FACTORS INFLUENCING THE UTILIZATION OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA CONTROL DURING PREGNANCY AMONG MOTHERS OF UNDER ONE CHILDREN IN RURAL LILONGWE, MALAWI

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health Program in Public Health
College of Public Health Sciences
Chulalongkorn University
Academic Year 2017

ปัจจัยที่มีผลต่อการใช้ยาป้องกันเป็นระยะ เพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ของมารดาที่มีบุตรอายุต่ำกว่า 1 ปี ในเขตชนบทของเมืองลิลองเว ประเทศมาลาวี

นายตวนก้า มาฟูเลเก

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2560

Thesis Title	FACTORS INFLUENCING THE UTILIZATION OF INTERMITTENTPREVENTIVE TREATMENT FOR MALARIA CONTROL DURING PREGNANCY AMONG MOTHERS OF UNDER ONE CHILDREN IN RURAL LILONGWE, MALAWI
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ตวนก้า มาฟูเลเก : ปัจจัยที่มีผลต่อการใช้ยาป้องกันเป็นระยะ เพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ของมารดาที่มีบุตรอายุต่ำกว่า 1 ปี ในเขตชนบทของเมืองลิลองเว ประเทศมาลาวี (FACTORS INFLUENCING THE UTILIZATION OF INTERMITTENTPREVENTIVE TREATMENT FOR MALARIA CONTROL DURING PREGNANCY AMONG MOTHERS OF UNDER ONE CHILDREN IN RURAL LILONGWE, MALAWI) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร.มนทกานติ์ เชื่อมชิต, 143 หน้า.

การใช้ยาป้องกันเป็นระยะเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ โดยการให้ยาซัลฟาดอกซิน-ไพริเมทามีน แก่หญิงตั้งครรภ์นั้น จะช่วยให้สุขภาพมารดาและผลการตั้งครรภ์ดีขึ้น การวิจัยนี้ต้องการศึกษาปัจจัยที่มีผลต่อการใช้ยาป้องกันเป็นระยะ เพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ของมารดาที่มีบุตรอายุต่ำกว่า 1 ปี ในเขตชนบทของเมืองลิลองเว ประเทศมาลาวี.การวิจัยครั้งนี้เป็นการศึกษาภาคตัดขวางด้วยการสัมภาษณ์ โดยการสุ่มตัวอย่างแบบหลายขั้นตอนจาก 6 สถานบริการ กลุ่มตัวอย่างคือมารดาที่มีบุตรอายุต่ำกว่า 1 ปี อายุระหว่าง 18-49 ปี จำนวน 355 คน สำหรับการวิเคราะห์ข้อมูลนั้น ได้ใช้สถิติการวิเคราะห์ตัวแปรสองตัว และตัวแปรหลายตัว.ผลการวิจัย พบว่า กลุ่มตัวอย่างร้อยละ 84 มารับการตรวจครรภ์อย่างน้อย 3 ครั้ง ซึ่งถือเป็นโอกาสที่ดีในการได้รับยาป้องกันเป็นระยะเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ อย่างไรก็ตามการวิจัยพบว่า กลุ่มตัวอย่างร้อยละ 24.8 เท่านั้น ที่มารับยาเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ตามเกณฑ์ที่ดี นั่นคือมากกว่า 3 ครั้งขึ้นไป ร้อยละ 52.7 รับยา 1-2 ครั้ง และร้อยละ 22.5 ไม่เคยรับยาเพื่อควบคุมโรคมาลาเรียระหว่างการตั้งครรภ์เลย สำหรับปัจจัยที่มีผลต่อการใช้ยาป้องกันเป็นระยะเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์นั้น คือ ความรู้ ($p = 0.005$) ทัศนคติ ($p < 0.001$) เวลาที่ใช้ในการมารับบริการฝากครรภ์ ($p < 0.001$) ความถี่/ความสม่ำเสมอในการมาฝากครรภ์ ($p = 0.005$) ความรู้เรื่องสุขภาพ ($p < 0.001$) และการรับรู้ประโยชน์ของการใช้ยาป้องกันเป็นระยะ ($p < 0.001$).กลุ่มตัวอย่างที่กินยาซัลฟาดอกซิน-ไพริเมทามีนขณะที่มีเจ้าหน้าที่สาธารณสุขอยู่ด้วย มีโอกาสที่จะรับยาเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ตามเกณฑ์ที่ดี มากเป็น 6.96 เท่า เมื่อเทียบกับคนที่กินยาขณะที่ไม่มีเจ้าหน้าที่อยู่ (95%CI 2.04-23.71) คนที่มีความพึงพอใจต่อบริการที่คลินิกฝากครรภ์ มีโอกาสที่จะรับยาเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์ตามเกณฑ์ที่ดี มากเป็น 1.94 เท่า เมื่อเทียบกับคนที่ไม่มีความพึงพอใจต่อบริการที่คลินิกฝากครรภ์ (95%CI 1.07-3.51).แม้ว่าอัตราการมารับบริการที่คลินิกฝากครรภ์ของกลุ่มตัวอย่างจะค่อนข้างสูง แต่การใช้ยาป้องกันเป็นระยะเพื่อควบคุมโรคมาลาเรียระหว่างตั้งครรภ์นั้นค่อนข้างต่ำ ไม่เพียงแต่เป็นเรื่องปัจจัยส่วนบุคคลเท่านั้น แต่ยังรวมถึงการไม่ปฏิบัติตามหลักเกณฑ์ของบุคลากรสาธารณสุขด้วยเช่นกัน ดังนั้นควรมีโปรแกรมที่มีจุดมุ่งหมายเพื่อแก้ปัญหาดังกล่าวรวมทั้งเสริมสร้างความเชื่อมั่นของชุมชน การวิจัยเชิงปฏิบัติการเพื่อศึกษาปัญหาและข้อจำกัดต่างๆของโปรแกรมการใช้ยาป้องกันเป็นระยะเพื่อควบคุมโรคมาลาเรียระหว่างการตั้งครรภ์ จึงมีความจำเป็น

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2560 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6078817053 : MAJOR PUBLIC HEALTH
KEYWORDS: ANTENATAL CARE / INTERMITTENT PREVENTIVE TREATMENT(IPT) / PREGNANCY / SULPHADOXINE PYRIMETHAMINE / MALARIA / LILONGWE / MALAWI

TAONGA MAFULEKA: FACTORS INFLUENCING THE UTILIZATION OF INTERMITTENTPREVENTIVE TREATMENT FOR MALARIA CONTROL DURING PREGNANCY AMONG MOTHERS OF UNDER ONE CHILDREN IN RURAL LILONGWE, MALAWI. ADVISOR: MONTAKARN CHUEMCHIT, Ph.D., 143 pp.

Routine administration of Sulphadoxine Pyrimethamine (SP) to pregnant women for intermittent preventive treatment (IPTp) of malaria during pregnancy leads to improved maternal health and pregnancy outcomes. This study explores determinants for IPTp-SP utilization among mothers of under-one children in rural Lilongwe, Malawi. Using multi-stage sampling method, this cross sectional study recruited 355 mothers of children under the age of one year from six health facilities. Respondents were aged 18-49 years and were interviewed using an interviewer-administered questionnaire. Bivariate analysis using Chi-Square and multivariate analysis (binary logistic regression) were performed. Overall, 84.0% of the mothers attended at least three antenatal care (ANC) visits, exposing them to the prospect of receiving optimal IPTp-SP. However, only 24.8% of the mothers received optimal (3+) doses of IPTp while 52.7% took partial (1-2) doses, and 22.5% did not utilize the intervention during pregnancy. Factors associated with IPTp utilization include knowledge ($p = 0.005$), attitudes ($p < 0.001$), timing of ANC visit ($p < 0.001$) and frequency of visits ($p = 0.005$), health education ($p < 0.001$), and perceived benefits of IPTp ($p < 0.001$). Women who were observed by a health worker while taking the SP were more likely to receive optimal IPTp (AOR 6.96; 95%CI 2.04-23.71). Women who expressed satisfaction with service delivery at ANC clinics also had higher likelihood of optimal IPTp-SP utilization (AOR 1.94; 95%CI 1.07-3.51). Despite a high ANC coverage, optimal IPTp-SP utilization in the study area is low. Apart from the influence of the identified client-level factors, this is low coverage can be attributable to health workers' non-adherence to IPTp guidelines leading to missed opportunities. Program efforts should aim at addressing the identified knowledge gaps and reinforcing community trust in the intervention. Operational research is recommended to explore bottlenecks limiting effective coverage of the intervention.

Field of Study: Public Health Student's Signature .....

Academic Year: 2017 Advisor's Signature .....

ACKNOWLEDGEMENTS

I dedicate this work to my lovely parents; Macloud and Aneck, for unceasingly encouraging me to actualize my dreams. Thank you for the boundless inspiration and belief in my abilities.

I am grateful for the invaluable guidance and mentorship from my academic and thesis advisor at Chulalongkorn University. Dr. Montakarn Chuemchit, you are a symbol of steadfast leadership.

The following individuals also provided insightful comments on the draft, for which I am very appreciative: Dr. Tepanata Pumpaibool (Chulalongkorn University, Thailand), Dr. Chikondi Mwendera (University of Malawi), Dr. Mwayiwawo Madanitsa (University of Malawi), and Dr. Maryse Kok (Royal Tropical Institute, Holland).

I wish to acknowledge the useful feedback from the thesis examination committee comprised of: Assoc. Prof. Ratana Somrongthong (Chairperson), Dr. Nanta Auamkul (External Examiner), Dr. Tepanata Pumpaibool (Examiner), and Dr. Montakarn Chuemchit (Advisor).

My heartfelt thanks to the amiable academic, administrative and support staff at Chulalongkorn University, College of Public Health Sciences for the support during my study stay in Thailand.

I will forever be indebted to the friendly people of Thailand for their generous financial support through the prestigious Thailand International Postgraduate Programme (TIPP). My warm appreciation to everyone working behind the scenes at Thailand International Cooperating Agency (TICA), the coordinating institution for the scholarship.

I am equally thankful to my employer, the Government of Malawi (Ministry of Health) for allowing me to leave my duty station and study in Thailand.

I am immensely indebted to my family in Malawi for their endless love, support and encouragement that kept me pushing for success during the study period.

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CHAPTER 1

INTRODUCTION

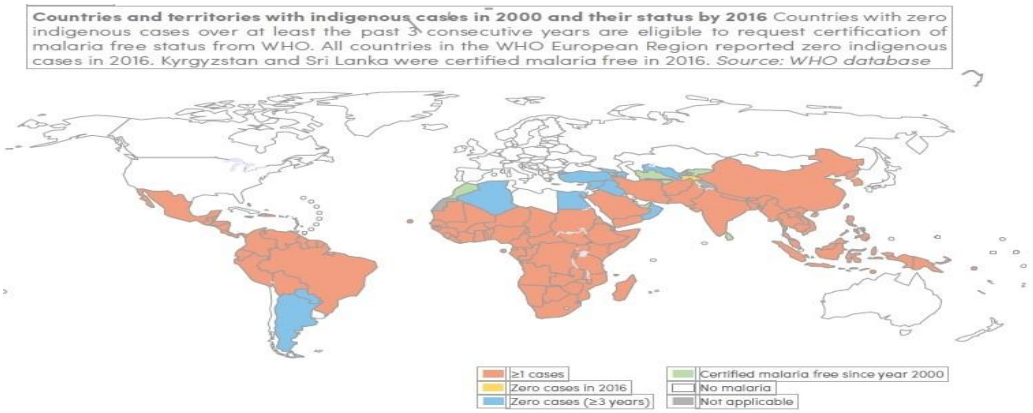
1.1. Background and rationale

Globally, malaria ranks fifth among the leading causes of mortality from infectious diseases (World Health Organization, 2017b). During the 20th century alone, malaria accounted for up to 300 million deaths representing approximately 5% of all mortality globally (Carter & Mendis, 2002). Although malaria incidence shows a declining global trend since 2000, the reduction rate has stagnated over the recent years while some regions that were moving towards elimination have experienced reemergence of infections with similar patterns in mortality rates (World Health Organisation, 2016c; World Health Organization, 2017b). The 2017 WHO's world malaria report shows that 216 million malaria cases from 91 countries were recorded leading to 445,000 deaths. This incidence figure represents an increase of approximately 5 million cases and almost the same number of fatalities reported during the previous year (World Health Organization, 2017b).

The major disease burden is concentrated in the WHO African region where 90% of all malaria cases and deaths occur (Breman J.G, 2001; World Health Organisation, 2016c) while the South-East Asia (6%) and Eastern Mediterranean (2%) regions are mildly affected (World Health Organization, 2017b). In these endemic areas, malaria remains a major public health challenge and continues to have a devastating impact on people's health and livelihoods.

Figure 1 shows progress made by the year 2016 by countries and regions which previously reported at least one indigenous malaria case in 2000 (World Health Organization, 2017b).

Figure 1: Global malaria burden - indigenous cases in 2016 (World Health Organization, 2017b)



According to the WHO, Malawi shoulders one of the largest malaria burden in sub-Saharan Africa and is still classified as a high-burden and hyper-endemic area (World Health Organisation, 2016c). Transmission occurs throughout the year but the peak period falls during the rainy season (November to April) when wet conditions present a favorable breeding environment for the malaria vector – the mosquito (Ministry of Health, 2017b).

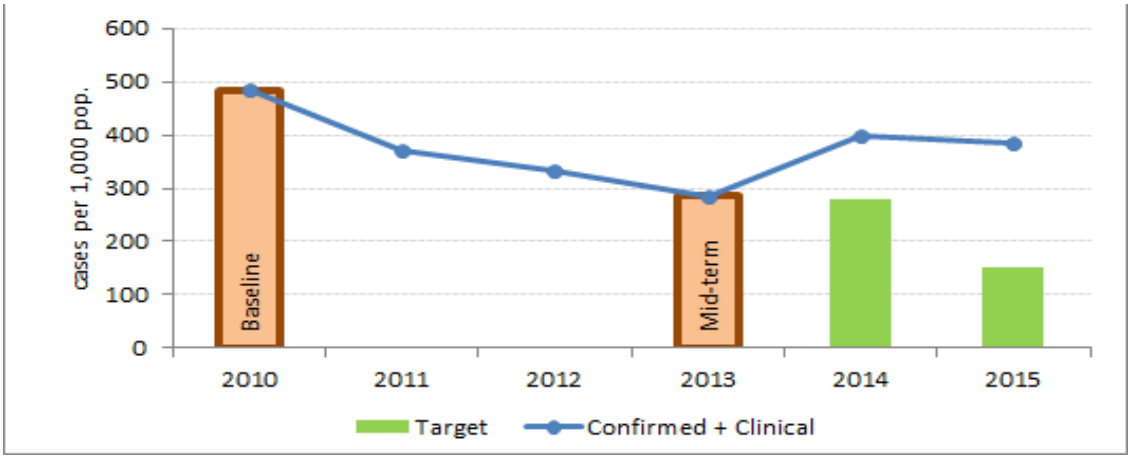
According to the WHO, Malawi shoulders one of the largest malaria burden in sub Saharan Africa and is still classified as a high-burden and hyper-endemic area (World Health Organisation, 2016c). Transmission occurs throughout the year with peak transmission occurring during the rainy season between the months of November an April when wet conditions present a favorable breeding environment for the malaria vector (Ministry of Health, 2017b).

Pregnant women, people living with HIV/AIDS and under-five children are considered as the most-at-risk populations (Ministry of Health, 2017c). Moreover, among these under-five children, disparities in prevalence rates are evident between rural and urban areas and the country's three administrative regions. Based on results from microscopic examination for malaria during the 2014 Malawi Malaria Indicator Survey (MMIS), the

parasite prevalence rate was significantly higher in rural areas (36.7%) than in urban areas (10.8%). The central region recorded the highest rate (36.1%) compared to the northern (28.5%) and southern (32.6%) regions (Ministry of Health & ICF International, 2015).

Over the past decade, the country has reported a declining trend with incidence and mortality figures going down by 37% and 48% respectively (Ministry of Health & ICF International, 2015; Okiro E et al., 2014). However, the disease still poses a major public health challenge for the country ranking fourth among the causes of death accounting for 8% of all mortality (Bowie C, 2011). It remains the leading cause of morbidity and mortality in under-five children (Ministry of Health, 2017b). The disease accounts for 34% of all outpatient visits and is estimated to be responsible for about 40% of all admissions of under-five children and 40% of all deaths in hospitals (Ministry of Health, 2015). In 2016, the country registered an estimated 4.5 million (confirmed and presumptive) cases of malaria resulting in 7,000 deaths (World Health Organisation, 2016b). The disease incidence for the period between 2010 – 2016 is presented in the figure 2.

Figure 2: Incidence of malaria (confirmed cases) in Malawi (Ministry of Health, 2015)



Lilongwe district is located in the central region and has the largest population in Malawi currently at 2,588,808 with an estimated annual growth rate of 6.5%. The majority of the population (60.8%) live in the rural areas and peri-urban centers while

the rest (39.2%) are resident in Lilongwe city (National Statistical Office, 2008). According to estimates in 2017, the disease ranks among the top five leading causes of morbidity and mortality in children under five years and pregnant women in the district (Ministry of Health, 2017b, 2017c). In 2016, there were an 494,200 confirmed cases of malaria resulting in 327 deaths among under-five children. Like most districts in the country, Lilongwe is mostly agrarian with most (90%) of its rural residents engaging in subsistence farming for their livelihoods. Therefore, malaria infection to family members poses a serious socioeconomic risk through lost productivity hours, absenteeism from school and costs for treatment (President's Malaria Initiative, 2017). This situation negatively affects educational attainment among children, contributes to food insufficiency at household level, and entrenches poverty by pushing the already impoverished households further down the poverty ladder (African Union, 2001).

While malaria can be deadly, it is also a preventable and curable disease. The successful reduction of the disease burden can go a long way in freeing up resources currently being invested for malaria prevention and control interventions. Such resources can then be reallocated for the management of other conditions such as HIV/AIDS, tuberculosis, diarrhea, pneumonia and cardiovascular diseases that contribute to the country's high morbidity and mortality rates (Ministry of Health, 2017c).

Recognizing these health and socioeconomic risks associated with malaria, the government of Malawi, with support from implementing partners, continues to scale up malaria control and prevention strategies (Ministry of Health, 2017c). Building on recommendations from the WHO, the country is currently using the following strategies for malaria prevention and control (Ministry of Health, 2017b):

- Integrated vector management (among other interventions includes long lasting insecticide treated bed nets [LLINs] and indoor residual spraying);
- Case management (prompt diagnosis and treatment);
- Chemoprophylaxis; for example, intermittent preventive treatment of malaria during pregnancy (IPTp) and seasonal malaria chemoprevention
- Social and behavior change communication (SBCC) which involves advocacy, social and community mobilization
- Surveillance, monitoring and operational research

The close collaborative efforts and synergies with stakeholders involved in malaria control efforts have largely been the hallmark of the gains that have been observed in malaria programing in Malawi. Over the past few years, the country recorded some positive strides in the fight against malaria. For instance, malaria parasite prevalence decreased from 43% in 2010 to 33% in 2014, according to the MMIS conducted in the respective years. The significant part of these gains is attributable to vector control approaches; mainly the use of LLINs which is effective in a wide range of circumstances (World Health Organisation, 2016a).

However, these gains are fragile and unevenly distributed across the population (World Health Organisation, 2016c). There are so many bottlenecks affecting the progress of malaria control and prevention including resistance of malaria parasites to drugs and vectors to insecticides (World Health Organisation, 2016a). In addition, indicators for service utilization for some malaria control interventions have remained low. For instance, coverage of IPTp for prophylactic control of malaria among pregnant still remains low (Ministry of Health, 2017b; National Statistical Office & ICF, 2017). IPTp is a treatment dose of *Sulphadoxine Pyrimethamine (SP)* administered to pregnant women, irrespective of parity, at pre-determined intervals with the aim of clearing existing malaria parasites and preventing new infections. It is one of high impact interventions recommended by the WHO for preventing malaria in pregnancy (MiP) and reducing the consequences of malarial infection in the mother, her fetus and neonate. IPTp-SP is recommended based on evidence from studies that established a high proportion of pregnant women in a malaria endemic region will have malaria parasites in her blood or placenta. This is usually associated with complications in both symptomatic and asymptomatic pregnant mothers (World Health Organisation, 2012b). Currently, the estimated national coverage of women receiving optimum IPTp-SP (at least three SP doses) stands at 30%. In Lilongwe district, the situation is equally worrying considering that up to 92% of all eligible women take the initial dose, but the proportion drastically falls to 30% for the third dose implying that many women drop out of the intervention along the way (National Statistical Office & ICF, 2017). Evidently, these coverages fall short of the 80% target set by African Heads of State

and the Roll Back Malaria (RBM) Partnership under the Abuja declaration (African Union, 2001; Roll Back Malaria Partnership, 2008).

Such low coverages are not reflective of the efforts and resources that have been invested to scale up IPTp-SP over the past decade. The situation is more worrisome considering the country's high ANC coverage, with up to 83% of all pregnant women attending at least three ANC visits (National Statistical Office, 2015). This disparity between ANC coverage and IPTp-SP utilization points to the possibility of missed opportunities to deliver the service to eligible women in health facilities. Such health system factors can negatively affect the delivery and scaling up of quality and client responsive IPTp-SP services (Hill et al., 2013; Ministry of Health, 2014).

Apart from these health sector factors, there are several possible client-side determinants that affect coverage and access of IPTp-SP services (Gudleski et al., 2017; Hill et al., 2013; Holtz et al., 2004; Ministry of Health, 2014; Pell, Straus, Andrew, Menaca, & Pool, 2011). Given that achieving the desired targets will be operationally difficult, identifying and understanding client level predictors to service utilization is a critical step. Several studies across Africa have attempted to describe the various factors that influence IPTp-SP service utilization. The findings have been inconsistent suggesting the existing enablers and barriers to uptake of services are contextual and may not all be applicable to the Malawi situation. No similar studies have been previously conducted in the selected area. This is an important research gap, thus, this study aims to identify and discuss the factors that influence the utilization of IPTp-SP among pregnant women in rural Lilongwe, Malawi. Another research gap comes in due to the recent change of the IPTp-SP policy which the country adapted based on recommendations from the WHO. Since this policy revision in 2013, studies on IPTp-SP utilization have not been conducted in the country. The evidence from the study will form the basis for designing programmatic adjustments in order to increase access, coverage and quality of the intervention.

1.2. Research questions

1. What is the proportion of pregnant women utilizing IPTp-SP in rural Lilongwe, Malawi?
2. What are predisposing, enabling and needs factors for IPTp-SP service utilization during pregnancy in rural Lilongwe, Malawi?
3. Is there any association between predisposing factors, enabling factors, need factors, and IPTp-SP service utilization during pregnancy in rural Lilongwe, Malawi?

1.3. Study objectives

1.3.1. General objective

To determine factors affecting utilization of IPTp-SP for malaria control during pregnancy in rural Lilongwe, Malawi.

1.3.2. Specific objectives

1. To describe the predisposing factors and their association with IPTp-SP service utilization in rural Lilongwe, Malawi.
2. To assess the enabling factors and their association with IPTp-SP service utilization in rural Lilongwe, Malawi.
3. To explore the need factors and their association with IPTp-SP service utilization in rural Lilongwe, Malawi.

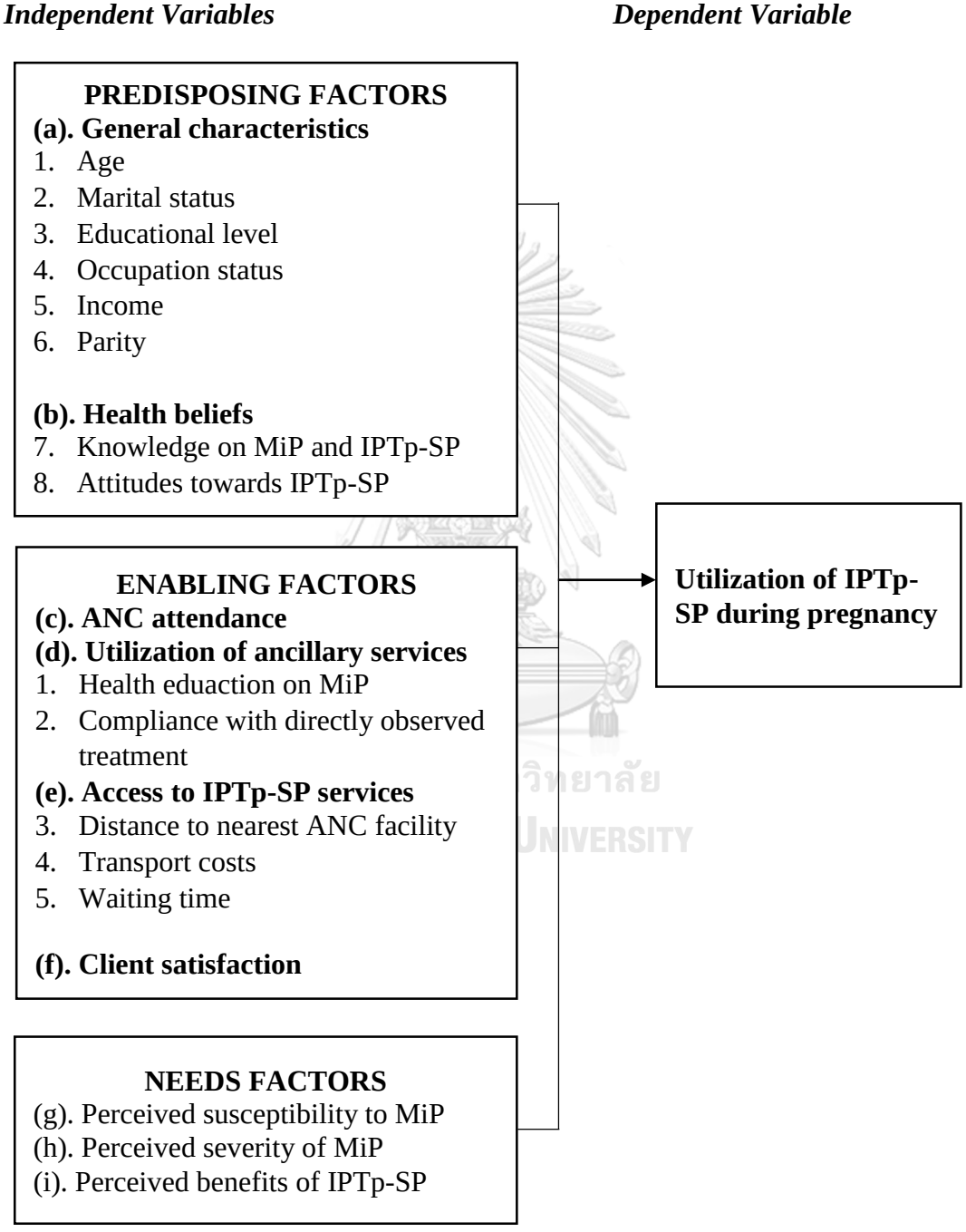
1.4. Research hypotheses

1. There is an association between predisposing factors and utilization of IPTp-SP services in rural Lilongwe, Malawi.
2. There is an association between enabling factors and utilization of IPTp-SP services in rural Lilongwe, Malawi.

3. There is an association between needs factors and utilization of IPTp-SP services in rural Lilongwe, Malawi.

1.5. Conceptual framework

Figure 3: Conceptual framework adapted from the Andersen's Behavioral Model for health service utilization (Andersen, 1995)



1.6. Operational definitions

1. Age; referred to the respondent's self-reported number of complete years during her last birthday; classified into three levels :18 – 24; 25 – 34; and old 35 – 49 ages.
2. Marital status; referred to the self-reported current civil status of a respondent; classified as single, married, separated/widowed.
3. Education level; referred to the self-reported highest level of education attained by a respondent and will be classified into four categories: none; incomplete primary; complete primary; and secondary and higher.
4. Occupation; denoted the self-reported occupation (livelihood) of the respondent at the time the survey will be conducted (classified into four groups: farmer; employed; self-employed; housewife/unemployed).
5. Income; referred to the self-reported average amount of money received on a monthly basis, for work, services, investments or from other sources. This was categorized into two: lower and higher monthly income.
6. Gravidity; referred to the number of pregnancies a woman has ever had irrespective of the outcome. Women were classified into 3 categories; primigravid (pregnant once) secundigravid (pregnant twice) and multigravida (pregnant more than two times).
7. Parity; referred to the respondent's self-reported number of biological children and was classified into three groups: 1 child; 2 to 3 children; and 4 or more children. For inferential analysis, two categories were derived: < 4 or ≥ 4 children.
8. Knowledge; referred to the respondent's level of understanding through provision of correct responses on malaria. The level of knowledge was classified into three groups; low, moderate, and high.
9. Attitudes; referred to beliefs and subjective judgement of respondents regarding IPTp-SP, categorized into three as: negative, moderate or positive.
10. Health education; respondents' self-reported exposure to messages on MiP and IPTp-SP, classified into two: adequate or inadequate.

