FACTORS ASSOCIATED WITH COVERAGE OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA IN PREGNANCY IN BUNGOMA COUNTY, KENYA.

BY:

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DECLARATION

Declaration by Candidate

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DEDICATION

I am humbled to dedicate this work to my Husband Bashir M. Noor, my children Muhammadnoor, Yusra, Bushra and to my sisters Hawa, Safia, Fatia, Zahra and Ummi.

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ABSTRACT

Background: The burden of malaria cases stands at 229 million, according to latest world malaria report, with about 94% of all cases and death reported in Africa. Globally, approximately 54.7 million pregnant women reside in areas with stable transmission of *Plasmodium falciparum* malaria. The IPT with sulfadoxine-pyrimethamine (IPTp-SP) is part of antenatal care services interventions for the prevention of malaria during pregnancy. Bungoma County recorded (43%) the least coverage in Lake Region malaria endemic counties.

Objectives: The study determined coverage of IPTp of pregnant women with sulfadoxine-pyrimethamine and described socio-demographic, pregnancy related, health facility related, and cultural factors among women of 36 weeks gestation or more attending Antenatal care (ANC) services in Bungoma County, Kenya.

Method: Both qualitative and quantitative studies were conducted using cross-sectional study design. A total of 362 pregnant women of 36 weeks and above gestation attending eight selected health facilities providing ANC services across the Bungoma County were interviewed. Data was collected using pretested structured questionnaire. Thirteen Key Informants (KII) were recruited across the selected sub-counties and interviews conducted using semi-structured interview guide and checklist to record observation. Descriptive analyses were done using measures of central tendency and dispersion for continuous variables and frequency for categorical variables. Multivariate analysis was performed to determine factors associated with IPTp-SP coverage. Adjusted odds ratios (AOR) were calculated, and 95% confidence intervals (CI) recorded with p values < 0.05 considered statistically significant. The qualitative data for KII was transcribed and the transcript analysed thematically.

Result: The coverage of the recommended three or more doses of IPTp-SP among study participants was 47.3%. About 305(84.3%) respondents started their clinic late or missed the visits. Being catholic or protestant compared to being a Muslim and making three or more visits to the antenatal clinic increased doses of IPTp-SP. Shortage of health care workers at ANC, resulting in high workload, and stock out of IPTp-SP were recorded by Key Informants as reason for low coverage of IPTp-SP in Bungoma County.

Conclusion: The use of IPTp-SP is sub-optimal. Pregnant women's late timing of ANC attendance, missing ANC visits, shortage of healthcare workers and frequent IPTp-SP stock outs were the major barriers to IPTp-SP access. Three times or more antenatal care clinic visits increased IPTp-SP dosing.

Recommendation: Continuous sensitization of pregnant women on the benefit of early ANC visits. Employment of more healthcare workers to reduce workload and the County to enhance uninterrupted supply of IPTp-SP in all health facilities providing ANC services.

Key words: Malaria, pregnancy, IPTp – SP, Coverage, Bungoma, Kenya.

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LIST OF ABBREVIATIONS

ANC	Antenatal Care
DHIS	District Health Information System
DOT	Directly Observed Treatment
IPTp	Intermittent Preventive Treatment in pregnancy
KII	Key Informant Interview
KDHS	Kenya Demographic and Health Survey
KMIS	Kenya Malaria Indicator Survey
LLINs	Long Lasting Insecticide Nets
MIP	Malaria in Pregnancy
MMR	Maternal Mortality Rate/Ratio
OR	Odds Ratio
SP	Sulfadoxine-Pyrimethamine
USA	United State of America
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Malaria is an ailment caused by parasites of *Plasmodium* species spread from person to person by *female Anopheles* mosquitoes (Kumpitak et al., 2021). Globally, *Plasmodium falciparum* is the commonest, followed by *P. vivax, P ovale*, and *P. malariae* (Garrido-Cardenas *et al*., 2019). Malaria is a global health challenge, with a projected 3.2 billion persons; half of biosphere's population, at risk of developing the disease (Karunamoorthi, 2016). According to WHO, most malaria transmission occurs in the tropical area, with 92% of total malaria cases and 93% of total malaria deaths (WHO, 2017). About 80% of the worldwide malaria death is contributed by African countries and Kenya is amongst the 15 sub Saharan nations that contributes 3% of worldwide malaria death (WHO, 2017).

In Kenya, malaria has been and is still a serious health and socio-economic challenge, with up to 70% of the populace susceptible to acquire the disease (KMIS, 2016). The country has four malarial epidemiological zones (Ghilardi et al., 2020); endemic transmission zone, epidemic prone, seasonal transmission zone, and low-risk transmission zone (Ministry of Health, 2016). The risk of parasitaemia varies with altitude, rainfall pattern, temperature, and humidity (Rossati et al., 2016). Malaria is the main cause of sickness and deaths in infancy (Sigauque *et al*., 2011), with most of the burden in the two endemic zones, the lake basin and the coastal region, and affecting children under 5 years and expectant mothers (Snow *et al*., 2015; GoK: Ministry of Health, 2016).

Globally, each year around 125 million females are pregnant and live in malaria prone areas, with an estimated 100,000 infant deaths and about 10,000 maternal deaths from all causes every year (Warrell DA *et al.,* 2016).

Intermittent preventive treatment during pregnancy using Sulphadoxine pyrimethamine (IPTp-SP) is presumptive, as it is administered regardless of symptoms or diagnostic test results (White, 2005). It serves to clear parasites that may be asymptomatic and to prevent infection for the half-life of the drug.

Symptomatic malaria during pregnancy can be diagnosed and treated. Malaria in pregnancy has various complications such as miscarriage, pre-term delivery, severe maternal anemia, and death (WHO, 2016). It is essential to recognize that malaria may have little effect on the mother, even be asymptomatic, but have severe impact on the fetus (Oumarou et al., 2020).

The WHO commends the application of long-lasting insecticide treated nets (LLITNs) and provision of IPT with sulfadoxine-pyrimethamine combination (IPTp-SP) as a way of preventing malaria during pregnancy (National guideline, 2016). The IPTp-SP was reported to scale down the danger of malaria in pregnant women and its associated complications in malaria endemic areas (WHO, 2014) (Oumarou et al., 2020)

Asymptomatic malaria during pregnancy are unlikely to be diagnosed hence untreated (Desai et al., 2007). A global scenario report indicates that asymptomatic conditions of malaria infections are even common in pregnant women in low malaria transmission area (Carmona-Fonseca & Arango, 2017). Screening of women for malaria and is encouraged as it’s shown to be prevalent in malaria prone regions of the world and also connected with anemia in asymptomatic pregnant women (Yimam

et al., 2021). To reduce ongoing malaria transmission, an increasing prevalence of asymptomatic malaria need to be considered as a threat to malaria elimination (Cheaveau et al., 2019). Placental malaria may not be detected even with a diagnostic test, it has higher burden of malaria in pregnancy and increased risk for adverse outcome (Kapisi et al., 2017).

Effect of severe malaria in pregnant women include convulsions, dehydration, reduced skin turgor, reduced urine output or anuria (National guideline, 2016). Death may occur as a result of severe anemia or blockage of capillaries carrying blood to the brain and coma (Snow *et al.,* 2015).

Objective one of the current Kenya Malaria Strategic Plan of the year 2019-2023 aims at providing 3 doses or more of IPTp-SP in targeted counties and engaging Community Health Volunteers (CHVs) to identify IPTp-SP missed pregnant mothers for referral to ANC. Objective 4 aims to scale up the usage of malaria intervention to not less than eighty percent by 2030 (Kenya Malaria Strategy 2019-2023)

Since 2016, the Kenyan National Malaria Treatment Guidelines have recommended that pregnant women should be given at least three doses of antimalarial prophylaxis during the pregnancy period (WHO, 2014; Ministry of Health, 2016), with the first dose starting in the 13th week of gestation period and subsequent doses given at a time interval of four weeks. In 2015, 38% of Kenyan women who live in malaria prone areas reported taking at least three doses of SP during the period of their pregnancy (GoK: Ministry of Health, 2016).

The coverage of IPTp-SP in District Health Information System 2 (DHIS2) is defined as the ratio of women getting IPTp-SP2 to the total number of women attending their first ANC. Data recorded in DHIS2 for the year 2016 to 2018 recorded low coverage

for those who accessed IPTp-SP2 at the ANC in both lake-endemic and the coast-endemic zone. The 2015 Kenya Malaria Indicator Survey (KMIS) report and DHIS2 data for the year 2015-2017 found low coverage of IPTp-SP (38%) and (47%) respectively among women in both lake and coastal endemic transmission zones (Malaria Programme, 2016).

