for IPTp-SP, it is essential to monitor the programmatic efficiency of SP delivery within ANC. The significance of tracking and evaluating interventions in public health such as IPTp-SP is essential to the effective execution of the program.

Although there have been studies conducted in the Ayawaso Sub-metro with a recent study on malaria indicators (Hakorimana, 2016), no studies have been conducted on the uptake of IPTp-SP in the Ayawaso North district and as well as the indicators for the IPTp-SP. This research, therefore, seeks to fill this knowledge gap by evaluating the uptake of IPTp-SP among postpartum women during their most recent pregnancy at Maamobi General Hospital, the referral center for most clinics and CHPS compounds in the newly formed Ayawaso North District of the Greater Accra Region of Ghana.

1.2 Conceptual Framework

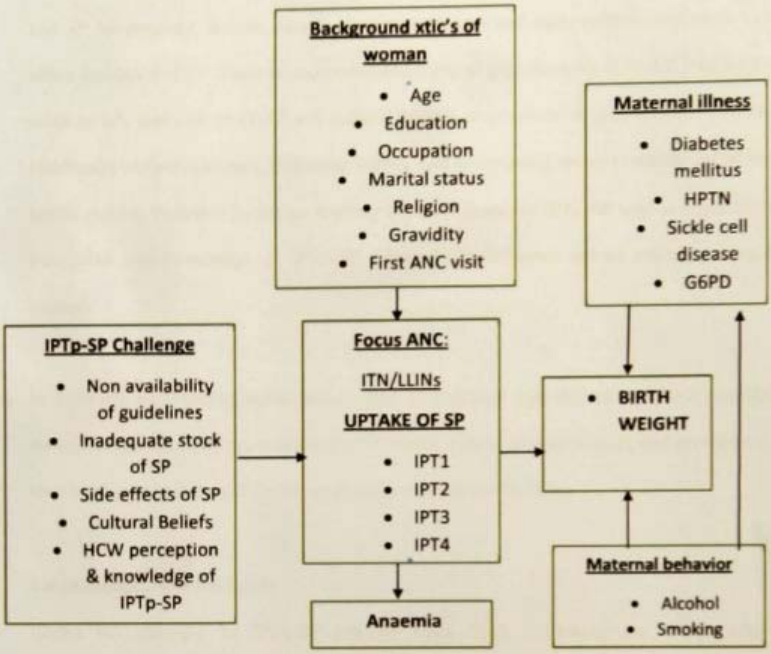

Figure 1: Conceptual Framework of Uptake of IPTp-SP and Birth Weight

1.3 Narration of Conceptual Framework

The advent of interventions such as "intermittent preventive treatment of malaria in pregnancy using Sulfadoxine-Pyrimethamine" among pregnant women during pregnancy has been proven to decrease the incidence of malaria in pregnancy and its related problems such as low birth weight. A higher number of SP dose in pregnancy has an increased chance of preventing low birth weight than a smaller number of dose. Maternal illness such as hypertension, diabetes, malaria, and anaemia can affect pregnancy outcome such as birth weight. Furthermore, maternal behavior such as smoking and drinking can lead to low birth weight and even maternal diseases.

The uptake of SP among pregnant women is determined by certain factors such as the health system effectiveness which includes a focus ANC which includes the distribution of ITN and SP for pregnant women. Health system challenges and other related constraints can affect the uptake of SP. These include non-availability of guidelines for IPTp-SP, inadequate stock of SP, side effects of SP and cultural beliefs or practices of the pregnant woman. Healthcare workers (doctors, midwives, nurses, and pharmacist) are an essential part of the health system, therefore in-service training and workshops on IPTp-SP tend to shape their perception and knowledge on IPTp-SP which could influence uptake among pregnant women.

In addition, socio-demographic factors such as maternal age, educational level, marital status, occupation, religion, number of ANC visits, date of first ANC visit, and gravity, etc. tend to adversely impact IPTp-SP uptake among pregnant females.

1.4 Justification of the Study

Ghana has changed its IPTp-SP strategy since 2012, following the WHO, latest recommendation on IPTp-SP, and now recommends that pregnant females could take IPTp-SP until delivery. In a study by WHO, IPTp-SP3+ was found to lead to fewer low birth weight and higher mean birth weight than two doses of IPTp-SP. Based on the evidence from the review, the WHO restructured the recommendations on IPTp-SP in October 2012 recommending that the last dosage of IPTp-SP could be given up to the period of delivery without any safety issues in order to upsurge the uptake of IPTp-SP during pregnancy. (Health, 2014)

This research is very essential to critically evaluate IPTp-SP uptake among postpartum females during their recent pregnancy and to evaluate IPTp-SP indicators. The results of this research will benefit first and foremost the healthcare workers, hospital and the district, Ghana's Ministry of Health; any other nation in sub-Saharan Africa with malaria endemicity, stakeholders, and donors as well. The results of this work could serve as a source of non-routine data for monitoring and evaluation purposes of IPTp-SP.

1.5 Research Questions

1. What is the uptake of IPTp-SP among postpartum women attending postnatal clinic in Maamobi General Hospital?
2. What is the proportion of postpartum women who took IPTp-SP under DOT during their most recent pregnancy?
3. What is the association between uptake of IPTp-SP and birth weight?
4. What are the challenges associated with the uptake of IPTp-SP in Maamobi General Hospital?

1.6 Study Objectives

1.6.1 General Objective

To assess the uptake of intermittent preventive treatment for malaria during pregnancy and its influence on birth weight of newborns in the Maamobi General Hospital in Ghana.

1.6.2 Specific objectives

The specific objectives of the study are to:

1. To determine the uptake of IPTp-SP among postpartum women attending a postnatal clinic in Maamobi General Hospital.

2. To estimate the proportion of postpartum women who took IPTp-SP under DOT during their most recent pregnancy.
3. To determine the association between uptake of IPTp-SP and birth weight.
4. To explore the challenges associated with uptake of IPTp-SP in Maamobi General Hospital

CHAPTER TWO

LITERATURE REVIEW

2.0 The burden of Malaria

Five significant parasite species of the genus Plasmodium parasite induce malaria. Four of these P.falciparum, P.vivax, P.malariae, and P.ovale are human malaria species that spread through the Anopheles genus female mosquito bite from person to person.

Around 367 million people around the world are at risk of malaria infection. Malaria is a P.falciparum infection. Malaria increase from 6.9 million in 2010 to 40.6 million in 2016 (i.e. 488% increase) with mortality rising from 39,100 in 2010 to 18,700 in 2016 (52% decline), while estimated cases decreased from 110.7 million in 2010 to 109.9 million in 2016 (0.01% decline) and from 287,000 in 2010 to 224,000 in 2016 (22%).(Confirmed, 2017). In 2017, the WHO reported that, compared to 217 instances in 2016, an estimated 219 million malaria cases happened globally. An approximately 20 million fewer cases of malaria were reported in 2017 than in 2010, but information for the 2015-2017 era did not show any important milestone in decreasing malaria instances worldwide. Significant cases of malaria that occurred in 2017 were in the WHO African Region (200 million or 92%), followed by the WHO South-East Asia Region with about 5% of cases, whereas 2% of cases occurred in the WHO Eastern Mediterranean Region.

Furthermore, in 2017, a total of 10 highest-burden nations in Africa reported a rise in malaria cases relative to 2016, but Rwanda reported an estimated decrease in its malaria burden, with 430,000 fewer cases in 2017 than in 2016, while it was estimated that Pakistan and Ethiopia registered a decrease of over 240,000 cases over the same period (World Malaria Report 2018, 2018).In addition, WHO 2018 reports that in 2017, the WHO Region of the

Americas experienced reductions in malaria mortality, with nearly 80% of global malaria mortality in 2017 being highly concentrated in the African and Indian region of the WHO, which accounted for 53% of all global malaria deaths with six of these countries in Africa. (World malaria report 2018, 2018)

2.1 Malaria in Pregnancy

Maternal anemia and low birth weight are correlated with malaria during pregnancy due to Plasmodium falciparum. But with intermittent preventive treatment with Sulfadoxine-Pyrimethamine, the issue of low birth weight due to malaria can be avoided. (Webster et al., 2013).

Notably, more than 30 million pregnant women in Africa are at danger of infection with Plasmodium falciparum in malaria-endemic regions. Malaria prevention during pregnancy is a significant public health challenge and a priority for the partnership between Roll Back Malaria. The symptoms and complications of pregnancy-related malaria vary depending on the transmission intensity and the quantity of immunity acquired. Therefore, pregnant women living in areas with low or unstable malaria transmission have little or no immunity to malaria and have a 2-3 chance of getting severe illness due to malaria infection compared to non-pregnant women. It is therefore estimated that malaria causes up to 10,000 maternal deaths each year in areas of stable transmission, primarily due to severe anaemia, and accounts for precisely 8% -14% of LBW and 3% -8% of child death. (Marchesini & Crawley, 2004)

2.2 Interventions in Malaria in Pregnancy

The WHO recommends a group of measures to control malaria and its impacts during pregnancy, consisting of promoting and using insecticide-treated net (ITNs), adequate case management through the timely and efficient treatment of malaria in pregnant females, and intermittent preventive treatment of malaria in pregnancy with Sulfadoxine-Pyrimethamine (IPTp-SP).(Health, 2014)

The WHO recommends that pregnant females should receive SP in regions of moderate to high malaria transmission. The WHO African Region in 2004 adopted this IPTp-SP policy after WHO introduced it in 2000. The IPTp-SP policy was updated in 2012 following findings from studies on the safety of multiple doses of SP. The new policy proposes four or more doses of SP during pregnancy and can be administered up to the time of delivery (WHO 2012).

Except during the first trimester, the WHO recommends that SP be administered at each planned ANC visit. Every month until the delivery period, SP can be administered with doses provided at 4 weeks intervals and under directly observed therapy. This is performed to guarantee that at least three doses of SP are received by a greater percentage of females during pregnancy. In addition, WHO recommends at least four ANC visits during pregnancy, with SP starting at the beginning of the second trimester, after the first movement or quickening of the fetus. According to WHO 2014, SP should be provided at each planned ANC visit, except in the first trimester, because it is assumed that prospective teratogenicity could happen when administered in the first trimester. SP can also be given on an empty stomach or with food, and can also be administered if G6PD status is negative. Pregnant

women with co-trimoxazole prophylaxis are excluded from taking SP and no more than 0.4 mg of folic acid is given to pregnant females daily. (Health, 2014).

2.3 Intermittent Preventive Treatment of malaria in pregnancy with Sulfadoxine-Pyrimethamine

IPTp-SP involves the administration of a curative dose of an effective antimalarial drug at predefined intervals during pregnancy beginning after quickening (the time the mother first senses fetal motion in the second trimester). IPTp-SP's effectiveness has been shown to be important in fighting malaria in pregnancy. A research in the Central Region of Ghana discovered that the use of IPTp-SP decreased submicroscopic falciparum infection considerably (OR = 0.13, 95%CI= 0.07-0.23, p = 0.005). (Nwaefuna et al., 2015).

In a comparable research in Ibadan, Nigeria, the impact of malaria prophylaxis was investigated in 983 parturient women with SP (598=60.8 percent), pyrimethamine (214=21.8 percent) and placebo (171=17.4 percent) as opposed to pyrimethamine and placebo groups, it was discovered that the incidence of maternal parasitaemia was considerably smaller at delivery between the IPTp-SP group. (Falade et al., 2007). Additionally, WHO 2014 states that IPTp-SP3+ is significantly associated with higher mean birth weight and fewer low birth weight (LBW) than two doses of IPTp-SP, whiles Clara Menedez et al 2010 showed that IPTp-SP reduced neonatal mortality by 61.3%.