11. Distance; a respondent's self-reported total time taken to travel from her home to her nearest ANC facility; categorized into two: < 1 hour and ≥ 1 hour.
12. Waiting time; the total time taken between a respondent's arrival at the ANC clinic to the point when she receives the service, classified into two: < 1 hour and ≥ 1 hour.
13. Perceived susceptibility; referred to respondent's perception about the likelihood of having malaria infection during pregnancy, categorized as low, moderate or high.
14. Perceived severity; referred to respondent's belief regarding the gravity of malaria infection during pregnancy, categorized as low, moderate or high.
15. Perceived benefits; referred to respondent's belief relating to the positive health outcomes that can be derived from utilizing IPTp-SP, categorized as low, moderate or high.
16. Intermittent preventive treatment in pregnancy (IPTp-SP); A therapeutic dosage of SP administered to pregnant women at predefined intervals (routine ANC visits), regardless of whether the woman is infected with malaria (at least 3 doses are considered complete as per WHO recommendation).
17. Utilization of IPTp-SP; extent to which a pregnant woman takes SP for malaria control during pregnancy. Basing on the revised policy, responses classified in two categories:
    a) ***Suboptimal****:* meant that a woman received less than three doses of SP during pregnancy
    b) ***Optimal****:* if the recommended three or more SP doses were taken during pregnancy

Where a respondent had an ANC card, utilization of IPTp-SP was validated from her records.

18. Directly Observed Therapy (DOT); respondent's self-reported account of compliance to administration of SP under the direct supervision of a health worker (at least for one dose).

CHAPTER 2

LITERATURE REVIEW

2.1. Malaria definition

According to the WHO, malaria is defined as a life-threatening infectious disease that manifests with a variety of symptoms; ranging from very mild symptoms or absent (uncomplicated) to severe disease (complicated) (World Health Organization, 2017b).

While the condition is deadly in the absence of case management interventions, it is both preventable and curable (President's Malaria Initiative, 2017).

2.2. Historical background

In the annals of human history, malaria infection occupies a distinct place (Institute of Medicine, 2004). Dating back to antiquity, the disease is ranked among the worst sicknesses to plague humankind with a major impact on world history. For centuries, it has caused the tragic loss of countless lives and robbed families and nations of their livelihoods, placing humanity in a vicious cycle of ill health and poverty (Roll Back Malaria Partnership, 2008).

Archaeological evidence from artifacts and ancient writings from early civilization in Mesopotamia (corresponding to present day's Iraq largely, as well as part of modern-day Iran, Turkey and Syria). There is suggestive proof of malaria outbreaks in this region with the disease commonly known as the 'deadly periodic fevers' (Breman et al., 2006). Researchers in the late 1980s detected the malaria antigen from ancient grave sites in Egypt which date back to the year 3200 BC (Miller et al., 1994). In India, evidence from writings between 1500 and 800 BC make reference to malaria as the 'king of diseases'. Around the year 270 BC, a Chinese traditional medicine practitioner linked occurrence of fevers with spleen enlargement (common in malaria cases). He also attributed the three commonest signs of malaria to corresponding demonic attacks; (a). Headache – demon carrying a hammer; (b). Chills – demon with a bucket of water and (c). Fevers – demon holding a stove (Bruce-Chwatt LJ, 1988).

Apart from causing high mortality, the infection also contributed to the socioeconomic and political landscape of the world (Institute of Medicine, 2004). It is reported that the first malaria outbreak in Rome during the first century was an important turning point in the history of Europe. The disease is believed to have originated from the African rain forest, through the Nile river, the Mediterranean Sea and then spread to Greece. From there, the Greek merchants carried the infection with them to Italy (Karlen A, 1995). In most European towns, located in marshy regions and usually crowded settlements, malaria outbreaks were common, leading to chronic illnesses and rendering the inhabitants weak and unproductive. Some schools of thought among historians have speculated that frequent malaria attacks may have contributed to the downfall of Rome. It is also reported that one of the worst malaria epidemics in 79 AD plagued and forced farmers to abandon their villages along the marshy and fertile farmlands (Cartwright F, 1991).

All this while, malaria was believed to be restricted to low-lying, swampy and humid valleys and was commonly known as the 'Roman fever'. It was also common belief among the people that the disease was caused by miasma (evil vapors) which inspired the name *mal'aria* (Latin word for bad air) (Jarcho, 1984). In 1880, Charles Louis Alphonse Laveran (1845 - 1922), became the first person to make associations between malaria and 'germs' (parasites). The connection between malaria infection and mosquitoes (vectors) only became apparent in 1897 through the work of Ronald Ross (1857 - 1932) who discovered the mosquito stages of malaria the parasite (Sherman IW, 1998).

2.3. Public health importance

Malaria remains a nightmare of life for billions of people resident in tropical regions. Each year, malaria kills an estimated 429,000 people worldwide with the sub-Saharan Africa region contributing significantly to this death toll (World Health Organisation, 2016c). Pregnant women and under-five children are the two most-at-risk groups and the disease also increases children's risk of dying from pneumonia and diarrhea (World Health Organisation, 2016c).

2.4. Malaria vectors and parasites

Among humans, the disease is reported to be caused by five distinct species of a parasitic protozoans from the *Plasmodium* genus endemic in different areas, namely: *Plasmodium falciparum, P. vivax, P. ovale, P. malariae* and the most recently discovered *P. knowlesi* (Singh & Daneshvar, 2013; White, 2008). The disease is vector-borne disease and parasites are transmitted to human hosts through the infective bites of female mosquitoes of the genus *Anopheles (An).* A diverse group of anophelines (between 30 - 40 species) serve as vectors of the human infection. In order to be effective, the vector has to satisfy several physiological, behavioral, and ecological traits (National Institute of Allergy and Infectious Diseases, 2016). The primary vectors - *An. gambiae* and *An. funestus*, are mostly anthropophilic meaning that they feed on human blood and therefore, are the most efficient vectors in the world (Centers for Disease Control and Prevention, 2017). The female anophelines need blood meals for development and maturation of their eggs. The process of obtaining a blood meal provides a perfect pathway between the mosquito and human hosts in the development and maturation of the parasite (World Health Organisation, 2012a). In order to successfully complete its life cycle, the mosquito stages of the parasite (transition from gametocyte to sporozoite stages) is reliant on several factors. Suitable humidity levels and temperatures accelerate the growth of the parasite inside the mosquito host. The other requirement is the lifespan of the anopheline to allow the parasite to complete the life cycle stages within the mosquito host (Centers for Disease Control and Prevention, 2017).

In Malawi, the predominant vectors are *An. funestus* and *An. gambiae* and the majority (>90%) of all malaria cases are attributed to infection due *P. falciparum*. Other less common (<5%) parasite species including *P. ovale and P. malariae* have been reported but usually as joint infections with *P. falciparum* (Lindblade et al., 2015; Mathanga et al., 2015).

2.5. Malaria in pregnancy

In areas with stable malaria transmission, under-five children and pregnant women are the vulnerable populations of malaria infection which may lead to death (World Health Organisation, 2016c). Globally, up to 125 million pregnancies are reported in malaria endemic regions every year (Malaria in Pregnancy Consortium, 2011). About 85% of these pregnant women come from the sub-Saharan Africa region and are therefore predisposed to the negative consequences of malaria (Dellicour, Tatem, Guerra, Snow, & ter Kuile, 2010).

During the first decade of life, a person's repeated exposure to malaria infections leads to the development of a reasonable degree of acquired immunity. However, women, especially primigravid, frequently regain vulnerability to malaria during pregnancy manifested by high prevalence and concentration of parasitaemia (World Health Organisation, 2004). Malaria in pregnancy (MiP) poses an enormous public health challenge and often leads to a variety of adverse consequences for the mother, her fetus and newborn (Steketee, Nahlen, Parise, & Menendez, 2001). Evidence from recent systematic reviews and meta-analyses of several trials have consistently established linkages between MiP with occurrence of severe maternal malaria, placental accumulation of parasites, impaired fetal growth and low birth weight (Eisele et al., 2012; Kayentao et al., 2013). In addition, pregnant women in malarious regions are

faced with adverse events such as abortion and premature delivery (Guyatt & Snow, 2001; McGready et al., 2012; Menendez et al., 2010). These adverse consequences are attributable to the sequestration of malaria parasites in the placenta, resulting into compromised trans-placental flow of nutrients from the mother to her fetus. This impedes fetal growth and development resulting in low birth weight (LBW) subsequently increasing the neonatal, infant and childhood mortality rates (Kayentao et al., 2013; McGready et al., 2012; Steketee et al., 2001).

Among the various contributors of neonatal mortality, LBW is acknowledged as the principal risk factor and therefore contributes significantly to infant mortality (Guyatt & Snow, 2004). In malaria-endemic countries of sub-Saharan Africa, an estimated 11% of all neonatal mortality, totaling 200,000 per year, is related to LBW induced by MiP (Guyatt & Snow, 2001, 2004; Steketee et al., 2001). On the other hand, severe malaria contributes to approximately 10% of maternal deaths, implying that approximately 25,000 maternal deaths could be averted every year through effective control of MiP (Malaria in Pregnancy Consortium, 2011).

2.6. Interventions to reduce Malaria in Pregnancy

MiP remains a priority concern in Malawi and the reduction of the associated adverse impacts of maternal and child health outcomes is dependent on the successful prevention of new infections and clearance of the existing parasitaemia from known cases (Ministry of Health, 2014). In order to achieve this goal, the government of Malawi with support from partners such as the WHO, Global Fund, President's Malaria Initiative (PMI) and UNICEF, has committed to investing resources and efforts to scale up malaria interventions (Ministry of Health, 2017c).

Currently, the National Malaria Control Program (NMCP) under the Ministry of Health (MoH) continues to deliver cost-effective and proven strategies on a long-term, sustainable basis in order to reduce the country's disease burden that will culminate into the pre-elimination and eventually eradication of the condition (Ministry of Health, 2017b). With the collaborative efforts, significant progress to date has been made, for

example, the country has registered a 48% reduction on all-cause mortality rate attributable to malaria among under-five children between 2004 and 2017.

Like many other malaria endemic countries in Africa, Malawi is implementing the recommended three-pronged approach to reduce the disease burden: promoting the use of long-lasting insecticide treated nets (LLINs), prompt and effective case management of malaria cases and IPTp-SP in pregnancy (Ministry of Health, 2014; World Health Organisation, 2013)

2.6.1. Long lasting insecticide treated nets

The current malaria policy in Malawi advances the call for universal coverage of LLINs through mass distribution campaigns as part of an integrated vector management strategy (Ministry of Health, 2017c). Cognizant of the lifesaving benefits of this commodity; the vulnerability of pregnant women (and under-five children) and need to maintain high LLINs coverage, the government integrated routine distribution of LLINs in all maternal and child health programs (Ministry of Health, 2017b).

2.6.2. Case management of malaria cases

In aligning with its objective of ending the malaria scourge, the Malawi government has also committed to scale up timely diagnosis and management of cases. This is the most effective way to prevent uncomplicated cases of malaria from developing into severe disease which can lead to death (World Health Organisation, 2010). In Malawi, management of malaria cases is done based on the WHO recommendations with artemisinin-based combination therapy (ACT) as the first line drug (Ministry of Health, 2017b). The majority of malaria patients (70%) who seek treatment from public health facilities are given ACTs (World Health Organisation, 2016c).

2.6.3. Intermittent preventive treatment during pregnancy

IPTp-SP refers to the routine provision of a therapeutic dose of an antimalarial drug to a pregnant woman during a scheduled ANC visit. Currently, the WHO recommends SP

as the drug for IPTp-SP in sub-Saharan African regions with stable transmission of malaria caused by *P. falciparum*, and where parasite resistance to SP is low (World Health Organisation, 2013). Findings from recent trials show that efficacious levels for SP are still high and the drug's safety profile is still good during pregnancy (World Health Organisation, 2012b). Thus, the drug is well suited for IPTp-SP programming because it is administered as a single dose treatment using the directly observation therapy (DOT). This makes it fairly easy to monitor utilization of IPTp-SP among pregnant women as well as providing accurate IPTp-SP coverage data (World Health Organisation, 2013).

Malawi was the first country to implement the IPTp-SP program in 1993 after successful trials showed the efficacy of using SP for prevention of MiP (Mwendera et al., 2017). In 2012, the WHO revised the IPTp-SP policy following research evidence that benefits derived from administration of SP to pregnant women were dose specific (World Health Organisation, 2012b). In analyzing the existing evidence, a WHO taskforce reviewed the findings from seven trials that evaluated the effectiveness of IPTp-SP (World Health Organisation, 2013). The findings showed that administration of a minimum of three doses of IPTp-SP had a significant effect in improving maternal and fetal outcomes (less placental malaria, less low birth weight and increased mean birth weight) as opposed to administration of two doses (Kayentao et al., 2013).

In the old policy, the first dose was scheduled to be provided very early in the second trimester of gestation during a scheduled ANC visit after 'quickening' (first felt movement of the fetus occurring between 16th and 22nd week of gestation). The second dose was administered early in the third trimester between week 28 and 34 of gestation (World Health Organisation, 2002). The revised policy calls upon countries

implementing the IPTp-SP program to move from provision of the initial two-dose regimen to every pregnant woman to the revised three-dose plan to achieve efficacious results (World Health Organisation, 2013).

Thus, all pregnant women should take an SP dose at each scheduled ANC visit with the first dose administered as early as possible during the second trimester and subsequent doses administered at monthly intervals until the time of delivery (World Health Organisation, 2013) without any major safety concerns (Peters P.J, 2007). In the revised IPTp-SP policy, the WHO further recommends provision of a minimum of three SP doses during each pregnancy and highlights the importance of integrating IPTp-SP with initiatives for promoting ANC services (World Health Organisation, 2013). Following this policy revision, Malawi adapted the updated IPTp-SP guidelines in 2013 (Mwendera et al., 2017).

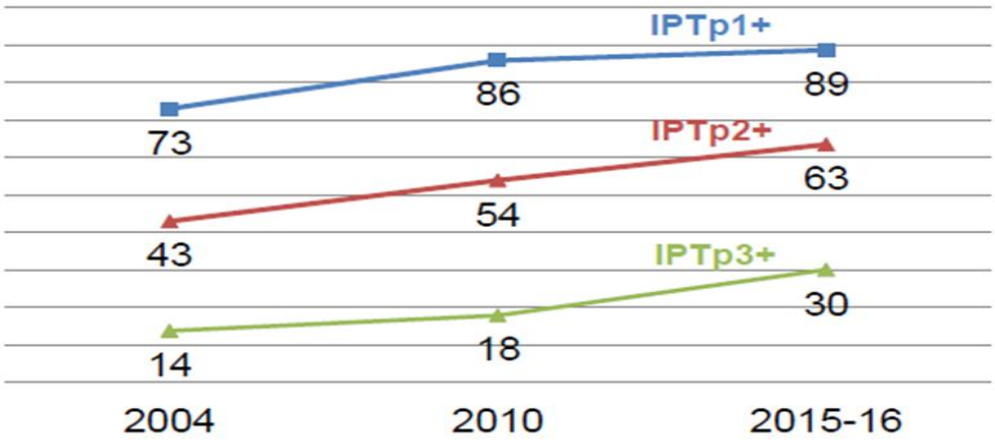
Although a few African countries have attained relatively higher uptake of optimal IPTp-SP, such achievements have remained elusive in Malawi. With the recent estimate of 30% coverage of at least three SP doses for IPTp-SP, the country is nowhere near the realization of the ambitious 80% target set by African Heads of States during the Abuja declaration (African Union, 2001; National Statistical Office & ICF, 2017). However, the situation is not entirely hopeless as the percentage of eligible women reporting receipt of at least one dose of IPTp-SP rose from 60.4% in 2010 to 89% in 2016 while estimated 63% received a minimum of two or more doses during the same period (Ministry of Health, 2017b).

2.6.4. Sulphadoxine pyrimethamine

SP, commonly identified by its brand name “Fansidar”, is a combination medication containing two active ingredients: sulphadoxine and pyrimethamine. Due to increasing parasite resistance across Africa, the drug’s therapeutic efficacy profile for case management declined. In accordance with WHO guidelines, SP was replaced by a new regimen of artemisinin combination therapy as the drug of choice for treatment. Currently, the drug is widely used across endemic African countries as one of the pillars

of national malaria control programmes. Randomized, controlled trials have demonstrated that, IPTp-SP still remains an effective approach in reducing the burden of pregnancy-related malaria which often presents as an asymptomatic infection (Peters P.J, 2007; World Health Organisation, 2017). For this prophylactic purposes, the WHO recommends that a curative dose of the drug be orally administered at least three times to each pregnant woman attending routine ANC visits using (World Health Organisation, 2013). A pregnant woman receives three tablets of SP as a single dose, with each pill having a concentration of 500 mg sulphadoxine and 25 mg pyrimethamine. The first dose is given at 16 weeks of gestation and subsequent doses spaced at least one month apart (World Health Organisation, 2017). The guidelines further state that SP should not be prescribed alongside cotrimoxazole due to their redundant functions and worsening adverse reactions as a result of this synergistic interaction. Therefore, IPTp-SP should not be given to pregnant women living with HIV/AIDS who are on cotrimoxazole prophylaxis (Ministry of Health, 2014; World Health Organisation, 2013). Although only a few pharmaceutical products can be certified as being completely safe for administration during pregnancy, IPTp-SP has a desirable safety profile (Peters P.J, 2007). However, along with its intended prophylactic functions, SP may cause uncommon, minor side effects among such as mild fever, nausea and vomiting. This is the body's normal way of reacting to the medicine not warranting medical attention, nevertheless, pregnant women are advised to consult a health worker if the reactions persist. In very rare and extreme cases, the drug has been reported to cause severe adverse events among pregnant women such as depression, nervousness, lower abdominal/back pain, change in amount of urine, bloody/painful urination, persistent nausea/vomiting (FDA, 2018). Although this is not exhaustive list of severe adverse events, any of these should be promptly reported to a healthcare professional.

Figure 4: Trends in IPTp-SP utilization in Malawi (National Statistical Office & ICF, 2017)

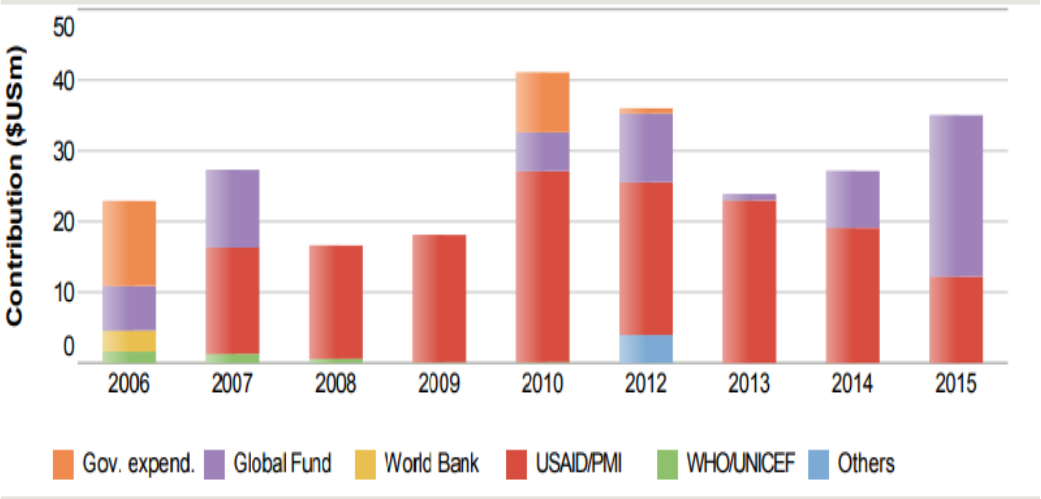


In a bid to further improve uptake of IPTp-SP, the Ministry of Health (MoH), with support from the President's Malaria Initiative (PMI), is currently conducting operational research studies to evaluate the feasibility of improving IPTp-SP coverage through community-based distribution of SP (President's Malaria Initiative, 2017). Although this strategy has the potential effect of improving the coverage indicators, there are fears and concerns that it might negatively affect ANC attendance among pregnant women (Msyamboza et al., 2009). Findings from such studies can broaden the horizon of the available evidence on the effectiveness of using this approach and can be used to inform policy development on IPTp-SP (Mwendera et al., 2016).

2.6.5. Financing for interventions

In its efforts to scale up the coverage of interventions, the government of Malawi with partners have embraced the ambitious possibility of malaria elimination and eradication. The country's progress in the fighting malaria since 2000 has been truly remarkable. The collaborative efforts and the investments from different stakeholders have been central pillars in realizing these gains. Figure 5 shows budgetary support towards malaria prevention and control interventions

Figure 5: Expenditure and funding sources for malaria interventions in Malawi(World Health Organization, 2017a).



2.7. Health care delivery system in Malawi

Public provision of health care is enshrined in the republican constitution which states that the State is obliged *"to provide adequate health care, commensurate with the health needs of Malawian society and international standards of health care"* (Parliament of Malawi, 1994). The geographic coverage of health services in Malawi is such that 76% of the population live within 8 km radius of a functioning healthcare facility. The sector has three distinct segments: public, private not for profit and private for profit (Ministry of Health, 2017c). The public health sector is the largest provider covering over 65% of the population and is financed by taxes and donor support. It offers free services at the point of use and includes all facilities under the MoH and other government departments or statutory corporations. The private not-for-profit sector is dominated by faith-based organizations with the Christian Health Association of Malawi (CHAM) serving up to 29% of the country's population. The services they offer are heavily subsidized and are deliberately targeted at poor people located in rural areas (Ministry of Health & ICF International, 2014).

As a way of further improving coverage and access to essential health services, the government has a contractual agreement with CHAM through the establishment of service level agreements. Under this memorandum of understanding, the CHAM facilities receive budgetary support from the public health sector to provide free

maternal and child health services to the community. This plan aims to promote equity in coverage and access of healthcare while upholding financial risk protection (Ministry of Health, 2017c). The third sector, private-for-profit health is rapidly growing, however, most of its service provision is mainly concentrated in the large urban centres. The country's health system is split into four levels of service provision (community, primary, secondary and tertiary) linked to each other through an established referral system. Under the de-centralization act, the first three levels fall under the jurisdiction of district councils under the leadership of a District Commissioner. At district level, health service delivery is managed by a District Health Management Team (DHMT) (Ministry of Health, 2017c; Ministry of Health & ICF International, 2014). Delivery of health services in the district is further demarcated into health zones or supervision areas comprising of a number of clustered health facilities in a specified geographic location and serving a population living within a defined catchment area (Ministry of Health, 2017c).

At the community and primary level, services are delivered through community initiatives, health posts, dispensaries, maternity clinics, health centres and community and rural hospitals. Service provision at this level includes community-based cadres such as health surveillance assistants, village health committees and other volunteers. The secondary level is comprised of referral facilities (hospitals) for the primary level facilities and offer both inpatient and outpatient services for their target populations. Finally, central hospitals constitute the tertiary level, providing specialist referral services for their respective regions. In addition, these central hospitals offer professional training, conduct research and provide support to district level service delivery (Ministry of Health & ICF International, 2014).

Despite progress made towards retention of the already scarce health workforce, staffing inadequacies in terms of both numbers and competencies exist and challenges towards increasing the patient-to-health worker ratio are apparent (Ministry of Health & ICF International, 2014).

Similarly, in the face of finite resources, essential supplies and commodities for malaria control are a major stumbling block for efficient service delivery in the public health sector in Malawi (Ministry of Health, 2017c). Unfortunately, this situation means that health facilities in the country face intermittent stock-outs of some essential medicines.

Worse still, the health financing in the country is largely dependent on donor financing mechanisms and often leads to insufficiencies in meeting the increasing demand for health services (Ministry of Health, 2017c).

2.8. Antenatal care in the context of Malawi

The successful delivery of IPTp-SP is heavily reliant on the coverage of focused ANC services among pregnant women (World Health Organisation, 2013). For each pregnancy, the WHO recommends that a woman should attend a minimum of four focused ANC sessions (World Health Organisation, 2002). ANC facilities offer pregnant women with platform for delivery of an integrated range of services that may improve their health outcomes and that of their infants (Holtz et al., 2004). For instance, ANC clinic visits can be used to inform women and their partners about potential risks during pregnancy which can improve uptake of the available services (World Health Organisation, 2002).

Similarly, receipt of ANC can result in reduction of MiP cases because it acts as a critical entry point for effective delivery and utilization of IPTp-SP (Ministry of Health & ICF International, 2014). For effective delivery and in order to increase coverage of optimal IPTp-SP uptake for maximum therapeutic benefits, pregnant women ought to receive ANC following the recommended schedule (Holtz et al., 2004). IPTp-SP produces the best results when administered at a time when the fetal growth is occurring at its highest velocity (16th - 24th week) as this helps to reduce placental parasitaemia, fetal growth reduction and the resultant low birth weight (Guyatt & Snow, 2004; Kayentao et al., 2013). Therefore, the first ANC visit should be initiated early in the first trimester of gestation and the subsequent visits scheduled at monthly intervals (World Health Organisation, 2002). Late initiation of first ANC visit has an additional bearing on the uptake of IPTp-SP services as delivery of the first SP dose is delayed and when combined with receipt of fewer ANC visits, the woman has insufficient opportunities to receive the required subsequent SP doses (Hill et al., 2013; Ministry of Health, 2014). This entails that the woman only gains partial protection and may still be at risk of the negative effects of MiP (Kayentao et al., 2013).

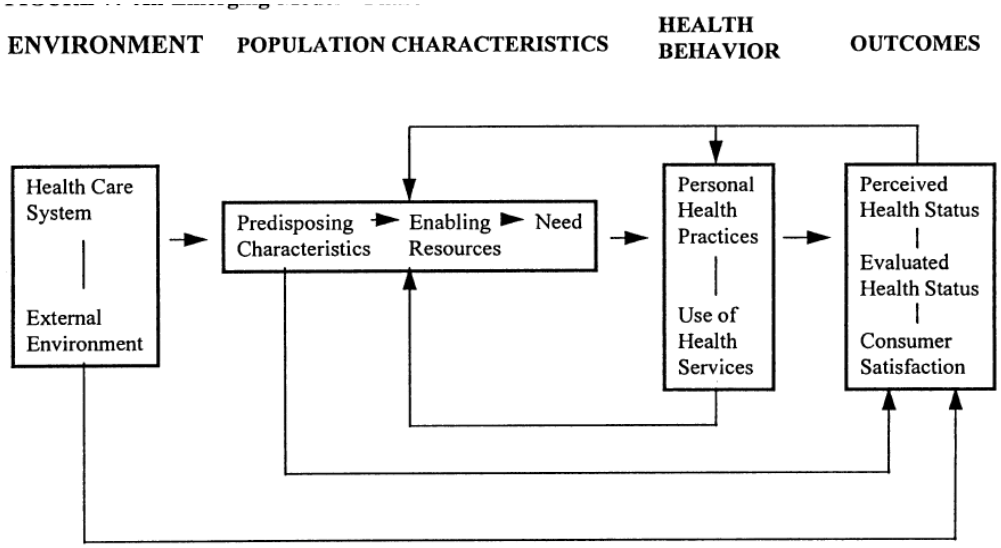
Based on WHO recommendations and domestic policies, expectant mothers in Malawi are encouraged to receive four ANC clinic sessions which are offered for free in

government and CHAM facilities (Ministry of Health, 2017c). Service provision in ANC facilities is mostly carried out by nurses or midwives (79%) while 14% is provided by clinical staff (medical doctors, clinical officers and medical assistants). Findings from a national survey (National Statistical Office, 2015) show that although ANC coverage for the first visit is very high (96%), this figure significantly drops to 45% for women who are able to attend the recommended four visits. Similarly, the reported 20% proportion of women who are initiated on ANC within the first trimester of gestation is unimpressive and is a growing concern.