Therefore the pregnant are susceptible to the consequences of malaria which includes; anemia, febrile illness and even death (Oumarou et al., 2020). It can as well cause neonatal death, miscarriage and still birth (Desai *et al*., 2007). The DHIS2 only gives data on coverage with IPTp-SP1&2, and the latest information available on IPTp-SP3 coverage was from the 2015 KMIS. The limited information on IPTp_SP3 coverage poses challenges in monitoring progress thus impeding interventions. Therefore, further research is required on how to improve uptake of IPTp-SP during pregnancy (Desai *et al*., 2018).

1.2 Problem Statement

The burden of malaria among pregnant women remains significant, however other pregnancy related conditions with malaria-like symptoms results in a delayed malaria treatment interventions (Menaca *et al*., 2013).

Malaria is the third cause of death in Bungoma County where maternal death is at 319 per 100,000 (KDHS, 2014). The Kenya Malaria Strategy 2019-2023, a strategic objective for IPTp targets 100% of pregnant women in the 14 malaria-endemic counties to take three or more doses during pregnancy (KMS, 2018). The 2015 Kenya Malaria Indicator Survey (KMIS) found low coverage of IPTp-SP among pregnant women who had given birth two prior years before the survey in both lake and coastal

endemic transmission zones (KMIS, 2016). The IPTp-SP coverage in Kenya remains low despite the efforts being made to increase it (Ministry of Health, 2016).

The lake counties recorded lower coverage of IPTp-SP compared to Coastal Malaria endemic counties and Bungoma County had the lowest (43%) IPTp-SP coverage compared to other lake endemic counties, and far below the target of 100% for 2023 (Malaria Strategy, 2018).

1.3 Justification

Since the roll out of IPTp-SP in malaria endemic zone, the coverage has continued to improve especially in IPTp-SP1 in some counties. Nevertheless, the gaps exists between counties with Bungoma County recording the lowest coverage of IPTp-SP. This poses bigger threat of consequences of malaria in pregnancy (KMIS, 2016). The national malaria treatment guideline states that minimum of 3 doses IPTp-SP need to be given to pregnant women in malaria high transmission areas (National guideline, 2016). Pregnant mothers in malaria endemic areas have a chance of receiving up to seven doses of IPTp-SP, from the quickening (13 week of pregnancy) to term (40 weeks pregnancy) (National guideline, 2016). The receipt of more than three doses of IPTp-SP has been reported to reduce placental malaria plus the associated risk of maternal anemia, premature delivery as well as low birthweight (Cowman *et al*, 2016). If a mother miss getting these doses during pregnancy or gets less than the three doses, they become more vulnerable to above mentioned risks. The objective of this study was to identify factors associated with low coverage of IPTp-SP in Bungoma County and recommend targeted interventions to increase the uptake hence minimize the dangers associated with malaria in pregnancy.

1.4 Research question

What are the factors associated with the coverage of IPTp-SP among pregnant women of 36 weeks gestation age or more attending Bungoma County ANC services?

1.5 Objectives

1.5.1 Broad objective

To describe the factors associated with the coverage of IPTp-SP in pregnancy in Bungoma County, Kenya.

1.5.2 Specific objective

1. To determine the coverage of IPTp-SP among women of 36 weeks gestation or more attending ANC services in Bungoma County.
2. To describe the Socio-Demographic factors associated with coverage of IPTp-SP among women of 36 weeks gestation or more attending ANC services in Bungoma County.
3. To describe the pregnancy related factors associated with coverage of IPTp-SP among women of 36 weeks gestation or more attending ANC services in Bungoma County
4. To describe the health facility factors associated with coverage of IPTp-SP among women of 36 weeks gestation or more attending ANC services in Bungoma County
5. To describe the cultural factors associated with coverage of IPTp-SP among women of 36 weeks gestation or more attending ANC clinics in Bungoma County.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

2.1.1 Burden of Malaria in Pregnancy

According to the 2018 Global Malaria Report, majority of cases of malaria in 2016 were in the Africa continent (90%), followed by South-East Asia (7%) and Mediterranean Region (2%) (World malaria report 2018). In sub-Saharan Africa, 99% of cases of malaria reported during 2016 were due to *Plasmodium falciparum* (WHO 2017). Approximately 54.7 million pregnant women are approximated to reside in areas of stable *P. falciparum* transmission, these represent the initial contemporary approximation of the worldwide distribution number of pregnancies at risk of *P. falciparum* infection.

Kenya continues to have a high maternal mortality rate (MMR) of around 362 per one hundred thousand births (KDHS 2014) and the maternal death risk of 1 in 42 (Anneceta Gacheri *et al*., 2016).

Parts of Kenya are far more affected by malaria transmission than others (GoK: Ministry of Health, 2016). According to DHIS2 2014, under-five mortality in urban and rural areas of Kenya is roughly the same but there is more variation by region. The lake endemic zone had the highest under-five mortality rate of 64 mortality per 1,000 live births during 2010–2014 compared to coastal endemic zone with under-five death rate of 54 deaths per 1000 live births in the same period (DHIS2; 2010-2014).

Desai and colleagues, reported a very high pregnancy-related mortality caused by HIV/AIDS, malaria, and postpartum hemorrhage in Siaya County in Western region

and the authors found that at least two-thirds of those deaths could be prevented (Desai *et al.*,2018).

This increased susceptibility to malaria in pregnant women is due to several factors; pregnancy induces immunological changes (Maestre A1 *et al,* 2014) such as decreased immunity due to high level of cortisol in maternal blood and nutritional deficiency that lowers their acquired immunity. Pregnancy also induces hormonal and physiological factors that increases cortisol and prolactin concentration in the peripheral venous blood and abdominal temperatures. In addition, women may spend more time outside their bed nets because of frequent urination hence increasing mosquito bites at night (Takem & Alessandro, 2013).

2.1.2 Complications of Malaria in pregnancy

Malaria complications varies, probably related to the individual's level of acquired immunity (Mcclure *et al*., 2014). It is common for the placenta to be infected when *P. falciparum*-infected erythrocytes accumulate in the intervillous space (Bayoh *et al.*, 2014). *Plasmodium Falciparum* malaria during pregnancy can be more severe through a range of mechanisms, the existence of repeated malaria infections and co-infections in an endemic region usually have debilitating effect on the affected persons (Cowman *et al.,* 2016). However, persistent malaria infections in such regions can be attributed to strengthening of immunity to malaria in normal adults living in the prone areas (Bayoh *et al*., 2014; Cowman *et al.*, 2016).

The escalated risk of malaria in pregnant women is due to immunological changes associated with physiological developments in pregnancy and concurrent infection such as HIV and helminthes (Manirakiza et al., 2017). Pregnancy is associated with decreased immunity as part of a general suppression of immunity. Humoral immunity

is decreased in part due to lack of gamma-globulin generation as a result of the high protein requirements of pregnancy, compounded by nutritional deficiency (Maestre A1 et al., 2014).

Malaria infections in the course of pregnancy necessitate prompt diagnosis followed by appropriate treatment (Odongo et al., 2015) to avoid associated complications for both the mother and the foetus *(*Ella, *et al.,* 2015*;* Kizito *et al.,* 2013). Preventing malaria infections has become a key part of reducing the burden of malaria in pregnancy. WHO recommends a combination of Long lasting insecticide-treated nets (LLITNs) and IPTp-SP (González, *et al*, 2016*;* WHO, 2014).

2.1.3 Malaria Case management

The current Kenya National Guidelines on the Malaria case management during pregnancy includes case management, IPTp-SP and the use of LLITNs (National guideline, 2016). For all malaria suspected cases, parasitological test is done to confirm the plasmodium species (WHO, 2021). Severe malaria in pregnancy is treated with artesunate at 2.4 mg/kg body weight, or artemether if artesunate is not available (National guideline, 2016). In a malaria prone zone, after quickening, the provision of IPTp-SP under directly observe treatment at 4 weeks intervals during pregnancy up to 40 weeks pregnancy (WHO, 2021) (Nkoka, Chuang *et al*., 2018). In Kenya, pregnant women who live in malaria prone region are provided with Long Lasting Insecticidal Treated Nets (LLITNs) at the initial visit to the ANC (National guideline, 2016).

In the first trimester of pregnancy, efficiency systems and knowledge on antimalarial safety for pharmacovigilance are needed, although tolerancy and efficacy might vary by treatment, numerous scholarly studies have confirmed that they are safe, especially when given in the third trimester of pregnancy (D'Alessandro *et al.,* 2018).