2.4 Uptake of IPTp-SP

According to the WHO the coverage of IPTp-SP is slow and below the expected targets of 80 %, as of 2017, the coverage of IPTp-SP3, IPTp-Sp2, and IPTp-SP1 were reported as 54%, 42% and 22% respectively with only Zambia reporting over 50% coverage of IPTp-

SP3.(world malaria report 2018). In a cross-sectional study conducted at Osu Government Maternity Home in Accra, Ghana, it was discovered that the proportion of IPTp coverage was as follows: IPTp1-98.8%, IPTp2-94.9%, IPTp3-87.5%, IPTp4-55.7%, IPTp5-14.5%. (Boateng & Anto, 2017). Another cross-sectional data on 18,603 women sampled from the Malaria Indicator Survey (MIS) conducted in eight (8) sub-Saharan African countries indicated an overall prevalence of taking three doses of IPTp-SP in last pregnancy as 29.5%. (Sanni Yaya, Olalekan A. Uthman, Agbessi Amouzou, 2018). There are many factors and predictors that have been discovered to be associated with taking up IPTp-SP during pregnancy and WHO 2014 reports of slowing attempts in a number of African nations to scale up IPTp-SP. While there may be several variables, one of the contributing variables recognized is the confusion among health employees regarding the administration of SP for intermittent preventive treatment of malaria during pregnancy. (WHO 2014).

Similarly, other studies also found that confusion among health care workers over the timing of the doses of IPTp-SP was a major barrier to the effective delivery of IPTp-SP and whether IPTp-SP can be administered on an empty stomach. This confusion is ascribed to a mix of variables such as uncertain policy and instruction, insufficient training and absence of data and work support on IPTp-SP (Hill et al., 2013). Additionally, a different study also found that the confusion among healthcare workers regarding the side effects of SP and whether SP should be taken on an empty stomach was a barrier to IPTp-SP coverage. (Webster et al., 2013) .Furthermore, another study reiterated the same assertion citing the inability of healthcare workers to mention the main side effects or contradictions of SP in Nigeria and Ghana. (Hill et al., 2013).

As of 2016, 36 African nations have enacted a strategy to provide pregnant females with IPTp-SP3+, according to the WHO (2018). But latest progress in adherence to this policy was found to have minimally increased: among the 23 nations surveyed in 2016, an estimated 19% of eligible pregnant females got IPTp-SP3+, compared to 18% in 2015 and 13% in 2014.

The average number of visits and the gestational age of pregnant females were also discovered to be feasible predictors of IPTp-SP uptake. Hill et al 2013 discovered that the main determinant of IPTp-SP coverage was the number and timing of antenatal clinic visits. But a study in Ghana did not find the gestational age at which a pregnant woman made the first ANC visit as the main determinant of receiving more doses of SP, it was the number of visits that some earlier studies reported. (Boateng & Anto, 2017). But a recent study concluded that the mean number of SP doses have an association with gestational age at first ANC visit and the number of ANC visit. (Hill et al., 2015). Cross-Sectional research in the Sunyani Municipality of Ghana revealed that 98.5% of pregnant females got at least one dose of IPTp-SP, 91% received at least IPTp-SP2 and 71% received three or more doses of SP. (Municipality, 2017). In the GDHS 29% were reported taking two or more doses of SP, whiles 39% reported taking three or more doses of SP(Survey, 2014). The study reported a 35.3% of IPT3 in the Greater Accra Region of Ghana. In a cross-sectional study in Gushegu, Ghana, a total of 91.5% and 8.5% of respondents took adequate ≥IPT2 and inadequate less than <IPT2 respectively. (Stephen et al., 2016). According to the projections of the WHO and the RBM Partnership, IPTp coverage stayed well below worldwide objectives of 80% by 2010, and 100% by 2015 (universal coverage). Although six countries including Ghana, Gambia, Senegal, Zambia, Malawi, Sao Tome' and Principe countries reached the original

2005 target of 60 percent coverage, the combined estimates for all countries with an IPTp policy were 24 percent in 2013.

2.5 System Effectiveness of IPTp-SP Implementation

2.5.1 Practice of Direct Observed Therapy

In research by Webster et al, it was discovered that the system efficacy for IPTp-SP delivery by DOT was ineffective among pregnant females with eligible gestation age in accordance with national policy and attending ANC for their first or second visit during the current pregnancy. Although the guideline for the administration of IPTp-SP recommends SP to be taken under DOT, some studies have reported poor compliance. Some of the documented reasons are unavailability of potable drinking water at the ANC clinic. Whiles other studies report that the barriers to receiving SP by DOT were attributable to women buying drugs elsewhere, or that SP was taken home because the women wanted to eat before taking SP or healthcare workers told them so or they were asked to share cups. (Hill et al., 2013). Reportedly, 21 out of 57 respondents (36.8%) who had received SP during pregnancy used it in the ANC of which only three (14.3%) were supervised by the health care worker at the time of ingestion. (Akinleye, Falade, & Ajayi, 2009). Similarly, another study revealed that only 16.4 percent of those who took SP as IPTp-SP did so under DOT in Nigeria's river state. (Western Tobin & Asuquo, 2013). Additionally, a study in Nigeria revealed a bad DOT practice in both private and public facilities where 64.7 percent of pregnant females were given SP to swallow at home, resulting in suboptimal use of SP in these facilities. But according to (Stephen et al., 2016) 96.7% of respondents reportedly taking SP under DOT in Ghana.

2.5.2 Availability of SP

The issue of the stock of SP has been extensively documented in some studies as important for the successful and effective implementation of the IPTp-SP. According to (*NMCP, 2016*, 2016) the stock out of SP is a major contributory factor to the challenges that affect the implementation of IPTp-SP. In a recent study in Ghana, there was no problem of SP stock-out but rather stock was adequate throughout the period of the review. (Boateng & Anto, 2017).

2.6 Socio-demographic factors

Although other system-related factors have been documented to influence IPTp-SP coverage, socio-demographic factors are also noted to contribute to IPTp-SP acceptance. Research of proof from the malaria indicator survey shared an important association with the prevalence of IPTp-SP and gradient of household wealth as well as the individual level of pregnant women in education (Sanni Yaya, Olalekan A. Uthman, Agbessi Amouzou, 2018).

Additionally, education and knowledge about IPTp-SP or malaria, socio-economic status, parity were factors cited to be key determinants of IPTp-SP coverage in a systematic review and meta-analysis study in sub-Saharan Africa. (Hill et al., 2013). Furthermore, Hill et al 2013 stated that other barriers to IPTp were lack of knowledge about IPTp-SP among women, whiles other commitments such as farming, employment, and childcare were enumerated as a barrier to earlier attendance of ANC which leads to women receiving no or incomplete doses of IPTp-SP.

2.7 IPTp-SP and Birth weight

The WHO defines low birth weight as below 2500g or 2.5kg birth weight. Low birth weight remains a significant public health issue worldwide and has implications. It is estimated that low birth weight is between 15% and 20% of the world's births, which is around 20 million births per year. Consequently, the objective is to achieve a 30% decrease in the number of infants born with a birth weight below 2500g/2.5kg by the year 2025. Apart from prenatal mortality and morbidity caused by low birth weight, recent studies have stated that low birth weight can also enhance the risk for non-communicable diseases such as diabetes mellitus (DM) and cardiovascular disease later in life. (Asia, 2012). A greater number of pregnant women with malaria may remain asymptomatic during pregnancy, the risk of the infection increases maternal anaemia and low birth weight. (Guyatt & Snow, 2004) . Malaria infection during the first trimester of pregnancy was found to be statistically associated with a higher risk of low birth weight. (Valea et al., 2012). Reportedly IPTp-SP was found to be associated with reduced risk of LBW in primigravida. (Gies, Coulibaly, Ouattara, & Alessandro, 2009). The use of IPTp-SP as the recommended method for the prevention of malaria in pregnancy has been found to be effective in several studies in Africa. Reportedly, birth weights of babies improved as the uptake of IPT2 increased from 29% to 38%, leading to a decrease in mean low birth weight from 14% to 10%. (Oke & Salihu, 2016). Furthermore, a randomized study among pregnant women who took IPTp-SP showed a reduced risk of low birth weight among the different doses of SP. The risk of LBW was significantly different between those who received IPT1 (41.4%), IPT2 (25%) and IPT3 (13.6) (Valea et al., 2010). Additionally (Agbozo et al., 2016) reported that mothers who took one dose of SP had an increased risk of LBW compared to those who took three or more doses (RR; 1.57, CI; 1.24-1.98, p=0.0001). A quantitative, cross-sectional and hospital-based research of 443 pregnant females in Ghana discovered IPT1 and IPTp-SP4+ to be 80.9% and 19.8%, while the

prevalence of low birth-weight was 12.2%. Reportedly, a proportion of 37% LBW was found among women who were attending ANC care services in northeastern Nigeria by (Muhammad et al., 2016). Additionally, another research recorded a decreased chance of LBW and a lower risk of LBW in pregnant females who took IPTp-SP4+.(Dapaa, 2017). Furthermore, it had been reported that the implementation of IPTp-SP had increased birth weights after clinical and parasitology parameters were assessed among women delivering. (Hommerich et al., 2007).

2.8 Monitoring and Evaluation

Monitoring is described as the routine data collection and information recording process to monitor progress towards anticipated outcomes, in this case monitoring the IPTp-SP intervention execution process. ("Monitoring and Evaluation Policy Framework," 2012). To do this, information is collected on indicators and recorded in order to be used for measuring whether the goal or target of a project or intervention such as IPTp-SP is being achieved. In the context of M&E, indicators are described as a quantitative metric providing data for monitoring performance, measuring performance and determining responsibility. In other words, indicators are standardized measures that enable comparisons to be made over time, across distinct geographic fields and through programs. (UNAIDS, 2010).The WHO recommends the following indicators for IPTp-SP monitoring and evaluating which is adopted by NMCPs: coverage of IPTp-SP, the stock of SP, the programme related challenges and whether a pregnant woman took SP under direct observation, and whether HCW received training on IPTp-SP.

On the other hand, evaluation is the systematic assessment of the design, execution, or outcomes of an action, project, policy, or activity. The aim of the assessment is to provide

precise and valuable information or data with the aim of determining whether the goal of an intervention is attained. ("Monitoring and Evaluation Policy Framework," 2012).Therefore it is important to collect data and indicators on IPTp-SP and measure them in order to determine the programme effectiveness.

With all the findings from different studies and their recommendations, one would expect to see a remarkable change in IPT uptake over time. However this has not been the case, it could be that the efforts that are in place for IPT implementation need to be strengthened. Several studies have been found to extensively cover malaria in pregnancy and it complications, interventions used in curtailing malaria in pregnancy, factors contributing to the uptake of IPTp-SP as well as the system effectiveness of IPTp implementation such as the practice of DOT and availability of SP. Apparently, no study was found to have explored the factors contributing to the uptake of IPTp from healthcare workers' perspective and the recommended indicators of IPTp-PS. Therefore, this study seeks to fill this gap by exploring on those aspect related to the topic.