2.9. Andersen's Behavioral Model of Healthcare Utilization

The study will attempt to identify determinants of IPTp-SP uptake in Lilongwe. In order to achieve this, a behavioral model developed by Ronald M. Andersen to identify and explain predictive factors influencing healthcare utilization among different groups of people will be adopted. This model has been deployed extensively in service utilization studies and suggests that care seeking is a function of three main components: (1) predisposing factors (demographic and socioeconomic characteristics that support or impede clients to utilize services), (2). enabling factors (include logistical elements that influence access to health services) such as the individual's income, health insurance status, and access to a source of regular care) and (3). patient needs which are basically the direct reason why people use health service e.g. severity of illness (Andersen, 1995). The extent to which this model can either explain or predict use of services has been an ongoing debate among health behavior experts, with some arguing that predisposing factors might be influenced by an external cause while enabling resources though necessary may not be sufficient reason. Apart from the presence of predisposing and enabling factors, an individual should perceive illness or risk of ill health as a need for the utilization of health services. Perceived health includes a varied scope such as quality of life, activities of daily living and other psychosocial variables as predictors of care-seeking behavior (Jahangir, Irazola, & Rubinstein, 2012).

Figure 6: Andersen's Behavioral Model of Health Care Utilization (Andersen, 1995).



Using a modified theoretical framework, the study will assess the determinants of IPTp-SP utilization among mothers of under-one children who might or might not have utilized the service during their recent most pregnancy. The dependent variable 'use of health services' will be the utilization of IPTp-SP while respondent's sociodemographic characteristics and knowledge will form part of the independent variables. Additionally, attendance of ANC services, distance to nearest facility, transportation costs, exposure to malaria (IPTp-SP) information, counselling on IPTp-SP, directly observed therapy, health staff attitude, waiting time to receive care will all be independent variables. The respondents' perceptions relating to susceptibility, severity, risks of MiP and perceived benefits of using IPTp-SP will be included on the list of need factors as the third level of independent variables.

2.10. Previous research

There is evidence from previous studies on the association between various determinants and utilization of maternal health services. Interestingly, different studies conducted in different settings have reported conflicting findings suggesting that the variables are dynamic and context specific. It is therefore imperative to identify potential influencing factors to the low utilization of IPTp-SP during pregnancy especially among rural women. With reference to the conceptual framework informed by the Andersen's model on service utilization, this study looks at the various independent variables as potential barriers or facilitators that influence the dependent

variable (utilization of IPTp-SP for prevention of malaria during pregnancy). The independent variables can be presented in the following categories: general characteristics, knowledge and attitudes on malaria and IPTp-SP, access to services, availability of services, client satisfaction, perceived susceptibility and severity to MiP and perceived benefits of IPTp-SP.

2.11. Predisposing factors

Several social and demographic factors associated with utilization of IPTp-SP have been discussed in previous studies conducted in sub-Sahara Africa. These include age, marital status, educational level, delayed ANC initiation, attitudes towards IPTp-SP (Hill et al., 2013; Hill & Kazembe, 2006; G. Mubyazi, Bloch, Kamugisha, Kitua, & Ijumba, 2005), multi-gravidity (Holtz et al., 2004), inadequate knowledge on adverse consequences of MiP (Nganda, Drakeley, Reyburn, & Marchant, 2004). In contrast though, other publications such as a study in Tanzania established that socio-demographic characteristics such as age, educational level, marital status and occupation were not predictive of utilization of IPTp-SP (Marchant et al., 2008). Perceptions of pregnant women relating to susceptibility and severity of MiP as well as potential benefits for taking SP have also been identified as determinants of IPTp-SP utilization (Hill et al., 2013; Pell et al., 2011).

2.11.1. Maternal age

Maternal age is an important determinant of service utilization, albeit in a complex fashion. Different studies have reported inconsistent associations between age and utilization of maternal health services. Studies established that service uptake tends to drop with age; with women older than 35 years old being less likely to access the services than women below the age of 20 years (Hill et al., 2013). This finding is consistent with results from a secondary analysis of data from household surveys conducted in six districts in Tanzania. This study predicted that women below the age of 20 years utilized maternal health services from the ANC clinic significantly more compared to women in the middle age bracket of 20 – 34 years (Exavery et al., 2014). Elsewhere, it has also been observed that women 35 years and older will usually delay or entirely neglect ANC because they feel accustomed to pregnancy and childbirth from

previous experiences (Simkhada B, Teijlingen ER van, Porter M, & Simkhada P, 2008). However, in a systematic review on factors affecting ANC utilization in Africa, it was reported that pregnant adolescent girls will attempt to conceal their pregnancy from the public and delay initiation of ANC (Simkhada B et al., 2008). This finding is echoed by a study in Malawi which showed that 25% of the women between the age of 15 – 24 years reported low uptake of IPTp-SP (AOR 1.98 95% CI 1.42–2.13) in comparison with 20% (25 – 34 years) and 19% for older women aged and 35–49 years (Odjidja & Duric, 2017). In a qualitative study from Uganda which explored perceptions on health-seeking practices for malaria prevention found that pregnant adolescent girls were less likely to utilize the existing health services. Upon realization that they are pregnant, these girls will be hesitant to go for ANC as they explore a decision to go for abortion before their parents and community become aware of their pregnancy. The fear of social reprimands including dismissal from school when they are recognized as being pregnant drives them away from accessing healthcare services (Mbonye AK, Neema S, & Magnussen P, 2006b).

2.11.2. Marital status

Marital status has been reported to be a strong predictor of health service utilization among women due to gender relations and dynamics of in-household decision-making (Mbonye AK et al., 2006b). The prevailing dynamics of decision-making at household level can either enable or impede a woman's ability to access the integrated health services offered at ANC including MiP interventions. For instance, in Uganda and Kenya, husbands are reported to be in control of household resources and ultimately hold exclusive privileges as decision makers. As a result, the decisions they make have a direct influence on care seeking practices of their spouses or whether they are able to purchase LLINs for malaria control (Chuma, Okungu, Ntwiga, & Molyneux, 2010; Mbonye, Neema, & Magnussen, 2005). This finding is also reflected in the echoed by findings of studies from Tanzania revealing that married women reported difficulties related to getting permission from their partners to seek care at health facilities, and consequently had lower rates of service utilization (Exavery et al., 2014).

2.11.3. Education

Previous studies have suggested that formal maternal education is one of the most potent determinant for utilization of health services (Exavery et al., 2014; Lam, Broaddus, & Surkan, 2013). In a clinical trial conducted in the United States, the level of education attained by an individual was reported to be predictive of health care utilization, even after controlling for confounders like income, gender and health insurance (Gudleski et al., 2017). In a study conducted in Nigeria, the level of maternal education was found to be positively associated with a woman's choice of delivering with the help of skilled birth attendants in an institution (Ikeako, Onah, & Iloabachie, 2006). Women with high education will most likely have a better understanding of health problems, are more familiar with existing resources and services and are therefore more likely to use healthcare services to maintain their health (Every Woman Every Child, 2015; Simkhada B et al., 2008). A systematic review of the literature of 28 studies found that education had the strongest association on ANC attendance; women with higher education were more likely to begin attending ANC within the first trimester and continue to receive the recommended four ANC visits (Simkhada B et al., 2008). As such, they were more likely to receive the required number of IPTp-SP doses (World Health Organisation, 2013). Contrary to these findings, however, a random telephone survey in the US observed that women who attained less than high (secondary) school education had better odds of using health services for the treatment of mental health compared to women with tertiary education (Satvinder S. Dhingra , Matthew Zack , Tara Strine , William S. Pearson , & Lina Balluz 2010).

2.11.4. Occupation status

Whether a pregnant woman is employed or not can have an effect on her health seeking behavior. A Tanzanian study on predictors of IPTp-SP demonstrated that utilization was lower amongst respondents in the self-employed (30.4 %) category than the employed group which scored 41.7% ($p < 0.001$) (Stephen M. Kibusi, Eunice Kimunai, & Courtney S. Hines, 2015). Results from a randomized controlled trial to assess the adherence to mammography showed that although the employment status was different between the two intervention groups and one control group, women who were employed reported having less time available to get a mammogram, both at baseline

and follow-up, a barrier which may have prevented them from receiving a mammogram (Gathirua-Mwangi et al., 2016). Another study conducted in Ethiopia that assessed caregivers' care seeking practices for their under-five children showed that occupation (housewife) was predictive of improved access to treatment services although it was not statistically significant (COR = 2.02, 95% CI = 0.81 - 5.01) (Mitiku & Assefa, 2017).

2.11.5. Gravidity and parity

Women who are pregnant for the first time (primigravidae) are considered to be at the greatest risk to the effects of pregnancy-associated malaria (Rogerson et al., 2000). Compared to other sub-groups of pregnant women receiving IPTp-SP, primigravid mothers are the least protected in terms of utilization of the intervention (Harry et al., 2007). According to a meta-analysis of studies from sub Saharan Africa assessing factors affecting delivery and uptake of IPTp-SP services, there was an association between primigravidity and receipt of IPTp-SP compared to women who reported having previous live births (multi-gravidity), with significant variations among studies (Hill J, Hoyt J, et al., 2013).

Parity is reported to have a statistically significant negative effect on attendance of ANC and ultimately uptake of IPTp-SP services. In a systematic review of literature from developing countries, it was reported that women of higher parity underutilize maternal health services whilst women who are pregnant for their first time possess better care seeking practices (Simkhada B et al., 2008). Because pregnancy is a new experience, primigravid women are nervous with the physiological changes due to fetal development and this may improve their care seeking behaviors (van Eijk et al., 2013; World Health Organisation, 2002). These findings are consistent with a study in Tanzania that utilized the country's malaria indicator survey to compare respondents' uptake of IPTp-SP by the number of children they had. Up to 58% of participants without a child took the optimal number of SP doses; the uppermost among all groups ($p < 0.001$). Surprisingly, mothers with at least three children reported the lowest utilization with a coverage of only 24% for the recommended doses (Stephen M. Kibusi et al., 2015). Moreover, undesirable experiences from previous pregnancies and birth outcomes can act as lessons learnt among higher parity women and can therefore

influence care seeking behaviors (Hill et al., 2013). In contrast, multi-gravid women are less likely to use IPTp-SP because they perceive themselves as being at a reduced risk of pregnancy-related complications than their primigravid counterparts (Simkhada B et al., 2008).

2.11.6. Knowledge about malaria and intermittent preventive treatment during pregnancy

Studies from different countries in Africa have discussed the effect of knowledge about malaria and the eventual utilization of related interventions. In Malawi, although the majority of women respondents linked mosquito bites with occurrence of malaria, there were other causal explanations such as changing weather, being soaked in rain, eating cold and/or unhygienic food as well as witchcraft were also mentioned (Ameh et al., 2016; Exavery et al., 2014; Launiala & Kulmala, 2006; G. Mubyazi et al., 2005). Knowledge of signs, symptoms and complications can influence a pregnant woman's decision to seek care. In a study from Malawi, most pregnant women reported experiencing malaria-like symptoms, particularly fever, headache and chills. The manner in which the women perceive and interpret such symptoms is of particular public health interest because it influences a woman's decision to seek care (Launiala & Kulmala, 2006). In East Africa, over 90% of the women in cross sectional studies were familiar with SP as the drug for IPTp-SP and 77.2% were aware of the benefits of taking SP. Conversely, up to 70% of the respondents were not aware about the scheduling or timing, frequency and dosing for IPT resulting in low utilization of IPTp-SP (Tarimo, 2007). Findings from two different studies in Ghana revealed that knowledge on IPTp-SP, such as the timing and scheduling of IPTp-SP and the consequences of MiP, was a determinant of IPTp-SP receipt. Women with good level of knowledge were more likely to return for subsequent SP doses which eventually determined the number of doses received (Ayiisi Evans A., 2017; Stephen et al., 2016).

2.11.7. Attitudes towards intermittent preventive treatment during pregnancy

A person's attitudes towards certain services can influence whether or not they will be willing to utilize them. A desirable attitude refers to an individual's positive valuation of an intervention, practice or related construct (Roll Back Malaria, 2014). In Malawi, for example, there is a negative attitude associated with targeted interventions such as

IPTp-SP with the community suspecting it is a deliberate ploy by government agencies to minimize population growth (Launiala A & Honkasalo, 2007; Launiala & Kulmala, 2006) These fears were cited in a study from Kenya where respondents expressed fears with the nature in which programs are targeted at specific population groups, mainly children and pregnant women (Chuma et al., 2010). An exploratory study on use of SP in Uganda revealed a belief that the drug was too 'strong' for pregnant women and can cause abortions and defects in fetal development (Mbonye AK, Neema S, & Magnussen P, 2006a). The successful modification and reinforcement of such attitudes can help to facilitate adoption of desirable behaviors such as uptake of IPTp-SP (Roll Back Malaria, 2014).

2.12. Enabling factors

Enabling factors include logistical elements that influence access to health services such as the individual's income, health insurance status, and access to a source of regular care.

2.12.1. Antenatal care attendance (initiation and frequency)

Studies have shown that in areas where focused ANC coverage is high, it is accompanied by a corresponding increase in IPTp-SP utilization (Hill & Kazembe, 2006). For effective delivery of ANC services, two factors ought to be considered; the gestational age at which a pregnant woman makes her first ANC visit (initiation) and the total number (frequency) of ANC visits she makes (G. Mubyazi et al., 2005; Pell et al., 2011). Both have been linked with uptake of optimal doses of IPTp-SP and could have far fetching consequences on maternal, fetal and neonatal health outcomes (Hill et al., 2013; Pell et al., 2011). In Malawi, pregnant women delay attending ANC with only 20% registering their first visit during the recommended first trimester while the majority (75%) start late between four and seven months (National Statistical Office & ICF, 2017). An ethnographic study in one the country's districts revealed that such delays are fueled by beliefs that revealing an early-stage pregnancy will expose them to the risk of witchcraft from the community. In addition, because miscarriages are common, they have to be certain about the pregnancy before making the long journey to the clinic (Launiala & Honkasalo, 2007). A study conducted in Zambia showed that

gestational age at which a pregnant woman attends her first ANC is significantly associated with achievement of optimal IPTp-SP utilization (Sikambale, Halwindi, & Baboo, 2013). This finding is also supported by a study in Tanzania that found that the timing of the first ANC visit has a significant association with completion of optimal SP doses with respondents who made their first visit late in the third trimester recording the lowermost level of uptake (Stephen M. Kibusi et al., 2015). The explanation for this is that because IPTp-SP is administered at monthly intervals starting from the fourth month of pregnancy, women who are initiated early on ANC are more likely to complete the recommended doses before delivery than women who are initiated late. Similarly, women who attend the recommended four or more ANC visits have a greater chance of receiving the optimal number of doses through their increased interaction with health services delivery platforms (World Health Organisation, 2002, 2013). In contrast though, a secondary analysis of MMIS 2014 and Malawi SPA established that women who made the recommended four ANC visits were less likely to take the recommended doses of IPTp-SP (AOR 1.53 95% CI 1.29–1.82) than those who had fewer visits (Odjidja & Duric, 2017). No reasons were given by the authors for this finding.

2.12.2. Distance to nearest facility and travel costs

In most remote areas, long walking distances has been identified as a barrier to utilization of maternal health services. Previous studies have demonstrated that a woman's travel costs and distance to her nearest ANC facility are influencing factors to utilization of IPTp-SP services. Findings from a study conducted in Malawi on care seeking for sick children revealed that caregivers who do not utilize the services cited long distance to the nearest health facility as a major barrier (Chibwana, Mathanga, Chinkhumba, & Campbell, 2009). Similarly, the longest travelling time to the nearest facility offering IPTp-SP and, inadequate transportation modes coupled with high travel fares resulted into high dropout rates from IPTp-SP particularly in rural, hard-to-reach areas (Odjidja & Duric, 2017). In a qualitative study in Malawi among women to explain potential facilitators and barriers to utilization of human papillomavirus vaccination, it was revealed that women who reside close to a health facility were more likely to bring their children to receive the intervention than those caregivers who lived

further away. The study confirmed that walking was reported as the commonest mode of transport with some participants citing up to four hours of walking (the mean was 58 minutes) to get to a nearest facility (Ports, Reddy, & Rameshbabu, 2013). While distance and travel costs can have a significant influence on an individual's decision to seek care from a facility (phase 1 delay), they can also contribute to delays caused by the travelling time to reach the nearest facility; phase 2 delay (Stekelenburg, Kyanamina, Mukelabai, Wolffers, & Roosmalen, 2004).

2.12.3. Health education and counselling on malaria in pregnancy

Delivery of information, education and communication in order to create demand for IPTp-SP services can lead to increased uptake of optimal doses of IPTp-SP and eventually improve health outcomes (Holtz et al., 2004; Odjidja & Duric, 2017). Women with adequate exposure to mass media such as the radio are more likely to utilize ANC services (Pell et al., 2011). One of the most important functions for health workers deployed in ANC clinics is to offer health education and counseling services that can significantly improve the health of women and their infants (World Health Organisation, 2002). In Tanzania, counseling women on MiP was found to be the strongest factor influencing receipt of IPTp-SP. Utilization of both optimal and partial IPTp-SP doses was highest among respondents who received counseling on the dangers of MiP as opposed to women who were not counseled, 52% versus 24% and 33% versus 21% respectively ($p < 0.001$). Women who were , with (Exavery et al., 2014). For the majority of women with optimal service utilization, health workers were cited as their primary and trusted source of health information and they were willing to utilize a particular health service if their health provider recommended it (Hill et al., 2013; Pell et al., 2011).

2.12.4. Adherence to directly observed therapy

As per recommendations from the WHO, administration of IPTp-SP should be done according to the principle of DOT where each pregnant woman takes the SP dose under the watch of health worker. Studies have revealed non-compliance with this practice leading to low utilization of IPTp-SP (Hill et al., 2013). For example, it is reported that pregnant women in Malawi and Nigeria were reluctant to take SP on an empty stomach (Ashwood-Smith, Coombes, Kaimila, Bokosi, & Lungu, 2002; Onoka, Hanson, &

Onwujekwe, 2012). Additionally, in two of the studies from Nigeria that formed part of a systemic review of literature from sub Saharan Africa, it was observed that women from one province were reluctant to take the SP under observation on hygienic grounds, because they were required to share cups for drinking water. In the second province, women did not take SP under DOT but instead had to take the dose home because they needed to eat first or because the health worker advised them to do so. Furthermore, in other settings women are expected to buy SP and/or water for taking SP by DOT which represents an important economic barrier affecting the utilization of IPTp-SP (Hill et al., 2013).

2.12.5. Health worker attitude

In healthcare systems experiencing resource constraints as well as in public health sector settings, poor health worker attitude can represent a major barrier to service delivery and utilization (Hill et al., 2013). Health workers' attitudes and behavior towards clients can be a common deterrent to service utilization by pregnant women. The clients' perspectives on how health workers are discharging their duties is therefore key to understanding the resultant effect on utilization of services (van Eijk et al., 2013) . A major finding from a study in Malawi showed that women are rebuked by health providers which contributes to high dropout rates from ANC attendance leading to low uptake of IPTp-SP (Pell et al., 2011; Tolhurst et al., 2008). In Tanzania, pregnant women are reportedly subjected for penalties and fines imposed by health workers if they initiate ANC late in pregnancy. For fear of these fines, some pregnant women opt not come to come to ANC facilities thereby affecting access and utilization of IPTp-SP and other critical services (Mubyazi GM et al., 2010).

2.12.6. Waiting time to receive health services

Uptake of maternal health services can also be affected by the amount of waiting time clients have endure before receiving a service. The long waits are a major contributor to phase three delays which occur because health providers take too long before providing a client with any or adequate services after she arrives at the facility (Stekelenburg et al., 2004). For example, the opening and closing times of health facilities has been mentioned as significant barriers. Women who are subjected to long waiting hours before being offered the service tend to shun away from accessing the

service. The Malawi SPA study reported that long waits before receiving a service at health facilities was the most commonly cited complaint (22%) among clients who participated in random exit interviews across the country (Ministry of Health & ICF International, 2014).

2.13. Need factors

Need factors, which have been shown to account for the majority of the explained variability in physician use, include the individual's perceived health care need and other indicators of their health status. Factors such as self-reported number of symptoms, self-perceived health, number of bed days, restricted activity, and activities of daily living are part of the patient's perceived need of health care (Champion & Skinner CS, 2008; Roll Back Malaria, 2014).

In this study, three interrelated constructs are derived and explored as being predictive of the likelihood that an individual pregnant woman will utilize the recommended service (IPTp-SP): (a). perceived susceptibility of MiP; (b). perceived severity of MiP, and (c). perceived benefits of IPTp-SP. Initially, a pregnant woman should feel susceptible and threatened by malaria infection, with perceived serious consequences. Then, she must be aware of the benefits derived from utilizing IPTp-SP and develop reasonable belief and trust that these said benefits reduce the risks from MiP (Mbonye AK et al., 2006b).

2.13.1. Perceived susceptibility to malaria during pregnancy

According to the RBM's SBCC indicator reference guide, perceived susceptibility refers to the belief held by an individual that a particular disease (or threat) can really befall them. It can be measured among people who are at risk in order to evaluate the extent to which they consider themselves vulnerable to developing the disease and it is usually a function of a person's characteristics and their behavior (Roll Back Malaria, 2014). In this case, a pregnant woman who perceives herself as being at risk from malaria will be more likely to seek preventive care than those who have low risk perception (Champion & Skinner CS, 2008). In a cross-sectional study in Ethiopia on care seeking for malaria treatment for under-five children, more than half (56%) of study participants reported low risk perception related to malaria infection (Mitiku &

Assefa, 2017). In their systematic review, Pell and colleagues established that although several studies in different settings viewed pregnant women as one of the vulnerable sub-populations to infection by malaria, their susceptibility was perceived to be lower than that of children. Moreover, in one of the studies under the same systematic review that was conducted in Uganda, the risk of malaria infection was identified as being equal across the population universal amongst all age groups, and pregnant women were not singled out (Pell et al., 2011).

A systematic review of 39 qualitative studies on the barriers to the effective treatment and prevention of malaria in Africa established that 27 out of the 39 articles observed a widespread endorsement of alternative causative mechanisms that do not associate malaria transmission with mosquitoes. Frequently identified causes included weather patterns (excessive cold or heat), dietary aspects (cold or unhygienic food), drinking or bathing in dirty water, witchcraft and spiritual causes (Maslove et al., 2009). This discovery implies that people with such beliefs may possess reduced perceived susceptibility to malaria and may therefore not adhere to the recommended prevention and control behaviors as they do not subscribe to the scientific evidence of the mosquito-based etiology of malaria (Roll Back Malaria, 2014).

2.13.2. Perceived severity of malaria during pregnancy

A person's perceived severity refers to feelings attached to the seriousness of a contracting a specific disease or threat and the likely health and socioeconomic consequences if the condition is left unmanaged such as pain, loss of productive time, deformity and even death (Champion & Skinner CS, 2008; Roll Back Malaria, 2014). In a systematic review of qualitative studies to explore social and cultural factors affecting uptake of interventions for MiP, Pell and others found that malaria was ignorantly placed in local disease categories that did not match the biomedical definitions (Pell et al., 2011). For instance, in Malawi, the local name for malaria *(malungo)* basically means some form of common and mild illness (Launiala & Kulmala, 2006). Studies on MiP conducted in rural areas have also shown that some forms of illnesses are normally associated with pregnancy and are therefore overlooked as being potential risks and dangers to a pregnant woman. In another study in rural Malawi, pregnancy was perceived as a vulnerable state which predisposes women to

greater risks of different conditions in general. More particularly, there is a widespread belief that pregnant women are a common target for witchcraft (Launiala A & Honkasalo, 2007).

2.13.3. Perceived benefits of malaria chemoprophylaxis

A person's perceived benefits is a function of susceptibility to a serious health condition and the resultant change in behavior which is largely influenced by the individual's belief that the action they choose to take will bring forth desired benefits of decreasing the threat (Roll Back Malaria, 2014). Even among individuals who perceive MiP as a serious health threat, their attitudes towards certain malaria prevention interventions can influence the utilization of these preventive methods. Apart from improved health outcomes, perceived benefits can also be shaped by socioeconomic features like saving resources that would otherwise be spent on management of ill health and the desire to please family members by seeking the recommended preventive care. Therefore, it follows that it is inadequate for people to just demonstrate the optimal beliefs in vulnerability or susceptibility and severity. In order to take action (in this case to utilize IPTp-SP), they must also be aware of the potential benefits of that recommended health action in minimizing the threat (Champion & Skinner CS, 2008).

In their systematic review, Maslove and colleagues identified bottlenecks contributing to healthcare seeking practices due to perceived benefits or lack of thereof. Some of the barriers to treatment services comprised of the belief that conventional medicines were not efficacious and therefore, people resorted to traditional therapies. These beliefs were motivated by misconceptions that malaria was caused by witchcraft or evil spirits and therefore had to be treated using traditional remedies (Maslove et al., 2009). In previous studies on LLINs and IPTp-SP, low uptake has partly been attributed to community perceptions that chemicals (insecticides) used in LLINs are harmful to pregnant women and unborn children (Hill et al., 2013). The fact that these interventions are also targeted at pregnant women has raised fears that they are strategies designed to check the high fertility rates among the communities (Chuma et al., 2010).

In a couple of studies analyzed by Pell and others, women expressed uncertainty over the prescribed drugs for IPTp-SP, their safety among pregnant women and their effect

in preventing MiP. Despite this uncertainty, women who accepted the drugs as safe cited the trust they have in health providers administering IPTp-SP as an enabler. In Sudan, pregnant women did not adhere to chemoprophylaxis using chloroquine (as recommended in the 1990s) owing to inadequate knowledge about the attached benefits coupled with fears about the safety of administering the drug in pregnancy. Furthermore, findings showed that the community regarded SP as harmful during pregnancy, speculating that it can cause miscarriages and other side effects like fever, mouth sores, rashes and itchiness and fatigue, all of which discouraged women from receiving (Pell et al., 2011). In Tanzania, there was an additional barrier as women were reportedly connecting SP with "difficult deliveries as a result of large babies" based on rumors rather than personal experience (G. Mubyazi et al., 2005; Mushi et al., 2008).

2.14. Literature relating to methodology

2.14.1. Likert scale

The Likert scale technique was conceived in 1931 by Dr. Rensis Likert, a sociologist at the University of Michigan. He defined this procedure as a tool for the assessing of attitudes and since then researchers in public health and other disciplines have used Likert-type of scaling to describe people's attitudes, perceptions, opinions and their environment. Using this technique, researchers have attempted to calculate constructs which cannot be measured directly by deploying multiple-item scales. The subsequent summated rankings are then used to quantify and categorize the construct(s) under study (Gliem & Gliem, 2003).

This technique uses a set of items, comprised of nearly an equal number of positive and negative statements relating to an attitude or perception, which is administered to a defined group of study participant. They are asked to indicate the extent to which they agree or disagree with each one of the favorable and unfavorable statements (Brooke, 1996).

In most cases, they are advised to select one of five available responses as follows: strongly agree, agree, uncertain, disagree, or strongly disagree. In the end, respondents' responses to the items are summed up and categorized in a way that individuals with the highest scores are rated as having the positive or favorable attitudes while individuals those with the least scores are ranked as possessing unfavorable (negative)

attitudes. Although different studies have made use of different models of scaling that are not consistent with Likert's procedures, they all share the technique's basic logic (Gliem & Gliem, 2003).

CHAPTER 3

METHODOLOGY

3.1. Study design

This was a facility-based, quantitative, cross sectional study and was conducted in June, 2018.

3.2. Study population

The study population was women aged 18 – 49 years who are also mothers of under-one children. Although national household surveys have previously studied mothers of under-two children aged 15 – 49 years, this study's population was selected to reduce recall bias that may occur due to the long duration between receipt of IPTp-SP and study period. Additionally, the lower age limit was adjusted upwards considering that persons below 18 years cannot legally and independently give consent according the country's laws.

3.3. Sample size

Based on the current WHO recommendations, coverage for optimal IPTp-SP utilization (a minimum of 3 SP doses is recommended or IPT3+ in this study) was used in determining the sample size (World Health Organisation, 2013). From the Malawi DHS 2015/16, an estimated 30% of pregnant women aged 15 - 49 years in the study area reported receipt of IPTp3+, with at least 1 dose being administered during an ANC visit (National Statistical Office & ICF, 2017). The sample size was calculated using the Cochran's formula with 95% confidence level as follows (Cochran, 2007):

$$n = \frac{Z^2 \, p\,(1-p)}{d^2} = \frac{1.96^2 \times 0.3 \times 0.7}{0.05^2} = 323$$

Where: n = minimum required sample size; Z = standard normal deviation corresponding to 95% confidence interval, thus Z = 1.96; p = proportion of pregnant

women who reported receipt of IPT3 taken to be 30% and ***d*** = the margin of error on ***p*** (estimated at 5%, thus ***d*** = 0.05).