Routine chemoprophylaxis to stop malaria and its benefits has been expansively tested in randomized controlled trials (RCTs) and quasi-experimental studies, with clinically important benefits to women during their first two pregnancies (Radeva-Petrova *et al*., 2014). This prevents extension of moderate anemia to severe anemia, improve the average birthweight and reduce the number of low birthweight in infants and may also prevent malaria illnesses (Radeva-Petrova *et al.,* 2014).

Monitoring of malaria transmission in pregnant women result showed that the health system costs limits accessibility to prevention and treatment services (Rogerso*n et al.,* 2018).

Reports findings by Desai indicated that, limited health seeking behavior among women during pregnancy .(Desai *et al*, 2018). Early ANC commencement increased the chance of the pregnant women who take more than three IPTp-SP dose, even though inadequate ANC visits contributes to low coverage of IPTp-SP. (Nkoka et al., 2018). Pregnant women in Sunyani district, Ghana, who had proper knowledge of malaria during pregnancy using sulfadoxine pyrimethamine was reported receive more doses of IPTp-SP (Hajira *et al*, 2017)

Some factors that may be associated with IPTp-SP coverage in high malaria transmission area might include socio-demographic factors, individual factors, cultural factors and health facility factors. Health education to all mothers attending ANC clinic to at least visit four times during gestation period and are reported to significantly increase the uptake of optimal number of doses of Sulphadoxine pyrimethamine compared to those with inadequate knowledge *(*Azizi *et al.,* 2018*;* Ibrahim H, *et al*., 2017)

While early ANC initiation increases the chance of the pregnant women taking more than three IPTp-SP doses, inadequate ANC visits contributes to low coverage of IPTp-SP due to cultural issues like seeking care from traditional practitioners (Desai *et al*., 2018); Nkoka *et al.*, 2018). Introducing behavior change communication and intervention Programme to improve malaria cases occurrence in poor socioeconomic areas (Sultana *et al.*,2017). Financial barriers due to some health facility charging for SP doses and other cost associated with ANC services such as transportation costs and charges for antenatal care the IPTp-SP cost may seem irrelevant, some health facilities in Mali was observed not administering IPTp-SP under directly observed therapy and not at an interval of the entire trimesters (Stephen *et al*., 2016) (Hurley, Harvey *et al*, 2016).

Health facilities in malaria endemic sub-counties in Kenya was reported having several stock out of commodities, health workers shortage and having discrepancies in IPTp registers and reporting tool which needs standardization and all this undermining IPTp-SP coverage (Okello, Gerrets *et al*., 2018)

According to DHIS, pregnant adolescents in Bungoma County from the year 2016-2019 has been on rise (DHIS2; 2016-2019). Even though the law does not recognize the marriage of girls below 18 years, because of culture/believes, they move from their parent home to the husband or in-laws. Many a times they are being excluded from studies, as they stay far from their legal guardian who is to give the assent hence unfair exclusion (Cheah & Parker, 2015).

2.2 Factors associated with utilization of IPTp services

Several factors have been linked to the utilization of IPTp. The age of the pregnant woman, spouse support, and knowledge on benefits of IPTp have been established to

be linked to utilization of IPTp services (Warrell DA *et al.*, 2016). The rate of defaulting ANC visits was found to be higher among younger mothers than the older ones. This decreased with an increase in the age of the mother where older mothers were more likely to have themselves administered to IPTp than the younger ones (Yimam et al., 2021). This is so because the younger women may be having insufficient knowledge of health care services and on the importance of IPTp compared to the older ones.

The child's birth order has also been found to affect the completion of vaccination. Studies have shown a strong association between being born second or later in the family with incompletion of ANC visits (Kenya Malaria Strategy 2019-2023). This may be because the firstborn child may have special attention by the mother adhering to the ANC profile and by making good use of the available health care services (Oumarou et al., 2020).

The mother's/caregiver's education level has equally been linked with utilization of IPTp services. Educated mothers have been found to more likely to ensure that they are protected against malaria in pregnancy as compared to the uneducated. This may be due to literate mothers being informed on malaria complications and the importance of getting anti-malarial prophylaxis (Ministry of Health, 2016). The mothers who do not recognize the benefits of utilization of IPTp are likely to default as compared to those who aren't aware of it.

Other factors that have shown an association with the uptake of IPTp services include education level of the spouse, occupation of the mother, family earnings, and place of delivery. Spouse's level of education may influence the decision of whether the woman should visit ANC clinic for IPTp services or not (Anneceta Gacheri *et al.*,

2016). If the spouse is knowledgeable of the malaria complications in pregnancy and the importance of IPTp, he may be able to ensure that the woman goes for the prophylaxis. Woman's occupation and family income have been found to affect the uptake of ANC services, utilization of IPTp included. The rate of utilization of IPTp has been found to be higher among women with some form of employment as compared who were just housewives (Takem & Alessandro, 2013). Children delivered at the health facility and whose mothers attended the Antenatal Clinic (ANC) has also been found to be higher compared to those born at home. The reason might be at the health facilities the mothers may be educated on the importance and benefits of utilization of IPTp.

Unavailability of IPTp services and products at the health facilities, missed opportunities, knowledge about the prophylaxis, distance from health facility and availability of outreach services have been found to be associated with the utilization of IPTp (Bayoh *et al*., 2014; Cowman *et al.*, 2016). Commodities unavailability on the appointed schedule as a result of stock-outs may lead to postponement of the IPTp services to a later date. Some of the women may not return hence defaulting utilization of IPTp. Studies have shown that distance to health facility and availability of outreach services to the hard-to-reach areas affects the rate of completion of ANC visits (Manirakiza et al., 2017). Long distances from the health facility may hinder the pregnant women from visiting the health clinics for utilization of IPTp.

The introduction of IPT with sulfadoxine-pyrimethamine together with heightened ANC activities has contributed greatly to the reduction of malaria cases in pregnancy and related. Globally, malaria in pregnancy associated cases and deaths decreased by over 40% and 50% respectively between 2000–2017 (Yimam et al., 2021). Despite the remarkable progress, a large number of pregnant women remain not getting the

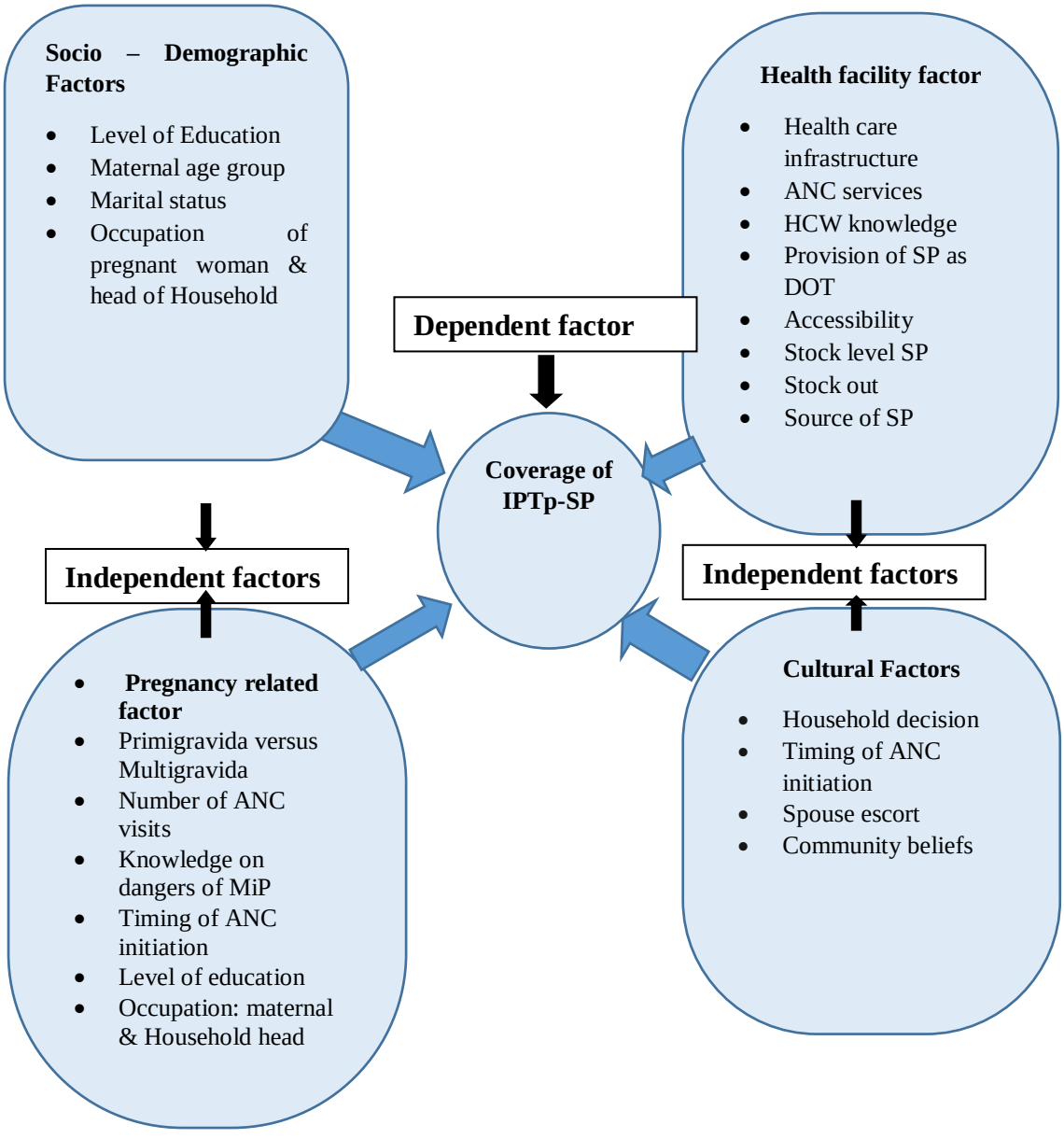
prophylaxis during the period they are pregnant. This is a major threat to the malaria in pregnancy elimination strategy which is yet to be achieved(Kabuya et al., 2021). Due to low coverage and high pockets of women who do not visit ANCs for the prophylaxis, large number of malaria cases among pregnant women have continued to be reported in several regions globally (WHO-UNICEF, 2019a).