METHODS

3.0 Study Design

This study was a cross-sectional, hospital-based research carried out among 380 postpartum women who were either visiting the Maamobi General Hospital postnatal or child welfare clinic and were not more than 24 weeks post-delivery before data collection. A complementary qualitative component was conducted to explore challenges influencing the uptake of IPTp-SP. A narrative design was used in the qualitative study, with a purposive sampling technique.

3.1 Study Location and Population

The study was conducted in the Maamobi General Hospital in Ayawaso North Municipal Assembly, which was created and upgraded in 2018 with Accra Newtown as its capital. The Ayawaso North formerly was part of Ayawaso Sub-metro. Ayawaso Sub-metro is made up of 10 communities; Nima, Alajo, Pigfarm and Accra Newtown, Kotobabi, Maamobi, Airport residential area, Legon and Dzorwulu. The population of Ayawaso was estimated to be 538,593 in the 2011 census. This population is predominantly a Muslim community, with a very high density that comes with its numerous environmental and health problems. Ayawaso is boarded on the north by Ga East district: Gimpa- University of Ghana and I.P.S road. On the South by Osu Klotey Sub-sub district: Ako Adjei interchange to Kwame Nkrumah circle. It is also boarded on the eastern side by the Kpeshie Sub District which is the Ako Adjei interchange to Legon. On the West: Okaikoi South District which is Kwame Circle to Apenkwa overhead to the Nsawam road. The occupation of the inhabitants varies, with the majority of the women mostly petty traders, whilst most men are artisans (e.g. Masons, Carpenters, Auto Mechanics). In addition, civil servants of low-income groups are

found in places like Nima, Maamobi, Accra New town, Alajo and Kotobabi. The high-income groups are found in places like Airport Residential Area, Roman Ridge, Kanda, and Legon where there is a government bungalow for these categories of workers. Furthermore, small scale farming activities are found between Alajo and Dzorwulu where vegetables and cassava are cultivated. Poultry farming and sheep rearing are undertaken in some residential homes and cattle's are occasionally found grazing in the area. There are Christians of all denomination, Muslims and people who practice traditional African Religion.

In the well-established residential areas like Airport, Roman Ridge, Legon, and Dzorwulu, the sanitation is excellent. Whereas places like Nima, Maamobi, Accra Newtown, Alajo and Kotobabi where the infrastructure is poor, sanitation has become the bane of Accra Metropolitan Assembly (A.M.A).

There are 3 government hospitals, 2 quasi-government hospitals, 10 private hospitals and 64 private clinics including dental clinics and maternity homes. Maamobi General Hospital was established in 1969 for the people of Ayawaso Sub-metro as a polyclinic. It is situated in the Ayawaso-Sub metro, specifically Ayawaso North. It is the biggest government health facility in the Ayawaso Sub-metro. It became a General Hospital on July 2011. The hospital has various departments such as CHIM, Theatre, Dressing and Injection room, OPD, Emergency, Male and Female wards, Children's ward, Lying-in, and Labour ward, Antenatal and Postnatal, Diabetic Unit, Dental, TB unit, HIV/AIDS unit and recently opened Wellness centre.

In recent times, the Ayawaso Sub-metro has been demarcated into four districts. Maamobi General Hospital is located in the Ayawaso North District. It is the main government

hospital in the newly created district. The hospital is chosen for this study because it serves as the referral point for the other hospitals, clinics and CHPS in the district and also has a high ANC attendance which will provide the needed sample size for the study.

3.2 Inclusion/Exclusion Criteria

All postpartum mothers who took SP during pregnancy and are not more than 24 weeks post-delivery and attending postnatal or CWC were eligible to participate. To minimize the problem associated with recall, postpartum mothers whose babies were more than 24 weeks post-delivery at the time of data collection were excluded from the study.

3.3 Variables

3.3.1 Dependent Variable

The dependent variable measured in this study is birth weight. This variable was measured as a continuous variable and later dichotomized into less than 2.5kg and 2.5kg or more than 2.5kg, with less than 2.5kg as the outcome of interest for this study (LBW).

3.3.2 Independent Variables

The independent variables included the socio-demographic characteristics of respondents such as maternal age and educational level, maternal behaviors such as smoking and maternal diseases such as hypertension as well as the practice of IPTp-SP at the ANC.

Table 1: List of Variables

No	Variable Name	Operational definition	Type of variable	Scale of measurement
1	Age	The age in years	Independent	Continuous
2	Marital Status	Married or not married	Independent	Categorical
3	Occupation	Self-employed or government or unemployed	Independent	Categorical
4	Level of Education	Stages of education attained	Independent	Categorical
5	Gravidity	The number of pregnancies regardless of the outcome	Independent	Continuous
6	ANC visit	Number of visits to ANC during last pregnancy	Independent	Continuous
7	Gestational age at first dose of SP	Stage of pregnancy in weeks first dose of SP received	Independent	Continuous
8	Gestational age at first ANC	Stage of pregnancy in weeks at first ANC visit	Independent	Continuous
9	IPTp-SP	Number of doses of SP received during pregnancy	Independent	Continuous
10	ITN use	Whether a mother slept under ITN throughout the pregnancy	Independent	Categorical
11	Maternal behaviour	Whether a mother smokes or drink alcohol	Independent	Categorical
12	Anaemia	Mothers Hb less than 11.g/dl	Independent	Categorical
13	Side effect	Whether a mother experienced side effects when SP was taken	Independent	Categorical
14	The stock level of SP	Quantity of SP tablets in stock per month	Independent	Continuous
15	Stock out of SP	Whether there was inadequate stock of SP	Independent	Categorical
16	Weight of baby	Weight of baby at birth	Dependent	Continuous

3.4 IPTP-SP Indicators

Performance indicators are measurements of project effects, results, outputs and inputs that are tracked during program execution to measure progress towards program goals. Indicators organize information in a manner that specifies the relationship between the impacts, results, outputs, and inputs of a program and helps measure program progress. (Sontheimer, 1996)

New recommendations for IPTp-SP were instituted by the WHO (2012), which is accepted by National Malaria Control Programmes. It proposes at least four pregnancy antenatal visits. The new recommendations suggest starting IPTp-SP as early as possible in the second trimester of pregnancy at around 13 to 16 weeks, with each dose given one month apart. Furthermore, SP should be given as DOT on either an empty stomach or with food. SP should not be given to pregnant women on co-trimoxazole prophylaxis, and dosage of folic acid given at 0.4mg. (Health, 2014). Subsequently, this study seeks to measure three main indicators of IPTp-SP which include: coverage of IPTp-SP, the proportion of pregnant women who took IPTp-SP under DOT and the stock level of SP.

Table 2: Indicator Reference Sheet

Type of Indicator	Indicator	Numerator	Denominator	Frequency of Measurement	Data Source
Output Indicator	The proportion of Adequate Stock	Number of adequate stock	Total number of months under review	Routine	Pharmacy records
Outcome Indicator	The proportion who took SP under DOT	Number of respondents who took SP under DOT	Total number of respondents	Non-routine	Survey
Outcome Indicator	The proportion of optimal doses of SP	Number of respondents who took ≥IPT3	Total number of respondents interviewed	Routine	ANC records book/ANC register

3.5 Sampling

3.5.1 Sample Size Determination

The determination for the sample size of the study was calculated by employing the formula;

$$\frac{Z^2(pq)}{e^2}$$

The z = standard normal deviation consistent to a 95% confidence interval, which is equivalent to 1.96.

P= proportion of pregnant women who received IPT3 = 33.6% (Osu Government Maternity Home, 2013)

E= the margin of error on P estimated to be at 5%.

Therefore: $n = \frac{1.96^2(0.336)(1-0.336)}{0.05^2}$

$$n = 343$$

Rate of Attrition given by $nf = \frac{n}{1-\alpha\%}$

n = obtained minimum sample size

Therefore $nf = \frac{343}{1-0.1}$ $n = 381$

The minimum sample size for the study was estimated to be 381 after calculating for 10% attrition rate in order to solve the problem of any possible non-response.

3.5.2 Sampling Technique

Systematic sampling

In this research, a systematic technique of sampling was used. A systematic sampling method is a probability sampling technique in which each respondent or item or person has an equal opportunity of being chosen. This method of sampling allowed for an unbiased

inference and generalization of the study on the population of interest. In systematic random sampling, every Kth member or participant in the total population is selected for inclusion into the sample after the first member or participant of the sample is selected at random from among the first Kth member of the population.

All postpartum women who met the inclusion criteria between 1 week and 24 weeks postpartum were extracted from the postnatal register to form a sampling frame. The total number of postpartum women in the sample frame was (N= 1003) eligible respondents. Given $Kth = N/n$, where n is the sample size needed for the study (n=381). In order to get Kth number, 1003/381 was computed giving 2.63, this was rounded to 2. A simple random technique was employed to randomly select between 1 and 2. After randomly selecting 2, every other number from the sample frame was selected into the study from the postnatal clinic and CWC until the total sample size was recruited for the study.

3.6 Data Collection Techniques/Methods and Tools

The questionnaire was used to collect the socio-demographic information of participants such as marital status, age, educational level, number of children and occupation. The Asante Twi language was used in interviewing women who did not understand English. In addition, data were collected on whether SP was available for participants at the ANC clinic, whether SP was given under DOT, side effects experienced from taking SP, use of ITN during pregnancy. Furthermore, the ANC record books of the mothers were used to accurately collect data on gestational age or trimester at first ANC visit, gravidity, number of doses of SP taken before delivery and the gestational age or trimester within which IPT1 was taken, G6PD enzyme deficiency status, maternal diseases such as HPTN, DM, sickle cell, whether participant had malaria during pregnancy, maternal behaviour such as alcohol

use and smoking, as well as intervals between doses of SP. Additionally, the level of haemoglobin concentration (g/dl) at first ANC visit and at birth was collected from the ANC book of participants to determine whether respondents were anaemic at the 36th weeks of pregnancy.

A data extraction form was designed and used to collect data on SP stock levels for the year 2017 and 2018 from the records of the pharmacy of the hospital. Furthermore, the ANC registers at the clinic were used to review the daily issuing of SP to eligible pregnant women. The collection of data was done by a face-to-face interview of the participant. The collection of data was conducted by research assistants, who were fluent in the local languages mostly used in the study area (Hausa and Twi) and English. Participants who do not understand any of the enumerated languages mentioned above were excluded from the study.

The stock level of the SP in the pharmacy in the year 2018 was calculated by first computing the average stock level (n=7,850) for the last six months in the year 2017, thus between July 2017 to December 2017. The average stock level for the past six months was multiplied by 1.5 and 3 to get the minimum stock and maximum stock for the following six months in the year 2018.

The average stock level for the first six months of 2018, thus January to June computed was (n=10,725), same multiplied by 1.5 and 3 respectively to get the minimum and maximum stock for the second quarter of 2018, that is, July to December. Stock levels which were below the calculated minimum stock were grouped as inadequate while's stock levels which were above the calculated minimum stock were grouped as adequate stock.

3.7 Quality Control/Assurance

Firstly, data collectors were trained for a period of 5 days on the objectives of the study and how to conduct the interview and obtain informed consent. Data extracted from ANC books and registers were verified from the postnatal register and the midwife in-charge at the ANC unit.

Quality control and assurance were also conducted by pre-testing the questionnaire in a pilot study among 10 postnatal attendants within 2 days (5 per day) to assess the flow of interview, appropriateness of questions for eliciting the desired information and average time of interview among other things. Issues identified during pre-test were addressed prior to data collection.