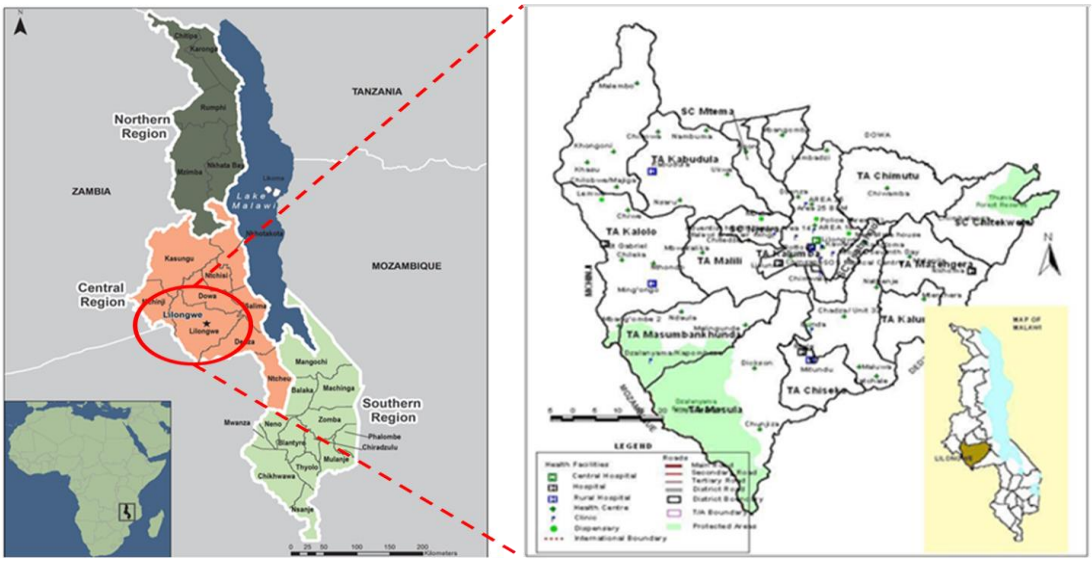
After adjusting for a 10% (n=32) dropout or refusal rate (non-response), a **total of 355 respondents** matching the inclusion criteria were recruited for the study.

3.4. Study Area

This study was conducted in the district of Lilongwe, Malawi's capital, located within the central region. According to projections from the 2008 census, Lilongwe district currently has a total population of 2,588,808, with the highest population density in Malawi(Ministry of Health, 2017a). The proportion of females is 50.6% (1,301,031), with the number of women in the childbearing age bracket and expected pregnancies at 24% and 5%, respectively (National Statistics Office (NSO) & ICF Macro, 2008).

Administratively, the district is demarcated into two sections; the urban and rural section. Therefore, this study focused on Lilongwe rural with 1,573,995 (60.8% of the district's population), and comprising of all areas located outside the city (urban) boundaries. There are no records of similar studies previously done on determinants of IPTp-SP utilization in this area. Like most rural areas in Malawi, the area is mostly agrarian with *Chewa* as the most widely spoken language(Ministry of Health, 2017a). The map for the study area is shown in figure 7.

Figure 7: Maps of Malawi (left) and Lilongwe(Ministry of Health, 2017a; Ministry of Health & ICF International, 2015).



3.5. Sampling technique

A multi-stage cluster sampling technique was used involving selection of supervision areas (SAs), health facilities, and respondents. For this study, Lilongwe district, located in the central region, was purposively selected based on high malaria incidence and low IPTp-SP uptake (National Statistical Office & ICF, 2017). In addition to the above-mentioned justification, the rural section of the district was purposively sampled because there is no evidence of similar studies that have previously been conducted.

Lilongwe rural has 5 SAs matching the inclusion criteria (entirely located outside Lilongwe city boundary). Three SAs *(Kabudula, Nathenje and Mitundu)* were selected using simple random procedure (Ibrahim et al., 2017). An identification number was assigned to each of the five eligible SAs, and a lottery technique was applied to select 3 SAs for the study. Utilizing the same method, two corresponding health facilities from each sampled zone were selected. The sampling frame comprised of all eligible health facilities that have been offering ANC services continuously for two years prior to the study period (Ayiisi Evans A., 2017). In the end, the following facilities were sampled: *Kabudula, Ukwe, Nathenje, Mtenthera, Mitundu and Dickson.*

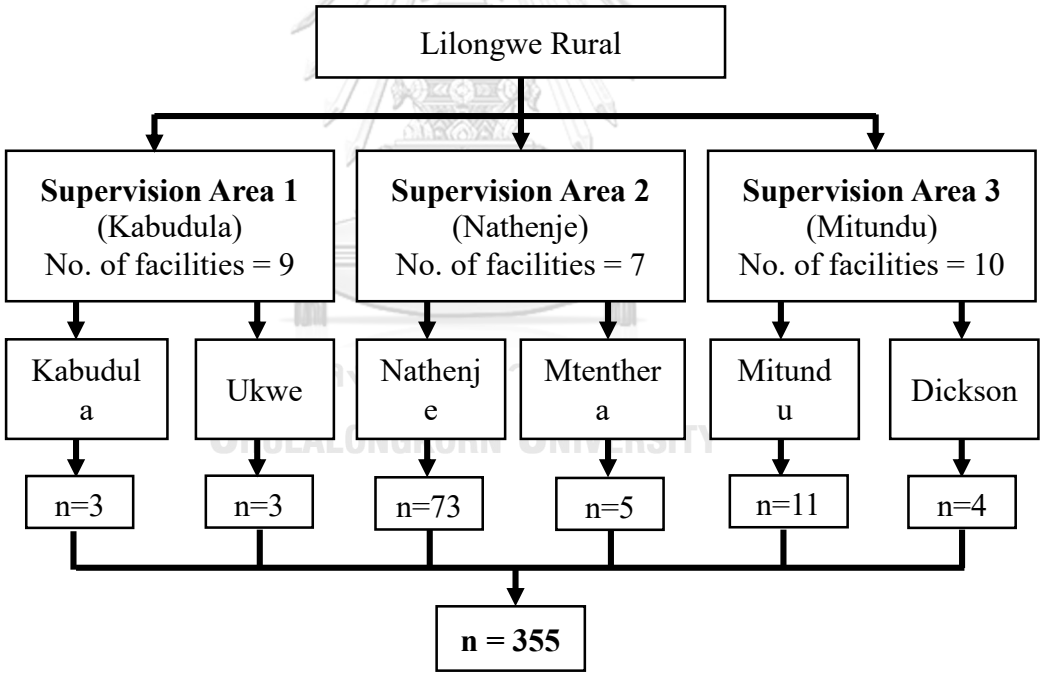
The last stage of sampling involved systematic random selection of eligible women matching the inclusion criteria for the study. In order to minimize selection bias, proportion to size allocations were conducted based catchment population (under-one children) for each health facility. Participants were enrolled into the study primarily through their scheduled clinic visits to access different child health interventions. A systematic random sampling method was employed to select respondents from each participating health facility. A non-replacement balloting technique was used to draw participants from a pool of eligible mothers on any given day of data collection (Margaret Kweku et al., 2017). A sampling frame *(x)* based on service utilization records for each facility was derived which was be equal to the aggregate number of mothers who accessed a service for an under-one child during the corresponding period in the previous year (2017).

In order to determine women to be enrolled into the study, a simple ballot was conducted in which all eligible mothers randomly picked one piece of paper from a box. Each piece of paper had either ‘yes’ or ‘no’ written on it. All women that picked ‘yes’

papers *(y)* qualified for enrolment while those that pick 'no' option were be excluded *(z)*. The sample space to be enrolled into the study *(y)* corresponded to the required number of participants according to the proportionate to size allocation or quota for each day per facility. On the other hand, sample space to be excluded from participation *(z)* was equivalent to the difference after subtracting the required number of mothers from the sampling frame (Margaret Kweku et al., 2017). A mathematical presentation derived from the process is $y = x - z$. In a scenario where the number of women was less than or equal to the required number of participants, all eligible women present at the facility were enrolled. The whole sampling process is demonstrated in the figures 8 and 9.

3.5.1. Sampling technique

Figure 8: Multi stage sampling flow chart



Step 1: Purposive sampling of section of district (city vs. rural)

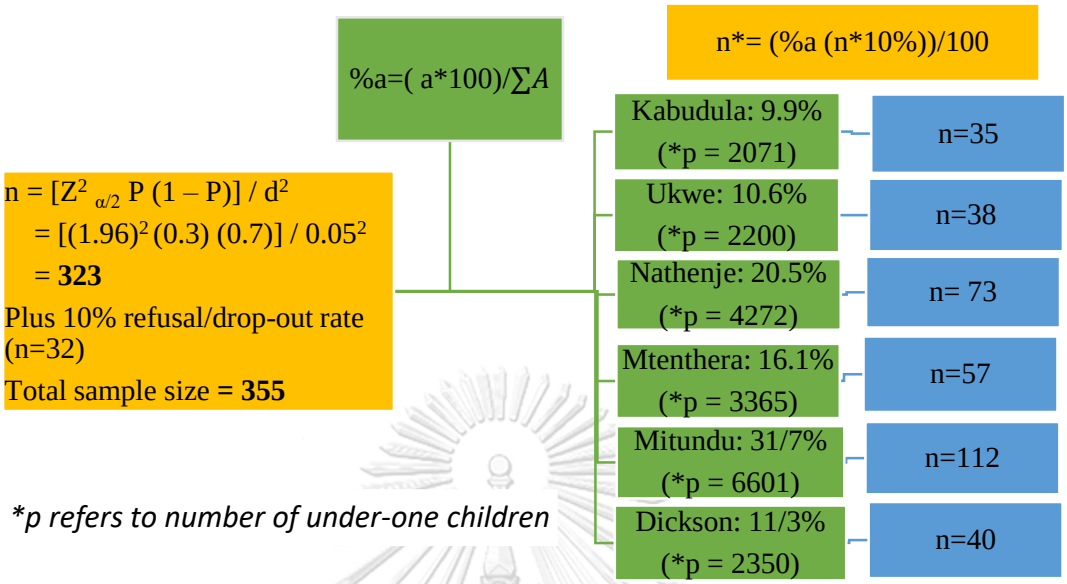
Step 2: Random sampling of supervision areas (n = 5)

Step 3: Simple random sampling for health facilities

Step 4: Proportionate to size and systematic random sampling of respondents

3.5.2. Proportionate probability sampling of respondents to health facilities

Figure 9: Proportionate allocation of respondents to selected health facilities



3.5.3. Inclusion criteria

To be eligible, all prospective participants had to be aged between 18 – 49 years at the time of the study; and be mothers of children under the age of one year. The integration of IPTp-SP as part of a broader focused ANC platform means that ANC serves as the entry point to IPTp-SP utilization. Thus, respondents should have attended at least one ANC visit during their most recent pregnancy that resulted in a live birth. They were also supposed to be resident within a catchment area of a participant health facility under review.

3.5.4. Exclusion criteria

Mothers of infants aged 12 months and below with hearing problems and history of psychiatric disorders that may interfere with their memory and judgement were not eligible to participate in the study. Since the questionnaire was administered in local language *(Chewa)*, Mothers who did not consent to enroll in the study and those were unable to communicate using the local *Chewa* language were left out (as the questionnaire was administered using this dialect only).

3.6. Research instrument

For data collection, this study utilized an interviewer administered questionnaire to capture information from each respondent. The tool was initially developed in English by the Principal Investigator (PI). Most of the items were adapted from validated tools that have been widely used in national surveys such as MMIS, MDHS, Malawi Service Provision Assessment (SPA) and RBM's SBCC indicator reference guide. Based on the conceptual framework, the tool had 4 components as follows: Section 1: Predisposing factors; Section 2: Enabling factors; Section 3: Need factors and Section 4: Utilization of IPTp-SP during pregnancy.

Section 1: Predisposing factors

This section contains questions on general characteristics about the respondent and they have been split into two parts:

a) Part A: General characteristics

There were 8 items in this part on general characteristics of respondents including questions that require to fill in the blanks as well as multiple choice questions with pre-determined responses. Variables contained in this part include age, marital status, education level, occupation status and parity. The variables are based on a standardized data collection tool for Demographic and Health Survey (National Statistical Office & ICF, 2017).

b) Part B: Health beliefs

This part comprises of two segments; the first had 10 questions (with a total of 25 items) and measured the level of knowledge among the respondents related to malaria (cause, transmission, signs and symptoms and preventive methods including IPTp-SP). The second segment had 9 items (5-point Likert scale) and focused on attitudes which respondents possess towards IPTp-SP as a malaria control intervention.

Section 2: Enabling factors

In this section, respondents were asked about logistical factors that support or impede health care utilization. The section was divided into 4 parts: ANC attendance (6 questions), utilization of ancillary services to IPTp-SP (8 items), access to IPTp-SP services (3 questions), and client satisfaction (8 items). The first 3 parts were adapted from MMIS, MDHS and (Ministry of Health & ICF International, 2015; National Statistical Office & ICF, 2017), while client satisfaction segment was adapted from the SPA survey (Ministry of Health & ICF International, 2014).

Section 3: Need factors

This section explores perceptions and comprises of 3 parts with 5-point Likert scale items; perceived susceptibility (6 statements), perceived severity (5 statements) and perceived benefits (5 statements). The items were adapted from the RBM's SBCC malaria indicator reference guide and were modified to suit this study's objectives (Roll Back Malaria, 2014). Each statement was rated using 5 categories (strongly agree; agree; uncertain, disagree and strongly disagree).

3.7. Validity and Reliability

3.7.1. Construct validity

The design of the questionnaire corresponds to a conceptual framework as described the Andersen's behavioral model on health care utilization. Furthermore, the operational definitions were informed by literature from similar studies conducted across Africa. The tool mostly comprised of closed-ended questions with a set of coded and pre-determined responses. Data gathered using this type of interview has several benefits such as ease of standardizing responses and statistical analysis (World Health Organization, 2008). Construct validity was initially done with assistance from a thesis proposal committee. After making the necessary corrections based on the committee's feedback, the updated version of the tool was validated by malaria experts.

3.7.2. Content validity

The majority of items in the questionnaire were adapted from MMIS, MDHS, Malawi SPA and RBM's Malaria SBCC indicator reference guide (Ministry of Health & ICF International, 2014, 2015; National Statistical Office & ICF, 2017; Roll Back Malaria, 2014). These items were either adapted wholesome or in some cases were restructured and modified based on the existing guidelines. To make the tool more suitable to the current study, additional items were derived from literature, existing policies and guidelines on malaria. For these modified and supplementary items, validation was sought from malaria experts. Thus, for this purpose, the study will utilize the item-objective congruence (IOC) indices from 5 malaria experts. For each item under validation, IOC index scores yielded from all the experts was summed up and an average score of ≥ 0.88 was obtained (Turner & Carlson, 2003). All items that fall short of this value will be revised according to recommendations. The validation resource personnel will include at least three of the following experts:

a) Assoc. Prof. Ratana Somrongthong, (PhD) – Associate Dean and Lecturer, Chulalongkorn University (College of Public Health Sciences)
b) Dr. Tepanata Pumpaibol (PhD) - Lecturer, Chulalongkorn University, (College of Public Health Sciences), with research interest in malaria
c) Dr. Montakarn Chuemchit (PhD) - Lecturer, Chulalongkorn University (College of Public Health Sciences), with research interest in community health
d) Dr. Chikondi Mwendera (PhD) - Lecturer, University of Malawi (The Polytechnic), with research interest on malaria
e) Dr. Mwayiwawo Madanitsa (MBBS, PHD) – Lecturer, University of Malawi (College of Medicine; Malaria Alert Centre).

3.7.3. Face validity

Face validity of questionnaire was checked during pilot testing (pre-test) for reliability which is described under pilot testing.

3.7.4. Translation of research tool

After validation and reliability tests, the English version of the research instrument will be translated into vernacular *Chewa* language version and then vice versa. For the most part, translations are already available from the corresponding studies from where the

tool was adapted. However, for the supplementary and/or modified items, translation will be conducted. In order to achieve quality results, the PI will seek the services of two bilingual malaria experts, the first one will perform the forward translation (English to *Chewa*) while the second will do the backward translation. The two English versions will then be compared to check for retention of concepts. If any major inconsistencies between the two translations are observed, the two translators will convene to agree on correct phrasing of items under consideration.

3.7.5. Pilot testing

In order to determine the duration of interviews; to check clarity and flow of questions; cultural acceptability and appropriateness; and to validate respondents' comprehension of identified themes of the questionnaire, a pre-testing (pilot) session will be conducted. This exercise will use the translated tool and shall take place in a similar setting within the district but different from the study area with participants being drawn from non-participating health zone and facility (people with comparable characteristics to the study population). To avoid data contamination, the PI will make certain that there are no linkages between respondents from the pilot test and those from the actual study. To yield reliable results, pre-testing will be conducted by the PI using approximately 10% of sample size (30 women matching the study's inclusion criteria).

3.7.6. Reliability

Lessons learnt from the piloting step were used to modify the questionnaire accordingly before the actual data collection. The tool's internal consistency for scale items was measured by the Cronbach's alpha correlation coefficient.

The Cronbach's alpha correlation coefficient for scale reliability was used to test the tool's internal consistency for attitudes and perceptions sections. Overall, results from the pre-test showed the questionnaire was reliable with Cronbach's alpha scores of 0.82 and 0.78 for attitudes and perceptions, respectively. For each item, the minimum score was set at $\alpha \geq 0.7$ with the level of statistical significance set at < 0.05 was accepted (implying that 70% of the measured variance was reliable, and 30% was due to random error). Items yielding a score below this cutoff point were either removed or adjusted for improvements in order to minimize random error (Tavakol & Dennick, 2011). For

the knowledge section of the tool, the Kuder–Richardson Formula 20 (KR-20) was used and yielded a score of 0.84 (Feldt, 1969).

3.8. Data collection procedures

3.8.1. Administrative procedures

In order to avert procedural hiccups during the data collection step, the PI officially wrote the Lilongwe District Health Office (DHO) under whose jurisdiction all participating facilities fall. In collaboration with the same office, the PI also designed a working schedule. Communication about the study was sent to health facility In-Charges in advance to allow for their adequate planning.

3.8.2. Training of research assistants

The structured interview was moderated by 4 research assistants (RAs) under the supervision of the PI. In order to ensure correctness, completeness and consistency of the data, the PI conducted a 1-day long training session with the RAs. Training areas included study objectives, procedures, ethics and familiarization with the questionnaire. For effective delivery of the material, classroom lectures, discussions, mock interviews and role plays were used. Furthermore, a field practice was conducted to enable RAs get acquainted with the research tool. The field practice was done at a non-participant health facility and each RA conducted 3 interviews with respondents matching the inclusion criteria. A debriefing session followed and then modifications were made to the questionnaire based on the feedback from the field.

The RAs recruited for the data collection had completed secondary school education at a minimum and with prior experience in conducting health research. To minimize any anticipated language barriers between interviewers and participants, all RAs were fluent in the local dialect of the study area.

3.8.3. Field work (actual data collection)

Data collection was done in June 2018. Prior to visiting any of the participant health facilities, the PI confirmed the schedule with the responsible facility In-Charge through the DHO. Upon arrival at the facility, the research team paid a courtesy call to the In-Charge who introduced team members and explained the purpose of the visit to the facility staff. Then the In-Charge or any other delegated member of staff informed

prospective respondents about the study and assisted in screening those that matched the inclusion criteria. Eligible women were sampled using a systematic sampling technique described under item 3.6. To protect the participants' privacy as per ethical requirement, and to avoid clinic staff members from influencing the participants' responses, respondents were interviewed from a designated area within the facility, but away from other clinic users and health providers. For each sampled respondent, the data collection team facilitated provision of verbal and written informed consent. For this purpose, RAs were guided by an information sheet detailing the study objectives, procedures for soliciting information, confidentiality, right of participation and withdrawal from the study. Mothers who consented to participate in the study were required to append their signature or right thumb print on the informed consent form. Respondents who were not willing to participate were excluded.

Data was collected over a period of 1 week. For quality assurance, each RA interviewed a maximum of 15 respondents per day. Each interview lasted for about 20 minutes. At the end of each field day, the PI reviewed 25% of the completed questionnaires to check for completeness and correctness. In case there was any missing data or irregularities were observed, that particular questionnaire was not counted and a replacement interview with a different respondent was arranged on the next available day.

3.9. Data processing and analysis

3.9.1. Data verification and entry

Data verification for completeness, correctness and consistency will be conducted before analysis. Initially, data was fed into Microsoft Excel before exporting it into Statistical Package for Social Science version 22 (SPSS 22.0) for analysis.

3.9.2. Measurement and scoring

Dependent variable

For this study, the dependent or outcome variable was utilization of IPTp-SP which refers to the extent to which the respondent received IPTp-SP during her pregnancy that

led to birth of youngest child. There were 6 items under this part. Basing on the revised IPTp-SP policy, responses classified in 2 categories:

Number of SP doses received	**Category**
None	Suboptimal
1 - 2 doses	
≥ 3 doses	Optimal

Independent variables

Section I: Predisposing factors

This section contained questions on general characteristics about the respondent and were split into 3 parts:

a) Part A: General characteristics

There were 8 items in this part related the respondents' age, marital status, education level, occupation status, income, gravidity, and parity. The variables were based on a standardized data collection tool for Demographic and Health Survey (National Statistical Office & ICF, 2017).

Marital age was classified into 3 groups as; 18 - 24; 25 – 34 and 35 – 49 (Odjidja & Duric, 2017).

Marital status was categorized into 3 groups as; single, married, separated and widowed. During inferential analysis, 2 categories emerged: living with spouse, and not living with spouse (Marchant et al., 2008).

Education level will be categorized into 4 groups; none; incomplete primary; complete primary; secondary and higher education according to previous literature (Exavery et al., 2014). During inferential analysis, category 2 and 3 were merged to form "primary education" class.

Occupation will be classified into four groups for analysis: farmer; employed; self-employed; housewife/unemployed. These were later re-demarcated for inferential statistics according to majority of respondents' occupation group (Exavery et al., 2014).

Using the median value, income was presented as the average monthly income for the respondent/family; classified either as lower or higher (Phiri, Rattanapan, & Mongkolchati, 2015).

Gravidity; referred to the number of pregnancies a woman has ever had irrespective of the outcome. Women were classified into 3 categories; primigravid (pregnant once), secundigravid (pregnant twice) and multigravida (pregnant more than two times).
Parity referred to the number of pregnancies a woman carried to term (or live births) and was categorized into 3 groups: 1 child; 2 to 3 children; and 4 or more children according to previous literature (Phiri et al., 2015). In inferential analysis, these were recoded into 2 categories: < 4 or ≥ 4 children.

b) Part B: Knowledge about malaria and intermittent preventive treatment

This part comprised of 25 items to measure level of knowledge related to malaria and IPTp-SP among the respondents with focus on malaria cause, signs and symptoms, and preventive methods for malaria according to the respondent (Ministry of Health & ICF International, 2015; National Statistical Office & ICF, 2017). To measure this variable, each item (B1 - B10) had pre-defined responses. A respondent was awarded a score of 1 for each correct response, while 0 was assigned for incorrect or uncertain responses. Consequently, scores ranged between 0 and 25, and depending on the sum of the scores, the respondents' knowledge will be categorized into three levels as defined by the Bloom's cut-off classification as follows; (Yimer, Abera, Mulu, & Bezabih, 2014).

Knowledge level	**Cut-off point**	**Scores**
Low	<60%	0 - 14
Moderate	60% - 80%	15 – 19
High	> 80%	20 – 25

c) Part C: Attitudes regarding intermittent preventive treatment

This part focused on attitudes women usually have towards health services such as the IPTp-SP. It contained 9 items in total, with 5 positive statements and 5 negative statements. For assessing attitudes, responses to statements were assigned according to the 5-point Likert scale as follows; strongly agree; agree; uncertain; disagree; and strongly disagree. Respondents chose 1 option that best suited their opinion. On one

hand, forward scoring was applied to all positive statements while reverse scoring was used for negative statements. The scoring synthesis is presented in the table that follows:

Positive statements (n = 4)		**Negative statements (n = 5)**	
Choice	***Score***	***Choice***	***Score***
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Uncertain	3	Uncertain	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

From the table above, the minimum and maximum scores were 9 and 45, respectively. To calculate the attitude score, the cut-off reference point was the mean score ± standard deviation. The attitudes were classified as follows;

1. Negative attitudes - ≤ mean - standard deviation
2. Moderate attitudes - mean - standard deviation < scores < mean + standard deviation
3. Positive attitudes – scores ≥ mean score + standard deviation

Section II: Enabling factors

In this section, respondents were asked about logistical factors that support or impede health care utilization. The section was divided into 4 parts: utilization of ANC services; availability of other related services; accessibility of services; and client satisfaction.

d) Part D: Utilization of antenatal care services

ANC attendance had two components:

i. Timing of the first ANC visit, categorized into 3 groups as: first, second, and third trimesters (Exavery et al., 2014; World Health Organisation, 2002).
ii. Number of ANC visits which will be categorized into 2 groups as < 4 visits and ≥ 4 based on previous research and existing policy guidelines (Odjidja & Duric, 2017; World Health Organisation, 2002).

*e) Part E: Utilization of ancillary service*s

Compliance with DOT was measured as a proportion of women reporting to have taken at least 1 SP dose under the observation of a health provider.

Exposure to health education messages was assessed as the proportion of women who received health information from a health provider on adverse effects attributable to MiP and benefits of IPTp-SP (Exavery et al., 2014). Two categories based on the mean score (5.05) as the cut-off reference were derived. The range of scores was between 0 and 8 and therefore, exposure health education was categorized as:

1. Inadequate - score < median
2. Adequate - score ≥ median score

*f) Part F: Accessibility of IPTp-SP service*s

Distance to the nearest facility was measured by estimated walking time from a respondent's home to a nearest or preferred ANC facility. Response categories were pre-categorized into 4 levels: < 30 minutes; 30 – 59 minutes; 1 – 2 hours and more than 2 hours (Stekelenburg et al., 2004). Analysis was done using frequency and proportions. At inferential analysis stage, the waiting time categories were recoded into 2: < 1 hour or ≥ 1 hour.

Transport costs for respondents for the commonly used mode of transport to the nearest facility was presented as the amount of money paid for a round trip (transport fare) between a respondent's home and the facility. Measurement of the variable was done under four categories: no payment; less than 500 MWK; between 500 – 1000 MWK and more than 1000 MWK. At inferential analysis stage, these were recoded into 2 categories: < 500 MWK and ≥ 500 MWK.

Waiting time will be measured as the time taken between a respondent's arrival at the health facility (during her first ANC visit) and the time she was attended to by a health worker; taking into consideration the official opening hours. The wait time was classified as immediately; < 1 hour; 1 and 2 hours; 2 to 3 hours; and > 3 hours. At inferential analysis stage, these were recoded into 2 categories: < 1 hour and ≥ 1 hour.

g) Part G: Client satisfaction

This segment comprised of 8 items and was measured by the respondents' self-rating of service provision and the likelihood that they would use the same facility in future (Jallow, Chou, Liu, & Huang, 2012; Ministry of Health & ICF International, 2014). Each potential barrier had 3 pre-defined answer; major problem, minor problem and not a problem with scores of 1, 2, and 3, respectively (i.e. the lowest score awarded if respondent reported experiencing a major obstacle). The range of score was from 8 to 24 and the median value was used as the cut-off reference. Level of client satisfaction was categorized as:

3. Unsatisfactory - score < median
4. Satisfactory - score ≥ median score

Section III: Need factors

There were three parts under this section which focuses on the perceptions respondents possess relating to MiP and IPTp-SP. These are perceived susceptibility, perceived severity of the disease (MiP) and perceived benefits of utilizing the recommended intervention (IPTp-SP). Each section had positive and negative statements on a 5-point Likert scale: 'strongly agree'; 'agree'; 'uncertain'; 'disagree' and 'strongly disagree' (Gliem & Gliem, 2003; Jallow et al., 2012). The least ideal response received a score of 1 while the most ideal response attracted a score of 5. Scores for each part were summed up and perception levels were categorized using mean and standard deviation. On one hand, forward scoring was applied to all positive statements while reverse scoring was used for negative statements.

h) Part H: Perceived susceptibility to malaria during pregnancy

This first part under need factors contained 6 items. There were 3 positive statements and 3 negative statements. For scoring the level of perceived susceptibility, responses to statements were assigned according to the 5-point Likert scale as follows; strongly agree; agree; uncertain; disagree; and strongly disagree. Respondents chose 1 option that best suited their opinion. On one hand, forward scoring was applied to all positive

statements while reverse scoring was used for negative statements. The scoring synthesis is presented in the table below:

Positive statements (n = 3)		**Negative statements (n = 3)**	
Choice	***Score***	***Choice***	***Score***
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Uncertain	3	Uncertain	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

From the table above, the minimum and maximum scores were 6 and 30, respectively. To calculate the perceived susceptibility level, mean scores ± standard deviation were used as the cut-off reference points and was classified as ;

1. Low perception: ≤ mean - standard deviations
2. Moderate perception: mean - standard deviations < scores < mean + standard deviations
3. High perception: scores ≥ mean scores + standard deviations

i) Part I: Perceived severity of malaria during pregnancy

The second part under need factors contained 5 items. There were 4 positive statements and 1 negative statement. For scoring the level of perceived severity, responses to statements were assigned according to the 5-point Likert scale as follows; strongly agree; agree; uncertain; disagree; and strongly disagree. Respondents chose 1 option that best suited their opinion. On one hand, forward scoring was applied to all positive statements while reverse scoring was used for negative statements.