Preliminary global data indicated an estimated 30% increase in malaria cases among pregnant women between January–March 2019 compared to the same period in 2018 (WHO, 2019). Similar upsurges have been witnessed in the past two years (WHO, 2019). In the current global outbreaks of malaria among pregnant women, even regions which are not considered to be malaria prone had recorded a significant number of malaria cases among pregnant women.

Therefore, the 2015 malaria in pregnancy elimination milestones are yet to be achieved due to gaps in utilization of IPTp-SP (Bajaria et al., 2019). Many pregnant women remain not administered to the prophylaxis against malaria irrespective of the efforts done by the government. Studies done have identified a lack of access to the prophylaxis, weak health systems, fear, or skepticism about the prophylaxis to low uptake of utilization of IPTp-SP services (UNICEF, 2019).

2.3 Conceptual Framework

Conceptual framework for area of high malaria transmission showing possible factors that may be associated with IPTp-SP coverage. (**Author generated**)



CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Site

Bungoma County is home to 1,670,570 people and covers an area of 2,069 km². The county has 12 sub-counties and 45 county assembly wards. The Mt. Elgon, Cheptais and Tongaren are the only sub counties not considered to be malaria endemic (Ministry of Health, 2020). Bungoma County has 177 health facilities (Kenya Health Facility Master List, 2018); Kenya Census, 2019).

According to 2014 Kenya Demographic and Health Survey, malaria is the third leading cause of mortality in Bungoma County. Neonatal mortality is at 31 per 1000 live births while under five mortality is 145 deaths per 1000 live births and maternal death is at 319 per 100,000. Fourteen percent of girls in Bungoma County aged between 15-19 years, had specific fertility rate of 103 births per 1000 girls. A total of 3,753 pregnant women have attended ANC clinic at the randomly selected health facilities in Bungoma County (KDHS, 2014). Bungoma County adolescents presenting with pregnancy from the year 2016 to 2019 has been on the rise according to Kenya Demographic and Health Survey.

Agriculture is the main economic activity in Bungoma that main comprise of maize and sugarcane cultivation. The area witness approximate annual temperature of 21.1 degrees Celsius and the altitude is 4,544 feet (1385m) above the sea level and a stable rainfall throughout the year. All these are factors conducive for the breeding of mosquitoes which are vectors for malaria transmission.

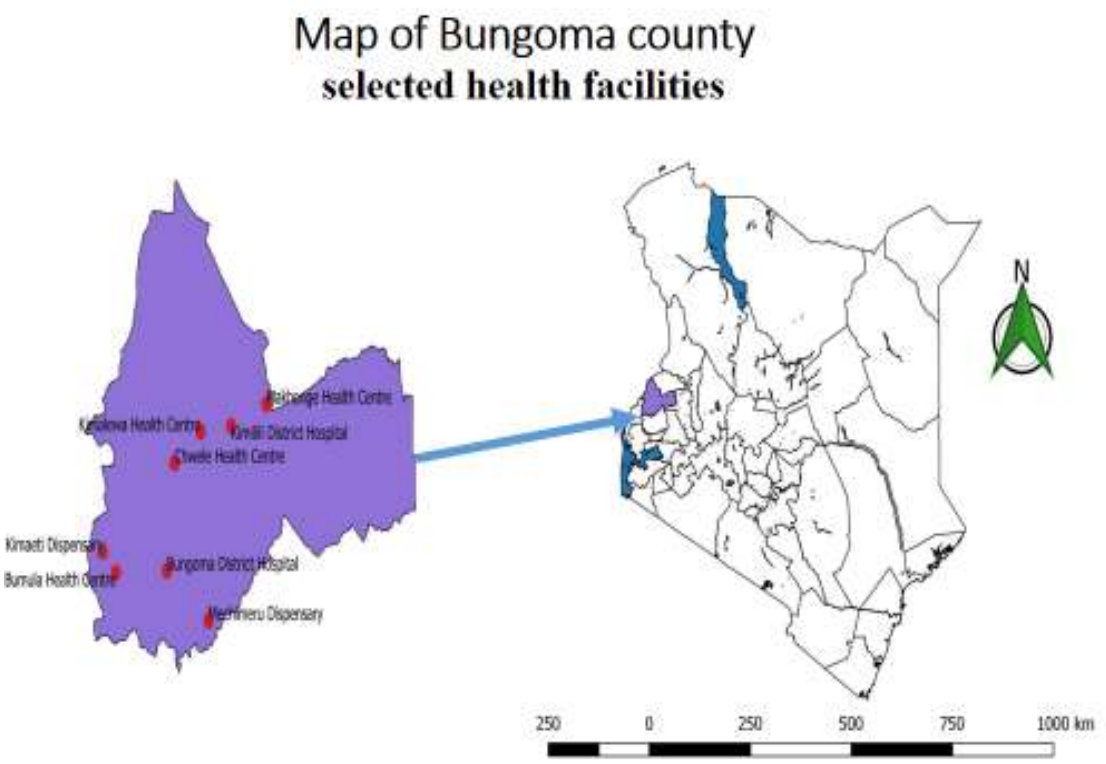


Figure 1: Map of the study site

3.2 Study Population

The target population were pregnant women, including those below 18 years (teenage pregnancies) attending ANC clinics in Bungoma County and key informants were health care workers.

3.3 Study Design

The project used a cross-sectional hospital-based study design and utilized a mixed method approach which involved collection of both qualitative and quantitative data.

3.3.1 Quantitative method

Cross-sectional study of pregnant mothers – Expectant mothers of 36 weeks and above gestational age were recruited from eight selected health facilities across four sub-counties in Bungoma County, Kenya.

3.4 Sampling Technique and Sample Size

3.4.1 Sample size calculation - Quantitative study

We used the formula developed by Cochrane (Cochran, 1977) to calculate the sample size for expectant mothers recruited:

$$n = \frac{Z^2P(1-P)}{\delta^2}$$

The following assumptions were made:

Z: The score at 95% confidence interval (CI) = 1.96,

p: Expected proportion of pregnant women taking three or more doses of IPTp-SP = 38% (Malaria Indicator Survey, 2016)

δ**:** Degree of precision =0.05

$[1.96 \times 1.96 \times 0.38 (1 - 0.38)]/0.0025$

$= 362$

3.4.2 Sampling Procedure for Quantitative study

Multi-stage sampling was used to recruit 362 pregnant women of 36 weeks gestation and above attending ANC clinic. In the first stage, four of the eight malaria-endemic sub-counties in Bungoma County were selected using simple random sampling. In second stage, from eligible forty two facilities in the four sub-counties, two health facilities providing ANC services in each sub-county were selected randomly one in a rural and the other in an urban setting after stratification by rural and urban was done. The number of pregnant women of 36 weeks gestation and above attending ANC clinic in the selected facilities were recruited. This was done by proportionate sampling using a sampling fraction of minimum sample size and the total number of

362 pregnant women of 36 weeks gestation and above attending the ANC clinic in 8 health facilities (sampling frame) in the first quarter of year 2019. The sampling fraction was multiplied by the number of pregnant women of 36 weeks gestation and above in each health facility specific register to estimate the number of participants per health facility. Thereafter, pregnant women of 36 weeks gestation and above were recruited by systematic sampling until the desired sample size in each health facility was achieved. The sampling interval of five was derived by dividing the sampling frame by the minimum sample size for each facility. In a case where a participant (pregnant women) refused to participate in the study, the next eligible participant was consecutively sampled until the desired number of participants at every health facility was reached.