3.8 Data Processing and management

The responses from the questionnaires were entered into a database using EpiInfo version X. The data was imported into Microsoft Excel software version 13 and double-checked for completeness, cleaned and imported into STATA version 15 for the analysis. Some socio-demographic and ANC characteristics were categorized with maternal age grouped into 16-25 years, 26-35 years and 36+. The weight of babies at birth in the continuous variable was categorized into a binary variable, <2.5kg, and ≥2.5kg. The Hb at birth was categorized into <11 g/dl and ≥11 g/dl. The uptake of IPTp-SP was categorized into less than IPTp-SP3 and IPTp-SP3+. The level of education of the participants was regrouped into none, basic education (primary/ middle school/ JHS), SHS and tertiary. Furthermore, the stock level of SP was grouped into adequate and inadequate stock. The stock of SP less than the calculated minimum stock at the pharmacy was grouped as inadequate and stock between the minimum and maximum calculated stock level as adequate.

3.9 Data Analysis

After the categorization and recoding, the imported data in STAT version 15 was checked for missing values and normality of continuous variables such as maternal age, birth weight, and heamoglobin concentration. Stata version 15 was used to summarize continuous variables into means with standard deviations whiles percentages and proportions were reported for categorical variables. Also, one-sample and two-sample tests of proportions were carried out on the uptake of IPTp-SP.

A Chi-square test was used to test the association between some socio-demographic characteristics such as maternal age, occupation, marital status, gravidity, gestation or trimester for first ANC visit, gestation or trimester for the uptake of IPT1, maternal diseases and behaviour, and the outcome variable (low birth weight). A logistic regression model was conducted and the odds ratio (OR) was reported. OR was used to assess the strength and direction of the association between low birth weight and the uptake of IPTp-SP3+ whiles significant socio-demographic characteristics in the bivariate analysis were included. OR was utilized to compare low birth weight among the uptake of IPTp-SP3+ with less than IPTp-SP3+ as the reference group to determine whether association exist between IPTp uptake and low birth weight. A p-value of <0.05 was considered to be significant. Other independents variables were controlled for to determine whether a significant association still existed between IPTp-SP3+ and the outcome variable.

3.10 Qualitative Approach

3.10.1 Data Collection Techniques/Methods and Tools

In-depth interviews were conducted in English with an interview guide to explore opinions of HCW's on policy issues related to IPTp-SP, implementation challenges and

recommendations on IPTp-SP in Ghana from the perspective of service providers. The interview guide for the study was semi-structured with flexible open-ended questions which reflected the generated themes. Privacy was maintained by conducting the interview in a room with no distractions and less noise.

3.10.2 Data Management and analysis

Firstly, all interviews were digitally recorded and transcribed verbatim by a research assistant and verified by the PI. Each transcript was given a unique number without any personal identifiers of the interviewees. The verified transcripts were manually coded based on the themes used in the interview guide.

Secondly, thematic content analysis was used to analyze the data. A codebook was developed which contained the definitions of themes, sub-themes, and examples of statements that should represent a theme. Then, guided by the fourth objective of the study and the codebook, coding was done by reading through the transcripts line-by-line manually to identify the main themes and sub-themes. The transcribed responses which looked alike were grouped under the generated codes such as side effects and stock availability and presented as the results.

3.11 Ethical Considerations/Issues

3.11.1 Ethics review and approval

Ethical clearance for the study was obtained from the Ghana Health Service (GHS) Ethics Review Committee (ERC) on 8th April 2019 (protocol number: GHS-ERC 032/03/19). Also, administrative approval was granted by the Medical Superintendent of Maamobi General

Hospital with consent from the hospital administrator. The deputy director of nurses' services, the consultant obstetrician, and the pharmacist were also informed. The head and staff of ANC were also officially informed. Informed consent was obtained from the participants before interviewing them. The personal identifiers such as name and phone numbers of participants were not recorded.

3.11.2 Informed Consent process

A study information sheet and consent form were developed. (See appendices 1 & 2). The form explained the purpose of the study, the potential risks and benefits, how privacy and confidentiality will be maintained, and an emphasis that participation in the research is voluntary. The research assistants who were being recruited into the study were trained on how to seek consent and demonstrate respect to the participants.

Before data collection, all potential participants were taken through the consent process and those who agreed to participate were requested to sign the consent form.

3.11.3 Risks and benefits to research participation

The proposed project was considered a minimal risk study since it did not involve any invasive procedures.

There were no direct benefits to the participants. Their participation in the project contributed to a better understanding of the uptake of IPTp-SP and some of the challenges associated with the successful uptake of IPTp-SP to inform national health policies.

3.11.4 Privacy and Confidentiality

With the permission of the authorities of the hospital, a room was secured for interview purposes. This was to safeguard the participants ' privacy. Efforts were also produced to keep the information acquired confidential. The names and other personal identifiers of the participants were not used in reporting the findings of this study. The data was not shared with third parties and will be accessible only to the student researcher and his supervisors.

3.11.5 Compensation

Participants did not receive any payments but some received a bottle of water.

3.11.6 Duration of Interview

The duration of an in-depth interview lasted between 10 minutes to 15 minutes, whereas the administration and answering of the questionnaire took between 15 minutes to 20 minutes.

3.12 Study Limitation

In order to fundamentally make good decisions and sound policies then data must be of the highest quality. The dimensions of quality data are timeliness, completeness, reliability, validity, and precision. It was identified that some of the ANC record book and postnatal registers were not completely filled which resulted in some missing data.

The responses from the interview may be favorable because the interviews were conducted at the hospital. Also, questionnaires were administered at the hospital and may increase the likelihood of biased responses as compared to a household survey.

Additionally, instead of 381 calculated sample size, the study was able to recruit 380 due to time constraints which may affect the power of the study. The uptake of IPTp-SP1 was found to be 100 % and this is because the study recruited only respondents who had taken SP during their most recent pregnancy, but the findings of the study were able to answer the objectives.

CHAPTER FOUR

RESULTS

This section shows an overview of the research results. The background characteristics outlined in this section include maternal age, marital status, maternal education, and maternal employment. Additionally, other socio-demographic variables include gestational period or trimester of first ANC visit, gravidity and gestation or trimester for the uptake of IPT1.

4.1 A Summary of the Characteristics of the Study Sample

A total of 380 respondents were recruited for the study from the Child Welfare Clinic and the Postnatal Clinic, representing CWC 65.9% (n=250) and Postnatal Clinic 34.0% (n=129). Participants ' ages ranged from 16-48 years. The mean age for the respondents recruited for the study was 28.9 (standard deviation, SD=5.5). The median age was 29.0 years. The mean number of antenatal visits during the last pregnancy was 7 (SD=2.2), whiles the median was 8. Out of 380 respondents recruited for the study, 375 had a recorded Hb level during the first ANC visit with a mean Hb concentration of 10.5g/dl (SD=1.4), whiles the mean Hb at birth was 10.4g/dl (SD=2.1).

Overall, 18.4% (n=70) of respondents were single, 0.3% (n=1) were divorced with 8.7% (n=33) cohabiting whiles majority of them were married 72.6% (n=276). In terms of level of education attained, 76.3% (n=290) of the respondents had basic education whiles 7.6% (n=29) had no education with 16.1% (n=61) having tertiary education. Majority of the respondents were Christians 59.7% (n=227), followed by Muslims who were 40% (n=152) and with only 0.3% (n=1) representing African Traditional religion. With regard to employment, the bulk of the participants were involved in business / petty trading activities

65.8% (n=250) whiles unemployed respondents were 15.8% (n=60), with civil servants representing 13.4% (n=51) and 5% (n=19) identifying as housewives.

In terms of gravidity, multigravid women were highest with 36% (n=135) followed by primigravid women 33.6% (n=126) whiles secungravid women were least with 30.4% (n=114). Also, majority of the respondents made their first ANC attendance in the 2nd trimester 67.1% (n=255), followed by the 1st trimester with 22.6% (n=86) whiles fewer respondents made their first ANC visit in the 3rd trimester of pregnancy 10.3% (n=39). As expected, majority of the respondents took IPT1 during the 2nd trimester of pregnancy 83.4% (n=317), followed by 3rd trimester with 15.3% (n=58) whiles 1.3% (n=5) respondents took IPT1 at the 1st trimester of pregnancy.

I observed that 54.2% (n=206) of the respondents did not sleep under bed nets during pregnancy whereas 45.8% (n=174) of the respondents reported sleeping under bed nets during their last pregnancy. A total of 47.6% (n=181) reported receiving ITN during last pregnancy whiles 52.4% (n=199) did not receive ITN during pregnancy. The respondents who reported to have ever smoked and not smoked before were (1.0%, n=4) and (99%, n=376) respectively. Also, majority of the respondents reported that they currently did not smoke (99.5%, n=378) whiles only (0.5%, n=2) still smoked. A total of 94% (n=357) reported never drinking alcohol before whiles 6.0% (n=23) had ever drunk alcohol. But a higher number of respondents did not currently drink (98.4%, n=374) and a few who currently drank (1.6%, n=6). With regards to maternal disease, I found that 99% (n=376) of the respondents did not have sickle cell disease whiles 1.0% (n=4) had sickle cell, majority of respondents were not diabetic 99.45% (n=378) with 0.5% (n=2) reportedly having diabetes. Out of the 380 participants, 97.4% (n=370) had hypertension whiles 2.6% (n=10)

did not have hypertension. Furthermore, (94.5%, n=399) and (5.5%, n=21) of the respondents respectively reported not having malaria and having malaria during pregnancy. In terms of the sex of the babies, there were more females than males recorded as (52.5%, n=199) and (47.5%, n=181) respectively.

Table 3: Background Characteristics of Respondents

Characteristics	Number	(%)
Age category		
16-25	108	28.4
26-35	225	59.2
36+	47	12.4
Gravidity		
Primgravid	126	33.6
Secunigravid	114	30.4
Multigravid	135	36.0
Marital Status		
Single	70	18.4
Married	276	72.6
Divorced	1	0.3
Co-habiting	33	8.7
Occupation		
Unemployed	79	20.8
Employed	301	72.2
Educational Status		
None	29	7.6
Basic	290	76.3
Tertiary	61	16.1

4.2 Uptake of IPTp-SP

All the 380 respondents took IPTp-SP1 (n=100%), the uptake of IPTp-SP2 among the respondents was 92.1%, with IPTp-SP3 at 72.1% followed by IPTp-SP4 and IPTp-SP5 with 36.8% and 8.7% respectively.

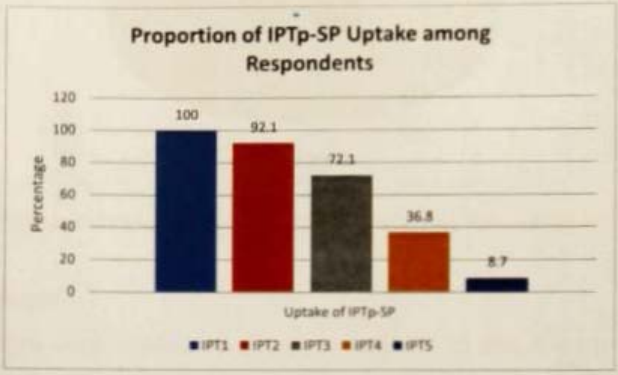

Figure 2: Proportion of IPTp-SP Uptake among Study Respondents in MGH

4.3 Uptake of Three or More than Three doses of SP

Figure 3 shows the IPTp-SP uptake (i.e. ≥IPT3 and <IPT3). The proportion of the uptake of three or more doses of SP was higher (72.1%, n=274), compared to the proportion of uptake of fewer than three doses of SP and (27.9%, n=106). The prevalence of ≥IPT3 was 0.72 (CI 95%, 0.67-0.77) among study participants.