Positive statements (n = 4)		**Negative statements (n = 1)**	
Choice	***Score***	***Choice***	***Score***
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Uncertain	3	Uncertain	3
Disagree	2	Disagree	4

Strongly disagree	1	Strongly disagree	5

From the table above, the minimum and maximum scores were 5 and 25, respectively. To calculate the perceived susceptibility score, the mean scores ± standard deviation were used as the cut-off reference points and was classified as;

1. Low perception - ≤ mean - standard deviations
2. Moderate perception - mean -standard deviations < scores < mean + standard deviations
3. High perception - scores ≥ mean scores + standard deviations

j) Part J: Perceived benefits of intermittent preventive treatment

The third part under need factors contained 5 items. There were 2 positive statements and 3 negative statements. For scoring the level of perceived benefits, responses to statements were assigned according to the 5-point Likert scale as follows; strongly agree; agree; uncertain; disagree; and strongly disagree. Respondents chose one option that best suit their opinion. On one hand, forward scoring was applied to all positive statements while reverse scoring was used for negative statements.

Positive statements (n = 2)		**Negative statements (n = 3)**	
Choice	***Score***	***Choice***	***Score***
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Uncertain	3	Uncertain	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

From the table above, the minimum and maximum scores were 5 and 25, respectively. To calculate the perceived susceptibility level, the mean scores ± standard deviation were used as the cut-off reference points and was classified as:

1. Negative perception - ≤ mean - standard deviations
2. Moderate perception - mean -standard deviations < scores < mean + standard deviations
3. Positive perception - scores ≥ mean scores + standard deviations

3.10.3. Statistical tests

Data analysis plan included both descriptive and analytical methods using SPSS (version 22): a standard package for applied biostatistics. Firstly, one-way tabulations (frequency distribution) across background characteristics of participants were executed. These descriptive statistics summarized different variables of importance in the study population. In order to measure the level of statistical association between the IPTp-SP utilization (dependent variable) and each one of the explanatory factors (independent variables), bivariate analysis using the Pearson's Chi-square test (p = 0.05) was conducted. In the event that the expected frequency of cells was below 5, the Fisher's exact test was used instead (p = 0.05). Since the outcome variable was dichotomous, multiple (binary) logistic regression was used to assess the predictive ability of independent variables (Azizi et al., 2018; Odjidja & Duric, 2017). The regression model included all independent variables with a p – value < 0.2 from the bivariate analysis. The model also included all known confounders from previous studies irrespective of their significance in the current study. Similarly, variables that were statistically significant from previous studies will be included even if they are not statistically significant in the current analysis (Abdi, 2003; Katz, 2011).

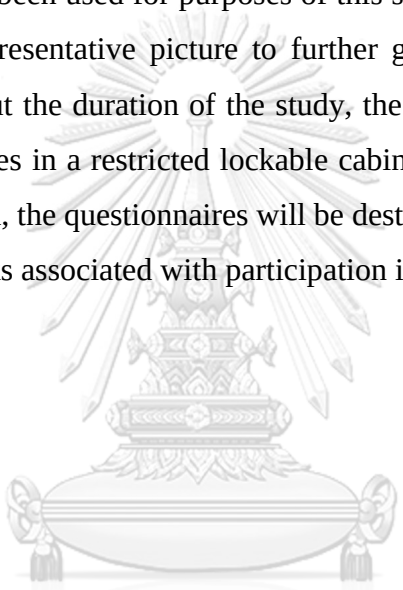
3.10. Ethical considerations

The study protocol was approved by 2 institutional review boards:

a) Research Ethics Committee, Chulalongkorn University (RECCU) - Thailand; under reference number *COA 091.1/61*,
b) National Health Sciences Research Committee (NHSRC) – Ministry of Health - Malawi; under reference number *1992*.

Participation in the study was voluntary and before enrollment into the study, all respondents gave verbal and written informed consent. To achieve this, each respondent was given an information sheet containing details of the study for her review. In case the respondent was not able to read on their own, she was allowed to appoint an

impartial witness to read out the information on her behalf while she listened. Respondents were only enrolled into the study after giving verbal and written consent (name and signature). Those that were not able to write were asked to provide a thumbprint confirmation of consent, which was observed and endorsed by the same witness. Even after initially giving consent, study subjects were at liberty to withdraw from further participating in the study at any given time without giving any reason. In order to ensure that participant confidentiality and anonymity is not breached, the study did not collect any data containing identification information of the respondents. The data collected has only been used for purposes of this study. Results of the study have been reported as a representative picture to further guarantee the privacy of study participants. Throughout the duration of the study, the PI ensured safe custody of all completed questionnaires in a restricted lockable cabinet. After report writing for the study has been finalized, the questionnaires will be destroyed. There are no anticipated social and/or health risks associated with participation in the study.



CHAPTER 4

RESULTS

4.1. Part A: Descriptive statistics

This study was aimed at exploring the determinants of IPTp-SP utilization for malaria during pregnancy in rural Lilongwe, Malawi. Mothers of children under the age of one year attending under-five clinic; who reported having sought ANC at least once during pregnancy were recruited from 6 participating health facilities. A total of 355 respondents were interviewed and provided complete information. After collection, the data was analyzed using SPSS version 22 (IBM Software Group, Chicago - USA). Table 1 shows the distribution of respondents across the six participating facilities.

Table 1: Number of respondents per facility

Health Facility	Number (n)	Percent (%)
Kabudula	35	9.9
Ukwe	38	10.7
Nathenje	73	20.6
Mtenthera	57	16.1
Mitundu	112	31.5
Dickson	40	11.2
Total	355	100

4.1.1 Outcome Variable

Utilization of intermittent preventive therapy

Uptake of IPTp in this study was categorized into 2: (a). suboptimal, if a respondent took less than 3 doses; and (b). optimal, if a respondent received the recommended 3 or more doses. Information on IPTp-SP uptake was sought from respondents using two methods; self-reported information was captured, which was then subjected to validation using records from respondents' ANC cards. This was done in an attempt to

reduce the effect of recall bias on the outcome variable. A total of 319 mothers (89.9%) had their ANC cards with them which were reviewed by the study team as proof of IPTp-SP receipt. Mothers who did not have ANC cards were categorized as having not taken any SP dose.

Overall, the results from self-reported information revealed that 84.5% of the women enrolled into this study received at least 1 dose of SP during pregnancy, while 28.2% received optimal IPTp-SP. However, based on the records from ANC cards as proof SP receipt, the IPTp-SP utilization rate was slightly lower with 77.5% receiving at least 1 dose and 24.8% of the respondents receiving at least 3 doses of IPTp-SP (Table 2). The discussion in this study is based on the results from validated IPTp-SP utilization.

Table 2: IPTp-SP utilization rates

Utilization rate	**SP doses**	**Self-reported *(n=355)* n (%)**	**Documented *(n=355)* n (%)**	**Difference**
Optimal	3+	100 (28.2)	88 (24.8)	3.4
Suboptimal	1 - 2	200 (56.3)	187 (52.7)	3.6
	None	55 (15.5)	80 (22.5)	- 7.0
Total		***355 (100%)***	***355 (100%)***	

4.1.2. Predisposing factors

Respondents' general characteristics

Data about general characteristics of study participants was collected using 8 questions (Appendix 3, question A1 - A8). Table 3 shows that more than half of the respondents (58.3%) were younger than 25 years (18 - 24 years) and 90.4% were married. School enrolment in the area was high with the overwhelming majority (92.7%) reportedly having at least attended some formal education. Nonetheless, most of the women were unable to attend secondary school education or beyond with only 24.5% of mothers having done so. A large proportion of respondents (63.4%) were engaged in subsistence farming, 24.8% were housewives and were therefore classified as not formally employed. The remaining percentage, classified as employed, consisted of women who were either self-employed through small scale businesses (8.7%) or were on formal

employment (3.1%) at the time of the study. Nearly 6 in every 10 women (58.9%) were classified as belonging to higher monthly income category based on a median value of 10,000 Malawi Kwacha. The proportion of primigravid mothers was similar to multigravid women at 38.3% and 39.2%, respectively; with the mother's most recent birth likely being the first child (39.4%) or fourth and greater birth order (35.8%).

Table 3: General characteristics of respondents

Variable/Category		**n (355)**	**(%)**
Age (years) – Mean = 25; SD = 6			
	18 - 24	207	58.3
	25 - 34	115	32.4
	35 - 49	33	9.3
Marital status			
	Single	28	7.9
	Married	321	90.4
	Separated	5	1.4
	Widowed	1	0.3
Education level			
	None	26	7.3
	Incomplete primary	179	50.4
	Complete primary	63	17.8
	Secondary and higher	87	24.5
Occupation			
	Farmer	225	63.4
	Employed	11	3.1
	Businesswoman	31	8.7
	Housewife	88	24.8
Monthly income*			
	Lower (< 10,000 MWK)	146	41.1
	Higher (≥ 10,000 MWK)	209	58.9
Gravidity			
	Primigravid	136	38.3

	Secundigravid	80	22.5
	Multigravid	139	39.2
Parity			
	1 child	140	39.4
	2 or 3 children	88	24.8
	≥ 4 children	127	35.8

*Median = 10,000 MWK

Knowledge on malaria

The level of knowledge was assessed to measure the extent to which women in the study area are exposed to malaria messages. Thus, each respondent was asked basic questions focusing on causes, symptoms and prevention of the disease with a possible score range of 0 – 25 points (Appendix 3, question B1 – B10). The level of knowledge was classified into 3 categories based on the Bloom's cut-off points (high; >80%, fair; 60 – 80%, and low <60%). Overall, 86.2% of the respondents had satisfactory knowledge on malaria (Table 4).

Table 4: Respondents' level of knowledge on malaria

Knowledge level (score)	Frequency	Percent (%)
High (20 - 25)	165	46.5
Moderate (15 - 19)	141	39.7
Low (0 - 14)	49	13.8

Despite the high level of knowledge exhibited, respondents showed marked deficiencies in awareness for some malaria themes as shown in Table 5. While the overwhelming majority of women (98.6%) were aware of the mosquito-malaria link, myths and misconceptions still seem to exist in the community about causation of malaria. This was revealed by incorrect responses given by respondents as follows: eating immature sugarcane (43.7%); eating cold food (52.7%); drinking dirty water (45.1%); getting soaked in the rain (63.1%); and witchcraft (16.9%).

The results showed that there was a high level of knowledge pertaining to malaria symptoms. Respondents reported that they would suspect malaria if a person had fever (98%); chills (97.2%) or nausea/vomiting (85.6%). Nevertheless, the proportion of

women reporting coughing (29.3%) and swollen feet (32.1%) as symptoms showed that some women did not have correct knowledge. The proportion of women who correctly mentioned pregnant women and under-five children as vulnerable populations for malaria was 97.2% and 92.4%, respectively. Roughly, half of the women reported that children over the age of five are equally vulnerable while one in every four respondents mentioned males as being at a higher risk of infection. The overwhelming majority cited use of LLINs (%) and prophylactic treatment (%) as effective preventive measures against malaria infection. Less than half of the mothers (47.3%) correctly mentioned that consumption of clean potable water is not linked with malaria prevention.

Table 5: Parameters for assessing knowledge

Item description	**Correct answer**	
	n	**%**
Cause		
Mosquito bites	350	98.6
Eating immature sugarcane	177	49.9
Eating cold food	159	44.8
Drinking dirty water	185	52.1
Getting soaked with rain	125	35.2
Witchcraft	260	73.2
Symptoms		
Coughing	242	68.2
Chills/shivering	345	97.2
Swollen feet	220	62.0
Nausea/vomiting	304	85.6
Fever	348	98.0
Vulnerability		
Under 5 children	328	92.4
Older children	177	49.9
Males	252	71.0
Pregnant women	345	97.2
Prevention		

Use of LLINs	351	98.9
Drinking clean water	168	47.3
Prophylactic treatment	332	93.5
Traditional medicine	320	90.1
IPTp-SP		
Target population	350	98.6
Service delivery points	347	97.7
Recommended number of doses	248	69.9
Number of tablets per dose	286	80.6
Timing of first dose	196	55.2
Interval between doses	311	87.6

Attitudes towards intermittent preventive therapy

The attitudes and beliefs of clients can play a significant role in the acceptability and utilization of health interventions. In this study, attitude was assessed using a 5-point Likert scale (strongly agree, agree, uncertain, disagree, and strongly disagree,). There were 9 statements with a possible minimum and maximum score of 9 and 45, respectively (Appendix 3, question C1 - C9). Using mean ± standard deviation (38.3 ± 5.1), attitudes were categorized into 3 groups: negative, neutral, and positive. Overall, only 19.7% women in rural Lilongwe had positive attitudes towards IPTp-SP as a malaria intervention, while 62.5% were indifferent (Table 6).

Table 6: Women's attitudes towards intermittent preventive treatment of malaria during pregnancy

Attitude rating*	**Frequency**	**Percent (%)**
Negative (< 34)	63	17.8
Neutral (34 - 43)	222	62.5
Positive (≥ 44)	70	19.7
Total	355	100.0

*Mean ±Standard Deviation: 38.4 ±5.1 Minimum-Maximum: 22-45

Table 7 shows attitudes scores based on participants' responses. The majority of respondents acknowledged that that SP is effective against MiP (99.4%); safe during

pregnancy (98.5%); and cannot cause complications (87.4%). However, 25.9% believe that SP could cause adverse side effects, and one-fifth of the mothers were convinced that SP should only be administered to pregnant women who feel sick. Roughly 6 in every 10 mothers (63.9%) highlighted the importance of early ANC initiation during pregnancy while slightly over half of them (56.4%) expressed disapproval to the belief that pregnant women should wait for spousal consent before initiating ANC. The majority of respondents (98.9%) demonstrated trust in health workers as a source of health information.

Table 7: Parameters for assessing attitudes towards intermittent preventive treatment of malaria during pregnancy

	Frequency (percent)				
Statement	**SA**	**A**	**UC**	**DA**	**SDA**
P/w[a] can delay ANC initiation*	75 (21.1)	41 (11.5)	12 (3.4)	71 (20.0)	156 (43.9)
P/w can only attend ANC after seeking permission from spouse*	111 (31.3)	39 (11)	5 (1.4)	67 (18.9)	133 (37.5)
For optimal protection against MiP, a p/w should adhere to IPTp-SP schedule	317 (89.3)	35 (9.9)	2 (0.6)	0	1 (0.3)
SP is effective against MiP compared to traditional remedies	321 (90.4)	32 (9)	1 (0.3)	1 (0.3)	0
SP causes side effects such as nausea/vomiting*	59 (16.6)	33 (9.3)	24 (6.8)	59 (16.6)	180 (50.7)
Health workers are a trusted source of health information	313 (88.2)	38 (10.7)	3 (0.8)	1 (0.3)	0
Health workers administer SP to protect p/w or her fetus from MiP	310 (87.3)	42 (11.2)	2 (0.6)	1 (0.3)	0

SP causes complications e.g. abortion*	16 (4.5)	8 (2.3)	20 (5.6)	76 (21.4)	235 (66.2)
Only sick pregnant women should take SP*	60 (16.9)	17 (4.8)	12 (3.4)	48 (13.5)	218 (61.4)

*Negative statement [a] pregnant woman **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SDA** = Strongly disagree

4.1.3 Enabling factors

Antenatal care attendance

ANC serves as an entry point to various integrated maternal health services (e.g. IPTp-SP). ANC promotes adoption of healthy behaviors and practices during pregnancy, childbirth, and the post-partum phase. Therefore, the extent to which every woman accessed ANC services was assessed in terms of timing of first visit and frequency of visits before she delivered. Women in the study area are encouraged to initiate ANC during the first trimester and attend 4 ANC visits in accordance with the previous WHO guidelines on focused ANC. Results from the study showed that only a quarter of the respondents (24.5%) had presented in the first trimester for ANC. Nearly 7 in every 10 women (67.8%) were more likely to report for ANC during their second trimester while 7.6% delayed until late in their third trimester. Up to 84.0% of the mothers attended at least 3 ANC visits; with 42.3% and 41.7% of the women having attended 3 and 4 visits, respectively. This high contact coverage for ANC meant that an equivalent proportion of mothers (84.0%) should have received the recommended doses of IPTp-SP if the service was effectively delivered.

Table 8: Antenatal care attendance

Variable/Category	**n**	**%**
Gestation at 1st ANC visit		
1st trimester	87	24.5
2nd trimester	241	67.9
3rd trimester	27	7.6
Number of ANC visits		
1 visit	15	4.2
2 visits	42	11.8

3 visits	150	42.3
≥ 4 visits	148	41.7
Received SP during any ANC visit (self-reported)		
Yes	300	84.5
No	55	15.5
Possess ANC card		
Yes	319	89.9
No	36	10.1

Utilization of ancillary services

This study measured the availability of two ancillary services related to the delivery of IPTp-SP at the ANC facility: pregnant women's exposure to health education messages of MiP and IPTp-SP, and receipt of the drug (SP) under DOT. It was apparent that both services were widely utilized among the respondents. More than three-quarters of mothers (78.6%) reported receipt of at least 1 SP dose under supervision from a health worker. Similarly, the majority of participants (63.9%) reported that they were adequately exposed to health promotion messages relating to MiP and IPTp-SP (Table 9).

Table 9: Utilization of ancillary services

Service description/Category	***n (355)***	**%**
DOT (at least 1 dose)		
Yes	279	78.6
No	76	21.4
Health education on MiP and IPTp-SP*		
Inadequate	128	36.1
Adequate	227	63.9

*Mean = 5.05 Range: 0 - 8

Overall, the majority of the women (74.6%) received health education messages on benefits of IPTp-SP (Table 10). Moreover, mothers were exposed to information on adverse effects of MiP as follows; maternal anemia (89.0%), still birth (85.4%), LBW (82.8%) and maternal death (87.0%).

Table 10: Exposure to messages through health education

Theme/Category	***n (355)***	**%**
Health education on benefits of IPTp-SP		
Yes	265	74.6
No	90	25.4
Health education on effects of MiP (overall)		
Yes	302	85.1
No	53	14.9
Health education on maternal anemia		
Yes	316	89.0
No	30	8.5
Not sure	9	2.5
Health education on still birth		
Yes	303	85.4
No	43	12.1
Not sure	9	2.5
Health education on LBW		
Yes	294	82.8
No	48	13.5
Not sure	13	3.7
Health education on maternal death		
Yes	309	87.0
No	37	10.5
Not sure	9	2.5

Accessibility of services

Often, clients are unable to utilize available health services due to barriers that limit their accessibility to life-saving interventions. Table 11 shows that despite their fragile condition, 42.8% of the pregnant women in rural Lilongwe had to walk for more than 1 hour to access the nearest ANC facility. More than half of the respondents (54.6%) were required to pay more than 500 Malawi Kwacha for a return trip from their home to the same ANC facility. In addition, waiting times at ANC facilities were reported to

be inconveniently long with 44.2% of the women enduring over one hour before being attended to by health workers.

Table 11: Accessibility of services

Variable/Category	***n (355)***	**%**
Distance to ANC facility (walking)		
< 1 hour	203	57.2
> 1 hour	152	42.8
Cost of transport to ANC facility (round trip)		
< 500 MWK	161	45.4
> 500 MWK	194	54.6
Waiting time before consultation with provider		
< 1 hour	198	55.8
> 1 hour	157	44.2

Client satisfaction with services

The extent to which clients feel satisfied with health service delivery is a determinant as to whether the available services will be utilized or not. In this study, the level of client satisfaction was categorized using the median score and ranked as either low or high. The overall score (range 8 - 24) was based on respondents' opinions about potential barriers to service utilization. Overall, more than half of the women (54.4%) were satisfied with service delivery at ANC facilities (table 12).

Table 12: Level of client satisfaction with service delivery at antenatal clinic

Level of satisfaction	**Frequency**	**Percent (%)**
Low	162	45.6
High	193	54.4
Total	355	100.0

Median score: 20 Minimum-Maximum; 10-24

Table 13 presents the respondents' opinions on some pre-selected barriers usually faced by clients while accessing services from health facilities across the country. Waiting time was cited by 28.7% and 21.4% as being a major and minor barrier, respectively. Nearly 7 in every 10 women (68.7%) recounted that they discussed problems relating

to their pregnancy with a health provider. However, 28.7% revealed that the provider was not accommodative. The majority of women (73.0%) were satisfied with the feedback they received regarding their problem or treatment. Nearly 60% of the respondents were impressed with the availability of medicines in the participating facilities, with 22.8% citing it as a major bottleneck. Women also expressed satisfaction with the number of hours in a day (65.4%) and number of days in a week (84.8%) during which services were offered at their nearest ANC facility. When asked whether they would use the same ANC facility in the event that they fell pregnant again, three quarters of women (75.8%) disclosed their willingness, but one fifth of respondents (19.2%) were hesitant.

Table 13: Parameters for assessing client satisfaction with services

Potential barrier/Category	***n***	**%**
Waiting time to see provider		
Major	102	28.7
Minor	76	21.4
No problem	177	49.9
Ability to discuss problems about your pregnancy		
Major	67	18.9
Minor	44	12.4
No problem	244	68.7
Amount of explanation about problem or treatment		
Major	54	15.2
Minor	42	11.8
No problem	259	73.0
Visual or audio privacy during consultation		
Major	12	3.4
Minor	37	10.4
No problem	306	86.2
Availability of medicines at this facility		
Major	81	22.8
Minor	64	18.0

No problem	210	59.2
Hours of service at this facility		
Major	53	14.9
Minor	70	19.7
No problem	232	65.4
Number of days services are available in a week		
Major	13	3.7
Minor	41	11.5
No problem	301	84.8
Willingness to use same ANC facility in future		
Yes	269	75.8
Maybe	18	5.1
No	68	19.2

4.1.4. Needs factors

Perceived susceptibility to malaria in pregnancy

The extent to which women perceive their susceptibility to MiP was also assessed. Perceptions regarding the risk of malaria infection during pregnancy influences whether or not women are able to use the available preventive and control interventions. In this study, susceptibility perceptions were assessed using a 5-point Likert scale (strongly agree, agree, uncertain, disagree, and strongly disagree,). There were 6 statements with possible minimum and maximum scores of 6 and 30, respectively. Using mean ± standard deviation (25.7 ± 3.5), such perceptions were categorized into 3 groups: low, moderate, and high. Table 14 shows the perceived level of susceptibility to MiP among women in the study area. Roughly, about a quarter of the women (23.9%) had a high risk perception, compared to 21.7% who wrongly assumed that the risk of infection among pregnant women is low. The remaining proportion (54.4%) was uncertain on whether or not pregnant women are a vulnerable group.

Table 14: Respondents' perceived susceptibility to MiP

Perceived susceptibility*	***n***	**%**
Low (< 23)	77	21.7
Moderate (23 – 29)	193	54.4
High (≥30)	85	23.9

*Mean = 25.7; Standard Deviation) = 3.5; Min-Max: 6-30; Range: 13-30

Table 15 shows how mothers responded to statements on susceptibility to MiP. For every 10 women, 6 of them parried away the misconception that MiP is easily curable. Most of the respondents underscored the fact that compared to other sub-populations, pregnant women are more vulnerable to malaria (95.9%), with the risk of infection spanning throughout the year (96.6%). More than two-thirds (67.1%) disputed the perception that malaria is a normal condition during pregnancy, and 89.0% reported seeing a severe case of MiP each year. Similarly, 92.7% of mothers were aware that treatment should be sought promptly for any fever during pregnancy.

Table 15: Parameters for assessing perceptions about susceptibility

	n (%)				
Statement	**SA**	**A**	**UC**	**DA**	**SDA**
Malaria is curable so pregnant women need not worry*	100 (28.2)	32 (9.0)	3 (0.8)	55 (15.5)	165 (46.5)
Pregnant women are more vulnerable to malaria	303 (85.4)	37 (10.4)	7 (2.0)	6 (1.7)	2 (0.6)
Pregnant women can get malaria any time of the year	304 (85.6)	39 (11.0)	1 (0.3)	8 (2.3)	3 (0.8)
Malaria is normal during pregnancy*	78 (22.0)	28 (7.9)	11 (3.1)	77 (21.7)	161 (45.4)
Each year, a pregnant woman suffers from severe malaria	267 (75.2)	49 (13.8)	9 (2.5)	16 (4.5)	14 (3.9)
A pregnant woman with fever should not seek care immediately*	16 (4.5)	5 (1.4)	5 (1.4)	72 (20.3)	257 (72.4)

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SDA** = Strongly disagree

Perceived severity of malaria in pregnancy

Adverse effects associated with a disease present anxiety among affected groups. In order to avoid experiencing such complications, vulnerable groups are willing to adopt preventive behaviors in order to reduce the risk of infection. Therefore, the extent to which women perceive the severity of MiP was also assessed. In this study, perceived susceptibility was assessed using a 5-point Likert scale (strongly agree, agree, uncertain, disagree, and strongly disagree,). There were 5 statements with possible minimum and maximum scores of 5 and 25, respectively. Using mean ± standard deviation (21.3 ± 3.0), such perceptions were categorized into 3 groups: low, moderate, and high. Table 16 shows the level of perception with regard to severity of MiP. Roughly four in every ten women (38.3%) of the respondents were likely to have high severity perception about the condition. The largest proportion (47.6%) had moderate perceptions while 14.1% assumed that the condition was not severe.

Table 16: Respondents' perceived severity of MiP

Perceived severity*	***n***	**%**
Low (< 19)	50	14.1
Moderate (19 -2 4)	169	47.6
High (25)	136	38.3

*Mean (±Standard Deviation): 21.3 (±3.0) Minimum-Maximum: 5-25

Table 17 shows how mothers responded to statements regarding perceptions to severity of MiP. A big proportion of mothers (95.8%) acknowledged that MiP can lead to retarded fetal growth and development. While 69.3% of the women did not agree with the perception that women are healthy and can easily recover from MiP, 26.2% were certain about this. With regards to pregnancy complications and outcomes, 97.4%, 89.6%, and 93.8% of respondents were familiar that MiP can lead to severe maternal anemia, infant mortality, and premature/still birth, respectively.

Table 17: Parameters for assessment of perceived severity to malaria in pregnancy

	n (%)				
Statement	**SA**	**A**	**UC**	**DA**	**SDA**
MiP can cause adverse effects on fetal growth	305 (85.9)	35 (9.9)	3 (0.8)	8 (2.3)	4 (1.1)
Pregnant women are healthy and recover easily from malaria*	67 (18.9)	26 (7.3)	16 (4.5)	71 (20.0)	175 (49.3)
Malaria causes severe anemia in pregnant women	310 (87.3)	36 (10.1)	2 (0.6)	3 (0.8)	4 (1.1)
Mortality is high among children born from women who had MiP	273 (76.9)	45 (12.7)	5 (1.4)	15 (4.2)	17 (4.8)
MiP can lead to premature or still birth	292 (82.3)	41 (11.5)	5 (1.4)	5 (1.4)	12 (3.4)

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SDA** = Strongly disagree

Perceived benefits of intermittent preventive therapy

Perceptions related to benefits of a particular health intervention are associated with the extent to which that service will be utilized. In order to effectively utilize a service, clients must be aware of the beneficial features of the intervention as an incentive. The extent to which women perceive the benefits associated with IPTp-SP utilization was also assessed. In this study, perceived benefits were assessed using a 5-point Likert scale (strongly agree, agree, uncertain, disagree, and strongly disagree,). There were 5 statements with possible minimum and maximum scores of 5 and 25, respectively. Using mean ± standard deviation (21.1± 3.3), such perceptions were categorized into 3 groups: low, moderate, and high. According to table 18, about one-third (34.4%) of the women acknowledged the preventive benefits of the intervention. In contrast, nearly one fifth of the respondents (19.4%) were ignorant of the beneficial effects associated with utilization of IPTp-SP during pregnancy.