3.4.3 Inclusion criteria quantitative study

- Pregnant women attending ANC services in selected health facilities, Bungoma County
- Women who have attained 36 weeks gestational age or more

3.4.4 Exclusion criteria quantitative study

- Any women with significant pregnancy related physical or mental illness

3.5 Data Collection

Two trained healthcare workers were recruited as research assistants. They were trained for three days prior to the day of actual collection of data for the main study was started. The training covered the purpose of the study, ethical issues, data collection tools as well as the importance of data protection and storage.

3.5.1 Quantitative data collection

Face to face structured questionnaires were administered to participants by the principal investigator or research assistants. The variables collected included socio-demographic factors (marital status), individual factors (knowledge of Malaria in pregnancy, prim gravida versus multigravida), cultural factors (household decision) and health facility factors (provision of SP on DOT).

3.6 Data Analysis

Data collected using questionnaires was entered into a computer database, cleaned, verified for consistency, and then uploaded into Epi info version 7.2.2 (CDC Atlanta, GA, USA) for further analysis.

3.6.1 Quantitative data analysis

Descriptive analysis was undertaken for categorical variables, in which case data was presented informs of frequencies and proportion using frequency tables. Continuous variables were analyzed using measures of central tendencies (media, mean) and measures of dispersion (range, standard deviations). Kruskal–Wallis rank test was applied for comparison of medians of continuous variables, and Chi square test applied for the categorical variables. Bivariate analysis was undertaken so as to analyze determinants of IPTp-SP coverage (< 3 doses); socio-demographic determinants, cultural determinants, individual determinants, and health facility related factors.

Explanatory variables with $p < 0.20$ in the bivariate analysis were considered in the regression analysis. The general findings was compared to the national malaria control Programme (KNMCP) target.

3.7 Qualitative method - Key Informant Interviews (KII)

These included County Health Director, sub-County Malaria Control Coordinators (one in every sub-county selected) and a practicing nurse providing services including IPTp at mother and child healthcare clinic (MCH) and have been working at the facility for at least two years at every selected health facility (eight health facilities).

3.7.1 Sampling procedure - for qualitative KII

Thirteen Key Informants were recruited, this included health care workers at different levels within the county who were involved in malaria coordination or malaria management. The Bungoma County Health Director, four sub-county malaria control coordinators (one per sub-county) and a practicing nurse working at ANC clinic for at least two years prior to the study at every selected health facility (total of eight health facility) were conveniently selected.

3.7.2 Inclusion criteria for KII

County Health Director, sub-County Malaria Control Coordinators and a practicing nurse providing services at mother and child health clinic (MCH) including IPTp and had been employed at the facility for a period not less than 2 years.

3.7.2.1 Data collection - Key Informant Interviews (KII)

A question guide (Appendix 3) was administered to 13 Key Informants who included: Bungoma County Health Director, four sub-County Malaria Control Coordinators, and a nurse at ANC clinic dispensing IPTp-SP in every facility selected.

3.7.2.2 Data analysis - Key Informant Interviews

The qualitative data collected from Key Informants was transcribed and the transcripts analyzed with the aid of N-vivo. Thematic analysis was undertaken by

reading through the transcripts and meaningful patterns was identified, coded and categorized into themes and sub-themes.

3.8 Qualitative method - Observational method

To explore more on IPTp-SP coverage, a standardized observational checklist was used to obtain data on availability of IPTp-SP stocks in the selected health facilities providing ANC, planned health educational talks, and interaction of health care providers with pregnant mothers in practice of DOT.

3.8.1 Qualitative data collection; Observation checklist

A standardized observational checklist (Appendix 4) was used to generate data on how the nurses interact with respective clients when giving services at the MCH during an ANC visit.

3.9 Limitations of the Study

Recall bias might have occurred in our study through mothers who did not have their mother-child clinic booklet, this might have made it difficult for us to confirm SP doses response question from participants. The recall bias was minimized by checking the SP doses information recorded during previous visits in the facility ANC registers. Finding from qualitative data could not be generalized due to the fact that the respondents are facility specific and are selected based on roles rather than the population based random sampling that could allow one to make an inference.

3.10 Ethical Consideration

The ethical approval was sought for from Moi University, department of ethics and research, specifically from MU-MTRH IREC and National Commission for Science, Technology and Innovation (NACOSTI). Authorization was attained in writing from the County government of Bungoma, health department and health facility in charges.

Informed consent was obtained from the participants above 18 years and assent from those aged less than 18 years.

All the study participants were informed regarding the objectives of the study and then those who agreed to participate signed the consent forms. The study participants gave their response at will and were allowed to withdraw if they so wished. The principal investigator and research assistance ensured venue for interview encouraged the participants to give more information and views without fear of their friends overhearing their responses.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographic Characteristics of Pregnant Women

A total of 362 pregnant women of 36 weeks gestation and above took part in the study.

The median age was 26 years with a range of 15 to 43 years. Among all women, 254(70%) were aged between 20 – 30 years. Majority 299(83%) were married, 153(42%) attended secondary level of education. On the case of occupation, majority of the respondents were housewives at 228 (63%).

Table 1: Socio-demographic characteristics of the respondents (n=362)

Variables	Frequency	Percent (%)
Age		
<20	19	5
20-30	254	70
>=30	89	25
Education		
None	16	4
Primary,	113	31
Secondary,	153	42
Higher Education	80	22
Occupation		
Housewife	228	63
Employed	35	10
Self employed	74	20
Student	25	7

4.2 IPTp –SP coverage.

An average of IPTp-SP of 3 and more doses is considered as IPTp –SP optimal coverage while 2 and 1 doses is considered as sub–optimal. The IPTp –SP coverage among study participants ranged from 1 dose to 4 doses. Only 171(47.2%) took three

doses and more of IPTp-SP, 115(31.8%) took two doses and 176(21%) took one dose SP at 36 weeks gestation or above (Figure 1.).

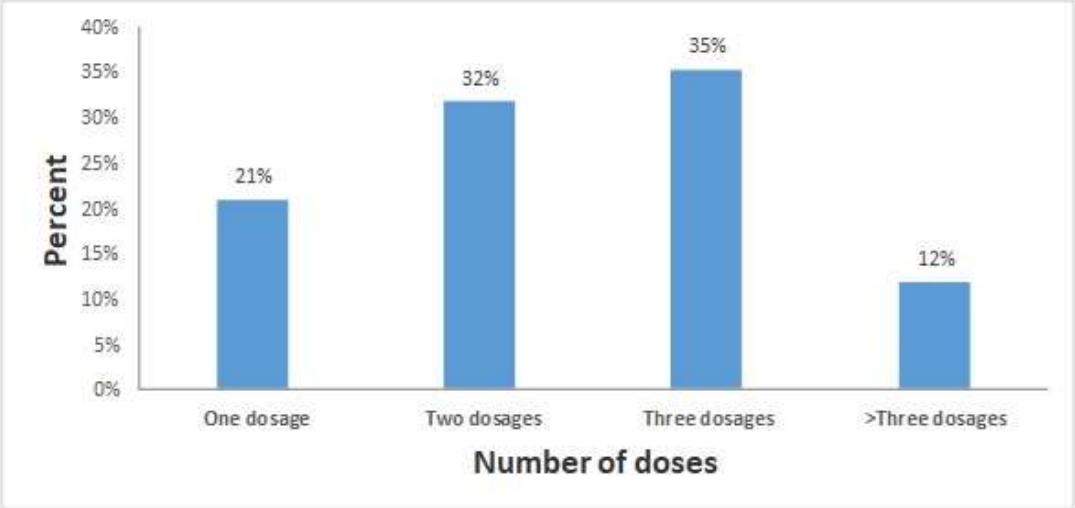


Figure 2: Distribution of IPTp-SP coverage among pregnant women, Bungoma County, Kenya (n=362)

4.3 Knowledge on Consequences of Malaria in Pregnancy

Knowledge of mosquito bite as the mode of malaria transmission was high at 322(89%) among the respondents. However, awareness about signs, symptoms and impacts of malaria in pregnancy was low among the respondents interviewed: About 144(39.8%) mentioned generalized body aches and 199(32.9%) mentioned headache as signs and symptoms of malaria in pregnancy. In assessing respondent's knowledge on effect of malaria in pregnancy, 146(40.3%) mentioned abortion and 82(22.7%) did not know any effect. On asking about means of malaria prevention, 260(71.8%) mentioned sleeping under insecticide treated mosquito net (Table 1).

