UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA DURING PREGNANCY WITH SULPHADOXINE-PYRIMETHAMINE (IPTP-SP) AMONG POSTPARTUM WOMEN IN ZOMBA DISTRICT, MALAWI: A CROSS-SECTIONAL STUDY

By

Steven Chifundo Azizi

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DECLARATION

I, STEVEN CHIFUNDO AZIZI, hereby declare that this dissertation for the Master of Science in Epidemiology is my own original work that has not been submitted to any other University for similar purposes. Where other people's work has been used acknowledgements have been made.

Signed:_____Date:_____

CERTIFICATE OF APPROVAL

This dissertation of Steven Chifundo Azizi has been approved as fulfilling the requirements for the award of the Master of Science in Epidemiology by the University of Zambia.

Examiners:

Signature:_____ Date:_____

Prof. Patrick Musonda
Examiner 1

Signature:_____ Date:_____

Dr. Joseph Mumba Zulu Date:
Examiner 2

Signature:_____ Date:_____

Mr. Mumbi Chola
Examiner 3

Supervised by:

Signature: _____ Date:_____

Prof. Charles Michelo
Main Supervisor

Signature: _____ Date:_____

Dr. Gershom Chongwe
Co-supervisor

ABSTRACT

Malaria in pregnancy causes adverse birth outcomes. Intermittent preventive treatment of malaria during pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) is recommended as a chemoprevention therapy. Despite the effectiveness of the intervention, Zomba district has below national average uptake of 43% of pregnant women who took at least two doses of SP. The study was conducted to assess determinants of IPTp-SP uptake during pregnancy among postpartum women in Zomba district.

The study used a cross-sectional survey with simple random sampling in selecting two public health facilities (HFs) from two strata (urban and rural). One HF was selected from each stratum. Study participants were selected by using exit poll method from HFs. A total of 463 postpartum women were interviewed using structured questionnaire from the two HFs. Univariate and multiple binary logistic regression was employed in data analysis.

Out of all the enrolled participants (n=463), 92% women had complete information for analysis. Of these, (n=426)women, 127 (29.8%, 95% CI: 25.6-34.3) received three (optimal) or more doses of SP, 299 (70.2%, 95% CI: 65.7-74.4) received two or less doses (poor uptake or suboptimal). Women receiving SP from rural HF were less likely to get at least three doses of SP than urban women, (AOR=0.31, 95% CI 0.13-0.70); Others less likely were those with three or few antenatal care (ANC) visits versus four or more visits (AOR=0.29, 95% CI 0.18-0.48); not taking SP under direct observation therapy (DOT) (AOR=0.18, 95% CI (0.05-0.63). The prevalence of low birth was 6.5% (95% CI 4.0-10.3, n=248) and there was no evidence of an association between poor IPTp-SP uptake and low birth weight even after adjusting for other variables, (AOR=0.59, 95% CI 0.19-1.78).

There is low utilisation of SP in this population and this seems to be associated with the number of ANC visits, use of DOTs and distance to health facility. These determinants may therefore be important in shaping interventions aimed at increasing the uptake of IPTp in this district. In addition, the rural urban differential suggests the need for further research to understand the barriers and enablers of uptake in each context in order to improve the health of the community.

DEDICATION

To the women in the study communities who shared their stories with the researcher.

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Thank you. To you be all honour and obeisance.

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ANC	Antenatal care
BMI	Body Mass Index
CHAM	Christian Health Association of Malawi
DHS	Demographic and Health Survey
DOT	Direct Obsservation Treatment
FANC	Focused Antenatal care
HMIS	Health Management Information System
IPTp	Intermittent Preventive Treatment in pregnacy
IPTp1	Single dose of IPTp-SP
IPTp2	Two doses of IPTp-SP
IPTp2+	Two or more doses of IPTp-SP
IPTp3	Three doses of IPTp-SP
IPTp3+	Three or more doses of IPTp-SP
IPTp-SP	Intermittent Preventive Treatment in pregnacy with Sulphadoxine-pyrimethamine
ITN	Insecticides treated net
MiP	Malaria in pregnancy
NMCP	National Malaria Control Programme
NSO	National Statistical Office
SP	Sulphadoxine-pyrimethamine
WHO	World Health Organization

CHAPTER 1: BACKGROUND

1.1 Introduction

Malaria is an important public health concern globally (Andrews et al., 2015). In 2015, it was estimated about half of the world population (3.2 billion) was at risk, 214 (uncertainty range: 149 – 303) million malaria cases, and 438, 000 (uncertainty range: 236000–635000) malaria deaths with 91% of all malaria deaths occurring in sub-Saharan Africa (WHO, 2015). Overall malaria burden has declined in the world but it is still a public health challenge in sub-Saharan Africa, especially in pregnant women and children(WHO, 2015).

Malaria in pregnancy (MiP) is a significant cause of maternal morbidity and poor birth outcomes yet is preventable and treatable (Guyatt and Snow, 2001, Menéndez et al., 2007, Desai et al., 2007, Hill et al., 2013). Dellicour et al. (2010) present a global estimate of about 125 million pregnant women are at risk of malaria infection each year.

In 2015, the estimated cases of malaria was 118 million and mortality was 395 000 in sub-Saharan Africa. The estimated incidence rate was 246 cases per 1000 person at risk of malaria against estimated death rate of 52 per 100 000 at risk of malaria (WHO, 2015). Young children and pregnant women are disproportionately burdened by malaria in malaria-endemic areas (ter Kuile et al., 2007).Women are particularly predisposed to adverse effects of malaria during their first and second pregnancies (WHO, 2004). It is estimated that 30 million pregnant women are at risk of malaria infection each year in sub-Saharan Africa (Dellicour et al., 2010). Furthermore, 75,000-200,000 infant and 10, 000 women deaths are estimated annually and the deaths are attributed to MiP (Roll Back Malaria Partnership, 2014, Dellicour et al., 2010). Mostly, *Plasmodium falciparum* infections in pregnancy contributes to approximately 11% (100, 000) of neonatal deaths due to low birth weight (Eisele et al., 2012, Roll Back Malaria Partnership, 2014). Pregnant women are susceptible to severe *Plasmodium falciparum* infection because of alteration of acquired antimalarial immunity due to parasites (VAR2CSA) that sequester in the placenta (Agomo et al., 2011, Kakkilaya, 2015). The *Plasmodium falciparum*impairs the capacity of the placenta to transport amino acids from maternal blood to the foetus; and therefore

contributing to lower birth weights (Dimasuay et al., 2017). Other consequences of malaria infection in pregnancy are increased risk of severe anaemia, pre-term delivery, and maternal death (Rogerson et al., 2007b).

Malaria is endemic in Malawi and transmission occurs throughout the year in most areas, and it is one of important public health concerns. The transmission trend rises in the rainy season (October to April) and in areas with high temperatures especially around lakeshore and lower Shire Valley. In Malawi, 98% of malaria infections are caused by *Plasmodium falciparum* transmitted by *Anopheles funestus*, *A. gambiae*, and *A. arabiensis* mosquito vectors (National Malaria Control Programme (NMCP) [Malawi], 2010).

Malaria accounts for about 34% of all outpatient visits and is estimated to be responsible for about 40% of all hospitalization of children under five years old and 40% of all hospital deaths according to unpublished 2010 Health Management Information System (HMIS) report. The 2009 HMIS report indicates that between 380,000 – 700,000 malaria outpatient cases were being reported monthly by the health facilities throughout the country. This resulted in about 6.1 million episodes of malaria reported in the outpatient departments in 2009(National Malaria Control Programme (NMCP) [Malawi], 2010, , p.7). Whatever the reasons for upsurge of malaria, the fact remains that the burden is important public health issue that needs to be addressed from all possible angles. Further, WHO (2015) report indicates that in 2015 Malawi had 2.9 (uncertainty range: 2.7 – 4.5) million reported malaria cases and 4490 (uncertainty range: 2500 – 11000) reported deaths against a population of 16,700,000 people. This represents 174 malaria incidence per 1000 population.

World Health Organisation (WHO) recommends three-pronged approach in stable malaria transmission areas for malaria prevention and control in pregnancy, which areIntermittent Preventive Treatment of malaria during pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) as a prophylaxis, use of insecticides treated nets (ITNs), and prompt diagnosis and effective treatment. Sulphadoxine-pyrimethamine is an antifolate drug that inhibits cell multiplication of malaria parasites hence, placental malaria infection is prevented or *Plasmodium falciparum* active in the placenta is controlled (Agomo et al., 2011).

In 2004, WHO recommended a minimum of two doses of IPTp-SP during pregnancy (WHO, 2007, Andrews et al., 2015). However, in October 2012 WHO updated IPTp policy to at least three doses during pregnancy, to be administered at least one month apart at each scheduled antenatal care (ANC) visit, beginning from second trimester under direct observational therapy (DOT) (WHO, 2012b, Mpogoro et al., 2014). This was after studies had shown that three or more doses are effective and safe in preventing MiP and its adverse outcomes (ter Kuile et al., 2007, ter Kuile and Steketee, 2007). Furthermore,a meta-analysis study done byEisele et al. (2012)showed that pregnant women who took IPTp during their first two pregnancies had reduced odds of LBW infants.

The Countdown to 2015 report indicates that among all interventions delivered by ANC facilities, IPTp and ITNs have the lowest utilisation in 20 countries in Africa (World Health Organization United Nations Childrens Fund, 2010). One of the factors is poor attendance on the subsequent scheduled ANC visits. Kinney et al. (2010)indicate that only 44% across sub-Saharan Africa attend ANC four or more times. This kind of erratic ANC attendance lowers uptake of IPTp because the recommended optimal doses of IPTp-SP hinges around multiple visits to antenatal care facilities (Mpogoro et al., 2014, d'Almeida et al., 2011, Haile et al., 2013, Leonard et al., 2016). Furthermore, time of ANC initiation is associated with higher uptake of IPTp (Kibusi et al., 2015).

WHO envisage the revised policy would increase IPTp-SP uptake as the Organisation also recommends at least four ANC visits during the second and third trimesters of pregnancy under Focused antenatal care (FANC) model (WHO, 2012b, WHO, 2006). FANC is a variant of the traditional ANC where it is based on ‘reduced but goal-oriented clinic visits’ to suit low-income countries (Pell et al., 2013). Therefore there is ample chance to attain a high proportion of women receiving at least three doses; and if a pregnant woman does not receive SP at each scheduled ANC visits within the recommended IPTp-SP administration period, it would be deemed as a missed opportunity (Andrews et al., 2015).

Utilisation of health services is associated with individual behaviour (Andersen and Newman, 1973). The behaviour is shaped by combination of factors such as individual characteristics, environment, and interaction of these two factors and societal forces

(Moore, 1969). Several studies have attributed barriers to IPTp-SP uptake in sub-Saharan Africa to individual factors (socioeconomic status, gender, cultural norms, and access to health facilities) and provider factors (training and supervision of staff, provider knowledge, quality of care, drug supply) (Hill et al., 2013, Kibusi et al., 2015, Mpogoro et al., 2014, Exavery et al., 2014).

1.2 Malaria in Pregnant women

Malaria in pregnancy (MiP) is major health burden in sub-Saharan Africa despite that is preventable and treatable (Onyeneho et al., 2013). Pregnant women are at increased risk of malaria complications than non-pregnant women due to hormonal and immunological changes during pregnancy especially in first pregnancy (prim gravidae) (Kakkilaya, 2015). MiP is associated with anaemia, increased risk of severe malaria which may result in abortion, stillbirth, prematurity and low birth weight.

Pathophysiology of MiP is due to changes in immunity and availability of placenta (Kakkilaya, 2015). *Plasmodium falciparum* sequesters in the placenta through adhesion to molecules such as chondroitin sulphate A (Rogerson et al., 2007a). Erythrocytes infected in the placenta have distinctive variant surface antigens (VSA), primarily VAR2CSA protein, and these pregnancy-specific variant surface antigens contribute to lack of immunity in pregnancy (Rogerson et al., 2007b).

Potential risk factors for development of malaria in pregnancy

There are several risk factors for development of malaria during pregnancy such as age, parity, gestational age, education level, number of ANC visits, use of IPTp-SP, use of Insecticide-treated nets (ITNs), and anaemia and environment (Cisse et al., 2014, Adam et al., 2005, van Eijk et al., 2002, Agomo and Oyibo, 2013). The malaria in pregnancy risk varies according to transmission intensity and level of susceptibility of individual women in the community.

1.3 Chemoprevention Intervention of malaria during pregnancy

Sulphadoxine-pyrimethamine (SP) is a standard anti-malarial drug that is used as a malaria chemo preventive drug to prevent malaria in pregnancy in Africa’s areas with

moderate to high transmission of *P. falciparum*(Sicuri et al., 2015). World Health Organization (WHO) recommends intermittent preventive treatment IPTp-SP administered during antenatal clinic visits in the second and third trimesters of pregnancy regardless of presence of malaria parasites (Jansen 2011; WHO 2015) and together with ITNs (WHO, 2013). The prophylaxis is aimed at preventing or limiting malaria infection in pregnant women who are at high risk for a limited period of time (Smith & Morrow, 1996) by maintaining therapeutic drug levels in the blood throughout the period of greatest risk (WHO 2015).

1.4 Factors Influencing the Uptake of Intermittent Preventive Treatment

Factors affecting uptake of optimal IPTp-SP doses can be categorised as barriers, facilitators, or determinants. Bausell and Wolf (2015) conceptual framework shows several potential barriers or facilitators of IPTp utilisation. The barriers are categorised as factors that affects women's perspective (cultural, individual and social structural such as education, occupation, family size, ethnicity, religion, residential, mobility) to receive IPTp-SP and health care providers' perspective (human resource, policy and guidance environment, supply chain factors and health systems) in order to deliver the intervention. Hill et al. (2013) synthesised the barriers from a systematic review analysis and discovered that from women's perspective the following factors are barriers: (1) pregnant women's knowledge (2) access to ANC (3) affordability of ANC services (4) quality of ANC services.

1.4.1 Pregnant women's knowledge

Lack of knowledge by women about the preventive benefits of IPTp, number of optimal doses, timing and safety of SP contribute to low IPTp-SP uptake (Hill et al., 2013). (Onyeneho et al., 2013) reported that higher knowledge in malaria preventive measures during pregnancy was associated with higher uptake of SP (AOR 4.41, 95% CI 2.74-8.94). Other studies such as Nganda et al. (2004) and Enato et al. (2007) also confirm that knowledge about IPTp remains low among pregnant women in developing countries, which suggests that ANC facilities are not doing enough on sensitization. Ignorance or misunderstanding can lead to lack of motivation to utilise an intervention. For example, women in Mangochi district, Malawi thought that any

bitter-tasting drugs can cause miscarriage and that SP is meant for malaria treatment in pregnancy so there was no point that of taking it if one was not ill (Launiala and Honkasalo, 2007). However, even in the midst of lack of or insufficient knowledge some women do take SP because they trust health workers to provide them with safe and beneficial drugs (Launiala and Honkasalo, 2007, Hill et al., 2013).