Table 18: Respondents' perceptions on benefits of IPTp-SP

Perceived benefits	***n (355)***	**%**
Low (< 19)	69	19.4
Moderate (19 - 24)	164	46.2
High (> 25)	122	34.4

*Mean ± Standard Deviation: 21.1 ± 3.3 Minimum-Maximum: 5-25

Analysis of women's responses for individual statements in table 19 shows that 68.4% disagreed with the belief that receipt of a single dose of SP can give optimal preventive effects against MiP. Most of the respondents (85.1%) were aware that risk of malaria infection decreases among pregnant women using IPTp-SP than those who do not. when administered to a pregnant woman. causes adverse side effects to pregnant women. In the same way, the majority (97.8%) of mothers were in agreement with scientific evidence showing that IPTp-SP remains the most effective method of preventing MiP when compared with the use of traditional remedies. Nearly 9 out of 10 (89.9%) respondents acknowledged that pregnant women should follow the prescribed schedule in order to maximize the preventive value of SP.

Table 19: Parameters for assessing perceived benefits of IPTp-SP responses

	n (%)				
Statement	**SA**	**A**	**UC**	**DA**	**SDA**
A pregnant woman is protected against malaria with one dose of SP*	71 (20.0)	33 (9.3)	8 (2.3)	64 (18.0)	179 (50.4)
SP causes adverse side effects to pregnant women*	40 (11.3)	18 (5.1)	24 (6.8)	68 (19.2)	205 (57.7)
Risk of malaria infection is equal whether or not pregnant women take SP*	26 (7.3)	18 (5.1)	9 (2.5)	66 (18.6)	236 (66.5)
SP is more effective than traditional medicine in preventing MiP	312 (87.9)	35 (9.9)	5 (1.4)	1 (0.3)	2 (0.6)
Pregnant women should follow SP schedule	281 (79.2)	38 (10.7)	11 (3.1)	14 (3.9)	11 (3.1)

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SDA** = Strongly disagree

4.2. Part B: Bivariate analysis

In order to determine the presence of any association between the different independent variables and the outcome variable (IPTp-SP utilization), Pearson's chi-square test was used, and $p < 0.05$ was considered significant. In executing bivariate analysis, the respondents' marital status, occupation status, parity, and number of ANC visits attended were recoded to simplify analysis and results as described in Chapter 3, section 3.10.2. - measurement and scoring (MacCallum, Zhang, Preacher, & Rucker, 2002). The results show that the following variables were associated with the outcome variable: knowledge ($p = 0.005$); attitudes ($p < 0.001$); gestation at 1st ANC ($p < 0.001$); number of ANC visits ($p = 0.005$); receipt of at least one dose under DOT ($p < 0.001$); health education ($p < 0.001$); client satisfaction ($p = 0.001$); and perceived benefits ($p < 0.001$). Distribution of these potential determinants to IPTp-SP utilization is presented in tables 20 – 22.

4.2.1. Association between predisposing factors and uptake of intermittent preventive therapy

There were no significant statistical associations between IPTp-SP utilization and the respondents' age; marital status; education level, occupation status, income, gravidity and parity (Table 20). However, an association was observed between the level of knowledge on MiP and IPTp-SP with utilization of the intervention. Overall, possession of high level of knowledge did not translate into the expected optimal utilization as only 16.9% of mothers in this category with received IPTp3+. However, when compared to the group with low knowledge, uptake of optimal IPTp-SP doses was slightly higher among respondents with high knowledge; 16.9% versus 14.6% ($p = 0.005$).

Women's attitudes towards IPTp-SP was strongly associated with the extent to which the intervention was utilized ($p < 0.001$). Among those who received optimal doses, mothers with negative attitudes had a lower coverage (12.7%) than their counterparts possessing positive attitudes (41.4%).

Table 20: Distribution of IPTp-SP utilization by predisposing factors

Variable	n	IPTp-SP Utilization - n (%)		χ2	*p* value[a]
		Suboptimal ***(n = 267)***	**Optimal** ***(n = 88)***		
Age *(years)*					
18 – 24	207	162 (78.3)	45 (21.7)	5.12	0.223
25 – 34	115	80 (69.6)	35 (30.4)		
35 – 49	33	25 (75.8)	8 (24.2)		
Marital status					
Without spouse	34	28 (82.4)	6 (17.6)	3.23	0.310
With spouse	321	239 (74.45	82 (25.3)		
Education level					
None	26	22 (84.6)	4 (15.4)	1.34	0.513
Primary	242	180 (74.4)	62 (25.6)		
Secondary/Tertiary	87	65 (74.7)	22 (25.3)		
Occupation					
Unemployed	313	240 (76.7)	73 (23.3)	3.05	0.081
Employed	43	27 (62.8)	16 (37.2)		
Monthly income *(Malawi Kwacha)*					
Lower	146	116 (79.5)	30 (20.5)	2.39	0.122
Higher	209	151 (72.2)	58 (27.8)		
Gravidity					
Primigravid	136	101 (74.3)	35 (25.7)		
Secundigravid	80	65 (81.3)	15 (18.8)	2.12	0.347
Multigravid	139	101 (72.7)	38 (27.3)		
Parity					
< 4 children	228	174 (76.3)	54 (61.4)	0.42	0.518
≥ 4 children	127	93 (73.2)	34 (38.6)		
Knowledge					
Low	48	41 (85.4)	7 (14.6)	10.42	**0.005**
Moderate	141	114 (80.9)	27 (19.1)		

High	166	138 (83.1)	60 (16.9)		
Attitudes					
Negative	63	55 (87.3)	8 (12.7)		
Neutral	222	171 (77.0)	51 (23.0)	15.73	**<0.001**
Positive	70	41 (58.6)	29 (41.4)		

[a] p value < 0.05 Significance by Pearson's Chi squared test

4.2.2. Association between enabling factors and uptake of intermittent preventive therapy

Table 21 shows the association between enabling factors and uptake of IPTp-SP among pregnant women in the study area. The following variables showed no statistical association with the outcome variable (IPTp-SP utilization): distance, and transport costs to the nearest ANC facility; and waiting time before consultation with health provider.

In contrast, ANC attendance in terms of both timing of initiation ($p < 0.001$) and frequency of visits ($p = 0.005$) were significantly associated with uptake of IPTp-SP services. Utilization of optimal IPTp-SP was highest among respondents who initiated ANC during the first trimester (41.4%) and was lowest among those reporting late in third trimester (14.8%). In the same way, women who received adequate ANC (4 or more) visits during the course of the pregnancy were more likely to take optimal doses (32.4%) compared to those who sought fewer visits (19.3%). This result also means that among women who attended at least four ANC visits, 67.6% were unable to utilize optimal IPTp-SP.

Adherence to DOT guidelines was significantly associated with IPTp-SP ($p < 0.001$). Receipt of optimal IPTp-SP was likely to be higher among women taking at least one dose of SP under DOT (30.5%) than those who did not observe the DOT requirement (2.7%). Among women who did not report any SP dose under DOT (n = 75), the majority (97.3%) received inadequate doses by the time they delivered. An association was also observed between IPTp-SP receipt and exposure to health education messages at the ANC facility. Women who were adequately informed about the dangers of MiP and benefits of IPTp-SP were more likely to take optimal IPTp-SP ($p < 0.001$) than those who received less information (31.3% versus 13.3%).

The extent to which clients were satisfied with service delivery was also seen to be significantly associated with IPTp-SP utilization (p = 0.001). Mothers who reported high satisfaction with service delivery had a higher likelihood of taking optimal IPTp-SP doses (31.6%) than those who were less satisfied (16.7%).

Table 21: Distribution of IPTp-SP utilization by enabling factors

Variable	**n**	**IPTp-SP utilization - n (%)**		**χ2**	***p* value[a]**
		Suboptimal *(n = 267)*	**Optimal *(n = 88)***		
Gestation at first ANC visit (trimester)					
1st	87	51 (58.6)	36 (41.4)		
2nd	241	193 (80.1)	48 (19.9)	17.35	**<0.001**
3rd	27	23 (85.2)	4 (14.8)		
Number of ANC visits					
< 4 (inadequate)	207	167 (80.7)	40 (19.3)	7.95	**0.005**
≥ 4 (adequate)	148	100 (67.6)	48 (32.4)		
At least 1 dose under DOT					
Yes	279	194 (69.5)	85 (30.5)	22.53	**<0.001**
No	75	73 (97.3)	2 (2.7)		
Health education					
Inadequate	128	111 (86.7)	17 (13.3)	14.22	**<0.001**
Adequate	227	156 (68.7)	71 (31.3)		
Distance to ANC facility					
< 1 hour	203	153 (75.4)	50 (24.6)	0.01	0.936
≥ 1 hour	152	114 (75.0)	38 (25.0)		
Transport costs					
< 500 MWK	161	119 (73.9)	42 (26.1)	0.27	0.606
≥ 500 MWK	194	148 (76.3)	46 (23.7)		
Waiting time					
< 1 hour	198	143 (72.2)	55 (27.8)	2.15	0.143
≥ 1 hour	157	124 (79.0)	33 (21.0)		
Client satisfaction					

Low	162	135 (83.3)	27 (16.7)	10.54	**0.001**
High	193	132 (68.4)	61 (31.6)		

[a] *p* value < 0.05 Significance by Pearson's Chi squared test

4.2.3. Association between needs factors and uptake of intermittent preventive therapy

Table 22 shows the association between needs factors and uptake of IPTp-SP among pregnant women in the study area. The results showed a significant statistical association observed between the outcome variable (IPTp-SP utilization) and one of the three variables. Women's perceptions on susceptibility to MiP ($p < 0.093$) and severity of the condition ($p < 0.176$) showed no association with utilization of the service. In contrast, women's perceived benefits of using IPTp-SP ($p < 0.001$) influenced the extent to which the intervention was utilized. Women who acknowledged the protective benefits of IPTp-SP were more likely (37.7%) to receive the recommended SP doses than those who were ignorant of the preventive value of SP (13.0%).

Table 22: Distribution of IPTp-SP utilization by enabling factors

Variable	**n**	**IPTp-SP utilization - n (%)**		**χ2**	***p* value[a]**
		Suboptimal *(n = 267)*	**Optimal *(n = 88)***		
Perceived susceptibility					
Low	77	65 (84.4)	12 (15.6)		
Moderate	193	142 (73.6)	51 (26.4)	4.75	0.093
High	85	60 (70.6)	25 (29.4)		
Perceived severity					
Low	50	40 (80.0)	10 (20.0)		
Moderate	169	132 (78.1)	37(21.9)	3.47	0.176
High	136	95 (69.9)	41 (30.1)		
Perceived benefits					
Low	69	60 (22.5)	9 (13.0)		
Moderate	164	131 (49.1)	33 (20.1)	17.94	**<0.001**
High	122	76 (28.5)	46 (37.7)		

[a] *p* value < 0.05 Significance by Pearson's Chi squared test

4.3. Part C: Multivariate analysis

Binary logistic regression was executed to establish the net effect of individual variables on the utilization of IPTp-SP after controlling for other predictors. The regression model comprised of all variables that were statistically significant from the bivariate analysis. In addition, variables with *p* value < 0.2 from the same analysis stage were included. The final regression model consisted of the following potential predictors: occupation status, income, knowledge, attitudes, gestation at first ANC visit, number of ANC visits, receipt of at least 1 SP dose under DOT, health education, waiting time, client satisfaction, and perceived benefits of IPTp-SP.

4.3.1. Predictors of utilization for intermittent preventive therapy among pregnant women

Results from the regression model show that only 2 variables showed predictive abilities after controlling for the effect of confounders using multivariate analysis (table 23). Having received at least 1 SP dose under DOT ($p < 0.002$) and the extent to which a woman was satisfied with delivery of services at ANC ($p < 0.029$) could predict to increased uptake of IPTp3+. The former predicted that receipt of IPTp3+ among women during pregnancy in the study area was 6.96 times more likely among those who complied with the DOT requirement at least once (AOR 6.96; 95% CI 2.04-23.71). In the case of client satisfaction, women who were contented with service delivery were 1.94 times more likely to receive optimal IPTp-SP doses (AOR 1.94; 95% CI 1.07-3.51). Apart from these two, the rest of the independent variables included in the regression model did not show statistical significance to predict uptake of optimal IPTp-SP among the study population.

Table 23: Multiple logistic regression model of potential predictors of IPTp-SP utilization

Variable	**AOR**	**95% CI**	***p* value**
Occupation status			
Unemployed	*Ref.*		
Employed	1.333	0.594-2.993	0.486
Monthly income			
Lower	*Ref.*		
Higher	0.998	0.549-1.814	0.994
Knowledge level			
Low	*Ref.*		0.320
Fair	1.142	0.409-3.189	0.799
High	1.818	0.650-5.087	0.255
Attitudes towards IPTp-SP			
Negative	*Ref.*		0.143
Neutral	1.141	0.460-2.833	0.776
Positive	2.271	0.758-6.804	0.143
Gestation at first ANC visit (trimester)			
3rd	*Ref.*		0.065
2nd	1.669	0.440-6.333	0.451
1st	0.792	0.231-2.718	0.710
Number of ANC visits attended			
Inadequate (< 4)	*Ref.*		
Adequate (≥ 4)	1.549	0.859-2.793	0.145
At least 1 dose taken under DOT			
No	*Ref.*		
Yes	6.956	2.041-23.705	**0.002***

Health education			
Inadequate	*Ref.*		
Adequate	0.602	0.250-1.449	0.258
Client satisfaction			
Low	*Ref.*		
High	1.941	1.072-3.514	**0.029***
Wait times at ANC facility			
< 1 hour	*Ref.*		
≥ 1 hour	1.113	0.629-1.971	0.712
Perceived susceptibility			
Low	*Ref.*		0.091
Moderate	1.249	0.539-2.893	0.605
High	0.526	0.174-1.584	0.253
Perceived severity			
Low	*Ref.*		0.995
Moderate	0.954	0.395-2.306	0.917
High	0.961	0.358-2.577	0.936
Perceived benefits			
Low	*Ref.*		0.048
Moderate	1.128	0.448-2.843	0.798
High	2.657	0.947-7.454	0.063

* Significance at p -value < 0.05 Reference category is Optimal IPTp-SP

CHAPTER 5

DISCUSSION OF RESULTS

This cross-sectional study was aimed at exploring factors affecting the utilization IPTp-SP among women during pregnancy in rural, Lilongwe, Malawi. All the 355 mothers who were approached to participate in the study consented and gave complete information for analysis. This was not unusual finding in a country where studies without potential risks are widely embraced by the community (Ministry of Health & ICF International, 2014, 2015; National Statistical Office & ICF, 2017). Respondents were recruited from the following 6 participating health facilities; *Kabudula, Ukwe, Nathenje, Mtenthera, Mitundu, and Dickson*. In this study, the potential determinants of the outcome variable (IPTp-SP utilization) were classified into 3 groups of predisposing; enabling; and needs factors. Data collection was conducted in June 2018 using an interviewer-administered questionnaire.

5.1. Utilization of intermittent preventive treatment of malaria during pregnancy

For countries with steady malaria transmission such as Malawi, the WHO recommends a three-pronged approach to minimize the adverse health effects related with MiP. These include: use of LLINs; IPTp-SP; and prompt diagnosis and treatment (World Health Organisation, 2013). Based on the WHO model, Malawi's IPTp-SP programme was integrated into the focused ANC platform. The goal of the intervention is to protect every pregnant woman, her fetus and newborn from malaria related complications. through administration of SP during routine ANC visits. The current national IPTp-SP policy, modelled around WHO's guidelines, recommends the administration of at least 3 doses of SP to each eligible pregnant woman. The first dose is administered at 16 weeks of gestation, and the subsequent doses given at least 1 month apart until the woman delivers (Ministry of Health, 2014).

The indicator used to measure utilization of IPTp-SP in this current study is the proportion of mothers with documentation of receipt of optimal (3 or more) SP doses.

This coverage is used as a proxy estimate of effective IPTp-SP service delivery i.e. the percentage of target women receiving IPT3+ (Florey, 2013). Thus, respondents were asked to provide information mostly relating to the period they were expectant with their youngest child under the age of one year. Based on documented evidence from respondents' ANC cards, more than three-quarters of the respondents (77.5%) took at least one SP dose. One in every four women (24.8%) had proof of having taken the recommended IPTp-SP doses. Utilization rates from self-reported information were slightly higher; with 84.5% and 28.2% of the respondents reporting that they took at least one and three doses of SP, respectively. These differences in utilization rates might be explained by the possibility of recall and/or response bias that is characteristic with self-reported information (Nkoka, Chuang, & Chen, 2018; Odjidja & Duric, 2017). Additionally, this can be attributed to health provider's incomplete or incorrect documentation of services offered to pregnant women at the ANC clinic (Hill et al., 2013).

In general, the effectiveness coverage estimates from this study providence evidence that the IPTp-SP programme in the district is underperforming. Nonetheless, both coverage figures show significant improvement compared with estimates from the 2014 national survey which reported a 13% utilization rate for optimal IPTp-SP (Ministry of Health & ICF International, 2015). The 28.2% estimate derived from self-reported information is comparable to a 29.8% IPTp3+ coverage reported in Zomba district, eastern Malawi (Azizi et al., 2018). However, coverage of optimal IPTp-SP remains short from the RBM's 80 % target (Roll Back Malaria, 2010). Regardless of this big deficit, the upward trend in coverage of IPTp3+ reflects the country's commitment to reduce the burden of malaria.

It must be noted that the 2014 study coincided with the country's adaptation of revised IPTp-SP guidelines from the initial minimum two doses to at least three doses as recommended by the WHO. Thus, this low coverage was attributed to this policy transition period, during which implementation of the new guidelines had not been scaled up fully. In essence, the 2014 MMIS estimate only serves as the baseline for IPTp3+ coverage (Ministry of Health & ICF International, 2015).

In contrast, both coverages from this current study are lower than findings from two, more recent national surveys conducted in the country. According to the 2015/16

MDHS and 2017 MMIS, coverage of optimal IPTp-SP was estimated at 30.2%. and 41.1%, respectively (Ministry of Health & ICF, 2018; National Statistical Office & ICF, 2017). While the methodology applied in the two national household surveys are similar, the current study adopted a different methodological approach. Firstly, for study participants, this study enrolled mothers of under-one children, randomly selected from participating health facilities. On the contrary, both household surveys recruited mothers who had a live birth in the two years preceding the survey, drawn from selected enumeration areas. Secondly, while the geographic and residential scope of the surveys was national, covering both rural and urban settings, the current study was only limited to rural settings in one district. Findings from both national surveys observed variations in uptake of malaria interventions between regions, districts and the rural versus urban divide. Thirdly, while this study used the validated information on IPTp-SP receipt, the 2 surveys only utilized self-reported information which is prone to social desirability bias as respondents may over-report in order to conform to prevailing societal norms (Nkoka et al., 2018). Therefore, critical analysis of such issues could help in attempting to explain the disparities observed in IPTp-SP utilization rates across findings from these three studies.

5.2. Predisposing factors

In an attempt to assess the influence of predisposing factors on IPTp-SP utilization, general characteristics and health knowledge and attitudes of the respondents on MiP and IPTp-SP were assessed in this study. In previous studies, associations were established between socio-demographic characteristics like age and marital status, education and parity with effective IPTp-SP uptake. However, this study did not observe associations between these respondents' characteristics and IPTp-SP uptake.

5.2.1. Maternal age

In this study, more than half of the mothers (58.3%) were aged between 18 and 24 years, followed by 32.4% from the 25 - 34 years' age group. From the bivariate analysis, it was observed that age was not associated with uptake of optimal utilization of IPTp-SP (p = 0.223). This result is consistent with findings from earlier studies that determined that maternal age does not influence uptake of IPTp-SP (Azizi et al., 2018; Odjidja & Duric, 2017). However, this finding contradicts with a study in the country which

reported that 25.4% of younger mothers (<25 years) received suboptimal doses (AOR 1.98 95% CI 1.42-2.13) compared to 20.4% and 18.8% of older women belonging to the 25 - 34 and 35 - 49 age groups, respectively (Odjidja & Duric, 2017). Similar findings were documented in a study by Kibusi and colleagues in which optimal IPTp-SP was highest among the 25 – 34 age group compared those aged below 25 years (Stephen M Kibusi, Eunice Kimunai, & Courtney S Hines, 2015). In their systematic review, Simkhanda et al determined that inadequate access to youth friendly sexual and reproductive health services and negative health worker attitudes might be a major deterrent for most young expectant women (Simkhada B et al., 2008).

5.2.2. Marital status

Similar to findings on age, this study found no association between marital status and optimal uptake of (p = 0.310). This finding contradicts with results from another study done in another district in Malawi which determined that single or separated women, compared to their married counterparts, were more likely to receive adequate doses of IPTp. The former group felt that in the absence of spousal support, they were socially vulnerable and with increased risk of MiP infection. In addition, because they did not require permission from a spouse before going to health facility, they had increased autonomy to use the available ANC services (Azizi et al., 2018). However, it has to be noted that this study only had 34 respondents who were not married, so certainly the power was too low to observe possible differences (Cohen, West, & Aiken, 2014; McDonald JH, 2014).

5.2.2. Knowledge on malaria in pregnancy and attitudes towards intermittent preventive treatment

The level of knowledge and attitudes towards a particular health intervention can play an important role on the acceptability and degree to which certain services are utilized. Although most women were aware about the mosquito-malaria link, the disease was also attributed to other etiologies like weather, consumption of dirty water/food, and supernatural causation. This result is consistent with findings documented in a study conducted in the country, 25 years prior to the current study (Helitzer-Allen, Kendall, & Wirima, 1993). This is a reflection of deep rooted beliefs and perceptions among communities that have not impressively improved despite the investments in malaria

SBCC interventions. Overall, the majority were aware about the vulnerability of pregnant women to malaria, that IPTp-SP is administered to pregnant women, the service delivery points, correct dose, number of recommended doses and interval between doses. However, just over half of the mothers demonstrated knowledge of the timing for the first dose. These findings highlight the need to intensify health communication programmes to improve specific knowledge gaps and create demand for the intervention (Roll Back Malaria, 2014). In this current study, low levels of knowledge on MiP ($p = 0.005$) and attitudes ($p < 0.001$) towards IPTp-SP were both associated with IPTp-SP utilization. For both factors, receipt of suboptimal IPTp was more likely to be reported among those with low knowledge and negative attitudes. This is logical, as misconceptions stemming from inadequate knowledge often lead to late care-seeking practices for lifesaving biomedical interventions (Launiala & Kulmala, 2006). This finding also reinforces observation by Hill and colleagues in their meta-analysis on determinants of IPTp-SP among pregnant women in sub-Saharan Africa. The authors indicated that because women had limited knowledge on the preventive value of SP, the recommended number of doses, and dosing schedule, they were less likely to receive optimal IPTp-SP (Hill et al., 2013). This realization necessitates stakeholders working on malaria programs to design client-centred health communication interventions in order to improve awareness (Exavery et al., 2014). Social and behavior change communication approaches through interpersonal and media campaigns have been successfully used in other countries to improve knowledge, influence behavior change and increase uptake of IPTp3+ (Florey, 2013). In contrast, this result contradicts with a Nigerian study which determined that knowledge of adverse effects of MiP did not significantly influence uptake of IPTp-SP (Okoronkwo & Okoye). Another study from Tanzania observed variations in treatment-seeking patterns for malaria despite the population having knowledge about the biomedical perspective of malaria (Kamat, 2008). It is important to note that for both variables, three categories were used during analysis: low/negative, moderate, and high/positive. Therefore, the placement of respondents into the intermediate category as opposed to having two discrete groups (e.g. by merging the two most lower categories) might have had an effect on the findings. For instance, mothers in the intermediate category of attitudes demonstrated their indifferent assertions towards the IPTp-SP intervention

with the likelihood of swinging to either direction on the attitudes scale. This indecision can be used to improve IPTp-SP coverage by designing communication programmes that can swing this group towards the possession of desirable attitudes. Programme efforts such as health communication can take advantage of this indecision and facilitate the graduation of this group into possessing desirable attitudes of the intervention (Roll Back Malaria, 2014).

5.3. Enabling factors

5.3.1. Antenatal care attendance

In order to achieve effective IPTp-SP coverage, the first step should involve improving ANC attendance by pregnant women. Proposals to integrate IPTp-SP as part of a broad ANC platform have been advanced on the basis that efforts to improve ANC attendance will lead to proportionate increase in the coverage of IPTp (de Jongh, Gurol–Urganci, Allen, Zhu, & Atun, 2016; World Health Organisation, 2013; World Health Organization, 2016). In this study, coverage of ANC was high and was therefore, not a major barrier. Overall, 84.0% of the respondents made at least 3 ANC visits; the average gestation at initiation of ANC was roughly mid-way through the pregnancy (4.4 months); and the mean frequency for ANC visits made was 3.3. This shows that the majority of the women attended ANC with satisfactory timing (of the first visit) and frequency; and should therefore have received the recommended 3 doses of SP. However, results show that only 24.8% of the eligible women received optimal IPTp-SP doses during pregnancy. Previous studies from Malawi and elsewhere have reported similar trends (Azizi et al., 2018; Exavery et al., 2014).

This current study established an association between ANC attendance and optimal IPTp-SP utilization. Women with early timing of the first ANC visit ($p < 0.001$) and adequate number of ANC visits ($p < 0.001$) were more likely to receive the recommended IPTp-SP doses. This finding is consistent with findings from studies conducted Malawi, Tanzania and Nigeria (Mpogoro et al., 2014; Odjidja & Duric, 2017; Okoronkwo & Okoye, 2016). However, this result contradicts with findings from a Kenyan study which did not determine such an association (Hill J, Dellicour S, et al., 2013). Given that more pregnant women start making the recommended number of

scheduled ANC visits, the number of SP doses will equally increase assuming that all other barriers such as staffing and SP stock-outs are addressed (Hill et al., 2013).

From the results, we also observe that the interaction between ANC facilities and clients was high, with 84.0% of the mothers making at least 3 ANC visits (contact coverage). Yet, this did not translate into the expected uptake of at least 3 doses of IPTp-SP estimated at 24.8% (effective coverage). This highlights the arguments raised in previous studies that ANC attendance may not actually be the key determinant to effective delivery of the IPTp-SP program (Florey, 2013; Odjidja & Duric, 2017). This also confirms the paradigm supporting the existence of gaps in the delivery of IPTp-SP service such as health worker performance and health facility level factors. Consequently, these bottlenecks lead to missed opportunities which slow down the effective coverage of the intervention (Hill J, Hoyt J, et al., 2013; Mpogoro et al., 2014). Since this current study only focused on identification of barriers limiting receipt of the intervention from the clients' perspectives, it cannot draw informed conclusions on policy and facility level factors. Nonetheless, other researchers have documented possible deterrents to effective IPTp delivery and utilization. There is literature suggesting that non-adherence to malaria treatment guidelines is common among health workers in Malawi (Kalilani-Phiri, Lungu, & Coghlan, 2011). In a Nigerian study, optimal IPTp-SP coverage was estimated at 7% and a key bottleneck identified was failure by health workers to offer SP to eligible clients (Onoka, Onwujekwe, Hanson, & Uzochukwu, 2012). In their systematic review and meta-analysis, Hill and colleagues reported that health workers possessed limited knowledge of IPTp-SP guidelines, potential side effects and preventive value of SP as key barriers (Hill et al., 2013). Moreover, studies have cited the following as limiting factors to IPTp-SP delivery: inadequate staffing (leading to long waiting times and inadequate provider-client interaction), inadequate training of health workers, drug (SP) stock outs; unavailability of supplies e.g. cups and clean drinking water to be used for DOT (Hill et al., 2013; Pell et al., 2011). Such bottlenecks linked to health worker performance and general service delivery could very well play a role in Malawi and should be thoroughly reviewed and addressed in order to realize effective coverage of this lifesaving intervention.

This finding has various potential policy implications for the national malaria control programme in Malawi. First, it advances the agenda for the full integration of IPTp-SP to reduce the number of missed opportunities for IPTp-SP delivery. Second, it questions whether all eligible pregnant women are offered to take SP at each applicable ANC visit. Thirdly, it underlines the importance of health systems strengthening in terms of health worker sufficiency and competency (training) on IPTp-SP guidelines, availability of supplies and equipment for IPTp, and the ability of health managers to use data from health information system for decision making. These should be investigated and a starting point is conducting operational research to identify specific health worker and facility level gaps that limit effective coverage of the intervention.