Table 2: Knowledge of malaria among pregnant women, Bungoma County, 2020 (n=362)

Characteristics	Frequency	%
What causes malaria		
Mosquitoes	322	89
Other causes	40	11
Malaria signs and symptoms		
Fever	77	21.
Generalized body aches	144	39.8
Headache	119	32.9
No signs	1	0.3
Vomiting	21	5.8
Effect of malaria		
Abortion	146	40.3
Stillbirth	10	2.8
Maternal death	47	13.0
Premature birth	64	17.7
Retarded fetal growth	8	2.2
Don't know	82	22.7
Maternal anemia	5	1.4
How to prevent malaria		
Don't know	17	4.7
Keeping the surroundings clean	32	8.8
Protective clothing during biting hours	7	1.9
Sleeping under ITN every night	260	71.8
Taking IPT/Fansidar	46	12.7

4.4 Compliance to IPTp-SP

When asked why they didn’t complete the IPTp-SP doses, 171(47%) responded that they missed their visits while 134(37%) started late and about 34(10%) reported that there was stock out of drugs during the ANC clinic visit (Table 3). On the reasons for taking more than 3 doses, 229(63.3%) did not know why they were taking the doses every time they attended their clinic and 130(35.9%) said that they were not told the reasons.

Table 3: Compliance to IPTp-SP among pregnant women Bungoma County (n=362)

Characteristics	Frequency	%
Why didn't complete 3 IPTp-SP dosage		
Did feel like taking any more Fansidar	15	4.1
Don't like the tablets	8	2.2
No Fansidar during some visits	34	9.4
Missed visits	171	47.2
Started late	134	37.0
Why take more than 3 dosages		
Did not know	229	63.3
Had malaria	2	0.6
Other	1	0.3
Was told so	130	35.9

4.5 Bivariate analysis

In the bivariate analysis age, education, occupation of woman, occupation of husband, number of antenatal care clinic visits, knowledge of malaria in pregnancy (MiP) and place of health facilities (rural or urban) were associated with the coverage of three or more doses of IPTp-SP .

Table 4: Bivariate analysis of factors associated with IPTp-SP coverage, Bungoma County, 2020 (n=362)

Variables	Freq.	Sub-optimal 1-2 dose	Optimal 3+ Dose	P – Value	cOR	(95% CI)
Age						
<20	19	16	3		Ref	Ref
20-30	254	134	120	0.02	4.78	**(1.36-16.80)**
>=30	89	41	48	0.01	6.24	**(1.70-22.95)**
Level of Education						
None	16	8	8	n.s	1.51	(0.53-4.32)
Primary,	113	68	45		Ref	Ref
Secondary,	153	83	70	n.s	1.27	(0.78-2.09)
Higher Education	80	32	48	0.01	**2.27**	**(1.06-4.07)**
Occupation of wife						
Housewife	228	134	94		Ref	Ref
Student	25	13	12	n.s	1.32	(0.58-3.01)
Employed	35	13	22	0.03	**2.41**	**(1.16-5.03)**
Self employed	74	31	43	0.02	**1.98**	**(1.16-3.37)**
Occupation of Husband						
Student	12	5	7	n.s	2.67	(0.78-9.08)
Unemployed	93	61	32		Ref	Ref
Farmer	37	21	16	n.s	1.45	(0.67-3.16)
Employed	82	37	45	0.01	**2.32**	**(1.26-4.27)**
Self-Employed	138	67	71	0.02	**2.02**	**(1.17-3.48)**
Health Facilities						
Urban	284	142	142	0.06	**1.69**	**(1.01-2.83)**
Rural	78	49	29	n.s	Ref	Ref
Mip Knowledge						
Yes	280	139	141	0.04	**1.76**	**(1.06 – 2.02)**
No	82	52	30		Ref	
Number of ANC visits						
1-2	137	132	5		Ref	
3+	225	59	166	<0.001	**74.28**	

cOR- crude Odds Ratio, ns - not significant, CI - Confidence Interval, Ref – Reference

4.6 Multivariate analysis

Variables with $p < 0.20$ in the bivariate analysis was included in the multivariable regression analysis. Adjusted odds ratios (AoR) and 95% confidence intervals were reported with p-value < 0.05. In multivariate analysis only two variables were independently associated with coverage of three or more doses of IPTp-SP. First, being catholic or protestant compared to being a Muslim (AOR=0.02, P=0.0031), second, visiting of antenatal care clinics three or more visits (AOR=92.73, P=0.00001). The results are presented in Table 5.

Table 5: Multivariate analysis of factors associated with IPTp-SP coverage, Bungoma County, 2020 (n=362)

Variables	Freq. [%]	Sub-optimal 1-2 Doses	Optimal +3 Doses	AOR	95%CI	P-Value
Age						
<20	19 [5.5]	16	3	**ref**		
>=20	343 [95]	175	168	1.02	0.95-1.09	0.68
Marital status						
Single	63[17]	40	23	**ref**		
Married	299[83]	151	148	2.196	0.82-5.82	0.11
Level of Education						
Pri/Sec/Higher Education	346[96]	183	163	**ref**		
No Education	16[4]	8	8	1.53	0.46-5.11	0.49
Occupation of wife						
House-Wife/student	253[70]	147	106	**ref**		
Employed/self employed	109[30]	44	65	1.46	0.74-2.97	0.26
Occupation of Husband						
Student/unemployed	105[29]	66	39	**ref**		
Farmer/Employed	257[71]	125	132	0.71	0.33-1.54	0.38
Religion						
Islam	3[0.8]	1	2	**ref**		
Catholic /protestant	**359[99.2]**	45	43	**0.02**	**0.0014-0.264**	**0.0031**
Decision maker						
All the family members	60[17]	39	21	**ref**		
Husband /wife	302[83]	152	150	1.21	0.45-3.23	0.71
Distance to HF						
<5km	167[46]	86	81	**ref**		
>5km	195[54]	105	90	0.89	0.49-1.65	0.73
Cultural beliefs						
Yes	90[25]	47	43	0.85	0.43-1.69	0.64
No	272[75]	144	128	**ref**		
knowledge of MiP						
Yes	280[77]	139	141	0.98	0.45-2.14	0.95
No	82[23]	52	30	**ref**		
What number is this pregnancy						
Primigravida	114[32]	68	46	**ref**		
Multigravida	248[68]	123	125	0.7	0.31-1.6	0.39
Age of pregnancy (timing of ANC)						
<13 weeks	41[11]	20	21	**ref**		
>13 weeks	321[89]	171	150	1.06	0.44-2.56	0.89
Health Facilities						
Rural	78[22]	49	29	**ref**		
Urban	284[78]	142	142	1.82	0.87-3.80	0.11
Health providers always supervise DOTs						
No	10[2.8]	8	2	**ref**		
Yes	352[97.2]	183	169	0.31	0.04-2.67	0.29
Number of ANC visits						
1-2	137[38]	132	5	**ref**		
3+	**225[62]**	59	166	**92.73**	**d**	**0.0001**

AOR- Adjusted Odds Ratio, CI - Confidence Interval, Ref – Reference

4.7 Results from Key Informants Interviews

1) Theme I: Key Informants Demographics

Majority, 62% (8/13) of the Key informants were females. All the 8 key informants interviewed at the ANC facility were registered nurses practicing at ANC for more than two years and providing IPTp-SP services.

2) Theme II: Knowledge of Key Informants on IPTp-SP

Most of the Health care providers interviewed described IPTp-SP as a drug offered to pregnant women in three doses starting from 13th or 16th week of pregnancy to prevent or minimize the complication of malaria in pregnancy. Some of the services mentioned by the health care providers included: Health education and SP provision. They alluded that the IPTp-SP was very helpful in reducing complications of malaria in pregnancy.

> "*My role is to ensure every mother who comes for the clinic gets the services they require, and those eligible mother gets IPTp-SP under DOT and educate them on the purposes of taking prescribed doses. I record the same information on their ANC book"* [Key Informant 1, Female].