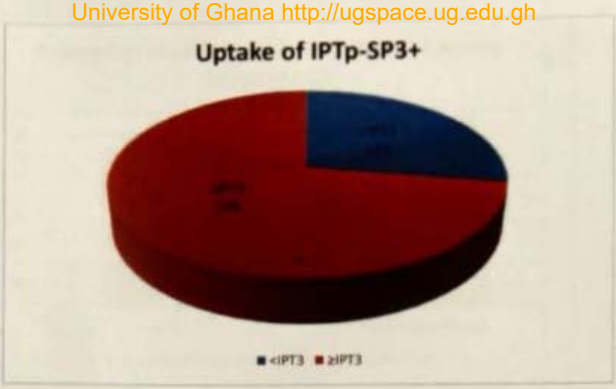

Figure 3: Uptake of <IPT3 (n=106) and >=IPT3 (n=274) among Respondents in MGH

4.4 Birth Weight

The mean birth weight of babies was 3.03kg (SD=0.52) with (CI 95%, 2.98-3.1). The median birth weight was 3.0kg, whiles the lowest and highest birth weight recorded were 1.25kg and 4.9kg respectively. The birth weight of babies was categorized into low birth weight (<2.5kg) and normal birth (≥2.5kg). The proportion of low birth weight and normal birth weight after categorization were (12.6%, n=48) and (87.4%, n=332) respectively. The prevalence of LBW among the sample was 0.13 (CI 95%, 0.09-0.16).

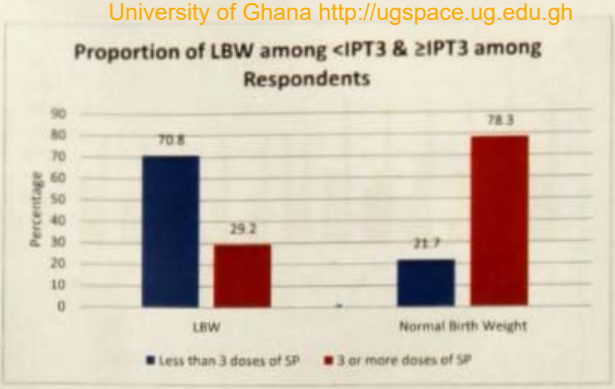

Figure 4: LBW among Respondents who took less than three and three or more than three doses of IPTp-SP

Of 380 respondents, a total of 48 were determined to have LBW, out of which 70.8% (n=34) were found to be among respondents who took less than three doses of SP whiles LBW among respondents who took three or more doses of SP was 29.2% (n=14).

4.5 IPTp-SP Indicator

4.5.1 Stock Level of SP

The stock level of the SP in the pharmacy in the year 2018 was calculated by first computing the average stock level for the last six months in the year 2017 and the first six months of 2018.

Figure 5: Adequate and Inadequate Stock Levels of Sulfadoxine-Pyrimethamine in MGH in 2018

The minimum stock level for January 2018 to June 2018 was (n=11,775). But the graph shows that the stock level for February (n=11,550), March (n=6,300), April (n=3,900) and May (n=3,300) in 2018 were less than the calculated minimum stock level. The month of January (n=14,550) and June (n=24,750) had adequate stock because the stock level of SP was more than the required minimum stock.

Additionally, the minimum stock level from July to December 2018 was (n=16,088). But the stock level of August (n=12,600), September (n=8,400), October (n=6,450) was below the calculated minimum stock for the last six months of 2018. The months of July (n=17,400), November (n=20,550) and December (n=16,350) had adequate stock because the stock level of SP for this months were more than the required minimum stock.

Table 4: IPTp-SP indicators

Indicators	N (380)	Percentage (%)
Uptake of SP		
≥ IPT3	274	72
< ITP3	106	28
Took SP drug under DOT		
Directly observed	380	100
Not directly observed	0	0.00
The stock level of SP	12	100
Adequate	5	41.7
Inadequate	7	58.3

N=number of respondents, SP= sulfadoxine-pyrimethamine, IPT = intermittent preventive treatment of malaria in pregnancy, DOT = direct observed therapy,

4.6 Socio-Demographic Characteristics of Respondents by Babies Birth Weight

The respondents who took less than three doses of IPTp-SP were more likely to have babies with low birth weight, than respondents who took three or more doses of IPTp-SP. Out of the 380 respondents, 48 had babies with low birth weight (weight less than 2.5kg). LBW was associated with the number of doses of SP taken. The mothers who took less than three doses of SP had the highest proportion of low birth weight babies (70.8%) as compared to mothers (29.2%) who took three or more doses of SP with a statistically significant association ($\chi 2=50.36$, $P=0.01$).

With regards to marital status married women had the highest proportion of low birth weight 60.4% (n=29) followed by single, co-habiting and divorced respondents with 22.9% (n=11), 14.6% (n=7) and 2.1% (n=1) respectively and the association was statistically significant ($\chi 2=10.84$, $P=0.013$).

In terms of low birth weight and the trimester for first ANC visit, respondents who reported for first ANC visit in the 2nd trimester had the highest proportion of low birth weight 58.3% (n=28) compared to 3rd and 1st trimester first ANC visit which reported 20.8% (n=10) and 20.8% (n=10) respectively. Test of significance for this association ($\chi2$=6.68, P=0.035).

Overall, respondents who took IPT1 in the 2nd trimester had the highest proportion of low birth weight 66.7% (n=32) followed by 3rd trimester with 31.25% (n=15) and 1st trimester 2.1% (n=1) respectively with a statistically significant association ($\chi2$=35.1, P=0.004).

With respect to maternal behavior, respondents who reported to have never smoked had a higher proportion of low birth weight of 95.8% (n=46) compared to respondents who have ever smoked 4.2% (n=2). Test of significance for this association ($\chi2$=14.2, P=0.024).

Furthermore, respondents who did not smoke had the highest proportion of LBW 97.9% (n=47) compared to respondents who currently smoke 2.1% (n=1). This association was not statistically significant ($\chi2$=2.54, P=0.111). Additionally none of the maternal diseases was found to be significantly associated with LBW. For instance, respondents who did not have hypertension had the highest proportion of LBW 100% (n=380) compared with those without hypertension 0.00% (n=0). The association was statistically insignificant. ($\chi2$=1.48, P=0.223). Respondents who were not anaemic at birth had a proportion of 47.6% (n=20) LBW as compared to anaemic respondents 52.4% (n=22). The association was not statistically significant. ($\chi2$=0.82, P=0.37).

Table 5: Summary of Background Characteristics of Respondents and Birth Weight

	LBW (Yes)	No LBW	Total	
Characteristics	**N (%)**	**N (%)**	**N (%)**	**P**
Age (years)				0.88
16-25	15 (31.3)	93 (28.0)	108 (28.4)	
26-35	27 (56.3)	198 (59.6)	225 (59.2)	
36+	6 (12.5)	41 (12.4)	47 (12.4)	
Uptake IPTp-SP3+				**p< 0.01**
No	34 (70.8)	72 (21.7)	106 (27.9)	
Yes	14 (29.2)	260 (78.3)	274 (72.1)	
Marital Status				0.013
Single	11 (22.9)	59 (17.8)	70 (18.4)	
Married	29 (60.4)	247 (74.4)	276 (72.6)	
Divorced	1 (2.1)	0 (0.0)	1 (0.3)	
Co-habiting	7 (18.8)	26 (7.8)	33 (8.7)	
Trimester for 1st ANC visit				0.035
1st Trimester	10 (20.8)	76 (22.9)	86 (22.6)	
2nd Trimester	28 (58.3)	227 (68.4)	255 (67.1)	
3rd Trimester	10 (20.8)	29 (8.7)	39 (10.3)	
Trimester for 1st IP1				0.004
1st Trimester	1 (2.1)	4 (1.20)	5 (1.3)	
2nd Trimester	32 (66.7)	285 (85.8)	317 (83.4)	
3rd Trimester	15 (31.3)	43 (13.0)	58 (15.3)	
Ever smoked				0.02
Yes	2 (4.2)	2 (0.6)	4 (1)	
No	46 (95.8)	330 (99.4)	376 (99)	
More than 4 ANC Visit				0.05
Yes	43 (89.6)	315 (96.0)	358 (95.2%)	
No	5 (10.4)	13 (4.0)	18 (4.6%)	

Data is shown as frequency (percentage), p-value is estimated when comparing low birth weight babies with normally birth weight babies using chi-square test, p-value < 0.05 is deemed statistically significant. ANC = Antenatal care, LBW= Low birth weight.

4.7 Association between Uptake of IPTp-SP and LBW

There was a significant difference between the doses of IPTp-SP and Low Birth Weight ($\chi2$=50.36, P=<0.01). Women who took IPTp-SP3+ had reduced odds of low birth weight (LBW) as compared to those who took less than IPTp-SP3+ (OR=0.11, CI=0.06-0.22), p<0.001). After controlling for the trimester within which a respondent took IPT1, the strength of IPTp-SP association with LBW remained statistically significant (AOR=0.11, CI=0.06-0.24, p<0.001).

The further analysis controlled for trimester within which first ANC visit was done, trimester within which respondents took IPT1 and whether respondents have ever smoked still the results showed a significant association between the uptake IPTp-SP and odds of having a LBW baby. For instance, respondents who took IPTp-SP3+ had 88% fewer chances of having a baby less than 2.5kg as compared to women who had less than IPTp-SP3+ doses (AOR=0.12[95%CI=0.06-0.25].