1.4.2 Access to Antenatal care

The number of visits is associated with utilisation of IPTp because ANC is a vehicle of the intervention. Hill et al. (2013) identified poor access to ANC, direct and indirect costs of accessing ANC, women's commitments to other duties, unwillingness to reveal pregnancy and lack of awareness of importance of ANC. These factors prevent pregnant women to access ANC services because of lack of affordability, lack of availability, lack of knowledge of preventive services.

Poor access to ANC is the chief barrier among the rest in this section. Several studies have demonstrated association between high uptake of IPTp and increased number of ANC visits that pregnant women make (Leonard et al., 2016, Mpogoro et al., 2014, d'Almeida et al., 2011). IPTp intervention is a dose-regime that relies on multiple scheduled visits of at least one month apart beginning from second trimester. Some of the determinants for poor access are long distances which brings in extra costs to the family or individual; women commitments with other domestic duties (van Eijk et al., 2004a), farming, employment, and childcare; hiding pregnancy which delays and also reduces number of ANC visits. On this later factor, Launiala and Honkasalo (2007) say some women fear once the pregnancy is revealed their adversaries will bewitch them and others say they do not go to ANC until they feel movement of the baby. All these affect negatively on access to ANC.

Linked to access to ANC is initial time for ANC attendance. Mubyazi et al. (2014) report that health workers from Mkurranga and Mufindi in Tanzania say pregnant women register late for ANC and some do not comply with appointments for revisits, hence they miss IPTp and other ANC services. Another study done in Tanzania found that first visit to ANC in first or second trimester was associated with higher IPTp uptake AOR 1.99, 95% CI 1.24-3.21 and AOR 1.94, 95%CI 1.29-2.90 respectively. Olliaro et al. (2008) report that the timing of IPTp is associated with the onset of ANC

visits. van Eijk et al. (2004b) found that delayed attendance of ANC contributed to non-completion of optimal IPTp doses. In this regard, 45% of the participants initiated ANC attendance in the third trimester and only 23.7% received IPTp2. The timing of first visits to ANC clinics also influences the IPTp uptake. In this regard, Anders et al. (2008) found that even though 48% of the participants started ANC visits before the 16th week of pregnancy, up to 86% of this lot did not receive IPTp1 because the gestation period was below the recommended 16 weeks. Those who did not receive proper explanation of this policy requirement were discouraged and failed to turn up for subsequent appointments.

1.4.3 Directly Observed Therapy (DOT)

Mubyazi et al. (2008) study shows that women who were allowed to take SP at home had poor uptake. The tendency by health care provider not to directly observe pregnant women taking SP is against ones of the implementation strategies for IPTp-SP intervention (WHO, 2013). There are severe possible reasons behind the noncompliance to DOT such as high women-to-staff ratios, unavailability of clean water and cups among others (Hill et al., 2013, Pell et al., 2011).

1.5 Low birth weight and poor uptake of IPTp-SP

Birth weight is an important factor that affects neonatal mortality and is a determinant of post-neonatal infant mortality and morbidity (Kramer, 1987). Of particular interest is low birth weight (LBW), which is defined by World Health Organization (WHO) as a birth weight less than 2500g. Kramer (1987, p.664) indicated that LBW is "caused by either a short gestation period or retarded intrauterine growth (or a combination of both)". In Malawi, the prevalence of LBW is estimated at 12% (National Statistical Office (NSO) [Malawi] and ICF, 2017).

Many factors can cause LBW. Factors that are well-known to have direct causal impacts on intrauterine growth include infant sex,maternal height, pre-pregnancy weight, paternal weight and height, maternal birth weight, parity, history of prior low-birth-weight infants, gestational weight gain and maternal nutrition, general morbidity and episodic illness, malaria, cigarette smoking, alcohol consumption, and tobacco chewing (Kramer, 1987). Several potential determinants of LBW are highly correlated and their effects are thus mutually confounded (Kramer, 1987). Some of the potential

determinants are just markers such as anaemia that are caused either by maternal undernutrition or malaria infection or both, failure to control for such markers would produce an association between anaemia and intrauterine growth retardation (IUGR) (Kramer, 1987). In other words, the markers are on the causal pathway or intermediate between the exposure of interest and the outcome of interest, example, poor maternal nutrition and IUGR.

Pregnancy induces immunosuppressision to a subset of parasites (VAR2CSA) that sequester in the placenta, hence increase susceptibility of pregnant women to malaria infection (Agomo et al., 2011, Hviid and Salanti, 2007, Vainberg et al., 1995). A placenta that is infested with parasites can lead to maternal anaemia, LBW, congenital malaria, premature delivery, abortion, and stillbirth (Steketee et al., 1996, Newman et al., 2003, Rogerson and Boeuf, 2007, Agomo et al., 2011). Guyatt and Snow (2004) say that *Plasmodium falciparum* is associated with prematurity (gestation of <37 weeks) and intrauterine growth retardation (IUGR) in pregnant women and placentas infected with the parasite have active immune response which may induce early labour though the precise effect is not known. The authors also say that IUGR is related to nutrient transport to the fetus, however the details of biological processes are unknown. Dimasuay et al. (2017) detailed that the sequestration of *Plasmodium falciparum*-infected erythrocytes in the maternal intervillous blood space of the placenta causes activation of maternal immune cells which triggers intervillous (inflammatory response), which in turn is strongly associated with LBW. In their study, Dimasuay et al. (2017) identified the first mechanism that links between being infected with malaria in pregnancy and having an increased risk of delivering a low birth weight infant. The authors demonstrated that inflammation caused by placental *Plasmodium falciparum* malaria disrupts a signalling pathway calledmechanistic target of rapamycin (mTOR), which impairs the capacity of the placenta to transport amino acids from maternal blood to the foetus; a major determinant of foetal growth and therefore contributing to lower birth weight. This important finding indicates that halting the inflammatory mediators in the placenta due to *Plasmodium falciparum* infestation would improve amino acid transportation to the foetus, hence improved foetal growth and birthweight. In that regard, WHO recommend the use of IPTp-SP during pregnancy to prevent or control malaria among other strategies. “Sulphadoxine-pyrimethamine is an antifolate drug. The malaria parasites require

folic acid for biosynthesis of purines and pyrimidines needed for DNA synthesis and cell multiplication. The combination of pyrimethamine and sulphadoxine thus offers a two-step synergistic inhibition of the bifunctional enzyme dihydrofolate reductase-thymidylate synthase (DHFR-TS) and dihydropteroate synthase (DHPS) in the folate synthetic pathway" (Agomo et al., 2011, p.2), thus nuclear division is prevented and the cell dies. This may prevent placental malaria infection or control *Plasmodium falciparum* actives in the placenta. Eisele et al. (2012) observe in their meta-analysis study that pregnant women who took IPTp during their first two pregnancies had reduced odds of LBW infants. This indicates that there is an association between IPTp uptake and birth weight.

In summary, the uptake of IPTp-SP mainly depends on more ANC visits (attendance) of pregnant women, availability of SP and delivery of the intervention at a health facility, and whether the women are observed taking the doses or not by health care provider. Furthermore, MiP causes LBW if not contained in good time, hence there is a link between IPTp-SP and birth weight. A systematic approach to understanding and addressing barriers to effective implementation of IPTp-SP intervention into routine practice is very important in health service delivery in communities where the study was conducted. The aim of this study was to understand factors that influence IPTp-SP uptake and to discern any association between poor IPTp-SP uptake and low birth weight in Zomba district, Malawi.

CHAPTER 2: MALARIA IN PREGNANCY AND IPTP-SP UPTAKE PROJECT

This chapter provides an overview of the research focus. It considers important concepts that dissect the problem into manageable components. The first section looks at statement of the problem, followed by significance of the study, research questions and objectives, and conceptual framework is the last component.

2.1 Statement of the Problem

Roll Back Malaria (RBM) Partnership has set goal of 100% coverage of IPTp by 2015 (Roll Back Malaria Partnership, 2012). Unfortunately, many countries are far from achieving that goal even after 2015 (Anon, n.d.). Malawi Ministry of Health (MoH) in its 2011-2015 Malaria Strategic Plan (MSP) intends to reach a target of 80% of all pregnant women receiving at least two doses of IPTp-SP (National Malaria Control Programme (NMCP) [Malawi], 2010). However, nationally, National Malaria Control Programme (NMCP) [Malawi] and ICF International (2015) shows that trends in the use of SP for malaria prevention during pregnancy have stagnated over the years with 60% in 2010, 54% in 2012 and in 2014, 63% of pregnant women took at least two doses of SP with at least one dose received during an antenatal care visit; against 95.4% (95% CI: 94.8-96.1) of at least one ANC attendance rate (Andrews et al., 2015). Furthermore, in Zomba district the uptake is 43% and is below the national average of 63%(National Statistical Office (NSO) [Malawi] and ICF Macro, 2011).

ANC clinics are used as a vehicle of coverage of health interventions against malaria and other adverse conditions. Thetard (2014) analysed ANC registers in Malawi and discovered that among women who completed two doses of IPTp, 63% completed the second dose of IPTp by the second antenatal visit, 93% by the third visit, and 100% by the fourth visit. Thus, the uptake of IPTp-SP mainly depends on more visits (attendance) of pregnant women and delivery of the intervention at a health facility (Andrews et al., 2015, van Eijk et al., 2013, Mpogoro et al., 2014).

As earlier indicated, WHO predict that the revised policy removes or mitigates previous barriers to IPTp uptake due to a focused antenatal care policy that runs concurrently. Therefore, there in a need to ascertain this assertion by assessing

determinants, the level of uptake of IPTp-SP and pregnancy outcomes given the adoption of the revised policy in Malawi, and in particular in Zomba district where uptake is below the national level.

2.2 Significance of the study

An optimal recommended dose regime of IPTp-SP has shown to be effective in preventing MiP regardless of pockets of resistance (van Eijk et al., 2004c, ter Kuile et al., 2007, Kayentao et al., 2007). Hence, World Health Organization currently recommends at least three dose regime of IPTp-SP. In Malawi, the revised IPTp policy was adopted in 2014 but the level of uptake and its associated determinants remains unknown at the time the proposal was developed in most parts of the country including Zomba district. Identifying factors associated with low IPTp-SP uptake and pregnancy outcomes may help direct needed changes to intervention programs and thus lead to increases in coverage.

2.3 Research questions

1. What are the determinants of uptake of at least three doses IPTp-SP during pregnancy among postpartum women in Zomba district, Malawi?
2. Is there any association between poor uptake of SP and low birth weight in the study population?

2.4 Aim

To assess determinants of IPTp-SP uptake during pregnancy among postpartum women and evaluate poor uptake of IPTp as one of the risk factors for low birth weight women in Zomba district.

2.5 Specific objectives

1. To calculate proportions of uptake of two or less doses of IPTp-SP (IPTp≤2) and three or more doses of IPTp-SP (IPTp3+).
2. To identify determinants of IPTp3+ uptake.
3. To estimate the prevalence of low birth weight.
4. To determine whether poor uptake of IPTp-SP is associated with low birth weight.

2.6 Conceptual framework

The study has adapted the conceptual framework which Bausell and Wolf (2015) used in their study.

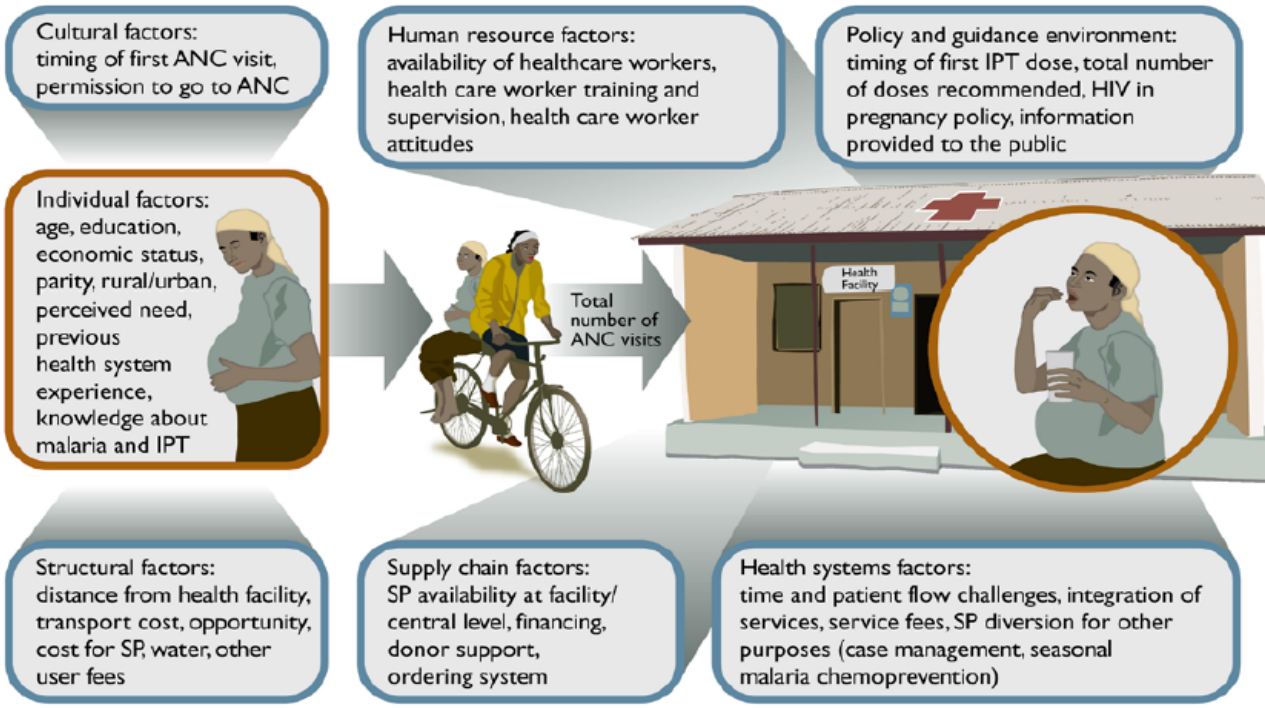

Figure 1: Conceptual Framework of factors affecting a woman's choice to access and use ANC and IPTp-SP intervention (Source: Bausell &Wolf (2015, p.4))

Figure 1indicates individual, cultural, and health systems factors that influence access to and uptake of SP by a woman. There are several factors that impact on a pregnant woman to access ANC services such as women's physical access to health facility, costs to access ANC services, and cultural barriers to access (when a woman decides to begin ANC) (Bausell and Wolf, 2015). When a woman unveils herself to ANC, she is confronted with a new set of factors relating to MiP policy and guidelines, workforce sufficiency and capacity and other health systems factors. Again, supply chain factors play a significant role on whether the SP drugs are available on the day of a woman's visit to the health facility (Bausell and Wolf, 2015). Mpogoro et al. (2014), Thetard (2014), Leonard et al. (2016) and Kibusi et al. (2015) found that more visits to ANC clinics create more opportunities for a pregnant women to receive recommended optimal doses of SP. Therefore, this study assessed the cultural, individual, and structural factors that influence total number of ANC visits. This is an important intermediate factor to utilisation of recommended optimal dose regime of IPTp-SP.