Practice of DOT

The water and cups for DOT was witnessed in all the 8 health facilities that were considered for the study. Five of the health facilities observed had SP within the ANC. The clients interviewed at the health facilities with the SP stock took SP under DOT (Table 5). This was equally confirmed during the interview that they give the SP under direct observation therapy.

> "*My role is to ensure every eligible mother gets IPTp-SP under DOT, we don't allow them to carry the SP home"* [Key Informant 1, Female].

3. **Theme III: Operations**

a) Workload/availability of staff

All the key informants reported staff shortage as a challenge in offering adequate IPTp-SP services to pregnant women attending ANC services. The same staff were still deployed to carry out other services within the ANC clinic. The challenges to the pregnant women seeking services include increased waiting time.

> "*There is general shortage of staff at MCH/ANC is a big challenge as the same staffs are required to serve other women for different services like family planning, children immunization among other services. Remember some of these mothers have come from a distant place from here and they have a lot of other work waiting them.*" [Key Informant No. 1, Female].

b) Challenges of IPTp-SP coverage

Five out of eight health facilities had adequate SP in stock, the rest were out of stock at the days of visit (Table 5). Five of the thirteen staffs interviewed mentioned frequent shortages and stock out as a challenge of SP coverage.

> "*Frequent IPTp –SP stock out is one of the challenges, where the availability of stock is on and off. We also experience most pregnant women missing the schedule visits or starting their clinics late in the pregnancy. All these have led to mothers ending up receiving SP below the requirement*" [Key Informant No. 5, Female].

c) Recommendation by KII in relation to IPTp-SP Programme

The Key Informants recommended improved IPTp-SP coverage through outreach to mothers in the villages and educating them on malaria and related complications. They further emphasized the need to address the frequent stock-outs.

> "*For every ANC visits, mothers should be sensitized on the importance of IPTp-SP and the need to make subsequent (scheduled) visits. At the same time, people concerned should plan timely procurement and adequate stock for SP in order to address the frequent shortages leading to stock-outs"* [Key Informant No. 4, Male].

1. Theme IV: Attitudes of Mothers to IPTp-SP

From the health care workers interviewed, the pregnant mothers were receiving an average of two to three IPTp-SP doses. The Key Informants also described awareness on malaria and use of IPTp-SP by pregnant mothers as a key method in preventing malaria and its complications.

> *"The pregnant Mothers will come at least twice during their pregnancy, which enables them to receive an average of two doses of IPTp-SP. Awareness through health education on malaria for pregnant mothers, most importantly at community level will prevent malaria and its complications*". [Key informant No. 8, Female].

4.8 ANC Units Observation

From the observations within the ANC units in all selected eight health facilities, it was observed that one facility had no posters of IPTp, and Malaria in Pregnancy displayed on the walls. Not even one of the ANC units observed had a National IPTp protocol and IPTp training manual for reference.

Table 6: Observations recorded at ANC units

ANC units Number of Health Facilities (n = 8) %	N=8
Health education program drawn for the quarter including MiP	0
Health education program drawn for the quarter including IPTp	0
Health talk given at ANC on day of visit	8
Presence of posters of IPTp/MIP on the wall	7
Presence of ANC Report Book for daily summaries	6
Presence of ANC Monthly Data returns form	6
SP available at ANC	6
Practice of DOT observed	6
SP given is recorded in ANC book of clients	5
Presence of water for DOT	6
Presence of water for sale for DOT	3
Availability of IPTp National protocol	1
Availability of IPTp National training manual	0

4.8.1 Availability of Water at ANC

The researcher established that all the ANC clinics visited had water available to be used and majority of the health facilities had shops where water for sale was available for SP on DOT (Table 5).

CHAPTER FIVE

DISCUSSION

The study reports that the IPTp-SP coverage of at least three dosages was 47%. This was half the coverage of the expected 100% as per the National Malaria Strategy of 2019/2023 (Malaria Strategy, 2018) and the WHO suggest not less than three dosages IPTp-SP to all pregnant mothers by the time of delivery (WHO, 2012). The coverage of 3 or more dosages of IPTp-SP of the present research is higher than (38%) 2015 Kenya Malaria Indicator Survey (KMIS) report. Our findings is similar to a study done in Malawi, Ghana, Kenya and Nigeria that reported poor utilization of IPTp-SP in primary health care centers which was 32.2%, 32.4%, 38.5% and 47.5% respectively (Oppong *et al*., 2019) (State, 2019) (Choonara & Elwange, 2015) (Nkoka *et al*., 2018).

The highest proportion of respondents (52.8%) with low coverage of IPTp-SP, reported late or missed ANC visits as the main reasons for not achieving the 3 doses. Late or missed ANC visits can result in missing repetitive ANC visits (Mutanyi et al., 2021) and health education services which include importance of SP and ANC service. Similar findings were reported in other studies done in sub-Saharan Africa where a survey involving 58 households on missed chances to deliver IPTp-SP to pregnant women showed 72.9% of respondents with low IPTp-SP coverage (Andrews & Gutman, 2015).

Similar low coverage of malaria prophylaxis was shown in a study conducted in Malawi (32.2%) and Mozambique (46.6%) and attributed to low level of awareness and sensitization on IPTp-SP (Nkoka et al., 2018)(Arnaldo et al., 2018). The low coverage (47%) in the present study is similar to studies conducted in Mali and Kenya where the coverage were 32.2% and 38.5% respectively. The reasons stated as per

these studies included: 4.4% of respondents were not able to recognize the drug given during ANC visit, the reasons why they had been given the drug, and recommending that there is great need to improve public sensitization on IPTp-SP during pregnancy (Buh et al., 2019). However, in our study, the main reason was late ANC and missed visits. Appropriate information on malaria treatment and IPTp-SP to mothers attending ANC clinics has been proven to improve the number of ANC attendance (Odongo et al., 2015).

Almost three-quarters (63.3%) of the study participants didn't have familiarity regarding IPTp-SP and the effect of malaria in pregnancy. This was similar to findings from a multilevel analysis of study in sub Saharan Africa on coverage of IPTp-SP (Darteh et al., 2021). Intervention in targeting increasing awareness on IPTp-SP to pregnant women should be prioritized (Darteh et al., 2021)

Late and missed ANC visits as recorded in our study contributed to low IPTp-SP doses coverage. Repeated antenatal care visits from 13 weeks to delivery increases the opportunity of mothers to receive up to seven SP doses which is above target of at least three recommended doses (WHO, 2012). Similar findings were reported in Gabon and Nigeria where the increased SP doses had positive correlation with the number of ANC visit (Bouyou-akotet et al,. 2013) (State, 2019).

The KII findings also revealed that low coverage of IPTp-SP could be related to workload due to staff shortages; as a nursing officer is involved in many activities at ANC per every client such as checking fetal heartbeat, weight monitoring, dispensing the drugs for IPTp-SP, iron folates and recording them in the ANC register and filling client clinic book as well. That could increase waiting time of these mothers (Young

et al., 2019) this might have reduced the opportunity of up to eight visits before delivery.

The IPTp-SP stockout in some of healthcare institutions and frequent interruption of IPTp-SP supply in many health facilities could have attributed to low coverage of IPTp-SP (Awantang et al., 2018). This was also confirmed by the KII results which unveiled that IPTp-SP was frequently out of stock in some of the health facilities. A scholarly research conducted on MiP Programme reviews across Africa reported almost the same findings (Roman et al., 2019).

Across all health facilities visited, none reported to be having a schedule for health talk on malaria in pregnancy and IPTp-SP for the quarterly program. Almost all health facilities visited has no National Training Manual and Protocol on IPTp-SP. The same observation was made in a study carried out in Arusha Tanzania (Mchwampaka et al., 2019). The readiness of hospitals on delivery of malaria services like uninterrupted IPTp-SP stock has shown to increase coverage of IPTp-SP (Bajaria et al., 2019).

Availability of the training manual and protocols equips health care workers with enough information on IPTp – SP (Health, 2014). Health education on benefit of IPTp – SP will go a long way in reducing malaria in pregnancy (Nkoka et al., 2020). Continuous capacity building of health care workers is necessary in improving IPTp-SP coverage (Roman et al., 2019).

CHAPTER SIX

CONCLUSSION

Our study found that majority of the pregnant mothers were in age group of 20 to 35 years, with secondary level of education and are housewives.

The findings of this study highlights that the usage of IPTp-SP is not yet optimal and insufficient. The result from this study indicates that pregnant women's late timing of ANC attendance and missing ANC visits (pregnancy related and cultural factors) are major obstacles to IPTp coverage. Visiting health facility more than three times for ANC clinic was positively linked to increased coverage of IPTp-SP.