Table 6: Association between the Uptake of IPTp-SP3+ and Low Birth Weight

LBW	AOR	[95% Conf. Interval]	P>|z|
Uptake IPTp-SP3+			
No	ref		
Yes	0.12	0.06 – 0.25	0.01
Trimester for First ANC Visit			
1st Trimester	ref		
2nd Trimester	0.81	0.35 – 1.88	0.62
3rd Trimester	0.81	0.23 – 2.88	0.74
Trimester IPT1 taken			
1st Trimester	ref		
2nd Trimester	0.45	0.04 – 5.48	0.53
3rd Trimester	0.49	0.04 – 6.90	0.60
Ever smoked			
No	ref		
Yes	2.32	0.30 – 17.9	0.42
Constant	1.17	0.09 – 13.7	0.90

Data is presented in odds ratio-values and confidence interval, p-value and <0.05 is considered statistically significant. IPTp-SP=Intermittent Preventive Treatment

4.8 Challenges Associated with the Uptake of IPTp-SP

4.8.1 Side effects and Drop-out

It was observed that the majority of the participants of the in-depth interview identified side effects of SP as a challenge to the programme implementation which leads to the refusal of SP by some pregnant women during ANC. This is confirmed by a participant,

> *"Ok so errm what usually happens is, most of the women do complain that when they take SP they react to it, some complain of vomiting, others complain of weakness, and so on. So I think taking of SP the side effects are quite uncountable, so usually when you are giving them they complain of she will vomit, she will feel weak, she will not be able to do anything for like three days after taking the so, so those are the actually the complaints they give us and that the reasons why they drop out from*

taking the SP, usually is the side effects that deter them from taking SP". [Participant 3]

Another participant also said

> *"Some of the issues are when they start reacting. We have side effects one or more side effects like nausea, feeling feverish or slight headache after taking the SP. But at time, the client will vomit everything. At times they can't do anything. Refusal is a major challenge because of this slight side effects so sometimes we have to re-educate them that it is normal and that they are part of it. Others want to take the medicines home and we don't allow that."* [Participant 5]

Additionally [Participant 6] also said that

> *"Maybe when she takes it feels dizzy, I can't get up, some even go on admission and others are sick for so many days. So the comments they make is general weakness so they stop it. The side effects make them stop it."*

4.8.2 Availability of Sulfadoxine-Pyrimethamine

The stock of SP in a facility is a very significant pillar in the smooth implementation of intermittent preventive treatment of malaria in pregnancy with SP. From the interviews that have been performed, it seems that SP inventory has not been a challenge to program running. A participant said;

> *"Is just about ermm stock management very well and SP is a program drug so is free so you have to make sure your order is up to your next level or your next batch of delivering the delivery system, so at a point in time you don't have then you have to buy and pay they will pay for it. And then SP available at the ANC we have platforms available for all the ANC in-charges so we are always monitoring their stock level those who don't have can borrow from another facility."* [Participant 1]

Another said

"Normally we don't have shortage because our in charge she always make sure that there is a lot in her place. So in my room every day we go for 20 so if you know your SP is about to finish and if it is left with three or five then you quickly go and write the clients name and take another one." [Participant 4]

Another participant also said

"We don't wait for the SP to get finish. So we have a re-order point, when it gets there we order some from the pharmacy. Never have SP shortage before, because we don't wait till zero, because of the reorder point for the new supply." [Participant 5]

Surprisingly a participants said;

"Ermm I think is ok with respect with IPT1, IPT2 and IPT3 we are always able to achieve but 4 and 5 is an issue but we are still working towards it so when patient start taking IPT4 and IPT5 we know that demand for SP will go higher" [Participant 6]

4.8.3 Religious Beliefs

The cultural belief of a pregnant woman is also attributed as a possible challenge to the implementation of IPTp-SP. This is confirmed by a participant who said that,

"Some women who are Muslims fast and no matter what you do them will not take the SP. And they want to take it at 6 pm, especially when they are fasting in the Ramadan. They will prefer to take it after 6 pm when they finish fasting. [Participant 6]

4.8.4 Knowledge and Perception of Healthcare Workers on IPTp-SP

The healthcare worker especially the frontline staff involved with the day to day administration of the SP to pregnant women may have implication in the uptake of SP. Therefore their knowledge and perception of the IPTp-SP policy are keen on promoting the

uptake of IPTp-SP. From the interview conducted, all the participants had a substantial amount of knowledge about IPTp-SP policy and guidelines. A participant said;

> *"SP as we call it is an anti-malaria, let say it a prophylactic treatment against malaria which we give to a pregnant woman after the first movement of the baby or quickening"* [Participant 3]

A participant said that

> *"So errm I made mention of the fact that a woman has to be 16 weeks and above before she starting taking SP and then she takes it five times and 28 days interval up to five times. And within the time the women is taking SP if she gets malaria then she is treated for malaria, during that time she is not supposed to take SP. So this are some of the guidelines we have it regards to SP and it under DOT, directly observed therapy, so we do it here you are not supposed to take it home. She will stop taking the SP when taking the antimalarial and start taking SP after like one month and then also she has to do a G6PD test before they start taking SP, so without the test you can't take SP so if she has a defect whether full or partial then she can't take SP."* [Participant 3]

DISCUSSION

The objectives of this cross sectional study was to determine the uptake of IPTp-SP among postpartum women attending postnatal clinic and also to estimate the proportion who took IPTp-SP under DOT. Additionally, the study determined the association between the uptake of IPTp-SP and birth weight as well as the challenges associated with the uptake of IPTp-SP in Maamobi General Hospital. The findings of this study suggest a good level of uptake of three or more doses of IPTp in Maamobi General Hospital with a good compliance to direct observed therapy. Furthermore, the uptake of more doses of SP was identified to affect birth weight, whiles side effects of SP was confirmed to contribute to the uptake of SP.

5.1 Uptake of IPTp-SP

The WHO 2012 made extensive recommendations on the policy on "intermittent preventive treatment in pregnancy using sulfadoxine-pyrimethamine" (IPTp-SP) requiring at least four antenatal visits to be made by pregnant women during pregnancy. IPTp-SP is expected to be given 28 days apart during each ANC visit and under the immediate oversight of midwives. The policy also promotes pregnant women to take three or more doses of SP during pregnancy for malaria protection during pregnancy and related complications such as premature birth, anemia, stillbirth, and low birth weight.

The uptake of IPTp-SP1, IPTp-SP2, IPTp-SP3, IPTp-SP4, and IPTp-SP5 reported for this study was 100%, 92.1%, 72.1%, 36.8%, and 8.7% respectively. According to the 2014 DHS of Ghana, 83% of the women with live births in the two years preceding the survey reported taking at least one dose of SP during ANC visit, 29% took IPTp-SP2+ and 39% reported taking IPTp-SP3+. But this study reported a 72.1% uptake of IPTp-SP3+ as compared to

the 39% reported in that of the DHS (Survey, 2014). A one-sample test of proportion revealed that the uptake of IPTp-SP3+ was statistically different between this study and the national average reported in the GDHS 2014 (p>0.39, p-value=0.01). This could be to the health education and promotional activities that has gone into IPTp-SP over the years. For instance, the ANC of the Maamobi general hospital organzises pregnancy school for pregnant women which could have influenced their attitude towards the uptake of IPTp-SP. Furthermore, the uptake of IPTp-SP1, IPTp-SP2, IPTp-SP3, and IPTp-SP4 according to the (*NMCP, 2016*, 2016) were 64.1%, 51.6%, 36.7%, and 16.7% as compared to what is reported in this study. The difference in proportions in IPTp-SP uptake and the national average only shows the difference in variation in IPTp-SP uptake in the country. For instance, the uptake of IPT3 in Sunyani Municipality in Ghana was reported to be 44% as compared to 72.1% in this study (Municipality, 2017). A two-sample test of proportion indicated that the uptake of less than IPTp-SP3+ and IPTp-SP3+ was significantly different between respondents who had low birth weight and normal birth weight babies (p>0; p=0.01). The prevalence of the uptake of IPTp-SP3+ among respondents with normal birth weight was 0.78 (CI 95%, 0.73-0.83), whiles the prevalence of the uptake of IPTp-SP3+ among respondents with LBW is 0.29 (CI 95%, 0.16-0.42).

On the contrary, the uptake of IPTp-SP3 was 47.6% in a study by (Dapaa 2017) in Ghana, as compared to 72.1% in this study. Whiles Dapaa 2017 reported 66.1% uptake for IPTp-SP2 this study reported 92.1% of uptake respectively. Similarly, (Antwi 2010) in a study in the Bosomtwe District of Ghana reported a higher uptake of IPTp-SP1 and IPTp-SP2 (95% and 77%) relatively compared to this study's 100% and 92.1%. Then again, IPTp-SP1 was 100% in this study because all the respondents recruited for the study had taken at least one

dose of SP during pregnancy. This study recorded a 72.1% uptake of IPTp-SP3, which is relatively higher as compared to 46% reported in Northern Ghana. (Doku et al., 2016) According to the WHO, IPTp-SP coverage is slow with the uptake of IPTp-SP3 and IPTp-SP2 reportedly at 22% and 42% as of 2017 compared to the 72.1% and 92.1% reported by this study. Rather Zambia was reported to have reported more than 50% uptake of IPTp-SP3 according to the World Malaria Report 2018. Additionally, (Boateng & Anto, 2017) reported a higher uptake of IPT-SP as follows: IPT1-98.8%, IPT2-94.9%, IPT3-87.5%, ITP4-55.7% and IPT5-14.5%. The level of IPTp-SP uptake in this study can be said to be similarly higher with their findings. Whiles the uptake of three or more doses of SP reported by (Boateng & Anto, 2017) was 88.5%, this study reported uptake of 72.1%. A one-sample test of proportion showed a significant difference ($p<0.885$, $p=0.01$). Additionally, a cross-sectional study from an MIS conducted in eight (8) sub-Saharan countries indicated an overall uptake of 29.5% IPTp-SP3 in last pregnancy as compared to the 72.1% IPTp-SP3 uptake reported in this study. (Sanni Yaya, Olalekan A. Uthman, Agbessi Amouzou, 2018) The WHO (2018) reported that 36 African countries as of 2016 had adopted a policy of three or more doses of IPTp-SP uptake during pregnancy. From the report, the uptake of IPTp-SP3+ was observed to have a steady increase. Reportedly, 23 countries had an estimated 19% of IPTp-SP3+ in 2016, 18% in 2015 and 13% in 2014 as compared to the 72.1% of IPTp-SP3+ in this study which is higher in comparison to the report by WHO (2018). The higher uptake of IPTp-SP3+ reported by this study was probably because the majority of respondents started ANC in their 1st and 2nd trimester of pregnancy, whiles majority of also reportedly took IPT1 in the 2nd trimester of pregnancy which could have led to them to have ample period to take adequate doses of SP. Additionally, the findings from the in-depth interview proved that HCW were familiar with the WHO recommendation which states that SP could be taken till delivery, this could also have led to the higher uptake

of IPTp-SP3+ found in this study. Even though this study did not look at the factors which influence the uptake of IPTp-SP, findings from other studies and WHO states that at least four ANC visit during pregnancy may increase the uptake of IPTp-SP. About 95.2% of respondents reportedly made more than four ANC visits during pregnancy and a test of association showed a significant association between the uptake of IPTp-SP3+ and those who made at least four ANC visits during pregnancy.

5.2 Direct Observed Therapy of IPTp-SP

WHO and NMCPs recommend the use of directly observed therapy (DOT) in the administration of SP to pregnant females. This technique guarantees that in the presence of the midwives or the HCW, pregnant women take the SP.

From the study, the proportion of women who responded to had received and taken SP under DOT was 100%. Thus out of all the 380 women interviewed, all of them reported receiving and taking SP in the ANC under the direct supervision of an HCW which was verified in their ANC record book. These findings could probably be attributed to the level of health education and promotion that has gone into the "intermittent preventive treatment of malaria in pregnancy with SP. The proportion for this indicator (DOT) could also be high probably because it is a hospital-based study which may make responses more favourable than household survey. The practice of DOT could probably contribute to the high uptake of IPTp-SP3+ in Maamobi General Hospital. This is not consistent with the findings. (Akinleye et al., 2009) which reported that 36.8% of women who took SP in the clinic, a proportion of 14.3% did so under DOT. Similarly, a study in Nigeria by (Tobin-West & Asuquo, 2013) discovered that only 16.4% of those taking SP as IPTp did so under DOT. Similarly, a study in Sunyani found that all the facilities studies practiced DOT

((Municipality, 2017). The proportion of practice of DOT in this study is higher than 64.7% reported in Nigeria. (Onoka, Hanson, & Onwujekwe, 2012).