Furthermore, the study investigated some policy and guidance environment relating to timing of first IPTp-SP dose and woman's knowledge of IPTp.

CHAPTER 3: METHODS

This chapter describes how the research problem was investigated. The study population is presented first, followed by study site, design and sampling, data collecton, data analysis and finally ethics.

3.1 Study population

The target population wasall pregnant women and the study population was all postpartum women aged 15-49 who had just delivered (<48 hours) and those that delivered a home but visited the health facility for check-up at a randomly sampled Government-owned health facility in Zomba district.

Inclusion and exclusion criteria

The study included postpartum women of the ages between 15 to 49 years who delivered at Government Health facility (HF),ordelivered at home but brought a baby to HF within 48 hrs for check-up**.** They hadsingleton pregnancy,absence of reported antimalarial treatment other than SP in the previous one month. On the other hand, complicated cases of pregnancy,postpartum women on cotrimoxazole prophylaxis during their pregnancy because of increased risk of adverse drug reactions when taken together with SP were excluded from the study (Peters et al., 2007, WHO, 2012a).

3.2 Study site

The study was conducted in Malawi, particularly in Zomba district, which is located in the Southern region of Malawi. The district was purposively chosen because it was among the districts that had the lowest uptake of IPTp in Malawi.

3.3 Study design and sampling

The study used a cross-sectional survey strategy.

Variables

Guided by literature review, the study included the following variables that had been theoretically and empirically linked to malaria in pregnancy and uptake of IPTp-SP. Primary outcome is IPTp-SP uptake (partial ≤2 vs 3+ optimal) and secondary outcome was Low birth weight <2500g. Explanatory variables were age, marital status, residence, level of education, socio-economic status, knowledge about IPTp-SP and

malaria, parity, number and timing of antenatal clinic visits, gravida, IPTp-SP uptake, iron and folic acid uptake, Body Mass Index (BMI), maternal infections during pregnancy, preterm delivery (<37 weeks' gestation), tobacco smoking, alcohol use,history ofhypertension, anaemia, and diabetes (Table 1).

Table 1: Variables used in the study

Variable	Definition	Measurement scale
IPTp-SP uptake (Primary outcome)	≤2 doses is uncomplete and three or more (3+) is optimal	nominal
Age	Age of a woman	ratio
Marital status	Marital status of a woman	nominal
residence	Type of woman's residence	nominal
Education	Level of education of woman	ordinal
Socio-economic status	Socio-economic status	nominal
IPTp-SP and malaria knowledge	Knowledge about IPTp-SP and malaria	nominal
Parity	Number of birth that a woman had after 20 weeks gestation	ordinal
ANC visits	Number of antenatal care visits	ordinal
Timing of ANC visits	Timing of antenatal care visits	ordinal
Gravida	Total number of confirmed pregnancies that a woman had regardless of the outcome	ordinal
Low birth weight (secondary outcome)	Low birth weight <2500g	nominal
Iron + folic acid uptake	Iron + folic acid uptake	nominal
BMI	Body Mass Index (BMI)	nominal
Maternal infections during pregnancy	Maternal infections during pregnancy	nominal
smoking	Tobacco smoking	nominal
alcohol	Alcohol use during pregnancy	nominal
hypertension	History of hypertension during pregnancy	nominal
anaemia	History of anaemia during pregnancy	nominal
diabetes	History of diabetes	nominal

Training of Interviewers

A two-day training workshop for six research assistants and data collectors was held followed by one-day fieldwork (hands-on practical).

Sampling and sample size consideration

The district was divided into two sites according to residential settings: rural and urban. All Government owned health facilities that offered maternity and antenatal

services were included in the stratified sampling frame. One health facility was selected from each stratum using simple random sampling.

The sample size was calculated to detect a prevalence of at least 43.5% of uptake of two or more doses of IPTp-SP in pregnant women population of Zomba district based on a 95% Confidence Interval (CI) and 5% decision precision. The minimal sample size of the study was estimated using Cochran formula (Cochran, 1977)$n = \frac{z^2 p(1-p)}{e^2}$, where p = proportion of IPTp2+ uptake in Zomba district, e= decision precision of 5%, z= 1.96 for 95% CI. Sample size $n = \frac{z^2 p(1-p)}{e^2}$, p=0.435 (National Statistical Office (NSO) [Malawi] and ICF Macro, 2011), e=0.05, z=1.96

$n = \frac{1.96^2 \times 0.435 \times 0.565}{0.05^2}$=378, Adding 20% as non-response rate = 454.

Since the number of deliveries varies for different facilities, a proportionate method was used for determining the sample size for each facility. The sample for each facility was determined by weighting the total sample size required with the relative proportion of clients that the facility handled- using the total deliveries figures for each facility (as reported by the heads of the facilities) for the week prior to commencement of data collection as numerator, and the sum of deliveries in all the facilities as denominator. Systematic sampling was used to choose postpartum women, as they exist from the labour ward at a specified interval by using the estimate of the average clinic deliveries to calculate sampling interval. The first participant was enrolled at random.

3.4 Data Collection

The study used a structured interviewer-administered questionnaire with some questions adapted from 2014 Malawi Malaria Indicator Survey and 2010 Malawi Demographic and Health Survey (National Malaria Control Programme (NMCP) [Malawi] and ICF International, 2015, National Statistical Office (NSO) [Malawi] and ICF Macro, 2011). The questionnaire solicited data on demographic, uptake levels of IPTp1, IPTp2, IPTp3+, knowledge about malaria and IPTp-SP, number of and timing of antenatal clinic visits, parity, gravida, weight and height, Iron and folic acid uptake, maternal infections during pregnancy, and infant birth weight. Number of ANC visits,

number of IPTp-SP doses received, date of the first ANC visit, age, baby weight, and woman height were the data that were obtained from the questionnaire and triangulated by women's ANC cards and health facility records.

Trained interviewers, using the local language, administered the questionnaire. We translated the questionnaire into Chichewa, which is a local language to facilitate communication, and ease its implementation, and pre-tested it out of the study site to check how it was functioning in terms of validity, reliability and feasibility.

A data entry template of the questionnaire was prepared using EpiData 3.1 (CDC, Atlanta, GA, USA) and data were entered into the software and validated by a second data entry (double entry). The data were then exported into Stata version 14.2 (Stata Corp, College Station, TX, USA) for further cleaning and analysis.

3.5 Data Analysis

The primary outcome variable was IPTp-SP uptake, categorised into less than three doses versus three or more doses. The secondary outcome variable was birth weight, with less than 2500 grams indicating low birth weight.

Data were summarised in the form of proportions and frequencies for categorical variables, and mean with their respective standard deviations if the variables were continuous and normally distributed, otherwise median and respective interquartile range were displayed to summarise variables.

Bivariate binary logistic regression analysis was performed to determine the presence or absence of association between primary or secondary outcome and respective explanatory variables, and chi-square test was used to assess association of categorical variables between explanatory variables. All explanatory variables with $p < 0.20$ in the bivariate analysis were included inboth automated and investigator-led backward-stepwise multiple binary logistic regression analysis to further examine the association between the outcome and each explanatory variable while adjusting for the others. The level of significance used was 5% (0.05), two-tailed at 95% confidence interval (CI).

The goodness of fit of the models was tested using likelihood ratio (LR), and Homsmer and Lemeshow tests. The full model consisting of all the independent variables was compared with the model created by backward stepwise regression at 5% significant

level. Test result with significant level above 5% was interpreted as a model with fewer independent variables wasbetter than the full model. The classification ability of the models was evaluated using Receiver Operating Characteristics (ROC) curve. The ROC value above 0.5 meant that a model classification was not due to chance.

3.6 Ethical Considerations

Non-maleficence and Beneficence

During this study, respondents were subjected to minimal psychological risk when answering some questions and possibility of fatigue due to the labour processes. The study minimised these by making sure the interview was short and the language of interview was culturally acceptable. There was no immediate benefit to the participants but the results of the studywouldbenefit future pregnant women in the communities to take optimal doses of fansidar in order to prevent MiP if the findings would be translated into action by relevant stakeholders.

Respect for Persons

The research team informed prospective participants about the purpose of the study, procedures required of them if recruited, risks and benefits, and that they had the right to volunteer whether or not to participate in the study. For women aged below 18 years, informed assent was obtained from parents or parents in-law, or their husbands if the husbands were above 18 years. The respondents were informed that they had the right to withdraw from the study at any time and without adverse consequences. The respondents were assured of privacy, confidentiality and that no names would appear on the questionnaire. Informed consent was obtained from each participants before administering the questionnaire. Written permission was sought from the University of Zambia Biomedical Research Ethics committee (Reference number 017-06-16) and National Health Sciences Research Committee (NHSRC approval number 1656) in Malawi, Zomba District Health Office and Health facility administrators.

Confidentiality assurance

The results of participants' anthropometric measurements; and answers to the questions were kept confidential and were only used for research purposes. All data were stored electronically in Netbooks in the field. Following the quality control checks, the team leader downloadedthe data files to an encrypted flash drive and placed them in a locked cabinet.

CHAPTER 4: RESULTS

In this chapter, results of the findings are presented under four sections. The first, prevalence of IPTp-SP uptake and participant characteristics, determinants of IPTp-SP uptake, assessment of goodness of models fit, prevalence of low birth weight, and the effect of poor IPTp-SP uptake on prevalence of low birth weight.

4.1 Prevalence of IPTP-SP uptake and participant characteristics

A total of 463 women were enrolled into the study. Out of this, 426 (92%) and 248 (53.6%) of women with complete information had their data analysed to investigate the determinants of IPTp-SP uptake and low birth weight respectively. Of 426 women, 127 (29.8%, 95% CI: 25.6-34.3%) received three (optimal) or more doses of SP, 299 (70.2%, 95% CI: 65.7-74.4%) received two or less doses (poor uptake or suboptimal).

Sociodemographic characteristics of participants

Out of 426 women, 55% delivered at urban health facility and 45% delivered at the rural health facility. Of 233 women who delivered at urban health facility, 40% took three or more doses and 60% received two or less doses of SP during pregnancy. Among 193 delivering women at rural health centre, 17% received three or more doses while 83% took two or less doses of SP. More than half (232, 54%) of participants had completed at least senior primary school. Pregnant women in the age group 25-35 had the highest uptake of optimal SP doses compared to the rest of the women. Women who were divorced or separated or widowed had highest percentage of taking optimal SP doses (Table 2).

Table 2: Sociodemographic characteristics of participantsby IPTp uptake

Characteristic	N (Total =426)	% of women who took IPTp ≤2 doses[a] n (%)	95%CI	3+ doses[b] n (%)	95%CI
Zone					
Urban	233	139(59.7)	53.2-65.8	94(40.3)	34.2-46.8
Rural	193	160(82.9)	76.9-87.6	33(17.1)	12.4-23.1
Education					
No formal education/junior primary	194	130(67.0)	60.0-73.3	64(33.0)	26.7-39.9
Senior primary	125	97(77.6)	69.4-84.1	28(22.4)	15.9-30.
Secondary/tertiary	107	72(67.3)	57.8-75.6	35(32.7)	24.4-42.2
Age group					
15-24	201	146(72.6)	66.0-78.4	55(27.4)	21.6-33.9
25-34	176	114(64.8)	57.4-71.5	62(35.2)	28.5-42.6
35+	49	39(79.6)	65.9-88.7	10(20.4)	11.3-34.1
Occupation					
Unemployed	307	228(74.3)	69.1-78.9	79(25.7)	21.1-30.9
Self-employed	104	64(61.5)	51.8-70.4	40(38.5)	29.6-48.2
Employed	15	7(46.7)	23.4-71.5	8(53.3)	28.5-76.6
Marital status					
Married	382	272(71.2)	66.4-75.5	110(28.8)	24.5-33.6
Divorced/separated/widowed	19	10(52.6)	30.5-73.8	9(47.4)	26.2-69.5
Never married	25	17(68.0)	47.3-83.4	8(32.0)	16.6-52.7
Religion					
CCAP[c]/7th day[d]/Baptist	112	70(62.5)	53.1-71.0	42(37.5)	28.9-46.9
Other Christian	134	102(76.1)	68.1-82.6	32(23.9)	17.4-31.9
Catholic/Anglican	93	65(69.9)	59.8-78.4	28(30.1)	21.6-40.2
Muslim/other religions	87	62(71.3)	60.8-79.8	25(28.7)	20.2-39.2
Tribe					
Nyanja	106	85(80.2)	71.4-86.8	21(19.8)	13.2-28.6
Chewa	107	69(64.5)	54.9-73.0	38(35.5)	26.9-45.1
Lomwe	102	75(73.5)	64.1-81.2	27(26.5)	18.8-35.9
Other	111	70(63.1)	53.7-71.6	41(36.9)	28.4-46.3

[a]uptake of two or less doses of IPTp-SP; [b]uptake of three or more doses of IPTp-SP, [c]Church of Central Africa Presbyterian, [d]Seventh Day Adventist

Cultural characteristics

Women who had problems with spouses' escort to ANC clinic had higher percentage (42%) of receiving three or more doses than those who had no problem with escorts (23%). Participants with a small problem in getting permission from their spouse to visit HF had a slight higher percentage (30%) of completing SP doses than women who had a big problem with seeking permission (25%). Women who first visited ANC in first trimester had the highest percentage of completing the recommended doses (Table 3).

Table 3:Cultural characteristics by IPTp uptake

Characteristic	N (Total=426)	% of women who took IPTp ≤2 doses	95%CI	3+ doses	95% CI
Permission to go to HF[e]					
Small problem	410	287 (70.0)	65.3-74.3	123 (30.0)	25.7-34.6
Big problem	16	12 (75.0)	48.2-90.6	4 (25.0)	9.4-51.8
Need for spouse escort to HF					
Small problem	276	212 (76.8)	71.4-81.4	64 (23.2)	18.6-28.6
Big problem	150	87 (58)	49.9-65.7	63 (42.0)	34.3-50.1
Timing of 1st ANC visit					
2nd trimester	284	198 (69.7)	64.1-74.8	86 (30.3)	25.2-35.9
1st trimester	92	56 (60.9)	50.5-70.4	36 (39.1)	29.6-49.5
3rd trimester	50	45 (90.0)	77.9-95.8	5 (10.0)	4.2-22.1

[e]Heath Facility

Individual characteristics

The percentages for completing SP doses were similar for both primigravida and multigravida (29.9% vs 29.5% respectively). At least four ANC visits a pregnant woman made was associated with higher proportion of taking three or more SP doses than three or less visits. Both groups of women who were knowledgeable and partially knowledgeable about malaria transmission had similar percentages of taking three or more doses of SP (29.8% vs 30%). However, those women who were aware of dangers of malaria in pregnancy had higher percentage (32%) of completing recommended SP doses than those with inadequate knowledge (25%) (Table 4).