5.3.2. Distance and related transport costs to health facility

Previous studies have reported that distance to the nearest ANC and the accompanying transport costs as dominant factors of IPTp-SP receipt. It has been documented that long walking distances to ANC clinics lead to discontinuity of receiving subsequent IPTp-SP doses among pregnant women who took the initial dose (Pell et al., 2011). Similarly, the absence of reliable transport modes means that transport costs are high exposing pregnant women and their families to economic hardships, and consequently leading to high dropout rates from the intervention (Hill & Kazembe, 2006). Surprisingly, no such associations were observed in this study and this unexpected observation can be explained by different possibilities. As this was a facility-based study that recruited caregivers accessing services from under-five clinic, mothers residing outside the recommended 8 km radius from a health facility may have been left out from participation. In Malawi, besides services offered at static sites, scheduled outreach clinics for under-five services are arranged in order to reach populations living in hard-to-reach areas (Ministry of Health, 2017b; Ministry of Health & ICF International, 2014). With such potential influence from selection bias, it is likely that perspectives regarding long distances as experienced by women from under-served areas were not adequately represented by this study. The absence of association with regard to transport costs and IPTp-SP utilization might be attributed to the distribution of respondents across the two classes of income. Since most of the mothers for both optimal and suboptimal IPTp-SP utilization were likely to belong to the upper income

group with a monthly income of 10,000 Malawi Kwacha, they had the capacity to cover the transport costs to access ANC services. This justification is supported by studies reviewed by Hill and others in their meta-analysis which reported higher income as a precursor for IPTp-SP optimization (Hill et al., 2013).

5.3.3. Directly observed therapy

This study determined an association between taking SP under observation and utilization of IPTp-SP. Women who were not observed when ingesting the SP (DOT) were less likely to take the recommended doses than those who received at least one dose under DOT ($p = 0.001$). A study from Tanzania made a similar observation which showed decreasing utilization of optimal IPTp-SP among women who were permitted to take the SP at home (G. M. Mubyazi et al., 2008). Although this is against the IPTp-SP guidelines, several factors would result in the pregnant women taking the SP unobserved. These may include inadequate unavailability of essential supplies and utilities for administration of IPTp-SP in ANC facilities such as clean drinking water, and cups and inadequate staffing that often leads to poor quality services (Hill et al., 2013; G. M. Mubyazi et al., 2008; Pell et al., 2011). Low compliance with this protocol among health workers in Malawi has been documented from previous studies due to weak service monitoring measures, among other reasons (Ameh et al., 2016; Odjidja & Duric, 2017). In Nigeria, a study revealed that despite pregnant women's willingness to receive IPTp-SP, only 14% were supervised by health workers at the time of ingesting the medicine (Akinleye, Falade, & Ajayi, 2009).

During multivariate analysis, this variable maintained its significance indicative of its predictive capabilities for IPTp-SP utilization during pregnancy after controlling for the confounding effect of other variables in the regression model. Women who were observed at least once at the time of ingesting the medicine were 7 times more likely to receive optimal IPTp-SP (AOR 6.956 95% CI 2.041-23.705). Nevertheless, the accuracy of this finding is uncertain considering the wide 95% confidence interval which can be attributed to a small sample size (Bland & Altman, 1986). For future studies, a bigger sample size is recommended.

5.3.4. Health education

In a study conducted across 6 districts in Tanzania, there was evidence that pregnant women who were counselled on the dangers of MiP were more likely to take optimal IPTp (Exavery et al., 2014). This current study shares the same observation; women who were adequately exposed to health education messages at the clinic had better likelihood of completing IPTp-SP than those who received less health information on dangers of MiP and benefits associated with IPTp-SP ($p < 0.001$). This awareness among pregnant women ensures that they possess correct information which facilitates informed decision-making thereby accelerating the utilization of IPTp-SP (Hill J, Hoyt J, et al., 2013).

5.3.5. Client satisfaction

The level of client satisfaction was measured by assessing clients' opinions on potential bottlenecks affecting healthcare accessibility like availability of commodities (SP), waiting times and their willingness to return to the same facility in future. Clients who expressed satisfaction with services offered at ANC facilities were more likely to receive the recommended number of IPTp-SP doses ($p = 0.001$). Even among those with low knowledge levels, some pregnant women in the study area still took optimal IPTp-SP doses. This demonstrates the trust these women have towards health providers in administering beneficial and safe drugs (Hill J, Hoyt J, et al., 2013). This finding was expected and is aligned with the responsiveness arm of the WHO's framework for health systems strengthening (World Health Organization, 2014).

During multivariate analysis, this variable maintained its significance demonstrating it can predict IPTp-SP utilization during pregnancy after controlling for the confounding effect of other variables in the regression model. Women reporting high satisfaction with services offered at ANC clinics were 2 times more likely to receive optimal IPTp-SP (AOR 1.941 95% CI 1.072-3.514).

5.4. Needs factors

5.4.1. Perceived benefits of intermittent preventive treatment

This study showed that in general, 34.4% of the respondents had positive perspectives regarding preventive value of IPTp-SP which are an important determinant of the extent

to which the service is utilized. This study showed that among women with negative perceptions of the intervention, receipt of optimal IPTp-SP is less likely ($p < 0.001$). This result is in line with literature from previous studies which showed that women with inadequate IPTp-SP uptake possess low awareness on the preventive benefits of SP. In a mixed methods study, researchers in Zambia observed that although pregnant women reported mild side effects after taking SP, they were still willing to receive the drug because of its proven protective functions (Sikambale et al., 2013). In their meta-analysis on factors affecting uptake of IPTp-SP in sub-Saharan Africa, Hill et al established that among populations with widespread ignorance on benefits of IPTp-SP, fears, myths and misconceptions may arise regarding the safety of taking the drug during pregnancy (Hill J, Hoyt J, et al., 2013). If these issues are left unchecked, a sense of mistrust is created with devastating implications such as some women rejecting all medication for fear of the perceived side effects and complications allegedly caused by SP such as abortion (Pell et al., 2011).

The absence of associations between perceived susceptibility to, and severity of MiP was another result of interest. Both the Andersen's model of health service utilization and the health belief model have suggested that perspectives individuals hold about a health condition in terms of risk and severity can have potential influence on whether or not they utilize treatment and control services (Andersen, 1995; Glanz, Rimer, & Viswanath, 2008). Perhaps women's perceptions on risk and severity of MiP were significant, but not at a significant level to influence the utilization of IPTp-SP during pregnancy. The other possibility is the issue discussed under attitudes relating to the use of two levels for perceptions (low and high) during data analysis as opposed to having an intermediate category. In addition, this is confirmation that just like beliefs and attitudes, women's perceptions on their vulnerability and severity to MiP are overlooked in malaria control efforts (Ministry of Health & ICF, 2018).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

This study has established that at 24.8% coverage, the proportion of women receiving optimal IPTp for malaria during pregnancy remains low and falls short of the RBM's 80% target. The country's NMCP, in collaboration with stakeholders, needs to be commended for the steady progress that have been achieved on IPTp-SP programming. Despite these gains, there is a lot that needs to be done if this performance trajectory is to remain on an ascending course. If this gap is to be successfully bridged, the programme should have clear understanding of the determinants affecting optimization of IPTp-SP. Specifically, it will be crucial to appreciate what motivates pregnant women to receive the recommended IPTp-SP doses, and bottlenecks that encourage discontinuity after receiving the initial done. If the proportion of pregnant women defaulting subsequent doses is controlled, Malawi will be on course to become the first country to achieve effective coverage IPTp-SP. In the same way, it would be rational to understand the barriers that prevent some pregnant women from utilizing the intervention altogether in order to come up with tailor made strategies that will stimulate sustained uptake of the service.

This study attempted to identify key bottlenecks from the clients' perspectives regarding the acceptability and uptake of IPTp-SP during pregnancy. These findings add to the existing pool of evidence on IPTp-SP service delivery and also forms the basis for designing, prioritizing and/or scaling up of new or existing high impact interventions. The study shows that while associations between potential determinants and IPTp-SP receipt were observed, most of these independent variables did not show statistical significance to predict utilization of the service. In contrast to findings from previous studies that IPTp-SP is dependent on sociodemographic factors, this study did not find such associations. Rather, findings from this study suggest that suboptimal IPTp-SP utilization may be a consequence of insufficient policy implementation, health system factors, health facility barriers, and health worker performance.

Based on comparisons made with previous studies, these findings highlight contextual variations and similarities regarding obstacles to access, delivery, and utilization of IPTp-SP across different socioeconomic and geographic borders. These findings provide important insights on the delivery and utilization of the intervention, however, while they may be generalizable to the study area, similar conclusions may not be applicable to the whole country. Therefore, in order to fully understand the influence of different determinants on IPTp-SP utilization, a large scale community-based study is proposed. To achieve maximum impact on IPTp-SP coverage, stakeholders should conduct thorough barrier analysis before settling for specific bottlenecks to address. For the client-level factors that show association with IPTp-SP utilization, there is need for stakeholders to intensify health communication programs to create demand and build trust for this lifesaving intervention. Additionally, in order to effectively improve coverage of the service on a sustained basis, it will be essential for healthcare providers to address the recurring problem of missed opportunities so that demand for the intervention is consistently matched with quality service delivery.

Past efforts have mostly focusses on examining the influence of knowledge, attitudes, beliefs and practices at community on IPTp-SP optimization. However, it is equally important to explore the effect these same variables on service delivery from the policy makers' and health practitioners' perspective (World Health Organization, 2015). Findings from such studies would help to identify the critical barriers to national level project planning, decision-making, and overall performance of health workers in terms of IPTp-SP. In addition, the results can provide insights into existing barriers that restrict adapting suitable, context-specific and needs-based strategies that accelerate effective coverage of IPTp-SP. This paradigm shift of focus from the traditional community context to the health system context could contribute to organizational changes and lead to better programmes and achievement of development targets (Odjidja & Duric, 2017).

6.2. Strengths and limitations

6.2.1. Strengths of the study

The application of randomization techniques at all stages of the sampling process during the data collection is a methodological strength of this study. In effect, this

allowed for a representative sample to be selected from the study population and thus the results could be generalizable to the study population, and regions with similar features as the study area, both locally and elsewhere.

This study used documented evidence from the respondents' ANC cards to validate the self-reported information on uptake of IPTp. Clearly, this procedure minimized the occurrence of recall and social desirability bias in as far as the outcome variable was concerned. Estimates from national surveys measuring coverage of IPTp utilization traditionally recruit eligible mothers who had had a live birth in the 2 years preceding the study period. Due to this long gap between exposure to a service and the timing of the interview, some respondents may have forgotten some important details leading to recall bias. Therefore, in order to reduce this bias, a modified inclusion criterion was used for this study in which only mothers of under-one children were enrolled. This study also adapted items from validated and reliable questionnaires that have been widely used in different settings.

6.2.2. Limitations of the study

A number of potential limitations for the study design should be noted. Firstly, for most of the variables, the findings are based on self-reported information as provided by study participants. Moreover, there was a delay of more than 1 year between the time respondents utilized the services and the study period. It could be that respondents had forgotten some important details and therefore, recall bias might have been a limiting factor. Therefore, the twin problems of recall and social desirability biases may have affected the results to some extent. In order to reduce the effect of such limitations, the data used for the analysis on the outcome variable (IPTp utilization) was based on verified, documented evidence from participants' ANC cards. Furthermore, to reduce occurrence of the same biases, participation into the study was restricted to women with a live birth in the previous one year preceding the survey. This was a departure from the standard procedure used by the MDHS and MMIS, national surveys which enroll mothers with a live birth in the two years prior to the survey.

As this was a facility-based study, it was liable to selection bias because women who do not use these facilities were constructively left out from participation. Moreover, it meant that respondents were interviewed outside their natural home environment and

some of them may have felt uncomfortable leading to inability to express their opinions fully. To counter this challenge, interviewers gave thorough explanation about the purpose and expected benefits from the study.

Furthermore, causal inferences cannot be established because the study design was cross-sectional and therefore, the findings only provide a single point and snapshot reference. Lastly, the study mostly explored the client-level perspectives leaving out health system level variables that significantly contribute to deficiencies in health service delivery. Despite the cited limitations, we believe that these findings generate useful evidence on the IPTp service utilization and will therefore guide future policy direction in Malawi and other sub-Saharan countries.

6.2.3. Expected benefit and application

Study findings will inform policy direction and design of strategies to achieve optimal utilization of IPTp-SP in the study area and elsewhere. Equipped with information on the key bottlenecks to service utilization, the NMCP and stakeholders will be able to work around the identified barriers with affected communities to implement strategies that attract and encourage pregnant women to attend ANC clinics and utilize IPTp-SP services optimally.

6.3. Recommendations

This study has highlighted the various factors that impede utilization of IPTp-SP in the study area. In order to improve coverage of the intervention in the short and medium term, stakeholders will have to design and implement strategies that offer cost-effective solutions to the identified challenges. Therefore, the following recommendations are proposed for consideration:

6.3.1. Stakeholder and programme recommendations

1. During the interviews with respondents, it was evident that self-reported information was inconsistent with records in the ANC cards. While this can be attributed to recall or response bias from the participants, it also points to the possibility of poor documentation of services offered into clients' ANC cards at

health facilities. Therefore, the DHO should ensure that health providers manning ANC units are recording correct and complete information not only in registers, but also in ANC cards. This can be done through routine supervisory and monitoring visits to health facilities.

2. Findings from this study show the predictive effect of administration of SP under DOT. Thus, in order to improve IPTp-SP utilization, NMCP in collaboration with DHO should ensure that health workers comply with this guideline by strengthening supportive supervision, conducting refresher courses for health workers, and providing DOT equipment and IPTp-SP guidelines among others.

3. Health workers should deliver effective health education and counseling services to reinforce pregnant women's trust regarding the intervention. This should not only take place at facility level, but also in the wider community.

4. To complement health workers' efforts in raising awareness on IPTp-SP, other stakeholders should amplify health communication programs, with the involvement of the influential leaders, to create demand for the intervention.

5. To avoid missed opportunity incidences, the DHO should ensure that IPTp-SP services are consistently available through deployment of health workers in under-served areas, maintenance of the supply chain to avoid SP stock outs.

6. NMCP should continue working with the reproductive health directorate in order to achieve full integration of the IPTp-SP into the focused ANC platform.

7. To achieve IPTp-SP optimization, health systems strengthening is crucial in terms of health workforce adequacy, competencies, availability of supplies and equipment, and use of data from health information system for decision making.

6.3.2. Future studies

1. In order to reduce biases associated with self-reported information, future research studies including national surveys (MMIS and MDHS) should use documented evidence for estimation of IPTp-SP coverage.

2. Future quantitative research should be community-based, conducted on a large scale in order to obtain generalizable findings.
3. Community-based qualitative research should be commissioned to investigate explanatory links for the identified barriers to utilization of IPTp-SP.
4. Future studies should scrutinize the diversity of knowledge, attitudes, and perceptions among women of child bearing age regarding malaria in pregnancy and IPTp-SP for programmes to effectively implement targeted community engagement and health education interventions.
5. Lastly, so far attention has been paid to exploring community knowledge, attitudes and practices in order to improve compliance with treatment regimens and preventive services ignoring the
6. NMCP should conduct operational research to investigate health system factors limiting the acceleration of IPTp-SP optimization. Using quantitative, qualitative or mixed methods, this investigation should examine the knowledge, attitudes and practices of health workers and programme planners working in malaria prevention.
7. Besides the traditional household survey exploring community level factors, future malaria indicator surveys should expand their scope to assess service provision.

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APPENDICES

Appendix 1A: Participant Information Sheet (English)

1. **Title of study**: Factors influencing the utilization of intermittent preventive treatment for malaria control during pregnancy among mothers of under-one children in rural Lilongwe, Malawi

2. **Principal Investigator's name**: Taonga Mafuleka *(a, b)*

3. **Thesis advisor (Co-Investigator)**: Dr. Montakarn Chuemchit *(b)*

4. **Contact details**

   a) Ministry of Health, P.O. Box 30377, Lilongwe 3, Malawi.

   b) College of Public Health Sciences, Chulalongkorn University, Institute Building 2, Soi Chulalongkorn 62, Phyathai Road, Pathumwan, Bangkok 10330, Thailand. ***Mobile:*** +265995877767. ***Email:*** taongamafuleka@gmail.com

5. **Objective:** To determine factors influencing the utilization of intermittent preventive treatment for malaria control during pregnancy among mothers of under-one children in rural Lilongwe, Malawi

6. **Study area:** The study will be conducted in rural Lilongwe, Malawi

Things you should know about research studies

You are being asked to take part in a research study. Choosing to join this study is voluntary and we hope you will agree to answer the questions since your views are important. You may choose not to participate, or you may withdraw your consent to be in the study, for any reason, without penalty. If you decide not to participate in the study or choose to withdraw from the study after initially giving consent to participate, it will not affect your ability to use any of the services offered at this health facility. This research study is designed to obtain new knowledge. This new evidence may be useful presently or in the immediate future. You will not receive any direct benefit from taking part in this research study.

Detailed information about this study is provided below. You are requested to read this information carefully or listen attentively as someone reads it for you so that you have a clear understanding of the study. With this understanding, you will be able to make an informed decision about taking part in this research study.
If you choose to take part in this study, we will ask you to sign or make a mark on the participant consent form that follows. You will also be given a copy of this consent form. You are encouraged to ask any questions you have about this study at any time. Your questions can be directed to the research team or the staff member in charge of this health facility.

Research methods and duration of your participation

We will be asking mothers of under-one children aged between 18 and 49 years who come to access child health services at different health facilities in rural Lilongwe. If you agree to participate in this study, you will be interviewed for approximately 15 – 20 minutes. The interviewer will use a prepared questionnaire with 64 questions to guide the discussion. For your privacy, your name will not be indicated on the questionnaire. If you decide to take part in this study, you will be one of 355 mothers taking part in the study.

Key areas for discussion during the interview

If you agree to participate in this study, you will be asked to be interviewed about your opinion about the problem of malaria during pregnancy, its harmful effects on the outcomes for the woman and her newborn and the preventive and control methods. For most of the questions, you will be asked to recall your experiences in accessing antenatal care services during the period when you were pregnant with your youngest child.

Potential benefits of the study

Research studies are intended to add value to the wellbeing of the society by generating new knowledge. The findings from this study will be used authorities to improve service delivery. Possible benefits of this study include the potential program adjustments in delivery of malaria prevention programs. We believe that this will encourage more pregnant women to utilize these services optimally to prevent malaria and its adverse effects on the mother, fetus and newborn. You may not benefit personally from being in this research study.

Possible risks or discomforts

We do not expect any risks from the one-on-one interview. You can decide to skip or refuse to answer any questions that you do not want to answer.

Protecting your privacy and anonymity

Every effort will be made to keep the information you will share with us confidential. This interview will be conducted away from other people to ensure the discussion remains private. After the interview, the information will be transferred into a computer that is protected by a password that is known by researcher only. To ensure that the information you provide remains anonymous, you will only be identified by a study ID number. Your name will not be indicated on the questionnaire. However, we will request you to provide basic information such as age and marital status. You will not personally be identified in any publication about this study.

Withdrawing from the study

You have the right to discontinue taking part in the study even before completing the interview. You can withdraw from the interview at any time without giving any reason. You will not be penalized for this decision.

Incentives and benefits to study participants

There are no incentives or direct benefits for taking part in the study. However, results from this study will be used to improve delivery of services at this health facility and elsewhere in the country.

Cost for taking part in the study

Participation in the study is free. It will not cost you anything to be in this study.

Questions about this study

You have the right to ask any questions you may have about this research. If you have questions, you should contact the researchers listed on the first page of this form.

Your rights as a research participant

All research on human volunteers is reviewed by committees that work to protect your rights and welfare. If the researcher does not perform upon you as indicated in the information, you can report the incident to the following:

a) National Health Sciences Research Committee (NHSRC), Ministry of Health, P.O. Box 30377, Lilongwe 3, Malawi. Telephone: +2651726422; Email: mohdoccentre@gmail.com

b) Research Ethics Review Committee, Chulalongkorn University (RECCU), Jamjuree 1 Building, 2nd Floor, 254 Phyathai Rd., Pathumwan, Bangkok 10330, Thailand. Telephone/Fax: +66-2218-3202; Email: eccu@chula.ac.th

Appendix 1B: Participant Information Sheet (Chewa)

Uthenga ofunika okhudza kafukufukuyi

1. **Mutu**: Zifukwa zimene zingapangitse kuti amayi oyembekezera asagwiritse ncthito mankhwala oteteza ku malungo m'madera akumudzi m'boma la Lilongwe, Malawi
2. **Otsogolera kafukufuku**: Taonga Mafuleka *(a, b)*
3. **Othandizira**: Dr. Montakarn Chuemchit *(b)*
4. **Keyala**
   a) Ministry of Health, P.O. Box 30377, Lilongwe 3, Malawi.
   b) College of Public Health Sciences, Chulalongkorn University, Institute Building 2, Soi Chulalongkorn 62, Phyathai Road, Pathumwan, Bangkok 10330, Thailand. ***Mobile:*** +265995877767. ***Email:*** taongamafuleka@gmail.com
5. **Cholinga:** kufuna kudziwa zifukwa zimene zingapangitse kuti amayi oyembekezera asagwiritse ncthito mankhwala oteteza ku malungo m'madera akumudzi m'boma la Lilongwe, Malawi
6. **Malo:** Kafukufukuyu akuchitikira madera akumudzi a m'boma lino la Lilongwe, Malawi

<u>Zomwe mukuyenera kudziwa zokhudza akafukufuku</u>

Mukupemphedwa kutenga nawo mbali mukafukufuku. Kutenga nawo mbali ndikodzipereka nokha ndipo tili ndi chikhulipiliro kuti muvomera kutenga nawo mbali pakafukufukyi chifukwa maganizo anu ndiwofunikira kwambiri. Mutha kukana kulowa nawo, kapena kuchotsa chilorezo chanu chokhala nawo mukafukufuku pa nthawi ina ili yonse komanso pa chifukwa chili chonse.

Akafukufuku amapangidwa pofuna kupeza nzeru zatsopano. Uthenga watsopanowu utha kuthandiza anthu ena mtsogolo. Simungalandire phindu lowonekeratu pokhala nawo mukafukufuku.

Kusankha kusakhala nawo mukafukufuku kapena kusiya kafukufuku asanathe sikudzasokoneza ubale wanu ndi ofufuza.

Tsatanetsatane wokhudza kafukufukuyu wafotokozedwa m'munsimu. Ndikofunika kuti mumvetsetse uthengawu kuti mupange chisankho choyenera chokhala nawo mukafukufukuyu.

Ngati mwasankha kuti mutenge nawo mbali mukafukufukuyu, tidzakupemphani kuti musayine kapena kuyika chidindo pa chikalata cha chivomerezochi. Mudzapatsidwa chikalata changati chimenechi kuti mukasunge. Mufunse afufuzi amene atchulidwa pamwamba, kapena ogwira ntchito amene atha kuthandizana nawo, mafunso ena ali onse amene mungakhale nawo wokhudza kafukufukuyu pa nthawi ina ili yonse.

Cholinga cha kafukufukuyu

Cholinga cha kafukufuku ndi chofuna kufuna kudziwa zifukwa zimene zingapangitse kuti amayi oyembekezera asagwiritse ncthito mankhwala oteteza ku malungo m'madera akumudzi m'boma la Lilongwe, Malawi. Tidzakhala tikufunsa amayi amene ali ndi ana osapyola chaka chimodzi amene abwera kudzalandira thandizo losiyanasiyana mzipatala zosankhika m'madera akumudzi m'boma lino la Lilongwe. Mukupemphedwa kutenga nawo mbali mukafukufukuyu chifukwa choti ndinu m'modzi mwa amayi amene mwafika kudzalandira thandizo pachipatala pano.

Njira zimene tikugwiritsa ntchito pakafukufukuyu ndi kutalika kwa mbali yanu

Mukasankha kukhala nawo mukafukufukuyu, mudzakhala m'modzi mwa amayi 355 a m'boma lino la Lilongwe amene atenge gawo pa kafukufukuyu. Ofufuza azakufunsani mafunso angapo pogwiritsa ntchito mndandanda wa mafunso amene akonzedwa ndipo tikuyembekezera kuti kucheza kumeneku kuzatenga pakati pa mphindi 15 ndi 20.

Mfundo zikulu-zikulu zimene zamanga nthenje mukafukufukuyu

Mukavomera kutenga nawo mbali mukafukufukuyu, mudzapemphedwa kuti mufunsidwe maganizo anu okhudza vuto la malungo ndi zotsatira zimene zingakhudze moyo wa mayiyo komanso khanda ngati mayiyu atadwala matendawa. Ena mwa mafunso ndiwokhudza nthawi imene inuyo munali oyembekezera ndi pathupi pa mwana wanu wamng'ono kwambiri. Tili ndi chikhulupiliro kuti mukwanitsa

kukumbukira ena mwa mathandizo amene munalandira nthawi imeneyo ku sikelo ya amiyi oyembekezera. Pofuna kukusungirani chinsinsi pa zonse zimene titakambirane, kucheza kwathu kudzachitika pamalo oduka mphepo kuti anthu ena odutsa asamvere nawo zokambirana zathuzi. Siinu okakamizidwa kuyankha funso lili lonse limene simukufuna kuyankha ndipo mutha kusiya kuyankha mafunso pa nthawi ina ili yonse.

Kufunika kwa kafukufukuyu

Kafukufuku amapangidwa pofuna kupeza nzeru za tsopano zomwe zingapindulire mtundu wa anthu. Phindu loyembekezeka la kafukufukuyu ndilakuti zotsatira zake zidzagwilitsidwa ntchito pofuna kupitsa patsogolo m'mene ife a chipatala tingakutumikilreni bwino. Potero, amayi oyembekezera ndi ana awo obadwawo adzalandira thandizo loyenerera pofuna kuwateteza ku matenda a malungo. Nkutheka kuti inuyo pa nokha mutha kusapindula pokhala nawo mukafukufukuyu.

Zoopsa zoyembekezeka kapena zosowetsa mtendere zokhudzana ndi kafukufukuyu

Sitikuyembekezera choopsa china chili chonse kupyolera mukufunsana mafunso apayekhapayekha. Mutha kusankha kudumpha kapena kukana kuyankha mafunso ena ali onse amene simukufuna kuyankha.

Kodi chinsinsi chanu chidzatetezedwa bwanji?

Tidzachita china chili chonse mukuthekera kwathu komanso mogwirizana ndi malamulo pofuna kukusungirani inu chinsinsi pa zonse zimene mungatiuze lero. Tikamaliza kucheza nanu, tizalowetsa mfundo zonse zimene mungatiuze m'makina a kompyuta imene idzakhale yotetezedwa ndi nambala ya chinsinsi imene idzadziwike ndi okhawo opanga kafukufukuyu.

Ndipo pofuna kuwonetsetsa kuti wina aliyense asazindikere kuti mayankho amenewa munapereka ndinuyo, dzina lanu sitilisindikidza pa papela la mafunsoli. Komabe tikupemphani kuti mutipase uthenga okhawo okhudza inu monga zaka zanu, ngati muli pa banja ndi zina zotero. Tikutsimikazanso kuti simudzatchulidwa kapena kudziwika mu zotsindikizidwa zina zili zonse zotsatira kafukufukuyu.

Kufuna kutuluka mukafukufuku mbali yanu isanathe

Mutha kuchoka mugawo lofunsidwa mafunso pa nthawi ina ili yonse popanda chilango.

Chipondamthengo pokhala nawo mukafukufukuyu

Palibe cholowa china chili chonse chimene mutalandire ngati mutasankha kutenga nawo gawo mukafufukuyu. Komabe nkofunikira kwambiri kuti mutenge nawo gawo chifukwa maganizo anu azathandizira kutukula ntchito za umoyo m'dera lanu lino ngakhalenso maboma ena.

Mtengo olowera mukafukufukuyu

Kulowa mukafukufukuyu ndi kwa ulere choncho simudzalipira china chili chonse mukasnkha kutenga nawo mbali mukafukufukuyu.

Mafunso wokhudza kafukufukuyu

Muli ndi ufulu kufunsa, ndi kuyankhidwa funso lina lili lonse limene mungakhale nalo lokhudza kafukufukuyu. Ngati muli ndi mafunso, mufikire ofufuza amene alembedwa pa tsamba loyamba la chikalatachi.