5.3 IPTp-SP Stock-Level.

From the study, the proportion of the adequate and inadequate stock of SP in the pharmacy in 2018 was 41.7% and 58.3% respectively. A total of seven months were found to be inadequately stocked with SP out of the 12 months under review. But this inadequacy was not found to be below the emergency reorder level and therefore did not affect the availability of SP for the eligible pregnant women. This could also be because the available stock in the pharmacy met the consumption level of women who attended ANC under the year of review. Similarly, (Boateng & Anto, 2017) in a recent study in Ghana, reported that there was an adequate stock level of SP throughout the period of the review. But according to (*NMCP, 2016*, 2016), stock-out of sulfadoxine-pyrimethamine (SP) is a contributory factor to the challenges that affect the scale-up of IPTp-SP in the country.

5.4 Uptake of IPTp-SP and Low Birth Weight

The proportion of LBW in the study was 12.6%. In a cross-sectional study in Ghana, Dapaah reported LBW of 12.2%. Analysis of these proportion using a one-sample test of proportion showed no statistically significant difference between the two proportions ($p=0.122$, $p=0.79$). Additionally, a 37% proportion of LBW was reported in a study in Nigeria. (Muhammad et al., 2016). Using one-test of proportion, there was a statistically significant difference between the proportion of LBW ($p<0.37$; $p=0.01$). This study also found that women who took less than IPTp-SP3+ had a significantly higher risk of LBW than women who took IPTp-SP3+. The risk of LBW was significantly different between those who received less than IPTp-SP3+ (70.8%, n=34) and IPTp-SP3+ (29.2%, n=14) respectively.

The findings of this study are consistent with findings from (Valea et al, 2010).According to a study by Oke & Salihu the birth weight of babies improved when the uptake of IPTp-SP was increased from 29% to 38%. Similarly, research has recorded a decreased chance of LBW and a lower risk of LBW in pregnant females who took IPTp-SP4+.(Dapaa, 2017). Also, it had been reported that the implementation of IPTp-SP had increased birth weights after clinical and parasitology parameters were assessed among women delivering (Hommerich et al., 2007).

This confirms that birth weight could improve when pregnant women take more doses of IPTp-SP to prevent malaria in pregnancy which could then prevent the complications related to malaria in pregnancy such as low birth weight. Additionally, this study found that the mean birth weight between respondents who took less than IPTp-SP3+ and those who took IPTp-SP3+ was significantly different. The mean birth weight among respondents who reported taking less than IPTp-SP3+ was 2.8kg whiles' respondents who reported taking IPTp-SP3+ had a mean birth weight of 3.1kg. This difference was statistically significant. Additionally, there was a statistically significant difference between the prevalence of LBW and the uptake of less than IPTp-SP3+ and IPTp-SP3+ ($P<0.01$). The prevalence of LBW among the uptake of less than IPTp-SP3+ is 0.32 (CI 95%, 0.23-0.40), whiles the prevalence of LBW among the uptake of IPTp-SP3+ was 0.05 (CI 95%, 0.02-0.07).

Also, it was found that experiencing LBW was significantly associated with the trimester within which a woman made the first ANC visit as well as the trimester within which a woman took IPT1. It was found that women who made their first ANC visit in the 2nd trimester of pregnancy had an increased likelihood of experiencing LBW 58.3% (n=28) as compared to women who made their first ANC visit in the 3rd trimester of pregnancy.

Likewise, women who took IPT1 in the 2nd trimester were more likely to experience LBW 66.7% (n=32) as compared to women who took IPT1 in the 3rd trimester 15% (n=31). It is expected that women who made their first ANC visit in the 1st trimester or 2nd trimester and women who started IPT1 in the 2nd trimester may end up taking more doses of IPTp-SP which may prevent malaria in pregnancy and its related complications such as LBW. But making the first ANC visit in the 1st trimester or 2nd trimester, as well as starting IPT1 in the 2nd trimester may not lead to taking adequate doses of SP. Rather it is the consistency and taking of adequate doses of SP during the course of the pregnancy which may reduce the likelihood of experiencing LBW. Majority of respondents started IPT1 in the 2nd trimester, this may probably be the reason accounting for the likelihood of experiencing LBW among such respondents because of the bias in numbers.

The uptake of IPTp-SP3+ was found to be a strong predictor for LBW. In a logistic regression of IPTp-SP and LBW, the association was significant. The study suggests that women with the uptake of IPTp-SP3+ will have a 88% reduced chances of having a baby weighing less than 2.5kg compared to uptake of less than IPTp-SP3+ (AOR=0.12[95%CI=0.06-0.26].

5.5 Challenges associated with uptake of IPTp-SP

Respondents in the in-depth interview suggested that side effects are basically the challenge in IPTp-SP uptake. The side effects associated with the SP are very common among pregnant women when they take the drug, according to most respondents. Nausea and vomiting, as well as general weakness, are among the side effects listed in the interview. These results are similar with results from (Municipality, 2017) that discovered nausea and vomiting as side effects that lead to women defaulting or dropping out of the programme.

This research also discovered that drop out among pregnant women taking SP during ANC could be attributed to the SP's side effects. For instance, 27.6% of respondents in this study reported experiencing side effects when they take SP, out of which the complaints of general weakness and vomiting were high with 12.9% and 8.2% respectively.

Additionally, even though the findings from the quantitative outcome indicated inadequate stock level for a period of seven months in 2018, the findings from the qualitative interview suggest that stock out of SP was not experienced at the ANC. Rather there was sufficient stock of SP for the programme at the pharmacy and the ANC during the period of the study. According to (WHO 2014) confusion among HCW about the administration of SP was a major challenge to the programme implementation. Similarly, (Hill et al., 2013) found that confusion among HCW concerning the timing of SP doses affected the effectiveness of the programme. But this study did not seem to find any confusion among HCW interviewed. All the respondents who participated in the in-depth interview had a fair amount of knowledge about IPTp-SP. It also appeared from findings from the qualitative results that HCW were conversant with the guideline and protocols for the IPTp-SP programme. Almost all the participants interviewed had an idea about the guidelines for IPTp-SP such as starting SP after quickening or after 13 weeks, DOT, and ruling out G6PD. But results from the quantitative study revealed that 5 respondents started IPT1 in the 1st trimester instead of the 2nd trimester of pregnancy.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Although Ghana has made quite significant strides in improving IPT uptake from 26.8% in 2008 to 38.5% in 2014 ,which is the second highest after Zambia (DHS 2014), there is still the need for Government of Ghana to recommit itself towards rigorously pursuing the fight against MIP. With an ambitious SDG target of reducing maternal mortality rate (MMR) from 319 to 70 per 100,000 live births,

Also, policy and practice must be consistent at all times to ensure service delivery follows latest and updated guidelines. Also training institutions should seek and adopt latest MIP guidelines during instruction.

The uptake of three or more doses of "intermittent preventive treatment in pregnancy using sulfadoxine-pyrimethamine "(IPTp-SP3+) in the Maamobi General Hospital was 72.1%. The findings for the uptake of IPTp-SP3+ were significantly increased in proportion as compared to the demographic and health survey 2014. (Survey, 2014). This is a remarkable improvement which should be sustained in order to meet the ambitious SDG target of reducing maternal mortality rate (MMR) from 319 to 70 per 100,000 live births.

Pregnant women who took three or more doses of "intermittent preventive treatment in pregnancy using sulfadoxine-pyrimethamine" (IPTp-SP3+) had a lower risk of low birth weight compared with those who took less than IPTp-SP3+.

Findings from the qualitative study acknowledged dropouts among pregnant women who attend ANC at the Maamobi General Hospital. Among the challenges identified by the

interviewees, side effects accounted for the highest reason given for dropouts. In light of this, the Coalition of NGOs in malaria partnership with the National Malaria Control Programme should intensify its house-to-house education on IPTp and vigorously follow-up on dropout rate. Apparently, stock out was not found to be a problem, as there was no reported case of stock out of SP at the ANC. Additionally, even though quantitative analysis found 58.3% of the inadequate stock of SP in the year 2018, the level did not fall below the emergency stock level of fewer than two weeks of stock. This factor and the level of consumption of SP in the facility could probably be the reason for no reported stock out at the ANC, however steps should be put in place to ensure that stock level of SP in the hospital is always above the minimum calculated stock.

6.2 Recommendations

The uptake of intermittent preventive treatment in pregnancy using sulfadoxine-pyrimethamine in the study was significantly high especially IPTp-SP3+. The ANC providers of Maamobi General Hospital should sustain the gains made so far and take steps to increase the uptake of IPTp-SP3+.

Also, ANC staff should encourage pregnant women to take adequate doses of SP and follow-up on ANC attendees who default IPTp-SP during pregnancy.

The staff at the ANC should maintain the practice of directly observed therapy.

ANC staff should strengthen health promotion and education among ANC attendees with special emphasis on the side effects of SP.

The hospital management should put in place mechanisms to ensure that stock levels of SP are continuously above the minimum required levels needed to satisfy any unexpected rise in ANC attendance that may boost SP consumption especially when there is an increase in IPTp-SP4 and IPTp-SP5 uptake.

Stakeholders such as the NMCP should conduct periodic monitoring of the programme implementation with an emphasis on data quality dimensions such as completeness and accuracy of documentation especially in ANC registers and ANC record book.

The hospital should strengthen supportive supervision, monitoring, and evaluation especially of ANC activities including postnatal registers and ANC record books for completeness and accuracy.

Finally, hospital and management should conduct periodic refresher training for ANC staff on the guidelines and recommendations of SP with continuous supportive supervision from the Ghana health service.

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APPENDICES

Appendix 1: Study Information Sheet

Project Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the** birth **weight of newborns in Maamobi General Hospital in Ghana".**

Hello, my name is Emmanuel Baffo a Master of Public Health Monitoring and Evaluation Student at the University of Ghana. I am conducting a study to assess the uptake of intermittent preventive treatment for malaria with SP and its influence on birth weight of newborns in Maamobi General Hospital. You have been selected to take part in this study because you have recently completed your antenatal visit and we will be grateful if you would be willing to share your experiences with us.

Study Procedure

If you agree to participate in this research, a trained research assistant will interview you. You will be asked to share your experiences during the antenatal visits when you were pregnant and whether you completed five doses of IPT-SP or not. The interview will be short and last only 15 to 20 minutes. You are free to answer the questions to best of your understanding and also seek clarification if any questions are unclear.

Nature of research

The expected outcome of this study is to find out the number of postpartum women who took IPT1, IPT2, IPT3 and more during their recent pregnancy and whether the number of doses taken during pregnancy has any association with the birth weight of the baby. Additionally, to know whether there was enough SP available for pregnant women on each ANC visit, as well as the practice of DOT. The study will recruit 381 postpartum women.

Risks and benefits

The proposed project is considered a minimal risk study since it does not involve any invasive procedures. There are no direct benefits to the participants. The findings of the study will be beneficial to the region and Ghana Health Service as a whole in especially monitoring and evaluating of intermittent preventive treatment in malaria intervention in pregnancy. Your participation in this study may, therefore, be helping in strengthening the monitoring and evaluation of the IPTp-SP uptake in the district and the region as a whole.

Cost

There will not be any cost incurred by participants in the course of this study

Confidentiality

The information acquired from this study will be kept private and used for the purpose of the study. The information will be stored safely in a file without your name, but with a number and will only be available and accessible to the members of the research team. The coded number to your name will be kept confidential. The results of the study would be shared in such a way to prevent a link between your identity and any information.

Compensation

We will not pay you for participation in this study.

Voluntariness

Participation in this study is voluntary and you can willingly withdraw from this study at any period without any consequences.

Outcome and Feedback

The findings from this study will be disseminated to ANC and postnatal attendants through the ANC unit in the hospital.