Table 4:Clinical characteristics and level of knowledge among participants by IPTp uptake

		% of women who took IPTp			
	N	≤2 doses		3+ doses	
Characteristic	(Total=426)	n (%)	95%CI	n (%)	95% CI
First pregnancy					
No	304	213 (70.1)	64.7-75.0	91 (29.9)	25.0-35.3
Yes	122	86 (70.5)	61.8-77.9	36 (29.5)	22.1-38.2
Parity					
One child	121	85 (70.3)	61.5-77.8	36 (29.8)	22.2-38.5
Two children	111	72 (64.9)	55.5-73.2	39 (35.1)	26.8-44.5
3+ children	194	142 (73.2)	66.5-78.9	52 (26.8)	21.0-33.5
ANC visits					
4+	234	140 (59.8)	53.3-65.9	94 (40.2)	34.1-46.6
Three or less	192	159 (82.8)	76.8-87.5	33 (17.2)	12.5-23.2
Gravida					
multigravida	194	141 (72.7)	65.9-78.5	53 (27.3)	21.5-34.1
Secundigravida	110	72 (65.4)	56.0-73.8	38 (34.6)	26.2-43.9
primigravida	122	86 (70.5)	61.8-77.9	36 (29.5)	22.1-38.2
Knowledge of malaria transmission					
knowledgeable	386	271 (70.2)	65.4-74.6	115 (29.8)	25.4-34.6
Inadequate Knowledge	40	28 (70.0)	54.0-82.3	12 (30.0)	17.7-46.0
Knowledge of dangers of malaria in pregnancy					
Knowledgeable	303	207 (68.3)	62.8-73.3	96 (31.7)	26.7-37.2
Inadequate knowledge	123	92 (74.8)	66.3-81.7	31 (25.2)	18.3-33.7

Structural factors (access to health facility and provider readiness) faced by participant

Pregnant women who took SP under Direct Observation Therapy (DOT) each time had higher percentage of completing three or more doses than those who did not take SP under DOT each time they visited ANC (33% vs 6%). Participants who had problems with long distance and lack of transport to health facility had lower percentage of completing the recommended doses. The women who worried most that there would be no health provider at HF had lower percentage (20%) of completing the recommended doses against 35% for participants who felt otherwise (Table 5).

Table 5:IPTp uptake against factors that affect access to health facility and health provider DOT adherence

	N	% of women who took IPTp			
Characteristic	(Total=426)	≤2 doses	95%CI	3+ doses	95% CI

Took SP under DOT[f] each time					
Yes	376	252 (67.0)	62.1-71.6	124 (32.9)	28.4-37.9
No	50	47 (94.0)	82.8-98.1	3 (6.0)	1.9-17.2
Distance to HF					
Small problem	348	233 (67.0)	61.8-71.7	115 (33.1)	28.3-38.2
Big problem	78	66 (84.6)	74.7-91.1	12 (15.4)	8.9-25.3
Transport to HF					
Small problem	344	231 (67.2)	61.9-71.9	113 (32.9)	28.1-38.0
Big problem	82	68 (82.9)	73.1-89.7	14 (17.1)	10.3-26.9
Worried no health provider at HF					
Small problem	280	183 (65.4)	59.6-70.7	97 (34.6)	29.3-40.4
Big problem	146	116 (79.5)	72.1-85.3	30 (20.0)	14.7-27.9
Worried no drugs at HF					
Small problem	263	172 (65.4)	59.4-70.9	91 (34.6)	29.1-40.6
Big problem	163	127 (77.9)	70.8-83.6	36 (22.1)	16.3-29.1

[f]Direct Observation Therapy

4.2 Determinants of IPTp-SP uptake

Bivariate and multiple binary logistic regression models were fitted on the data to generate crude odds ratios (OR) and adjusted odds ratios (AOR). ORs were estimated to assess the strength of the associations between uptake of at least three doses of SP (outcome) and each explanatory variable, and AORs estimated the measure of effect between SP uptake and independent variable by controlling the effects of other explanatory variables. We used 95% confidence intervals (CIs) for significant testing. The results are presented in Table 6.

Table 6:Factors associated with uptake of three or more doses of IPTp-SP among postpartum women

Characteristics	N (Total =426)	Crude Odds Ratio (95%CI)	Unadjusted *p*-value[a]	Adjusted Odds Ratio (95%CI)	Adjusted *p*-value[b]
Zone					

Urban	233	1		1	
Rural	193	0.30(0.19-0.48)	<0.001	0.31(0.13-0.70)	0.005
Education					
No formal education/junior primary	194	1			
Senior primary	125	0.58(0.35-0.98)	0.043		
Secondary/tertiary	107	0.99(0.60-1.63)	0.961		
Age group					
15-24	201	1		1	
25-34	176	1.44(0.93-2.23)	0.100	1.72(1.06-2.78)	0.028
35+	49	0.68(0.32-1.46)	0.322		
Occupation					
Unemployed	307	1			
Self-employed	104	1.80(1.13-2.89)	0.014		
Employed	15	3.30(1.15-9.39)	0.025		
Marital status					
Married	382	1		1	
Divorced/separated/ widowed	19	2.23(0.88-5.63)	0.091	2.58(0.90-7.39)	0.078
Never married	25	1.16(0.49-2.77)	0.733		
Religion					
CCAP/7th day/Baptist	112	1		1	
Other Christian	134	0.52(0.30-0.91)	0.021	0.61(0.35-1.05)	0.075
Catholic/Anglican	93	0.72(0.40-1.29)	0.0.267	0.53(0.28-0.97)	0.041
Muslim/other religions	87	0.67(0.37-1.23)	0.195		
Tribe					
Nyanja	106	1			
Chewa	107	2.23(1.19-4.15)	0.011		
Lomwe	102	1.46(0.76-2.79)	0.256		
Other	111	2.37(1.28-4.38)	0.006		
First pregnancy					
No	304	1			
Yes	122	1.04(0.65-1.64)	0.883		
Parity					
One child	121	1			
Two children	111	1.28(0.74-2.23)	0.382		
3+ children	194	0.86(0.52-1.43)	0.571		
Timing of 1st ANC visit					
2nd trimester	284	1			
1st trimester	92	1.48(0.91-2.41)	0.116		
3rd trimester	50	0.26(0.09-0.67)	0.005		
ANC visits					

4+	234	1		1	
Three or less	192	0.31(0.19-0.49)	<0.001	0.29(0.18-0.48)	<0.001
Gravida					
multigravida	194	1			
Secundigravida	110	1.40(0.85-2.32)	0.187		
primigravida	122	1.11(0.67-1.84)	0.674		
Knowledge of malaria transmission					
knowledgeable	386	1			
Inadequate Knowledge	40	1.01(0.50-2.06)	0.978		
Knowledge of dangers of malaria in pregnancy					
Knowledgeable	303	1			
Inadequate knowledge	123	0.73(0.45-1.17)	0.186		
Took SP under DOT each time					
Yes	376	1		1	
No	50	0.13(0.04-0.43)	0.001	0.18(0.05-0.63)	0.007
Permission to go to HF					
Small problem	410	1			
Big problem	16	0.78(0.25-2.46)	0.669		
Distance to HF					
Small problem	348	1		1	
Big problem	78	0.37(0.19-0.71	0.003	0.49(0.23-1.06)	0.070
Transport to HF					
Small problem	344	1			
Big problem	82	0.42(0.23-0.78)	0.006		
Need for spouse escort to HF					
Small problem	276	1		1	
Big problem	150	2.40(1.56-3.68)	<0.001	2.03(1.26-3.26)	0.004
Worried no health provider at HF					
Small problem	280	1			
Big problem	146	0.49(0.30-0.78)	0.003		
Worried no drugs at HF					
Small problem	263	1		1	
Big problem	163	0.54(0.34-0.84)	0.006	1.84(0.82-4.12)	0.140

[a]Bivariate logistic regression; [b]Multiple logistic regression

Bivariate binary logistic regression results show that 12 out of 21 predictor variables were significantly associated with completion of the recommended doses of SP during

pregnancy. The following factors were significant barriers to completion of recommended SP doses by a pregnant women: Attending ANC from health facility in rural setting compared to urban setting (OR $= 0.30, 95\%$ CI: 0.19-0.48, $p < 0.001$), women who attained senior primary school education than women without formal or junior primary education (OR $= 0.58, 95\%$ CI: 0.35-0.98, $p = 0.043$), being a member of other Christian denomination than a member of Church of Central Africa Presbyterian (CCAP) or Seventh Day Adventist or Baptist (OR $= 0.52, 95\%$ CI: 0.30-0.91, $p = 0.021$), commencing ANC in third trimester than in second trimester (OR $= 0.26, 95\%$ CI: 0.09-0.67, $p = 0.005$), three or less number of ANC visits against four or more visits (OR $= 0.31, 95\%$ CI: 0.19-0.49, $p < 0.001$), not taking SP doses under direct observation of health care provider (OR $= 0.13, 95\%$ CI: 0.04-0.43, $p = 0.001$), distance to health facility (OR $= 0.37, 95\%$ CI: 0.19-0.71, $p = 0.003$), transport problem to health facility (OR $= 0.42, 95\%$ CI: 0.23-0.78, $p = 0.006$), and worried that there would be no drugs at health facility (OR $= 0.54, 95\%$ CI: 0.34-0.84, $p = 0.006$).

The enabler determinants significantly associated with a pregnant woman to more likely to complete recommended doses were: being self-employed woman versus unemployed women (OR $= 1.80, 95\%$ CI: 1.13-2.89, $p = 0.014$), being employed against unemployed (OR $= 3.30, 95\%$ CI: 1.15-9.39, $p = 0.025$), being Chewa tribe than Nyanja tribe (OR $= 2.23, 95\%$ CI: 1.19-4.15, $p = 0.011$), being of other tribe rather than Nyanja (OR $= 2.37, 95\%$ CI: 1.28-4.38, $p = 0.006$), and having problems with spouse escort to health facility (OR $= 2.40, 95\%$ CI: 1.56-3.68, $p < 0.001$).

In multiple binary logistic regression results, six out of nine explanatory variables were significantly associated with a pregnant woman receiving at least three doses of SP. Two factors were the only enablers that were significantly associated with a pregnant woman at least completing recommended SP doses. First, being in the age group 25-34 compared to age group 15-24 (AOR $= 1.72, 95\%$ CI: 1.06-2.78, $p = 0.028$). Second, pregnant women with problem of spouse escort to health facility (AOR $= 2.03, 95\%$ CI: 1.26-3.26, $p = 0.004$).

The following determinants make a pregnant woman less likely to complete at least the recommended doses of SP after adjusting for other independent variables. Pregnant women who attended ANC from health facility in rural setting than those from urban

settings (AOR $= 0.31, 95\%$ CI: 0.13-0.70, $p = 0.005$), pregnant women who had three or less ANC visits (AOR $= 0.29, 95\%$ CI: 0.18-0.48, $p < 0.001$), women who did not take doses of SP under direct observations of health care provider (AOR $= 0.18, 95\%$ CI: 0.05-0.63, $p = 0.007$), and being a Catholic or Anglican member compared to a member of Church of Central Africa Presbyterian (CCAP) or Seventh Day Adventist (AOR $= 0.53, 95\%$ CI: 0.28-0.97, $p = 0.041$).

4.3 Assessment of goodness of fit of the models

Appropriateness, adequacy, performance and use of the fitted models was tested by likelihood ratio test (LRT), Homsmer and Lemeshow goodness of fit test and Receiver Operating Characteristics (ROC) curve.

Full model consisting of all the independent variables was compared to model created by backward stepwise regression, which had fewer numbers of variables than the full model. The Likelihood ratio (LR) chi-square with 22° of freedom was 14.09, p-value $= 0.898$. This means the model with fewer explanatory variables was better model.

Furthermore, ROC value for the selected model as shown in Figure 2 is 0.77, which suggests that classification is not due to chance as ROC value is close to 1 than 0.5. The Hosmer-Lemeshow goodness-of-fit test was found to be not significant ($\chi^2 = 8.39, df = 8, p$-value $= 0.396$). Thus, we do not have enough evidence to reject the null hypothesis that the model fitted the data well.

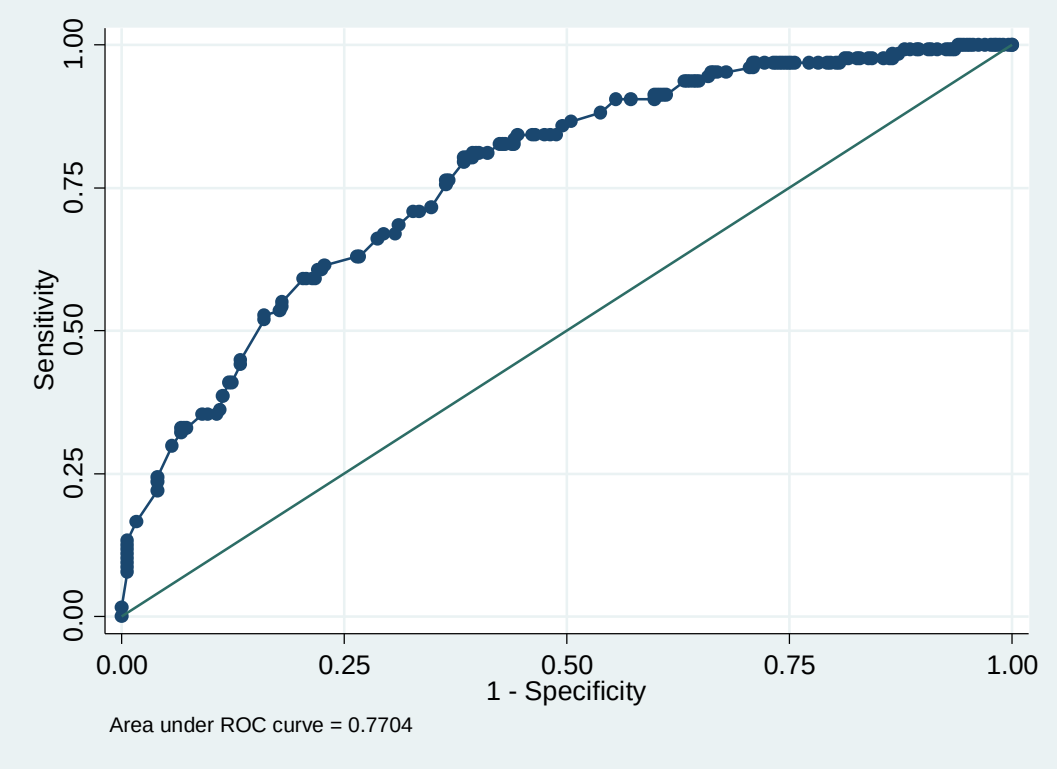

Figure 2: Receiver Operating Characteristic (ROC) curve

4.4 Prevalence of low birth weight and participant characteristics

The prevalence of low birth weight in this study population was estimated to be 6.5% (16 out of 248), 95% CI 4.0-10.3.

Characteristics distribution of participants by low birth weight

Table 7 shows distributions of characteristics against low birth weight. A total of 248 pregnant women had complete data on all variables assessed on low birth weight against effect of poor uptake of IPTp-SP. Out of this, 182 (73%) had received two or less doses of SP, which is suboptimal or poor uptake, and 10 versus 6 mothers (6% versus 9%) had infants with low birth weight.