Ufulu wanu ngati wotenga nawo mbali mukafukufuku

Kafukufuku aliyense wokhudza anthu wotenga nawo mbali amaunikidwa ndi komiti imene imagwira ntchito yoteteza ufulu wanu ndi chisamaliro. Ngati muli ndi mafunso kapena nkhawa zokhudza ufulu wanu ngati wotenga nawo mbali mukafukufuku, mutha kufikira ma komiti awa, modzimbayitsa ngati mukufuna:

a) nthambi yoyang'anira ntchito zakafukufuku ku unduna wa za umoyo (National Health Sciences Research Committee), P.O. Box 30377, Lilongwe 3, nambala ya foni: +2651726422, kapena tumizani kalata ya pa intaneti pogwiritsa ntchito keyala iyi mohdoccentre@gmail.com

b) ofesi yoyang'anira ntchito za kafukufuku ku sukulu ya ukachenjede (Research Ethics Committee, Chulalongkorn University) pa nambala iyi +66-2218-3202 kapena tumizani kalata ya pa intaneti pogwiritsa ntchito keyala iyi eccu@chula.ac.th

Appendix 2A: Informed Consent Form (English)

Title of study: Factors influencing the utilization of intermittent preventive treatment for malaria control during pregnancy among mothers of under-one children in rural Lilongwe, Malawi

Principal Investigator: Taonga Mafuleka; **Co-Investigator:** Dr. Montakarn Chuemchit

SIGNATURES

If you have read this informed consent, or have had it read and explained to you, and understand the information, and you voluntarily agree to participate in this research study, please sign your name or make your mark in the signature area at the bottom of this page.

PART A : LITERATE PARTICIPANT

Participant is literate : ☐

_____	_____	_____
Participant Name	Participant Signature	Date
_____	_____	_____
RA Name	RA Signature	Date

PART B : ILLITERATE PARTICIPANT

Participant is illiterate : ☐

The Research Assistant must complete this section, **ONLY** if an impartial witness is available.

Research Assistant must write participant's name and date of consent in the **shaded area** provided.

Participant Name	Thumbprint	Date
_____	_____	_____
RA Name	RA Signature	Date
_____	_____	_____
Witness Name	Witness Signature	Date

Appendix 2B: Informed Consent Form (Chewa)

Fomu yopelekera chivomerezo

Mutu: Zifukwa zimene zingapangitse kuti amayi oyembekezera asagwiritse ncthito mankhwala oteteza ku malungo m'madera akumudzi m'boma la Lilongwe, Malawi

Afufuzi: Taonga Mafuleka komanso Dr. Montakarn Chuemchit

MASAYINI

Ngati mwawerenga chikalata cha chivomerezochi, kapena chawerengedwa ndi kufotokozedwa kwa inu, ndipo mwamvetsetsa uthenga, ndipo mwavomera mwakufuna kwanu kutenga nawo mbali mukafukufukuyu, chonde sayinani dzina lanu kapena yikani chizindikira chanu pa malo osayinira pa musi pa tsamba limeneli.

GAWO A : OTENGA MBALI ODZIWA KULEMBA/KUWERENGA

Wotenga mbali ndi wodziwa kulemba ndi kuwerenga : ☐

_____	_____	_____
Dzina	Sayini ya wotenga nawo mbali	Tsiku
_____	_____	_____
Dzina (RA)	Sayini	Tsiku

GAWO B : WOTENGA MBALI OSADZIWA KULEMBA NDI KUWERENGA

Wotenga mbali ndi wosadziwa kulemba ndi kuwerenga : ☐

Ogwira ntchito ya kafukufuku alembe gawo ili pokha-pokha ngati pali mboni.

Ogwira ntchito ya kafukufuku atsindikize dzina la wotenga mbali ndi tsiku limene chilolezochi/chivomerezo chaperekedwa pa mpata umene uli ndi utoto

	☐	
Dzina	Chidindo cha chala	Tsiku
_____	_____	_____
Dzina (RA)	Sayini ya wogwira ntchito	Tsiku
_____	_____	_____
Dzina la mboni	Sayini ya mboni	Tsiku

Appendix 3: Interviewer-Administered Questionnaire (English/Chichewa)

Study title: Factors influencing the utilization of intermittent preventive treatment for malaria control during pregnancy among mothers of under-one children in rural Lilongwe, Malawi

Respondent (ID) no: ……. Respondent (ID) no: ……..…

Date of interview: …… … Health facility code: …….

Instructions to the Research Assistant (RA):

- Read out loudly questions and pre-defined responses to respondents
- Fill out the blank space, tick or circle the response according to the respondent
- Questions with an asterisk* are ***inverted***
- Item-specific instructions are indicated in BLOCK letters

SECTION I: PREDISPOSING FACTORS

PART A: GENERAL CHARACTERISTICS

SN	QUESTIONS	CODING CATEGORIES	SKIP
A1	How old are you? *Kodi muli ndi zaka zingati?*	Age (completed years)____	
A2	What is your current marital status? *Muli pa banja?*	1. Single 2. Married 3. Separated 4. Widowed	
A3	What is the highest level of school you attended? *Sukulu yanu munafika kalasi yanji?*	1. None 2. Incomplete primary 3. Complete primary 4. Secondary and higher	
A4	What is your occupation? *Mumagwira ntchito yanji?*	1. Farmer 2. Employed 3. Businesswoman 4. Housewife/unemployed 5. Other …….	
A5	What is the average monthly income for your family? *Kodi ndalama zimene inuyo kapena banja lanu limapeza mwezi uliwonse ndizochuluka bwanji?*	Amount (MWK)……..	

A6	How many pregnancies have you ever had? *Kodi munakhalapo ndi mimba kangati?*	Number ..... __ __	
A7	How many pregnancies resulted in live births? *Nanga munabereka ana angati?*	Number ..... __ __	
A8	How old is your youngest child? *Mwana wanu wachitsiriza ali ndi zaka zingati?*	Months ..... __ __	

PART B: KNOWLEDGE

	QUESTIONS	**CODING CATEGORIES**		
B1	**Malaria is caused by?** ***Chimayambitsa malungo ndi chani?***	1. Yes	2. No	98. Don't know
B1.1	Mosquito bites *Kulumidwa ndi udzudzu*			
B1.2	Eating immature Sugarcane *Kudya nzimbe zosakhwima*			
B1.3	Eating cold food *Kudya zakudya zozizila*			
B1.4	Drinking dirty water *Kumwa mwadzi oyipa*			
B1.5	Getting soaked with rain *Kunyowa ndi mvula*			
B1.6	Witchcraft *Ufiti/kulodzedwa*			
B2	**The symptoms of malaria are?** ***Zizindikiro zoti munthu akudwala Malungo ndi?***	1. Yes	2. No	98. Don't know
B2.1	Coughing *Chifuwa*			
B2.2	Feeling cold (chills/shivering) *Kumva kuzizira/Kunjenjemera*			
B2.3	Swollen feet *Kutupa mapazi*			
B2.4	Nausea and vomiting *Nseru komanso kusanza*			
B2.5	Fever *Kutentha thupi*			
B3	**The following people are at a higher risk of malaria infection in your community**	1. Yes	2. No	98. Don't know

	Anthu otsatilawa ali pa chiopsezo chachikulu chodwala nthenda ya Malungo?			
B3.1	Under five children *Ana ochepera zaka zisanu*			
B3.2	Older children *Ana okulilapo*			
B3.3	Males *Azibambo*			
B3.4	Pregnant Women *Azimayi oyembekezera*			
B4	**A person can prevent malaria by?** ***Munthu atha kupwewa malungo potsatira njira izi***	1. Yes	2. No	98. Don't know
B4.1	Sleeping under a treated mosquito net *Kugona mu neti yonvikidwa m'mankhwala*			
B4.2	Drinking clean water *Kumwa madzi aukhondo*			
B4.3	Taking preventive medication *Kumwa mankhwala a Fansida oteteza ku malungo*			
B4.4	Using charms from witch doctor *Kugwilitsa ntchito mankhwala azitsamba kuchokera kwa sing'anga*			
B5	SP for the prevention of malaria in pregnant women is given to? *Kodi mankhwala a Fansidar oteteza ku malungo amapalekedwa kwa gulu la anthu liti?*	1	Men	
		2	Girls	
		3	Pregnant women	
B6	SP can be accessed from? *Mankhwala a Fansidar oteteza ku malungo amapezeka kuti?*	1	Traditional birth attendant	
		2	Village clinic	
		3	ANC facility	
B7	How many times should a pregnant woman take IPT to get optimal protection from malaria? *Kodi mayi oyembekezera amamwa Fansidar maulendo angati kuti akhale ndi chitetezo chokwanira ku malungo*	1	1 dose	
		2	2 doses	
		3	3 or more doses	
B8	How many tablets of SP should a pregnant woman take at once as a dose? *Nanga mayi oyembekezera amalandira mapilisi angati amakhwalawa nthawi imodzi?*	1	1 tablet	
		2	2 tablets	
		3	3 tablets	
B9		1	First month	

	At what stage of pregnancy should a woman take her first dose SP? *Kodi mayi akuyenera kuyamba kumwa mankhwalawa pakatha miyezi ingati ali woyembekezera?*	2	Fourth month
		3	Sixth month
B10	After the first dose of SP, a pregnant woman should take subsequent doses at the following intervals *Nanga akamwa mankhwalawa ulendo oyamba, mankhwala otsatira akuyenera kumwa mundondomeko yotani?*	1	Every day
		2	Every week
		3	Every month

PART C: ATTITUDES

No	Statements ***Chiganizo***	SA	A	UC	DA	SD
C1*	Even if a woman thinks she may be pregnant, she should wait a few months to know for certain before she sees a health provider *Mzimayi akazindikira kuti ndiwombekezera adikire miyezi ingapo asanayambe kupita ku sikelo ya amayi oyembekezera*	1	2	3	4	5
C2*	A pregnant woman needs permission from her husband or other family to go to ANC *Mzimayi woyembekezera akuyenera kupempha chilolezo kwa amuna ake asanapite ku sikelo ya amayi oyembekezera*	1	2	3	4	5
C3	A pregnant woman must seek several doses of SP to protect herself from malaria during pregnancy *Mzimayi woyembekezera akuyenera kumwa mankhwala a Fansida motsatira ndondomeko*	5	4	3	2	1
C4	Modern medicine works better than traditional medicine in preventing malaria during pregnancy *Mankhwala akuchipatala amathandiza kusiyana ndi mankhwala azitsamba poteteza azimayi oyembekezera ku malungo*	5	4	3	2	1
C5*	Pregnant women feel nauseated after taking SP *Akamwa mankhwala a Fansida, azimayi oyembekezera amachita nseru penanso kusanza*	1	2	3	4	5

C6	Health providers are the best people to talk to for methods of preventing malaria during pregnancy *Achipatala ndi odalirika popereka uphungu ndi malangizo okhudza njira zoteteza azimayi oyembekezera ku malungo*	5	4	3	2	1
C7	Health providers will only give a pregnant woman medicine if they know for certain that it is not harmful to her or to her baby *Achipatala amapeleka mankhwala a Fansida pofuna kuteteza mayi ndi mwana ku malungo*	5	4	3	2	1
C8*	SP can cause complications such as abortion *Mankhwala a SP/Fansidar atha kupititsa mimba padera*	1	2	3	4	5
C9*	Pregnant women do not need to take SP if they do not feel sick *Azimayi oyembekezera sakuyenera kumwa SP/Fansidar ngati sakudwala*	1	2	3	4	5

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SD** = Strongly disagree

SECTION II: ENABLING FACTORS

PART D: UTILIZATION OF SERVICES

No	**QUESTIONS** ***MAFUNSO***	**CODING CATEGORIES**		**SKIP**
Now I would like to ask you some questions about your last pregnancy that resulted in a live birth. *Ndikufunsani mafunso okhudzana ndi mimba yomwe munabeleka mwana wanu wachitsiriza*				
D1	What was the gestation when you made your first antenatal care visit for the pregnancy? *Munayamba kupita kusikelo ya amayi oyembekezera mimba ili ya miyezi ingati?*	1 98	Months .... __ Not sure	
D2	How many times did you receive ante natal care during the pregnancy? *If range is given, record minimum number of ANC visits received* *Ku sikelo munayendera maulendo angati muli oyembekezera?*	1. Number __ 98. Not sure		
D3	During any of the antenatal visits for your pregnancy, did you take SP to keep you from getting malaria?	1. Yes 2. No		

	Pa maulendo amenewa, munamwapo mankhwala a Fansidar podziteteza ku malungo?	98. Not sure	
D4	How many times did you take SP during the pregnancy? *Kodi Fansidar munamwa kangati muli oyembekezera?*	1. Yes, 1 dose 2. Yes, 2 doses 3. Yes, 3 or more doses	
D5	Do you have an antenatal care card/book? ***If Yes; ask to see card/book***. *Kodi muli ndi khadi yakuchipatala yomwe munkayendera sikelo ya mayi oyembekezera?* ***If Yes; ask to see card/book***.	1. Yes 2. No	
D6	CHECK IF CARD INDICATES THE CLIENT HAS RECEIVED FANSIDAR/SP ***If Yes; indicate number of doses***	1. Yes, 1 dose 2. Yes, 2 doses 3. Yes, 3 or more doses 98. No record	

PART E: AVAILABILITY OF SERVICES

No	**QUESTIONS** ***MAFUNSO***	**CODING CATEGORIES**	**SKIP**
E1	Were you asked to swallow the SP tablets/pills within the facility under observation from a health provider? *Kodi munamwa mankhwalawa ku sikelo komweko moyang'aniridwa ndi ogwira ntchito ya chipatala?*	1. Yes 2. No 98. Not sure	
E2	How many times did you take the SP under observation by the health worker? *Kodi munamwa mankhwalawa kangati moyang'aniridwa ndi wachipatala?*	1. Number of times __ __	
E3	During any of your ANC visits, did a provider explain to you the benefits of taking SP? *Pamaulendo anu akusikelo ya amayi oyembekezera, kodi achipatala anakulangizani za kufunikira komwa Fansidar?*	1. Yes 2. No	
E4	During any of your antenatal visits, did a provider counsel you on the adverse effects of malaria during pregnancy? *Nanga kodi pamaulendo amenewo, munalandirako uphungu pa zakuwopsa kwa malungo kwa amayi oyembekezera?*	1. Yes 2. No	

E5	Did the provider give you messages on the following adverse effects of malaria during pregnancy? *Nanga achipatala anakuuzani zotsatira zake ngati mayi oyembekezera angadwale malungo monga izi*	**1. Yes**	**2. No**	**98. Not sure**	
E5.1	Maternal anemia *Kuchepa kwa magazi mthupi la mayi oyembekezera*				
E5.2	Still birth *Mayi oyembekezera kupita padera*				
E5.3	Low birth weight baby *Kubeleka mwana wotsika sikelo*				
E5.4	Maternal death *Mayi kumwalira kumene*				

PART F: ACCESSIBILITY OF SERVICES

	QUESTIONS	**ANSWERS**
F1	If you have to walk, how long does it take from your home to the nearest antenatal facility? *Kuti muyende wapansi, zingakutengereni nthawi yochuluka bwanji kuchokera kunyumba kwanu kufika ku sikelo ya amayi oyembekezera?*	1. Less than 30 min 2. 30 – 59 min 3. 1 – 2 hours 4. More than 2 hours
F2	If you were to use the most widely used mode of transport to get to this facility, how much money would you spend on transport costs for a round trip? *Mutati mukulipira ulendo opita ku sikelo ya amayi oyembekezera pogwiritsa ntchito njira yamayendedwe yotchuka kwambiri, mungamalipile ndalama zochuluka bwanji kupita ndi kubwelera?*	1. Less than 500 MWK 2. Between 500–1000 MWK 3. More than 1000 MWK
F3	When you made your first ANC visit during your previous pregnancy, how long did you wait between the time you arrived at the facility and the time you were able to see a provider for the consultation? *Pamene munapita ku sikelo koyamba, zinatenga nthawi yayitali bwanji musanakumane ndi wachipatala kuti akuthandizeni* **Starting from the time the facility officially opens for services.**	1. Saw provider immediately 2. Less than 1 hour 3. Between 1 - 2 hours 4. Between 2 – 3 hours 5. More than 3 hours

PART G: CLIENT SATISFACTION WITH SERVICES

	Now I am going to ask you some questions about some common problems you may have faced in accessing services from your ANC facility. I would like to have your honest opinion so please tell me whether you think any of them were barriers. **If yes**, please indicate whether they were **major** or **minor** problems for you. *Tsopano ndikufunsani mafunso okhudza mavuto amene amayi oyembekezera amatha kukumana nawo nthawi imene akufuna kulandira thandizo ku sikelo ya amayi oyembekezera. Mukhale omasuka pofotokoza ndipo munene ngati chinali chiphinjo kapena ayi. Ngati munakuma ndi vutoli mufotokoze mlingo wake.*			
No	**ISSUE DESCRIPTION** ***(VUTO)***	**CODING CATEGORIES**		
		Major	Minor	No problem
G1	Time you waited to see a provider *Nthawi yodikirira musanakumane ndi adokotala*	1	2	3
G2	Ability to discuss problems or concerns about your pregnancy *Kupatsidwa mpata okwanira kuti mufotokoze mavuto kapena nkhawa zanu*	1	2	3
G3	Amount of explanation you received about the problem or treatment *Kulandira uphungu okwanira molingana ndi vuto lanu komanso kukufotokozerani mwatsatanetsatane za thandizo lomwe munalandira*	1	2	3
G4	Privacy from having others see your examination or hear your discussion *Kulandira thandizo mukachipinda kobisika kwa anthu kuti akusungireni chinsisi*	1	2	3
G5	Availability of medicines at this facility *Kupezeka kwa mankhwala pa chipatala*	1	2	3
G6	Hours of service at this facility, i.e., when they open and close *Nthawi yotsekula ndi kutseka chipatala*	1	2	3
G7	Number of days in a week when services are provided *Kuchuluka kwa masiku amene sikelo ya amayi oyembekezera imaperekedwa msabata imodzi*	1	2	3
G8	Should you become pregnant again in the future, to what extent will these barriers affect your decision to come back to the same facility for your antenatal visits?	1. No	2. Maybe	3. Yes

	Zitachitika kuti muli ndi mimba ina mtsogolo muno, mavuto atchulidwawa angakulepheretseni kuzayenderanso sikelo yanu pa chipatala chomwechi?			

SECTION III: NEEDS FACTORS

PART H: PERCEIVED SUSCEPTIBILITY TO MALARIA DURING PREGNANCY

No	Statement ***Chiganizo***	SA	A	UC	DA	SD
H1*	Pregnant women should not worry about malaria because it can be easily treated *Azimayi oyembekezera asamade nkhawa ndi malungo chifukwa matendawa ali ndi mankhwala*	1	2	3	4	5
H2	Pregnant women are at more risk of malaria than other community members *Azimayi oyembekezera ali pa chiwopsezo chodwala malungo kuposa anthu ena*	5	4	3	2	1
H3	Pregnant women can get malaria all year round even when there are lesser mosquitoes *Azimayi oyembekezera atha kudwala malungo nthawi ina ili yonse pa chaka ngakhale kuli udzudzu wochepa*	5	4	3	2	1
H4*	Pregnant women need not to worry about malaria infection because it is a normal condition during pregnancy *Panthanwi imene akuyembekezera, mayi aliyense ayenera kudwala malungo*	1	2	3	4	5
H5	Nearly every year, a pregnant woman in this community gets a serious case of malaria *Mdera lino pafupifupi chaka chonse pamapezeka mzimayi woyembekera wokuti akudwala malungo kowopsa*	5	4	3	2	1
H6*	When a pregnant woman has a fever, she should wait a couple of days before going to a health provider *Mzimayi woyembekezera akamva kutentha thupi akuyenera kudikira masiku angapo asanakumane ndi wachipatala*	1	2	3	4	5

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SD** = Strongly disagree

PART I: PERCEIVED SEVERITY OF MALARIA DURING PREGNANCY

No	**Statement** ***Chiganizo***	**SA**	**A**	**UC**	**DA**	**SD**
I1	Malaria in pregnancy is a serious condition with adverse effects on the growth and development an unborn child *Malungo ndi owopsa kwa mayi oyembekezera chifukwa atha kupangitsa kuti mwana ali m'mimbamo asakule ndi thanzi*	5	4	3	2	1
I2 *	Pregnant women are so healthy that they would easily recover from malaria *Azimayi woyembekezera ali ndi chitetezo chokwanira ndipo atha kuchira mosavuta ku malungo*	1	2	3	4	5
I3	Pregnant women are at risk of severe anemia induced by malaria *Malungo atha kubweretsa vuto lakuchepa kwa magazi muthupi la mayi woyembekezera*	5	4	3	2	1
I4	Babies born from pregnant women with malaria infection are at a greater risk of dying *Mwana obadwa kwa mayi oti anadwala malungo ali oyembekezera ali pa chiwopsezo choti atha kumwalira*	5	4	3	2	1
I5	A pregnant woman is at risk of abortion or premature delivery as a result of malaria infection *Mayi woyembekezera amene wadwala malungo atha kupititsa pa chabe kapena kubereka mwana osakwana masiku*	5	4	3	2	1

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SD** = Strongly disagree

PART J: PERCEIVED BENEFITS OF TAKING *SP* DURING PREGNANCY

No	**Statement** ***Chiganizo***	**SA**	**A**	**UC**	**DA**	**SD**
J1 *	Even after taking just one dose of SP, a pregnant woman gains adequate protective effect against malaria *Ngakhale atangomwa Fansidar kamodzi, mzimayi amatetezedwa mokwanira ku matenda a malungo*	1	2	3	4	5

J2 *	SP is too strong for a pregnant woman and can cause serious side effects *Fansidar ndi wa mphamvu kwambiri ndipo atha kubweretsa mavuto ena kwa mzimayi woyembekezera.*	1	2	3	4	5
J3 *	A pregnant woman's chances of getting malaria are the same whether or not she takes SP *Palibe kusiyana kwa chiopsezo chodwala malungo pakati pa mzimayi amene wamwa Fansidar ndi wina oti sanamwe mankhwalawa*	1	2	3	4	5
J4	SP works better than traditional medicine in preventing malaria during pregnancy *Fansida ali ndi mphamvu yoteteza mzimayi oyembekezera ku malungo kusiyana ndi mankhwala adzisamba*	5	4	3	2	1
J5	After taking the first SP dose, a pregnant woman should take subsequent doses at each scheduled ANC visit *Akalandira Fansida koyamba, mzimayi oyembekezera ayenera kumwa mankhwalawa ulendo wina uliwonse umene wapita ku sikelo*	5	4	3	2	1

*Negative statement **SA** = Strongly agree; **A** = Agree; **UC** = Uncertain; **DA** = Disagree; **SD** = Strongly disagree

Appendix 4: Administration and time schedule

#	Item description	Timeline											
		2017					2018						
		A	*S*	*O*	*N*	*D*	*J*	*F*	*M*	*A*	*M*	*J*	*J*
1	Develop proposal												
2	Seek ethical clearance												
3	Validation of tool												
4	Pretesting (pilot) of questionnaire												
5	Recruit and train research assistants												
6	Collection of data												
7	Data processing and analysis												
8	Report writing												
9	Dissemination of results												

Appendix 5: Budget

#	Line Item	Qty	Days	Rate (MWK)	Amount (MWK)	Amount (THB)	Amount (USD)
1	Recruitment and training of RAs	6	2	20,000	240,000	10,148	322.15
2	Daily subsistence allowance (DSA) for RAs during data collection	6	6	20,000	720,000	30,443	966.44
3	DSA for Drivers	2	6	20,000	240,000	10,148	322.15
4	Stationery (printing and photocopying)	1	1	100,000	100,000	4,228	134.23
5	Transport (fuel for 2 vehicles for data collection)	2	6	50,000	600,000	25,369	805.37
	Malawi Kwacha	**Total in MWK**			**1,900,000**		
	Thai Baht	**Total in THB**				**80,336**	
	US Dollar	**Total in USD**					**2,550.34**

Cost assumptions based on the following exchanges rates as of 1st March, 2018:

1USD = 725 Malawi Kwacha (MWK) = 31.5 Thai Baht (THB)

Appendix 6: Approval certificate (Chulalongkorn University)

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University
Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand,
Tel/Fax: 0-2218-3202 E-mail: eccu@chula.ac.th

COA No. 127/2018

Certificate of Approval

Study Title No. 091.1/61 : FACTORS INFLUENCING THE UTILIZATION OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA CONTROL DURING PREGNANCY AMONG MOTHERS OF UNDER-ONE CHILDREN IN RURAL LILONGWE, MALAWI

Principal Investigator : MR. TAONGA MAFULEKA

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP).

Signature: ..... Signature: .....
(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Nuntaree Chaichanawongsaroj, Ph.D.)
Chairman Secretary

Date of Approval : 1 June 2018 Approval Expire date : 31 May 2019

Protocol No. 091.1/61
Date of Approval - 1 JUN 2018
Approval Expire Date 31 MAY 2019

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaire

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the RECCU for any serious adverse events within 5 working days*
5. *Report to the RECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

Appendix 7: Approval certificate (Ministry of Health - Malawi)

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

22nd March, 2018

Taonga Mafuleka
Chulalongkorn University
Thailand

Dear Sir/Madam,

Re: Protocol 18/03/1992: Factors Influencing the Utilization of Intermittent Preventive Treatment for Malaria Control during Pregnancy among Mothers of Under-One Children in Rural Lilongwe, Malawi

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 : 1992**
- The above details should be used on all correspondences, consent forms and documents as appropriate.
- **APPROVAL DATE : 22/03/2018**
- **EXPIRATION DATE**
  This approval expires on **21/03/2019**. 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 (HIV Research Database).

SECRETARY FOR HEALTH
2018 -03- 22
P.O BOX 30377, CAPITAL CITY LILONGWE 3

Kind regards from the NHSRC Secretariat.

.....
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 8: Permission letter (Lilongwe District Council – Health Sector)

In reply please quote NO DZH/MALAWI,

Ref. No.:
Telephone No.: 265 726 466/464
Telefax No.: 265 727817
Telex No.:
E-Mail. lilongwedho@malawi.

COMMUNICATIONS TO BE ADDRESSED TO: THE DISTRICT HEALTH OFFICER

Lilongwe District Health Office
P.O. Box 1274
Lilongwe
Malawi

12th March 2018

To: The Chairperson,
National Health Sciences Research Committee,
Ministry of Health, P.O. Box 30377, Lilongwe,
Malawi.

Dear Sir/Madam,

PERMISSION TO CONDUCT A STUDY IN LILONGWE DISTRICT

On behalf of Lilongwe District Health Office. I write to confirm our support of the research project titled '*Factors influencing the utilization of intermittent preventive treatment of malaria during pregnancy among mothers of under-one children in rural Lilongwe, Malawi*'. The Principal investigator is Mr. Taonga Mafuleka currently studying for a Master of Public Health with Chulalongkorn University in Thailand.

Our office therefore, grants permission to Mr. Mafuleka to conduct this proposed study in our health facilities upon approval from your board.These health facilities include: *Kabudula, Ukwe, Nathenje, MtentheraMitundu and Dickson.*

Please feel free to contact me if you need more information on +265 991 25 10 49 Email: nafekmbewe@gmail.com

Sincerely,

Dr. Alinafe Mbewe

Director of Health and Social Services

VITA

Name: Taonga Mafuleka

Date of birth: April 6th, 1984

Nationality: Malawian

Email: taongamafuleka@gmail.com

Education qualification: Bachelor of Science in Environmental Health

Institution: University of Malawi (2006)

Working Experience

1. January 2017 to date: Ministry of Health – National Malaria Control Programme (Lilongwe, Malawi)

2. January 2014 - December 2016: Ministry of Health – Health Education Unit (Lilongwe, Malawi)

3. September 2008 - December 2013: Ministry of Health – Mwanza District Hospital (Mwanza, Malawi)

Summary of Responsibilities and Achievements

Taonga Mafuleka brings 11 years of programmatic experience working in the Malawi health sector, with a focus on Malaria; HIV/AIDS; Sexual and Reproductive Health; Maternal, Neonatal and Child Health, Water and Sanitation; Neglected Tropical Diseases and Non Communicable Diseases.

Mr. Mafuleka participates in policy formulation through development of policy documents for the Ministry of Health. Among other important documents, he has contributed to the development of the following published documents: National Malaria Strategic Plan (2017 – 2022), Malaria National Health Communication Strategy (2015 - 2020), Malawi Malaria Communication Strategy (2015 - 2020), Health Promotion Policy and Guidelines for Distribution of Long Lasting Insecticide Nets (LLINs) – 2017.

He possesses vast experience in capacity building initiatives targeting community-based health workers to empower them to utilize integrated and multi-disciplinary approaches to address health problems in their catchment areas.