Funding information

The study is funded by the student researcher or the principal investigator

Sharing of participants information/Data

The data which will be generated will be used for the purposes of academic work and publication in the future. The data will be destroyed after the purposes for which it is being collected.

In-depth Interview

We will record the in-depth interview in order to transcribe and translate the information for analysis. This is solely for the purposes of this study, after which the recording s will be destroyed.

Provision of Information and Consent for participants

A copy of the information sheet and the consent form will be given you for keeping after signing it.

QUESTIONS

You are encouraged to ask questions about the study. If you have any questions concerning this study information you may contact the following persons;

Contact Numbers

In case of any queries/difficulties you may contact the following:

Emmanuel Baffo

Tel: 0249417897

E-mail: e.baffo86@yahoo.com

Dr. Paulina Tindana

Tel: 0544905490

E-mail: ptindana@gmail.com

You may also contact the Chair or Administrator of the Ghana Health Service Ethical Review Committee. Madam Hannah Frimpong (0507041223)

Appendix 2: Consent Form

I have read the written information (or have had the information read and adequately explained to me in a language I understand) for the study "**Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana**".

I have been given adequate opportunity to ask any question I have. All questions have been answered to my satisfaction. I have also been given enough time and opportunity to consider taking part in this study. I fully comprehend the content and possible implications as well as my right to withdraw from the study even after consenting and signing this form.

I therefore agree to participate in this study.

Initials of Participant..... ID Code.....

.....

Signature of Participant Date: .....

Right thumb print Sign (Witness):

RTP

Form filled by: .....

Signature: .....

Date: .....

Interpreters' Statement

I interpreted the objectives and the content of the Participant's Information Sheet to the afore-mentioned participant to the best of my knowledge in the (.....) language to her proper understanding.

All questions, appropriate explanations sort by the participant and answers were also duly interpreted to her satisfaction

Name of Interpreter .....

Signature .....

Date .....

Contact Details

Investigators Statement and Signature

I declare that enough time has been given the participant to read and learn about the study. All questions and clarifications which came up have been duly addressed.

Researcher's name .....

Signature .....

Date .....

Appendix 3: Questionnaires

Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana**

You have been selected to assist in this study by responding to this questionnaire. The information you provide for the purposes of this research work will be strictly confidential. Kindly tick the appropriate box that corresponds to your response and writes appropriately where space has been provided.

Unique Number: .....

Sampling Unit: .....

Date: ...../2019

SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Age of respondents (in completed years).....

2. Marital Status :

   1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. Co-habiting [ ]

3. Educational Level :

   1. None [ ] 2. Primary [ ] 3. Middle School [ ] 4. JHS [ ] 5. SHS [ ] 6. Tertiary [ ]

4. Ethnicity: .....

5. Religion :

   1. Christianity [ ] 2. Islam [ ] 3. African Tradition [ ] 4. Others [ ]

6. Occupation :

   1. Unemployed [ ] 2. Housewife [ ] 3. Business/Petty Trading [ ] 4. Civil Servant [ ]

PRACTICE OF IPTp AT ANC

7. Gravidity :
   1. Primgravid [ ] 2. Secundigravid [ ] 3. Multigravid [ ]

8. The number of children? .....

9. The number of ANC visit during last pregnancy? .....

10. At what gestational age or trimester was your first ANC visit?
    1. 1st [ ] 2. 2nd [ ] 3. 3rd [ ] 4. 4th [ ] Gestational age in weeks .....

11. Did you take IPTp-SP during pregnancy?
    1. Yes [ ] 2. No [ ]

12. If Yes, Tick all that apply:
    1. IPT1 [ ] 2. IPT2 [ ] 3. ITP3 [ ] 4. IPT4 [ ] 5. IPT5 [ ]

13. Was the interval between doses of SP one month apart?
    1. Yes [ ] 2. No [ ]

14. At what gestational age or trimester did you take IPT1?
    1. 1st [ ] 2. 2nd [ ] 3. 3rd [ ] 4. 4th [ ] Gestational age in weeks .....

15. Where did you get SP?
    1. ANC [ ] 2. Others [ ]

16. Where did you swallow SP?
    1. ANC/direct supervision of HCW [ ] 2. Outside the hospital [ ]

17. How many tablets of SP did you swallow? .....

18. Did you stop folic acid whiles taking SP?
    1. Yes [ ] 2. No [ ]

19. Did you receive ITN/LLIN during ANC your last pregnancy?
    1. Yes [ ] 2. No [ ]

20. Did you sleep under ITN/ LLIN while pregnant?
    1. Yes [ ] 2. No [ ]

CHALLENGES ASSOCIATED WITH SP

21. Did you have side effect/challenge upon taking SP?

Yes [ ] No [ ]

22. Which side effect/challenges did you have taking SP? .....

MATERNAL BEHAVIOUR AND DISEASE

23. Have you ever smoked?

1. Yes [ ] 2. No [ ]

24. Do you still smoke?

1. Yes [ ] 2. No [ ]

25. Have you ever drunk alcohol?

1. Yes [ ] 2. No [ ]

26. Do you still drink?

1. Yes [ ] 2. No [ ]

27. Do you have any of these diseases?

1. Sickle cell disease: 1. Yes [ ] 2. No [ ]
2. Diabetes: 1. Yes [ ] 2. No [ ]
3. HPTN: 1. Yes [ ] 2. No [ ]
4. G6PD: 1. Full [ ] 2. Partial [ ] 3. No [ ]
5. Malaria during pregnancy 1. Yes [ ] 2. No [ ]

28. Haemoglobin at 1st ANC: ..... (g/dl)

29. Haemoglobin at 36 week: ..... (g/dl)

OUTCOME OF PREGNANCY

30. Birth weight of baby.....(kg)

31. Sex of baby :

1. Male [ ] 2. Female [ ]

Appendix 4- Interview Guide – IDI with Midwives

Project Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana.**

Introduction

- Welcome the participant and briefly describe the objectives of the project
- Review Study Info Sheet & provide a copy of the Consent Form for signature
- Outline the format of the interview

Section A: Background of interviewee

Interviewee ID	Sex	Level of education	Role at the facility	Length of service

Malaria in Pregnancy

1. What are the problems related to malaria in pregnancy?

Knowledge on IPTp-SP

2. What in your opinion is IPTp-SP?
3. How beneficial is IPTp-SP in the prevention of malaria in pregnancy? Are there any benefits associated with IPTp-SP during pregnancy?
4. Is there any recommendations or guideline for IPTp-SP administration in Ghana? What are the recommendations for IPTp-SP in Ghana?

Challenges related to IPTp-SP

5. How is SP issued?
6. How do you ensure SP is always available for supply and issue? How do you deal with SP stock?
7. Are there cases of dropouts in SP uptake? What do you think accounts for the dropouts?
8. What are some of the challenges you face in implementing the IPTp-SP programme?
9. What do you think could be done to improve the challenges related to IPTp-SP intervention?

Appendix 5: Interview Guide – IDI with Physician

Project Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana.**

Introduction

- Welcome the participant and briefly describe the objectives of the project
- Review Study Info Sheet & provide a copy of the Consent Form for signature
- Outline the format of the interview

Section A: Background of interviewee

Interviewee ID	Sex	Level of education	Role at the facility	Length of service

Malaria in Pregnancy

1. Is there any problem related to malaria during pregnancy? What are the problems related to malaria in pregnancy?

Knowledge on IPTp-SP

2. What in your opinion is IPTp-SP?
3. How beneficial is IPTp-SP in the prevention of malaria in pregnancy? Are there any benefits associated with IPTp-SP during pregnancy?
4. Are there any recommendations for IPTp-SP administration in Ghana? What are the recommendations for IPTp-SP in Ghana?

Challenges related to IPTp-SP

5. Are there cases of dropouts among pregnant women in SP uptake? What reasons do you think accounts for the dropouts for taking IPTp-SP among pregnant women?
6. What are some of the challenges you face in the implementation of the IPTp-SP programme?
7. What do you think could be done to improve the challenges related to IPTp-SP intervention?
8. What are the challenges related to the availability of SP in the implementation of IPTp-SP programme? What do you recommend in relation to the improvement of the IPTp-programme?

Appendix 6: Interview Guide – IDI with Pharmacist

Project Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana**

Introduction

- Welcome the participant and briefly describe the objectives of the project
- Review Study Info Sheet & provide a copy of the Consent Form for signature
- Outline the format of the interview

Section A: Background of interviewee

Interviewee ID	Sex	Level of education	Role at the facility	Length of service

Malaria in Pregnancy

1. Is there any problem related to malaria in pregnancy? What is the problem related to malaria in pregnancy?

Challenges related to IPTp-SP Stock

1. What do you think about the demand for SP in the facility?
2. What is the frequency of SP supply to the ANC? How do you determine adequate stock for the consumption of ANC attendees?
3. Are there ever any challenges related to the stock of SP? How do you ensure SP is always available? How do you ensure SP is always available for ANC?

Appendix 7: Interview Guide – IDI with Public Health Nurse/Community Health Nurses

Project Title: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana**

Introduction

- Welcome the participant and briefly describe the objectives of the project
- Review Study Info Sheet & provide a copy of the Consent Form for signature
- Outline the format of the interview

Section A: Background of interviewee

Interviewee ID	Sex	Level of education	Role at the facility	Length of service

Malaria in Pregnancy

1. What are the problems related to malaria in pregnancy?

Knowledge on IPTp-SP

2. What in your opinion is IPTp-SP?
3. How beneficial is IPTp-SP in the prevention of malaria in pregnancy? Are there any benefits associated with IPTp-SP during pregnancy?

Challenges related to IPTp-SP

1. Do you engage pregnant women during a home visit? What education are they given on IPTp-SP?
2. What challenges have pregnant women given in relation to IPTp-SP? What are some ways you think this challenges can be addressed?

Appendix 8: Data Extraction Form for Stock of SP

TOPIC: **Uptake of Intermittent Preventive Treatment during Pregnancy and its influence on the birth weight of newborns in Maamobi General Hospital in Ghana**

No	MONTH/YEAR 2018	STOCK LEVEL	MINIMUN STOCK :	MAXIMUM STOCK :	BELOW MINIMUM STOCK (inadequate)	BETWEEN MINIMUM & MAXIMUM STOCK (adequate)
1	January					
2	February					
3	March					
4	April					
5	May					
6	June					
		STOCK LEVEL	MINIMUM STOCK :	MAXIMUM STOCK :	BELOW MINIMUM STOCK (inadequate)	MINIMUM & MAXIMUM STOCK (adequate)
1	July					
2	August					
3	September					
4	October					
5	November					
6	December					

APPENDIX 9: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax: +233-302-685424
Email: ghserc@gmail.com

8th April, 2019

MyRef. GHS/RDD/ERC/Admin/App [9] [107]
Your Ref. No.

Emmanuel Baffo
University of Ghana
School of Public Health
Legon

RECEIVED

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC 032/03/19
Project Title	Uptake of Intermittent Preventive Treatment during Pregnancy and its Influence on the Birth Weight of Newborns in Maamobi General Hospital in Ghana.
Approval Date	8th April, 2019
Expiry Date	7th Anil, 2020
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED

DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

DR. SALAMATU ATTAH-NANTOGMA
FAMILY PHYSICIAN
MAAMOBI HOSPITAL

Attn - Department Head OPD
DONS Laughing
I.I.N and Ca