Table 7: Distribution of participants by characteristic and low birth weight, N=248

Characteristics	Number of infants (% of total)	No.(%) low birth weight	95%CI
IPTp-SP uptake			
3+ doses	66(26.6)	6(9.1)	4.1-18.9
≤2 doses	182(73.4)	10(5.5)	3.0-10.0
Zone			
Urban	109(43.9)	8(7.3)	3.7-14.1
Rural	139(56.1)	8(5.8)	2.9-11.1
Education			
No formal education/junior primary	101(40.7)	8(7.9)	4.0-15.1
Senior primary	95(38.3)	5(5.3)	2.2-12.1
Secondary/tertiary	52(21.0)	3(5.8)	1.8-16.7
Age group			
15-24	126(50.8)	9(7.1)	3.7-13.2
25-34	100(40.3)	5(5.0)	2.1-11.5
35+	22(8.9)	2(9.1)	2.2-30.8
Occupation			
Unemployed	209(84.3)	16(7.7)	4.7-12.2
Self-employed	34(13.7)	0	
Employed	5(2.0)	0	
Marital status			
Married	236(95.2)	15(6.4)	3.9-10.3
Divorced/separated/widowed	12(4.8)	1(8.3)	1.0-43.8
Never married	0	0	
Religion			
CCAP/7th day/Baptist	59(23.8)	3(5.1)	1.6-14.8
Other Christian	88(35.5)	5(5.7)	2.3-13.0
Catholic/Anglican	54(21.8)	2(3.7)	0.9-13.9
Muslim/other religions	47(18.9)	6(12.8)	5.8-25.9
Tribe			
Nyanja	75(30.2)	5(6.7)	2.8-15.2
Chewa	63(25.4)	5(7.9)	3.3-17.9
Lomwe	63(25.4)	4(6.4)	2.4-15.9
Other	47(19.0)	2(4.3)	1.0-15.8
First pregnancy			
No	175(70.6)	10(5.7)	3.1-10.3
Yes	73(29.4)	6(8.2)	3.7-17.3
Parity			
One child	73(29.4)	6(8.2)	3.7-17.3
Two children	58(23.4)	4(6.9)	2.6-17.2
3+ children	117(47.2)	6(5.1)	2.3-11.0
Timing of 1st ANC visit			
2nd trimester	167(67.3)	13(7.8)	4.6-12.9

1st trimester	53(21.4)	2(3.8)	0.9-14.1
3rd trimester	28(11.3)	1(3.6)	0.5-22.2
ANC visits			
4+	129(52.0)	7(5.4)	2.6-11.0
Three or less	119(48.0)	9(7.6)	4.0-14.0
Iron default time in months			
One month	102(41.1)	5(4.9)	2.0-11.3
Two months	21(8.5)	3(14.3)	4.5-36.9
Three months	52(21.0)	4(7.7)	2.9-19.0
Four months	32(12.9)	2(6.3)	1.5-22.3
5+ months	41(16.5)	2(4.9)	1.2-17.9
Smoking during pregnancy			
No	248(100)	1 (6.5)	4.0-10.3
Yes	0	0	
History of hypertension			
No	241(97.2)	16(6.6)	4.1-10.6
Yes	7(2.8)	0	
History of anaemia			
No	247(99.6)	16(6.5)	4.0-10.3
Yes	1(0.4)	0	
Alcohol consumption last 9 month			
No	244(98.4)	14(5.7)	3.4-9.5
Yes	4(1.6)	2(50.0)	9.3-90.7
History of diabetes			
No	248(100)	16(6.5)	4.0-10.3
Yes	0	0	
History of urinary tract infection			
No	247(99.6)	16(6.5)	4.0-10.3
Yes	1(0.4)	0	
History of pneumonia			
No	244(98.4)	15(6.2)	3.7-9.9
Yes	4(1.6)	1(25.0)	2.4-82.2
History of STIs			
No	243(98.0)	15(6.2)	3.7-100
Yes	5(2.0)	1(20.0)	2.1-74.6
History of hepatitis			
No	246(99.2)	15(6.1)	3.7-9.9
Yes	2(0.8)	1(50.0)	1.9-98.1
Body mass index			
Normal	184(74.2)	8(4.4)	2.2-8.5
Overweight	41(16.5)	5(12.2)	5.1-26.5
Underweight	23(9.3)	3(13.0)	4.1-34.3

Seven percent of infants born in urban health facility had low birth weight against 6% from rural setting. Mothers with no formal or junior primary school education had the highest proportion (8%) of infants with low birth weight. Highest proportion of women with low birth weight was in age group 35 or above. Mothers who were divorced or separated or widowed had higher proportion (8.3% versus 6%) of low birth weight. Proportion of low birth weight babies was highest (13%) in Muslim or women from other religious groups. Women who had first pregnancy had higher proportion of infants with low birth weight. Pregnant women who started ANC in second trimester had highest proportion of low birth weight infants. Pregnant women who made three or less visits to ANC clinic had higher percentage (8%) of babies with low birth weight than those who made four or more ANC visits. Those mothers who defaulted taking iron tablets for two months during gestation period had the highest proportion (14%) of low birth weight infants. No woman reported that she ever smoked. Mothers who consumed alcohol, had history of pneumonia, STIs, history of hepatitis had higher proportions of low birth weight babies. Pregnant women who were underweight or overweight had similar proportions of babies with low birth weight (13% versus 12%).

4.5 The effect of poor IPTp-SP uptake on prevalence of low birth weight

Table 8 displays the results of bivariate and multiple binary logistic regression analysis. In bivariate logistic regression, poor uptake of IPTp-SP was not significantly associated with low birth weight ($\text{OR} = 0.58, 95\%\ \text{CI: } 0.20\text{-}1.67, p = 0.313$). Among all the independent variables in the analysis, only alcohol consumption was associated with low birth weight ($\text{OR} = 16.4, 95\%\ \text{CI: } 2.15\text{-}125, p = 0.007$). The multiple logistic regression was employed to control for other independent variables in the analysis.There was no evidence of an association between poor IPTp-SP uptake and low birth weight even after adjusting for other variables ($\text{AOR} = 0.59, 95\%\ \text{CI: } 0.19\text{-}1.78, p = 0.347$). Alcohol intake was still highly associated with low birth weight ($\text{AOR} = 18.2, 95\%\ \text{CI: } 2.34\text{-}142.4, p = 0.006$), the confidence interval is so wide because of small sample size of women in that category.

Table 8: The effect of poor IPTp uptake on prevalence of low birth weight adjusted for maternal characteristics

Characteristics	N (Total =248)	Crude Odds Ratio (95%CI)	Unadjusted *p*-value [a]	Adjusted Odds Ratio (95%CI)	Adjusted *p*-value[b]
IPTp-SP uptake					
3+ doses	66	1		1	
≤2 doses	182	0.58(0.20-1.67)	0.313	0.59 (0.19-1.78)	0.347
Zone					
Urban	109	1			
Rural	139	0.77(0.28-2.12)	0.615		
Education					
No formal education/junior primary	101	1			
Senior primary	95	0.65(0.20-2.05)	0.458		
Secondary/tertiary	52	0.71(0.18-2.80)	0.627		
Age group					
15-24	126	1			
25-34	100	0.68(0.22-2.11)	0.509		
35+	22	1.30(0.26-6.46)	0.749		
Marital status					
Married	236	1			
Divorced/separated/ widowed	12	1.34 (0.16-11.1)	0.786		
Never married	0				
Religion					
CCAP/7th day/Baptist	59	1			
Other Christian	88	1.12(0.26-4.89)	0.876		
Catholic/Anglican	54	0.72(0.12-4.5)	0.722		
Muslim/other religions	47	2.73(0.65-11.6)	0.172		
Tribe					
Nyanja	75	1			
Chewa	63	1.21(0.33-4.37)	0.775		
Lomwe	63	0.95(0.24-3.70)	0.940		
Other	47	0.62(0.12-3.34)	0.580		
First pregnancy					
No	175	1			
Yes	73	1.48(0.52-4.22)	0.467		
Timing of 1st ANC visit					
2nd trimester	167	1			
1st trimester	53	0.46(0.10-2.13)	0.324		
3rd trimester	28	0.44(0.06-3.49)	0.436		

ANC visits					
4+	129	1			
Three or less	119	1.43(0.51-3.96)	0.496		
Iron default time in months					
One month	102	1			
Two months	21	3.23(0.71-14.7)	0.130		
Three months	52	1.62(0.42-6.30)	0.489		
Four months	32	1.29(0.24-7.01)	0.765		
5 + months	41	0.99(0.19-5.35)	0.995		
Alcohol consumption					
No	244	1		1	
Yes	4	16.4(2.15-125.4)	0.007	18.2(2.34-142.4)	0.006
History of pneumonia					
No	244	1			
Yes	4	5.09(0.50-51.9)	0.170		
History of STIs					
No	243	1			
Yes	5	3.80(0.40-36.2)	0.245		
History of hepatitis					
No	246	1		1	
Yes	2	15.4(0.92-258.5)	0.057	15.9(0.92-277.4)	0.057
Body mass index					
Normal	184	1			
Overweight	41	3.05(0.95-9.88)	0.063		
Underweight	23	3.30(0.81-13.5)	0.096		

[a]Bivariate logistic regression; [b]Multiple logistic regression

Assessment of goodness of fit of the models

The full model consisting of all the independent variables was compared with the model created by backward stepwise regression, which had fewer numbers of variables than the full model. The Likelihood ratio (LR) chi-square with 24° of freedom was 19.26, p-value $= 0.7379$. This means the model with fewer explanatory variables was a better model.

CHAPTER 5: DISCUSSION

Malawi Ministry of Health adopted the updated WHO policy recommendation on IPTp-SP in October 2014, which among other issues recommend all pregnant women to receive at least three doses of SP during gestation period, stating in the second trimester until time of delivery (WHO, 2013). Therefore, there were limited studies that evaluated the uptake of at least three doses of SP in Malawi, apart from current Malawi Demographic and Health Survey 2015-16. The uptake of at least three doses of IPTp-SP in this study was very low when comparing to Roll Back Malaria (RBM) benchmark target for all pregnant women in areas with moderate-to-high transmission in Africa(Roll Back Malaria Partnership, 2014). This study revealed that the following factors were crudely associated with IPTp-SP uptake: participants' residential settings, education level, timing of first ANC visit, number of ANC visits, distance to health facility, transport cost, availability of healthcare providers and drugs, taking SP doses under direct observations (DOT) of healthcare provider, occupation, tribe, need for spouse escort to health facility, religion denomination. However, after adjusting for confounders, only women's residential area/health facility location, number of ANC visits, DOT, age of the woman, and need for spouse escort to health facility were significantly associated with IPTp-SP uptake.

Health facility location/women's residential area setting has been found in this study to be related to uptake of IPTp-SP. Women who attended rural health facility were less likely to complete the recommended SP doses during pregnancy. This finding is similar to a study done in Geita district, Tanzania by (Mpogoro et al., 2014). To the knowledge of the researcher, the Geita-Tanzania study was the only study that evaluated uptake of IPTp-SP, categorised into less than three doses versus three or more doses of SP, at the time of writing this thesis. This observation might either indicate that pregnant women in rural areas made fewer ANC visits than urban women or rural health facility had lower stock levels of SP than urban health facility because of poor supply chain from district health office (DHO) due to challenges in transportation the commodity or understaffing(Hill et al., 2013) which leads to high client-to-staff ratios and subsequently long queues and waiting times. This could prompt some pregnant women not make further ANC visits. Kibusi et al.

(2015)reported that being a resident of Eastern Zone (urban) in Tanzania was associated with completing two or more doses of SP.

Further, the study has shown that receipt of at least three doses of SP was higher among pregnant women making four or more ANC clinic visits than those making fewer visits. The finding is consistent with a study conducted in Tanzania (Mpogoro et al., 2014, Exavery et al., 2014), in Ghana (Hommerich et al., 2007), in Burkina Faso (Gies et al., 2009), and in Mali (Hill et al., 2014), (Leonard et al., 2016) in Cameroon, and in Benin (d'Almeida et al., 2011). ANC clinic is the vehicle that carries the intervention from the healthcare provider to the pregnant woman, hence the more visits a pregnant woman makes to ANC clinics the higher the number of SP doses she would receive as long as the visits are scheduled at least one month apart beginning from second trimester. Out of 426 women, 234 (55%) made at least four ANC visits but only 94 out of 234 (40%) received optimal doses of SP. This suggests a missed opportunity to provide the recommended doses of SP to women who attended WHO recommended number of at least four scheduled ANC visits, as two-thirds (284 out of 426) of the women commenced ANC clinic in the second trimester. The mismatch between percentage of 4 or more ANC visits and percentage of receipt of 3 or more doses could occur in part because of intermittent shortage of SP in the health facility, poor fidelity in implementation of IPTp-SP by individual healthcare providers as recommended in WHO policy brief (WHO, 2013), and women's negative attitudes towards the use of the drug during pregnancy (Mpogoro et al., 2014, Hill et al., 2013, Hill et al., 2014, Bausell and Wolf, 2015).

In regards to direct observation therapy (DOT), the study has revealed that pregnant women who did not take doses of SP under DOT had less likelihood of completing the recommended number of doses. Mubyazi et al. (2008) observed that uptake of SP was low among the study participants especially when women were allowed to take the SP at home. There are many reasons why healthcare providers allowed women to take the drug home such as shortages of clean water and cups (Mubyazi et al., 2008), high client-to-staff ratios which reduces consultation times resulting in poor or no observation (Hill et al., 2013, Pell et al., 2011). Taking doses of SP under direct observation therapy (DOT) of healthcare provider is one of the strategies in implementation of IPTp-SP with fidelity.

Pregnant women between age group 25 to 34 were 1.72 times more likely to complete three or more doses of SP than women between the ages of 15 to 24 years old. This result indicates that young pregnant women were under utilizing the intervention, which is similar result that Kibusi's study revealed (Kibusi et al., 2015). Therefore, there is need to increase awareness of importance of completing recommended doses of IPTp-SP among pregnant women aged between 15 to 24 years as well pregnant women older than 34 years. The study has shown that poor uptake was affected by differentially on women born at different times, which might reflect different changes between the stages of life.

Spouse escort to health facility has shown to be positively associated with good uptake of several interventions offered at ANC (Tweheyo et al., 2010). However, pregnant women in the study population who had a problem with spouse escort were more likely to complete the recommended doses of SP. Mostly, these women were either divorced or windowed or on separation, hence they were socially vulnerable and probably took their situation positively by attending ANC clinics and took the recommended SP doses to avoid MiP and its adverse effects. The other possible explanation would be that they had more autonomy in relation to the use of ANC than married women (Simkhada et al., 2008).

The prevalence of low birth weight was 6.5%,which isbelow the national average of 12% (National Statistical Office (NSO) [Malawi] and ICF, 2017). In this study population, the low birth weight was significantly associated with alcohol intake after controlling for other potential variables, and it was consistent with other studies (Kramer, 1987, Jaddoe et al., 2007, Patra et al., 2011). The poor SP uptake was not statistically significantly associated with low birth weight. The observation could suggest that there was few or no infants with low birth weight attributable to malaria. This might mean that, by chance, the study population had no complicated placenta malaria infection during pregnancy, which is associated with LBW (Dimasuay et al., 2017, Guyatt and Snow, 2004).

Strengths and Limitations

In order to minimise measurement errors, the study adapted most of questions from 2014 Malawi Malaria Indicator Survey and 2010 Malawi Demographic and Health Survey which were already validated (National Malaria Control Programme (NMCP) [Malawi] and ICF International, 2015, National Statistical Office (NSO) [Malawi] and ICF Macro, 2011). Furthermore, the research team was trained on how to effectively implement the study protocol during data collection phase to avoid information bias; and double entry of data into EpiData 3.1 was employed. Responses from recall, where possible were verified from other source documents such ANC cards and Health Facility records in order to minimise recall bias.

In assuring reliability, research team was trained on how to conduct the interviews and how to record the responses. The training helped in standardising the way the questionnaire and other measuring instruments were used to collect data and the processes leading to and after collection of data in order to maximise consistency and minimise inter-data-collector variability among the data collectors.

The study had a limitation of only recruiting study participants from health facility maternity wings and antenatal clinics. In Malawi, according toNational Statistical Office (NSO) [Malawi] and ICF Macro (2011), 20% of births occur at home and 80% of women who received no antenatal care services deliver at home. Therefore, it can be argued that the sample could not be representative of the wider population of postpartum women in Zomba district. However, the researcher minimised this limitation by including women who delivered at home and visited the health facility within 48 hours for check-up.Only 14% of women age 15-49 giving birth outside health facility received a postnatal check in the first 2 days after delivery (National Statistical Office (NSO) [Malawi] and ICF, 2017).

Health systems factors (time and patient flow challenges, integration of services into ANC); Policy and guidance environment, human resource factors, and supply chain factors (SP availability at the facility) in the conceptual framework also play an important role in the coverage of the intervention. However, this study did not explore these factors because the focus was primarily on pregnant women's perceptive. This limitation would under-or-overestimate the problem understudy when viewed holistically.

The study focused on determinants of IPTp-SP uptake and associated low birth weight in postpartum women from catchment areas of selected health facilities in Zomba district. Hence, the results would not be generalised to all districts in Malawi because the participating district was purposively sampled because of its low uptake. However, the results could be related to other districts with similar characteristics as the sampled one.

Finally, recall bias is an inherent limitation of the survey design. There was a possibility of women reporting past exposures/experiences with varying degree of accuracy. However, some of these recall biases were minimised by using records such as ANC cards and interviewing the women immediately after delivering.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

Malaria in pregnancy continues to pose a major public health problem in sub-Saharan Africa and particularly in Malawi. However, there are a number of evidenced-based interventions for preventing MiP and one of them is IPTp-SP. This study was conducted for the purpose of determining the facilitators and barriers of a pregnant woman completing at least three doses of IPTp-SP, and to establish whether there was an association between poor uptake of IPTp by pregnant women and infant LBW in Zomba district

The study has established that the proportions of uptake of three or more doses of IPTp-SP is substantially lower than the expected target of 80%. Based on the research results, it is concluded that there is low utilisation of SP in this population and this seems to be associated with the number of ANC visits, use of DOTs and distance to health facility. These determinants may therefore be important in shaping interventions aimed at increasing the uptake of IPTp in this district. In addition, the rural urban differential suggests the need for further research to understand the barriers and enablers of uptake in each context in order to improve the health of the community.

6.2 Recommendations

1. There is need to carry out a research to investigate reasons for the differential uptake of IPTp-SP in urban and rural settings. Evidence gathered from that research with help to shape context-specific solutions to the problem.
2. The investigation revealed that attending at least four ANC clinics is an important prerequisite for receiving at least three dose of SP. The advice is the Government should empower women with social capital, knowledge, and skills to influence health-seeking practices to achieve optimal number of ANC visits.
3. One of the corner stones of IPTp effective implementation is DOT strategy. In this study, pregnant women who were directly observed each time they take doses of SP had high chance of completing the recommended doses. Therefore, DHO should train or offer refresher courses to ANC staff on how to effectively

implement this evidence-based intervention and provision of water and cups to facilitate DOT implementation.

4. The study has shown that younger pregnant women (15-24 years) face the greatest risk of not completing the recommended doses. To prevent or combat this, it is therefore recommended that special health promotion messages should be created to target this group in particular.

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APPENDICES
APPENDIX A: WOMAN QUESTIONNAIRE

Survey Information				
		Response		Code
Participant Identification number		⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋ ⌊_⌊_⌊_⌋		
Health Facility name				
Zone (Residential Area)		urban	0	
		rural	1	
Village name of Participant				
Interviewer name				
Signature of Interviewer				
Date of interview		⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌊_⌊_⌋ dd mm year		
Duration of interview	Time started (24 hour clock)	⌊_⌊_⌋ : ⌊_⌊_⌋ hrs mins		
	Time ended (24 hour clock)	⌊_⌊_⌋ : ⌊_⌊_⌋ hrs mins		

Consent, Interview Language and Name	Response			Code
Consent has been read and obtained	Yes No	1 0	**If No, End**	
Interview Language	Chichewa	1		
	Yao	2		
	Lomwe	3		
	Tumbuka	4		
	English	5		
	Other (Specify)	6		
Interview Result	Complete	1		
	Postponed	2		
	Refused	3		
	Partly completed	4		
	Other (Specify)	5		

Question No.	Section 1: Respondent's Background	Response			Code
101	In what month and year were you born? *Munabadwa mwezi uti, ndiponso chaka chanji?*	Month	⌊__⌋⌊__⌋ mm		
		Don't know month	98		
		Year	⌊__⌋⌊__⌋⌊__⌋⌊__⌋ year		
		Don't know year	9998		
102	How old were you at your last birthday? *Munakwanitsa zaka zingati pa tsiku lanu la kubadwa lapitalo?* Compare and correct 101 and/or 102 if inconsistent	Age in complete years	⌊__⌋⌊__⌋ Years old		
103	Have you ever attended school? *Kodi sukulu munayimbapo?*	Yes	1		
		No	0	**If No, Go to Q.106**	
104	What is the highest level of school you attended: primary, secondary or higher? *Kodi sukulu munafika nayo pati: pulaimale, sekondale kapena koleji?*	Primary	1		
		Secondary	2		
		Higher	3		
105	What is the highest level (grade/standard/form/year) you completed at that level? *Kodi sukulu munasiyira kalasi iti (sitandadi, folumu, chaka)?* If completed less than one year at that level record '00'	Std/Form/Year ***Tick where applicable here***	⌊__⌋⌊__⌋ **If secondary or Higher, Go to Q.107**		
106	What is your religion?	Catholic	01		
		CCAP	02		
		Anglican	03		

	Kodi ndinu a mpingo wanji?	Seventh Day Advent/Bapti	04	
		Other Christian	05	
		Muslim	06	
		No Religion	07	
		Other (Specify)	96	
107	What is your tribe or ethnic group? *Kodi ndinu a mtundu wanji?*	Chewa	01	
		Tumbuka	02	
		Lomwe	03	
		Tonga	04	
		Yao	05	
		Sena	06	
		Nkhonde	07	
		Ngoni	08	
		Other (Specify)	96	
108	What is your marital status? *Kodi muli pa banja?*	Never married	1	
		Currently married	2	
		Separated	3	
		Divorced	4	
		Widowed	5	
		Cohabiting	6	
		Refused	98	
109	Which of the following describes your main work status over the past 12 months? *Kodi ntchito yanu yeniyeni ndi yotani pa miyezi 12 yapitayi?*	Government employee	1	
		Non-government employee	2	
		Self-employed	3	
		Non-paid	4	
		Student	5	
		Homemaker	6	
		Retired	7	
		Unemployed (able to work)	8	
		Unemployed (unable to work)	9	
		I don’t know/Refused	98	

110	How many people older than 18 years, including yourself, live in your household? *Kodi pakhomo panu pali anthu angati opyola / opitilira zaka 18?*	└__┘__┘ Number of people			
111	Taking the past year, can you tell me what the average earnings of the household have been? *Kodi munapeza ndalama zochuluka bwanji pa mulungu kapena pa mwezi kapena pa chaka mu chaka chapitachi?* (Record only **One, Not** all 3)	└__┘__┘__┘__┘__┘__┘__┘ Per week			
		OR └__┘__┘__┘__┘__┘__┘__┘ Per month			
		OR └__┘__┘__┘__┘__┘__┘__┘ Per year			
112	Many different factors can prevent women from getting medical advice or treatment for themselves. When you are sick and want to get medical advice or treatment, is each of the following big problem or not? *Pali zifukwa zosiyanasiyana zomwe zimalepheretsa a mai apakati kupeza uphungu okhudzana ndi umoyo wao or chithandizo ku chipatala. Kumbali yanu, kodi mukadwa kapena mukufuna uphungu wa zamoyo, ndi zifukwa ziti zomwe zili zazikulu zimakubwezani mbuyo?*		A big Problem *Chifukwa chachikulu*	Not a big Problem *Chifukwa chaching'ono*	
		Getting permission to go? *Kupeza chilorezo kuchoka abambo?*	1	2	
		Getting money needed for treatment? *Ndalama zolipirila ku chipatala?*	1	2	
		The distance to the health facility? *Kutalika kwa mtunda waku chipatala?*	1	2	
		Having to take transport? *Mayendedwe?*	1	2	
		Not wanting to go alone? *Kusafuna basi?*	1	2	

		Concern that there may not be a female health provider? *Ganizo loti sindikapezako a dokotala achizimai?*	1	2	
		Concern that there may not be any health provider? *Ganizo loti sindikapeza ondipatsa thandizo?*	1	2	
		Concern that there may be no drugs available? *Ganizo loti ndikapeza kopanda mankhwala?*	1	2	

Question No.	**Section 2: Reproduction**	**Response**			**Code**
201	Was this your first pregnancy? *Iyi inali mimba yanu yoyamba?*	Yes	1	**If Yes, Go to Q.203**	
		No	0		
202	How many pregnancies have u had during your life? Kodi mwachembezako kangati?	⌊__⌋⌊__⌋ Number of pregnancies			
203	Have you ever given birth? *Munayamba mwaberekako?*	Yes	1		
		No	0	**If No, Go to Q.204**	
204	How many births have you given during your life? *Mwabelekako ana angati pa moyo wanu?*	⌊__⌋⌊__⌋ Number of birth			

Question No.	**Section 3: Pregnancy, Malaria and Intermittent Preventative Treatment**	**Response**			**Code**
301	When you were pregnant with this new born baby, did you see anyone for antenatal care for this pregnancy? *Pamene munali oyembekezera, mudabwerako kusikelo?*	Yes	1		
		No	0	**If No, Go to Q.305**	

302	Whom did you see? *Ndi ndani amene anakupatsani chithandizo?*	**Health Personnel**			
		Doctor/Clinical Officer	A		
		Nurse/Midwif	B		
		Patient Attendant	C		
		HSA	D		
		Other person			
		Traditional Birth Attendant			
		Other (Specify)			
303	How many times did you receive antenatal care during this pregnancy? *Pa nthawi yomwe munali oyembekezera, mudapitako kangati ku sikelo?* **CROSS-CHECK WITH ANC CARD**	⌊__⌋⌊__⌋ Number of ANC visits			
		Don't know	98		
304	How old was the pregnancy (in months) when you first sought/visited antenatal care? *Kodi pamene munkayamba sikelo, munali ndi pakati pa miyezi ingati?*	⌊__⌋⌊__⌋ Number of months (Gestation period)			
		Don't know	98		
305	How is malaria transmitted? *Mwanjira izi, sankhani njira zomwe mukudziwa kuti malungo amafalila?*		Yes	No	
		Eating un matured sugar cane *Kudya nzimbe zosankhwima*	1	0	
		Mosquito *Udzudzu*	1	0	
		Witchcraft *Ufiti*	1	0	
		Don't know	1	0	
306	What are the dangers of malaria in pregnancy? *Kodi malungo amabweretsa mavuto wotani kwa amai apakati?*		Yes	No	
		Abortion *Pathupi kuchoka*	1	0	
		Still birth *kupititsa padela*	1	0	
		Low birth weight *Mwana kubadwa onyetchera?*	1	0	
307		Yes	1		

	Have you ever heard or informed about malaria prevention during pregnancy using SP/Fansidar? *Kodi munavapo za mankhwala a fansidar ngati njira imodzi yoteteza amai apakati ku malungo?*	No	0	
308	During this pregnancy, did you take SP/Fansidar or Novidar SP to keep you from getting malaria? *Kodi munamwako mankhwala a fansidar panthawi yomwe munali woyembekezera?*	Yes	1	
		No	0	**If No or don't know, Go to S.4**
		Don't know	98	
309	How many times did you take SP/ Fansidar or Novidar SP during this pregnancy? *Ndimaulendo angati omwe munamwa fansidar?*	⌊_⌊_⌋ Times		
310	Where did you get SP/ Fansidar or Novidar SP from? *Mankhwala amenewa munawalandilila kuti?*	Antenatal visit	1	
		Another facility visit	2	**If 2 or 3, Go to S.4**
		Other sources	3	
311	How many times did you take SP/ Fansidar or Novidar SP during an antenatal visit? *Ndimaulendo angati amene munalandira fansidar mutapita ku sikelo?*	⌊_⌊_⌋ Times		
312	Did you take SP/ Fansidar or Novidar SP under direct observation by the health worker each time? *Kodi a dokotala amakhala ali pompo kuonetsetsa kuti*	Yes	1	**If Yes, Go to S.4**
		No	0	

	mwamwa fansidar pa nthawi zonse zomwe mumalandila mankhwalawa ku sikelo?			
313	How many times did you take SP under observation by health worker? *Ndimaulendo angati omwe munamwa Fansidar pamaso pa dokotola?*	⌊_⌋⌊_⌋ Times		

Question No.	Section 4: Iron supplements during pregnancy	Response			Code
401	During this pregnancy, were you given or did you buy any iron tablets? *Kodi munamwako mankhwala owonjezela magazi panthawi yomwe munali woyembekezera?* SHOW TABLETS	Yes	1		
		No	0	**If No or don't know, Go to Q.403**	
		Don't know	98		
402	During the whole pregnancy, for how many days did you take the tablets? *Panthawi yonse munali oyembekezera, kodi ndimasiku angati omwe munamwa mankhwala owonjezela magaziwa?* IF ANSWER IS NOT NUMERIC, PROBE FOR APPROXIMATE NUMBER OF DAYS	⌊_⌋⌊_⌋⌊_⌋ Days			
		Don't know	98		

Question No.	Section 5: Alcohol use and tobacco smoking	Response		Code
501	How often during the past **ninemonths** did you have a drink containing alcohol? *Kodi ndikangati komwe munamwako chakumwa choledzeletsa pa mwezi isano ndi inayi yapitayi?*	Never *Sindinamweko*	0	
		Monthly or less *Kamodzi pa mwezi*	1	
		2-4 times a month *Kawiri, katatu ndi kanai pa mwezi*	2	
		2-3 times a week *Kawiri kapena katatu pa mulungu*	3	
		4 or more times a week	4	

		Kanai or kupyolera apo pa mulungu		
502	Have you ever smoked tobacco cigarettes? *Kodi munasutapo fodya?*	Never smoked	0	
		Yes, but not in the past **ninemonths**	1	
		Yes, in the past **ninemonths**	2	
		Prefer not to answer	99	

Question No.	**Section 6: Woman's maternal health**	**Response**			**Code**
	History of Raised blood pressure				
601	During the past **nine months** have you been told by a doctor or health worker that you have raised blood pressure or hypertension? *Kodi pa miyezi 9 yapitayi a dokotala anakupimaniko ndikukupezani ndi matenda othamanga magazi (BP)?*	No	0		
		Yes	1	**CROSS-CHECK WITH ANC CARD**	
	History of anaemia				
602	During the past **nine months** have you been told by a doctor or other health worker that you have anaemia? *Kodi pa miyezi 9 yapitayi a dokotala anakupimaniko ndikukupezani ndi matenda ochepa magazi?*	No	0		
		Yes	1	**CROSS-CHECK WITH ANC CARD**	
	History of diabetes				
603	During the past **nine months** have you been told by a doctor or other health worker that you have diabetes? *Kodi pa miyezi 9 yapitayi a dokotala anakupimaniko ndikukupezani ndi matenda a suga?*	No	0		
		Yes	1	**CROSS-CHECK WITH ANC CARD**	

604	During the whole pregnancy, have you ever got sick with the following illness?		Yes	No	
		Urinary tract infection *Matenda achikhodzodzo*	1	0	
		Pneumonia *chibayo*	1	0	

	Kodi anakupezanipo ndi matenda awa munyengo yomwe munali ndipakati?	STIs *Matenda opatsirana pakugonana*	1	0	
		Hepatitis *Matenda achiwindi*	1	0	
		Other (Specify)			

Question No.	Section 7: Physical Measurements	Response			Code
701	Was you newly born baby weighed at birth? *Kodi mwana wanu anamupima sikelo atangobadwa?*	Yes	1		
		No	0	**If No or don't know, Go to Q.503**	
		Don't know			
702	How much did she/he weigh? *Kodi sikelo yake imalemela bwanji?* RECORD WEIGHT IN KILOGRAMS FROM MOTHER'S HEALTH CARD, IF AVAILABLE	**a. Kg from Card**	⌊_⌊_⌊_⌋.⌊_⌋ Kilograms		
		b. Kg from Recall	⌊_⌊_⌊_⌋.⌊_⌋ Kilograms		
		Don't know	9998		
703	What was your weight from the first antenatal care visit measurement? *Kodi mene mumadzayamba sikelo, mumalemera bwanji?* RECORD WEIGHT IN KILOGRAMS FROM MOTHER'S HEALTH CARD, IF AVAILABLE	**a. Kg from Card**	⌊_⌊_⌊_⌋.⌊_⌋ Kilograms		
		b. Kg from Recall	⌊_⌊_⌊_⌋.⌊_⌋ Kilograms		
		Don't know	9998	**If don't know, Go to Q.504**	
704	Weight from the current measurement. TAKE WEIGHT OF THE PARTICIPANT	⌊_⌊_⌊_⌋.⌊_⌋ Kilograms			
705	What was your height from the first antenatal care visit measurement? *Nanga kodi mulingo wakutalika kwanu unali*	**a. Height from Card**	⌊_⌊_⌊_⌋.⌊_⌋ Centimetres		

	otani panthawi yomwe mumadzayamba sikelo?	**b. Height from Recall**	⌊_⌊_⌊_⌋.⌊_⌋ Centimetres		
		Don't know	9998	**If don't know, Go to Q.506**	
706	Height from the current measurement. TAKE HEIGHT OF THE PARTICIPANT	⌊_⌊_⌊_⌋.⌊_⌋ Centimetres			
707	Body Mass Index (BMI) FROM Q. 503 AND Q. 505 OR Q.504 AND Q.506 CALCULATE BMI =Weight (in kilogram)÷ height squared (in centimeters)	⌊_⌊_⌋.⌊_⌊_⌋ BMI (kg/cm^2)			

*Most questions adapted from Malawi Malaria Survey Indicator 2015 and 2010 Malawi DHS

END OF QUESTIONNAIRE

Mafunso athera pamenepa

THANK YOU

APPENDIX B: INFORMATION SHEET AND INFORMED CONSENT FORM

Study Title: Determinants of uptake of Intermittent Preventive Treatment for malaria during pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) among postpartum women in Zomba District: A cross-sectional study

Introduction

Hello. My name is Steven Chifundo Azizi from University of Zambia. I am doing research on Malaria in Pregnancy which very common in Malawi. I would like to invite you to take part in a research study on factors affecting uptake of Fansidar in your community. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Consent Form to keep.

Purpose of Study

Pregnant women are given Fansidar at antenatal care clinics. We want to find out underlying factors associated with poor uptake or use of Fansidar and relate this to birth weight of your last born child. We expect that the information that you will give us is going to contribute to knowledge and help to best facilitate the use of Fansidar by pregnant women in your community.

Random selection

You have been randomly selected to be part of this survey and this is why we would like to
interview you.

Study Procedures

If you agree to take part in this research study, you will be asked to participate in an interview with me. Firstly, I will kindly take your weight and measure your height then I will sit down with you in a comfortable place for face-to-face interview using a questionnaire, which will take about **30 minutes**. If you do not wish to answer any of the questions during the interview, you may say so and I will move on to the next question. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except Research Team will access to the information documented. Your answers to the questions in survey will be written down, and no name will be used to identify you, only a number will identify you.

Confidentiality
The results of your height and weight measurements and your answers to the questions will be kept confidential and will only be used for research purposes.

Study Benefits
There will not be any immediate benefit to you if you choose to participate. However, your participation is likely to help us find out more about how to increase use of Fansidar during pregnancy by addressing the problems that women face in order to take the drug in your community. Hence many pregnant women may benefit in future if we are able to find the answers to our questions.

Study Risks
There are two anticipated risks:

- a risk that you may share some personal or confidential information by chance, or that may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. You do not have to answer any question if you feel the question(s) are too personal or if talking about them makes you uncomfortable.,
- because I have taken up your valuable time you may be losing some social time with your new baby, family and friends and get tired with the interview

Voluntariness
Your participation in this study is completely voluntary. Should you choose not to participate, no penalty or injury shall occur to you and you will continue to receive the same health care that you otherwise enjoy. You have the right to withdraw your participation any time you wish to do so.

If you have any doubts or you wish to seek clarification on the research, please feel free to contact the main researcher on the address below:

Name: Steven Chifundo Azizi
Organisation: UNZA, School of Medicine, Dept of Public Health
Address: Ridgeway Campus, P.O. Box 50110, Lusaka, Zambia
Email: steve_aziz@hotmail.com
Tel: +265 999 328 017

If you have any complaints about the study, please contact the Chairperson of the National Health Sciences Research Committee at the following address:

The Chairperson
National Health Sciences Research Committee
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi
Tel: +265 1 726 422/418

I understand the information given to me and that my participation in this research is completely voluntary and its purpose has been fully explained to me. I also understand that my rights and privacy will be respected.

Name of Participant: _____

Signature or thumb print of participant: _____ Date: _____

Name of person obtaining consent _____

Signature of person obtaining consent: _____ Date: _____

APPENDIX C: CHICHEWA INFORMATION SHEET AND INFORMED CONSENT FORM

Mutu Wakafukufuku: Kufufuza zifukwa zomwe zimapangitsa amai apakati kumwa kapena kusamwa Fansidar mu nthawi yomwe ali oyembekezera.

Malonje

Moni. Dzina langa ndi Steven Chifundo Azizi, ophunzira wa sukulu ya ukachenjede ya University of Zambia. Ndikuchita kafukufuku wa zovuta zomwe amai apakati amakumana nazo kuti amwe mankhwala a fansidar panthawi yomwe ali oyembekera m'dela lanu. Ndikufuna kuitana inu kuti mutenga mbali mu kafukufuku ameneyu. Musanapange ganizo lotenga nao mbali mukafukufukuyu muyenela kudziwa chifukwa chimene kafukufuku akuchitika, zimene zichitike mukavomereza kutenga nao mbali, ubwino ndi kuipa kwa kutenanga nao mbali, ndiponso zomwe zidzachitike pambuyo pa kafukufukuyu. Chonde tengani nthawi kumvera mfundo ndi ndondomeko zotsatirazi mosamala pamene ine ndiwerenge izo kwa inu. Funsani mafunso ngati chirichonse ndinena sichinamveke bwino kapena pakufunika uthenga woonjezela. Ndikupatsani mpata opanga chiganizo cha kutenga nao gawo kapena ai.

Mukavomeraza kutenga nao mbali mu kafukufukuyu, mudzafunsidwa kusaina Fomu la chilolezo pa tsamba lotsiriza la chikalatachi.

Cholinga cha Kafukufuku

Amayi apakati amapatsidwa Fansidar akapita kusikelo pa nthawi yomwe ali oyembekezera. Cholinga cha kafukufuku ameneyu ndi kufuna kudziwa mavuto omwe azimai apakati amakumana nao m'dela lanu omwe amapangitsa kuti asamamwe mankhwala a fansidar amene amapelekedwa kusikelo. Tikukhulupira kuti zomwe mutiuze zitithandiza kuti tipeze njira zongonjetsa ena mwa mavutowa m'dera lanu.

Kasankhidwe ka anthu olowa nkafukufuku

Si amai onse kudera kwanu kuno amene alowe nkafukufukuyu ayi. Tachita maula kuti tisankhe amai oti alowe. Inu ndi amodzi amene mwasankhidwa titachita maula amenewa. Ndi chifukwa chache takupezani.

Zochitika mu kafukufukuyu

Kafukufukuyu ali ndi mbali ziwiri. Mbali yoyamba ndi yokuyesani sikelo yanu ndi kutalika kwanu.. Mbali yachiwiri ndi yoyankha mafunso osiyanasiyana okhudza za umoyo wanu komaso zamamwedwe anu a mankhwala a fansidar panthawi yomwe munali woyembekezera. Izi zonse zitenga **phindi zosapitilira makumi atatu**. Muli ndi ufulu osayankha funso lili lonse lomwe mukuona kuti simukwanitsa kuyankha kamba kazifukwa zina.

Chinsisi

Mayankho amene mutapeleke ndi achinsinsi ndipo sadzapelekedwa kwa wina aliyense. Adzagwiritsidwa ntchito ya kafukufukuyu basi. Dzina lanu, malo okhala ndi zina zonse zokhudza inu zidzafufutidwa pa chipepala cha mafunso.

Ubwino wakafukufuku

Palibe cholowa yomwe muchipeze mukatenga nao mbali mukafukufukuyu patsiku la lero. Komabe, mavuto omwe mutiuze lero atithandiza kupeza dongosolo la bwino loti amai apakati azitha kulandila ndi kumwa fansidar mosavutika ndicholinga chakuti apewe matenda a malungo. Choncho akazi ambiri apakati angapindule m'tsogolo ngati tingathe kupeza mayankho.

Zotsamwitsa kwa kafukufuku

Pali zotsamwitsa ziwiri zomwe mungakumane nazo mukatenga nao mbali:

— Mayankho ena omwe mungatipatse atha kukhala achinsinsi. Koma ife sicholinga chathu kuti mutiululire zisisi zanu. Sitikufuna kuti izi zichitike. Muli ndi ufulu osayankha fuso lomwe mukuona kuti simukwanitsa kutero.

— Ndikutengerani nthawi yanu yomwe mukanakhala mukupanga zina ndi zina.

Kuzipereka pakutenga nao mbali mukafukufukuyu mosakakamizidwa

Mwakufuna kwanu mungathe kuvomeleza kutenga nao mbali mukafukufukuyu. Ngati mwasakha kusatenga nao mbali, palibe chilango kapena choipa zidzachitika kwa inu ndipo mupitiriza kulandira chithandizo chamankhwala pa chipatala pano. Ngati mutavomereze, muli ndi ufulu ondiletsa kupitiliza kukufunsani mafunso nthawi ina ili yonse.

Ngati mukufuna kudziwa zambiri zakafukufukuyu, chonde khalani omasuka polumikizana ndi mkulu wakafukufuku ameneyi pa keyala ili m'munsiyi:

Dzina: Steven Chifundo Azizi
Bungwe: UNZA, School of Medicine, Dept a Health Public
Keyala: Ridgeway Campus, P.O. Bokosi 50110, Lusaka, Zambia
Email: steve_aziz@hotmail.com
Tel: +265 999 328 017

Ngati muli ndi madandaulo ali onse pa za kafukufukuyu, lemberani Wapampando wa National Health Sciences Research Committee pa keyala ili m'munsiyi:

Wapampando
National Health Sciences Research Committee
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi
Tel: +265 1 726 422/418

Kuvomeleza kafukufuku

Ine ndamvetsetsa mfundo ndi ndondomeko yonse ya kafukufukuyu zimene andifotokozera ndipo ndavomera mwakufuna kwanga, mosakakamizidwa kutenga nawo mbali pakudziwa kuti ufulu ndi zinsinsi zanga zilemekezedwa.

Dzina la Mai: _____

Signature kapena chidindo cha chala cha Mai: _____ Tsiku: _____

Dzina la ofunsa mafunso _____

Signature la ofunsa mafunso: _____ Tsiku: _____

APPENDIX D: INFORMATION SHEET AND INFORMED ASSENT FORM FOR UNDER 18 YEARS OLD

Study Title: Determinants of uptake of Intermittent Preventive Treatment for malaria during pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) among postpartum women in Zomba District: A cross-sectional study

Introduction

Hello. My name is Steven Chifundo Azizi from University of Zambia. I am doing research on Malaria in Pregnancy which very common in Malawi. I would like to invite you to take part in a research study on factors affecting uptake of Fansidar in your community. Before you decide you need to understand why the research is being done, what it would involve for you, what the benefits and risks to you might be, and what would happen after the study ends. Please take time to listen to the following information carefully as I read it to you. Ask questions if anything I say is not clear or would like more information. Take time to decide whether or not to take part.

If you agree to take part in this study, you will be asked to sign the Assent Form on the last page of this document. You will be given a copy of both the Participant Information Sheet and the Assent Form to keep.

Purpose of Study

Pregnant women are given Fansidar at antenatal care clinics. We want to find out underlying factors associated with poor uptake or use of Fansidar and relate this to birth weight of your last born child. We expect that the information that you will give us is going to contribute to knowledge and help to best facilitate the use of Fansidar by pregnant women in your community.

Random selection

You have been randomly selected to be part of this survey and this is why we would like to
interview you.

Study Procedures

If you agree to take part in this research study, you will be asked to participate in an interview with me. Firstly, I will kindly take your weight and measure your height then I will sit down with you in a comfortable place for face-to-face interview using a questionnaire, which will take about **30 minutes**. If you do not wish to answer any of the questions during the interview, you may say so and I will move on to the next question. No one else but the interviewer will be present unless you would like someone else to be there. The information recorded is confidential, and no one else except Research Team will access to the information documented. Your answers to the questions in survey will be written down, and no name will be used to identify you, only a number will identify you.

Confidentiality

The results of your height and weight measurements and your answers to the questions will be kept confidential and will only be used for research purposes.

Study Benefits

There will not be any immediate benefit to you if you choose to participate. However, your participation is likely to help us find out more about how to increase use of Fansidar during pregnancy by addressing the problems that women face in order to take the drug in your community. Hence many pregnant women may benefit in future if we are able to find the answers to our questions.

Study Risks

There are two anticipated risks:

- a risk that you may share some personal or confidential information by chance, or that may feel uncomfortable talking about some of the topics. However, we do not wish for this to happen. You do not have to answer any question if you feel the question(s) are too personal or if talking about them makes you uncomfortable.,
- because I have taken up your valuable time you may be losing some social time with your new baby, family and friends and get tired with the interview

Voluntariness

Your participation in this study is completely voluntary. Should you choose not to participate, no penalty or injury shall occur to you and you will continue to receive the same health care that you otherwise enjoy. You have the right to withdraw your participation any time you wish to do so.

If you have any doubts or you wish to seek clarification on the research, please feel free to contact the main researcher on the address below:

Name: Steven Chifundo Azizi
Organisation: UNZA, School of Medicine, Dept of Public Health
Address: Ridgeway Campus, P.O. Box 50110, Lusaka, Zambia
Email: steve_aziz@hotmail.com
Tel: +265 999 328 017

If you have any complaints about the study, please contact the Chairperson of the National Health Sciences Research Committee at the following address:

The Chairperson
National Health Sciences Research Committee
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi
Tel: +265 1 726 422/418

I want to take part in this study and my parents/guardians agree. I understand the information given to me and that my participation in this research is completely voluntary and its purpose has been fully explained to me. I also understand that my rights and privacy will be respected.

Name of Under-age Participant: _____

Signature or thumb print of participant: _____ Date: _____

Name of parent/guardian/ or witness: _____

Signature or thumb print of parent/guardian/ or witness: _____ Date _____

Name of person obtaining consent _____

Signature of person obtaining consent: _____ Date: _____

APPENDIX E: CHICHEWA INFORMATION SHEET AND INFORMED ASSENT FORM FOR UNDER 18 YEARS OLD

Mutu Wakafukufuku: Kufufuza zifukwa zomwe zimapangitsa amai apakati kumwa kapena kusamwa Fansidar mu nthawi yomwe ali oyembekezera.

Malonje

Moni. Dzina langa ndi Steven Chifundo Azizi, ophunzira wa sukulu ya ukachenjede ya University of Zambia. Ndikuchita kafukufuku wa zovuta zomwe amai apakati amakumana nazo kuti amwe mankhwala a fansidar panthawi yomwe ali oyembekera m'dela lanu. Ndikufuna kuitana inu kuti mutenga mbali mu kafukufuku ameneyu. Musanapange ganizo lotenga nao mbali mukafukufukuyu muyenela kudziwa chifukwa chimene kafukufuku akuchitika, zimene zichitike mukavomereza kutenga nao mbali, ubwino ndi kuipa kwa kutenanga nao mbali, ndiponso zomwe zidzachitike pambuyo pa kafukufukuyu. Chonde tengani nthawi kumvera mfundo ndi ndondomeko zotsatirazi mosamala pamene ine ndiwerenge izo kwa inu. Funsani mafunso ngati chirichonse ndinena sichinamveke bwino kapena pakufunika uthenga woonjezela. Ndikupatsani mpata opanga chiganizo cha kutenga nao gawo kapena ai.

Mukavomeraza kutenga nao mbali mu kafukufukuyu, mudzafunsidwa kusaina Fomu la chilolezo pa tsamba lotsiriza la chikalatachi.

Cholinga cha Kafukufuku

Amayi apakati amapatsidwa Fansidar akapita kusikelo pa nthawi yomwe ali oyembekezera. Cholinga cha kafukufuku ameneyu ndi kufuna kudziwa mavuto omwe azimai apakati amakumana nao m'dela lanu omwe amapangitsa kuti asamamwe mankhwala a fansidar amene amapelekedwa kusikelo. Tikukhulupira kuti zomwe mutiuze zitithandiza kuti tipeze njira zongonjetsa ena mwa mavutowa m'dera lanu.

Kasankhidwe ka anthu olowa nkafukufuku

Si amai onse kudera kwanu kuno amene alowe nkafukufukuyu ayi. Tachita maula kuti tisankhe amai oti alowe. Inu ndi amodzi amene mwasankhidwa titachita maula amenewa. Ndi chifukwa chache takupezani.

Zochitika mu kafukufukuyu

Kafukufukuyu ali ndi mbali ziwiri. Mbali yoyamba ndi yokuyesani sikelo yanu ndi kutalika kwanu.. Mbali yachiwiri ndi yoyankha mafunso osiyanasiyana okhudza za umoyo wanu komaso zamamwedwe anu a mankhwala a fansidar panthawi yomwe munali woyembekezera. Izi zonse zitenga **phindi zosapitilira makumi atatu**. Muli ndi ufulu osayankha funso lili lonse lomwe mukuona kuti simukwanitsa kuyankha kamba kazifukwa zina.

Chinsisi

Mayankho amene mutapeleke ndi achinsinsi ndipo sadzapelekedwa kwa wina aliyense. Adzagwiritsidwa ntchito ya kafukufukuyu basi. Dzina lanu, malo okhala ndi zina zonse zokhudza inu zidzafufutidwa pa chipepala cha mafunso.

Ubwino wakafukufuku

Palibe cholowa yomwe muchipeze mukatenga nao mbali mukafukufukuyu patsiku la lero. Komabe, mavuto omwe mutiuze lero atithandiza kupeza dongosolo la bwino loti amai apakati azitha kulandila ndi kumwa fansidar mosavutika ndicholinga chakuti apewe matenda a malungo. Choncho akazi ambiri apakati angapindule m'tsogolo ngati tingathe kupeza mayankho.

Zotsamwitsa kwa kafukufuku

Pali zotsamwitsa ziwiri zomwe mungakumane nazo mukatenga nao mbali:

— Mayankho ena omwe mungatipatse atha kukhala achinsinsi. Koma ife sicholinga chathu kuti mutiululire zisisi zanu. Sitikufuna kuti izi zichitike. Muli ndi ufulu osayankha fuso lomwe mukuona kuti simukwanitsa kutero.

— Ndikutengerani nthawi yanu yomwe mukanakhala mukupanga zina ndi zina.

Kuzipereka pakutenga nao mbali mukafukufukuyu mosakakamizidwa

Mwakufuna kwanu mungathe kuvomeleza kutenga nao mbali mukafukufukuyu. Ngati mwasakha kusatenga nao mbali, palibe chilango kapena choipa zidzachitika kwa inu ndipo mupitiriza kulandira chithandizo chamankhwala pa chipatala pano. Ngati mutavomereze, muli ndi ufulu ondiletsa kupitiliza kukufunsani mafunso nthawi ina ili yonse.

Ngati mukufuna kudziwa zambiri zakafukufukuyu, chonde khalani omasuka polumikizana ndi mkulu wakafukufuku ameneyi pa keyala ili m'munsiyi:

Dzina: Steven Chifundo Azizi
Bungwe: UNZA, School of Medicine, Dept a Health Public
Keyala: Ridgeway Campus, P.O. Bokosi 50110, Lusaka, Zambia
Email: steve_aziz@hotmail.com
Tel: +265 999 328 017

Ngati muli ndi madandaulo ali onse pa za kafukufukuyu, lemberani Wapampando wa National Health Sciences Research Committee pa keyala ili m'munsiyi:

Wapampando
National Health Sciences Research Committee
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi
Tel: +265 1 726 422/418

Kuvomeleza kafukufuku

Ine ndavomereza kutenga nao mbali ndipo makolo anga agwirizana nazo. Ndamvetsetsa mfundo ndi ndondomeko yonse ya kafukufukuyu zimene andifotokozera ndipo ndavomera mwakufuna kwanga, mosakakamizidwa kutenga nawo mbali pakudziwa kuti ufulu ndi zinsinsi zanga zilemekezedwa.

Dzina la Mai wachichepere: _____

Signature kapena chidindo cha chala cha Mai wachichepere: _____ Tsiku: _____

Dzina la kholo kapena mboni: _____

Signature or kapena chidindo cha chala cha kholo kapena mboni: _____ Tsiku: _____

Dzina la ofunsa mafunso _____

Signature la ofunsa mafunso: _____ Tsiku: _____

APPENDIX F: BUDGET

S/N	Item	Description	Qty	No. of Months	Unit Cost (ZMK)	Total (ZMK)
1	Equipment	Canon MF628cw Color	1		4,100.00	4,100.00
		External hard drives (Toshiba 1TB)	1		1,120.00	1,120.00
		Pen drives (TDK 16GB)	2		230.00	460.00
		Laptop	1		5,390.00	5,390.00
		Antivirus (Kaspersky 1PC each)	1		530.00	530.00
		Digital floor weighing scales	2		300.00	600.00
		Height Rods (Stadiometer)	2		600.00	1,200.00
	Subtotal					**13,400.00**
2	Stationery	Toner black	2		1,900.00	3,800.00
		Toner Color	2		1,700.00	3,400.00
		Ream of Bond paper (Typek 5 Reams per box)	4		200.00	800.00
		Pens (Bic 24 per packet)	1		65.00	65.00
		Pencils (3 per packet)	4		27.00	108.00
		Stapler Heavy duty	1		400.00	400.00
		Stapler	1		200.00	200.00
		Staples (per box)	4		50.00	200.00
		Puncher	1		200.00	200.00
		Paper clips (500 pieces per box)	2		50.00	100.00
		Bulldog clips (pack of 6)	2		30.00	60.00
		Flip charts	2		100.00	200.00
		Permanent Markers	4		10.00	40.00
		Concertina Files	7		95.00	665.00
		Leverarch Files	2		52.00	104.00
		Pencil Sharpeners	4		22.00	88.00
		Transparent Tape	2		25.00	50.00
		Notepads	6		20.00	120.00
		Highlighters (pack of 4)	2		56.00	112.00
		White board marker (pack of 4)	1		60.00	60.00
		Sticky note pad	2		20.00	40.00

		Photocopying (per page)	6000		0.50	3,000.00
		Binding	6		60.00	360.00
	Subtotal					**14,172.00**
3	Research Per diem Costs	Research assistants/data collectors	4	1	2,500.00	10,000.00
		Data entry clerk	1		2,000.00	2,000.00
	Subtotal					**12,000.00**
4	Dissemination	Publishing	1		-	-
5	Training Costs	Per diem Research assistant	2		180.00	360.00
		Data collectors	4		180.00	720.00
		Data entry clerk	1		50.00	50.00
		Venue	1		250.00	250.00
	Subtotal					**1,380.00**
6	Transport		1		3,000.00	3,000.00
7	Zambia IRB fee		1		500.00	500.00
8	Malawi IRB fee		1		1000.00	1000.00
	Subtotal					**4,300.00**
	Incidentals (10%)					4,525.20
	Grand Total					**49,977.20**

APPENDIX G: UNZABREC APPROVAL LETTER

THE UNIVERSITY OF ZAMBIA

BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
E-mail: unzarec@unza.zm

Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia

Assurance No. FWA00000338
IRB00001131 of IORG0000774

3rd August, 2016.

Our Ref: 017-06-16.

Mr. Steven C. Azizi,
University of Zambia,
School of Medicine,
Department of Public Health,
P.O Box 50110,
Lusaka.

Dear Mr. Azizi,

RE: RESUBMITTED RESEARCH PROPOSAL: **"DETERMINANTS OF UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA DURING PREGNANCY WITH SULPHADOXINE-PYRIMETHAMINE (IPTp-SP) AMONG POSTPARTUM WOMEN IN ZOMBA DISTRICT: A CROSS-SECTIONAL STUDY" (REF. No. 017-06-16)**

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 26th July, 2016. The proposal is approved.

CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology, you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

Dr. S.H Nzala
VICE-CHAIRPERSON

Date of approval: 3rd August 2016. **Date of expiry:** 2nd August, 2017.

APPENDIX H: NHSRC APPROVAL LETTER

Telephone: + 265 789 400
Facsimile: + 265 789 431

All Communications should be addressed to:

The Secretary for Health and Population

In reply please quote No.

.....

MINISTRY OF HEALTH AND POPULATION

P.O. BOX 30377
LILONGWE 3
MALAWI

12th September, 2016

Steven Chifundo Azizi
MDF-Health Services (University of Zambia)
Lilongwe

Dear Madam,

RE: PROTOCOL # 1656: 'DETERMINANTS OF UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA DURING PREGNANCY WITH SP (IPTp-SP) AMONG POSTPARTUM WOMEN IN ZOMBA DISTRICT: A CROSSECTIONAL STUDY'

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for review. Please be advised that the NHSRC has **reviewed** and **approved** your application to conduct the above titled study.

- **APPROVAL NUMBER : 1656**
- The above details should be used on all correspondences, consent forms and documents as appropriate.
- **APPROVAL DATE : 12/09/2016**
- **EXPIRATION DATE**
  This approval expires on **11/09/2017**. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC Secretariat should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the NHSRC within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **MODIFICATIONS**: Prior NHSRC approval using forms obtainable from the NHSRC Secretariat is required before implementing any changes in the protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on phone number *+265 888 344 443* or by email on mohdoccentre@gmail.com.
- **OTHER**: Please be reminded to send in copies of your final research results for our records (Health Research Database).

Kind regards from the NHSRC Secretariat.

SECRETARY FOR HEALTH
2016 -09- 09
P.O. BOX 30377, CAPITAL CITY

For: **CHAIRPERSON, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE**
~~Promoting Ethical Conduct of Research~~

Executive Committee: *Dr B. Chilima (Chairperson), Dr B. Ngwira (Vice-Chairperson)*
Registered with the USA Office for Human Research Protections (OHRP) as an International IRBIRB Number IRB00003905 FWA00005976

APPENDIX J: ZOMBA DHO APPROVAL LETTER

Reply please quote Ref Med
Telephone: 01 11570030
Fax:
Communications should be addressed to
DISTRICT HEALTH OFFICER

gkawalazira@yahoo.co.uk

Zomba D H O,
Private bag 18
ZOMBA.

5 September 2016.

TO WHO IT MAY CONCERN

PERMISSION TO CARRY OUT A STUDY IN ZOMBA DISTRICT

The District Health Office assent to Mr Steven Chifundo Azizi to carry out research entitled "Determinants of uptake of Intermittent Preventive Treatment for malaria during pregnancy with sulphadoxine-pyrimethamine (IPTp-SP) among women in Zomba District in partial fulfilment of the requirements for the award of master's degree in Epidemiology.

We believe the study will identify significant factors associated with low IPTp-SP uptake in selected health facilities' catchment areas, and provide us with information about the extent of the burden and barriers and help direct needed changes to intervention and thus lead to increases in coverage.

Looking forward to your favorable assistance.

Yours sincerely,

MINISTRY OF HEALTH
DISTRICT HEALTH OFFICE
2016 -09- 30
PRIVATE BAG 18
ZOMBA

Dr. Gift Kwalazira

DISTRICT HEALTH OFFICER