The shortages of staff and increased workload due to staff shortages increases waiting time of these mothers hence discouraging pregnant mother making subsequent ANC visits during pregnancy.

6.1 Recommendations

So as to enhance the overall benefit of IPTp -SP intervention, continuous sensitization of pregnant women with relevant knowledge regarding IPTp - SP and the associated malaria risk during pregnancy period need to be escalated by healthcare workers.

Health facility related factors such as workload and stock out need to be addressed since stock out of IPTp-SP in some of health facilities and frequent interruption of IPTp-SP supply in many health facilities prevents the health workers from prescribing IPTp-SP to attending eligible mothers.

The County government of Bungoma should provide adequate SP stocks at all the hospitals providing ANC service. To improve the number of ANC visits and timing, sustained support and sensitization should be done at the community level.

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APPENDICES

Appendix 1A. Consent Form

Title of Study: Factors Associated with Coverage of Intermittent Preventive Treatment for Malaria Pregnancy, Bungoma County, Kenya.

Principal Investigator: Muma Omar Shariff: Kenya Field Epidemiology Laboratory Training Program, Moi University.

The research has been approved by: Moi University-Moi Teaching Referral Hospital Institute of Research and Ethical Committee (MU-MTRH IREC) have approved this research to be carried out at this health facility and Permission has been granted by the County Director department of health Bungoma County.

Introduction: I am Muma Omar Shariff, request you to take part in this study. The study aims to determine factors associated with Coverage of IPTfor Malaria Pregnancy, Bungoma County, Kenya. The study outcome will help the County and National department of health in planning. The interview sessions involves few questions that will take about 15-20 minutes. During this time you are free to ask questions or clarifications if you may not understand words in questionnaire or the question read to you.

Risks and benefits: There is a very small risk of breach of confidentiality if information becomes available to those outside the study, but we will do everything to mitigate against this risk, by using unique identifiers instead of names and addresses of participants, limit access to identifiable information to unauthorized persons, securely store data documents within password protected computers and locked locations, delete or destroy study documents after the required period of time. There is no individual benefit to participation.

Confidentiality: All Information obtained about you will be kept confidential and will be used only for the purposes of the study. The results of the study may be disseminated or published without revealing your identity.

Consent: You are free to take part or to withdraw from the study now and whenever you want, there will be no penalty.

Contact: For any questions, concerns or complaints about the study, please contact Muma Omar Shariff - 0729291212; e-mail: mumafirst@hotmail.com.

Signatures: Your signature below indicates that you agree to participate in this study. You will receive a copy of this signed document. Participation in this study is entirely voluntary, the information in this

consent have been answered to my satisfaction; I freely and voluntarily choose to participate. I understand that participation or not will not affect my health care. By signing below I understand that my rights and privacy are maintained and hereby give my consent to participate in study of factors associated with Intermittent Preventive Treatment of malaria in pregnancy-using Sulfadoxine Pyrimethamine coverage in Bungoma County, Kenya.

Signature (Thumbprint) of Participant /Key informant (KI)	Date
Witness (Name and Signature)	Date

(Following section must be signed by the person undertaking informed consent)

Signature of interviewer	Date
Signature of Principal investigator	Date

Appendix 1B: Assent Form

Title of Study: Factors Associated with Coverage of Intermittent Preventive Treatment for Malaria Pregnancy, Bungoma County, Kenya.

Principal Investigator: Muma Omar Shariff: Kenya Field Epidemiology Laboratory Training Program, Moi University.

The research has been approved by: Moi University-Moi Teaching Referral Hospital Institute of Research and Ethical Committee (MU-MTRH IREC) have approved this research to be carried out at this health facility and Permission has been granted by the County Director department of health Bungoma County.

Introduction: I am Muma Omar Shariff, request you to take part in this study. The study aims to determine factors associated with Coverage of IPTfor Malaria Pregnancy, Bungoma County, Kenya. The study outcome will help the County and National department of health in planning. The interview sessions involves few questions that will take about 15-20 minutes. During this time you are free to ask questions or clarifications if you may not understand words in questionnaire or the question read to you.

Risks and benefits: There is a very small risk of breach of confidentiality if information becomes available to those outside the study, but we will do everything to mitigate against this risk, by using unique identifiers instead of names and addresses of participants, limit access to identifiable information to unauthorized persons, securely store data documents within password protected computers and locked locations, delete or destroy study documents after the required period of time. There is no individual benefit to participation.

Confidentiality: All Information obtained about you will be kept confidential and will be used only for the purposes of the study. The results of the study may be disseminated or published without revealing your identity.

Consent: You are free to take part or to withdraw from the study now and whenever you want, there will be no penalty.

Contact: For any questions, concerns or complaints about the study, please contact Muma Omar Shariff - 0729291212; e-mail: mumafirst@hotmail.com.

Signatures: Your signature below indicates that you agree to participate in this study. You will receive a copy of this signed document. Participation in this study is entirely voluntary, the information in this

consent have been answered to my satisfaction; I freely and voluntarily choose to participate. I understand that participation or not will not affect my health care. By signing below I understand that my rights and privacy are maintained and hereby give my consent to participate in study of factors associated with Intermittent Preventive Treatment of malaria in pregnancy-using Sulfadoxine Pyrimethamine coverage in Bungoma County, Kenya.

_____ _____

Signature (Thumbprint) of Parent /Guardian Date

_____ _____

Signature (Thumbprint) of person Obtaining Assets. Date

(Following section must be signed by the person undertaking informed assent)

_____ _____

Signature of interviewer Date

_____ _____

Signature of Principal investigator Date

Appendix 2: Questionnaire

MOI UNIVERSITY

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS

STRUCTURED QUESTIONNAIRE FOR 36 WEEKS PLUS PREGNANT MOTHERS ON THE EFFECTIVENESS OF IPT IN PREGNANCY ON STRUCTURED INTERVIEW SCHEDULE

DATE: _____ NAME OF HEALTH FACILITY: _____

QUESTIONNAIRE ID NO: _____ SUB-COUNTY:_____

INSTRUCTIONS TO THE INTERVIEWER:

1. Do not write the name of the respondent on the questionnaire.

2. Information given will be considered confidential.

3. Indicate the answer to the question by ticking the responses provided and write the responses to open-ended questions in the space provided.

4. Please ask all questions as indicated.

The information you give is highly confidential

SECTION A: SOCIAL-DEMOGRAPHIC DATA

1. How old are you
   Specify……..
2. Marital status
   - Single
   - Married
   - Divorced

3. What is the highest level of School you attended?
   - None
   - Primary,
   - Secondary,
   - Higher?

4. What religion are you?
   - Catholic
   - Protestant
   - Islam
   - Other (Specify)

5. What is your occupation?

- Employed
- Self-Employed
- House-Wife/ Unemployed
- Student

6. What is the occupation of your husband?

- Employed
- Self-Employed
- Unemployed
- Student
- Farmer

7. What is the distance of this health facility from your home?

- Less than 5KMs
- 6 KMs
- 10 KMs
- 15 KMs
- More than 15KMs

8. Who makes household decisions?

- Husband
- Wife
- Together as Husband and Wife
- All the family members

9. Cultural beliefs on timing of ANC?

- Yes
- No

10. Who escort you when visiting health facility for ANC?

- Husband
- None
- Any family members
- Neighbor

11. What number of pregnancy was this one?

- One
- Two
- Three
- Four and above

12. At what age of the pregnancy did you start attending Antenatal clinic?

- <12 weeks
- 13 - 16 weeks
- 17 - 20 weeks
- 21 and above weeks

SECTION B: EXISTING KNOWLEDGE ON THE CONSEQUENCES OF MALARIA IN PREGNANCY

13. What causes malaria?
- Mosquito
- Others
  1. _____
  2. _____
  3. _____
  4. _____

14. How would you tell that a person is suffering from malaria in pregnancy?
- Generalized body aches
- Headache
- Fever
- Vomiting
- No signs
- Other; Specify

15. Did you have malaria during pregnancy?
- Yes
- No

16. What measures did you take?
- Went to the clinic
- Did nothing
- Took Fansidar home
- Other measures ;Specify

17. Did they take your blood slide?
- Yes
- No

18. What was the result?
- Positive malaria parasites
- Negative malaria parasites

19. What treatment were you given at the clinic?
- Fansidar SP
- Chloroquine
- Coartem
- Panadol
- Nothing
- Don't know the drug

20. What would malaria in pregnancy cause?
- Abortion
- Premature birth
- Retarded fetal growth
- Maternal anemia
- Stillbirth
- Maternal death
- Other Specify

21. How do you prevent malaria in pregnancy?
- Taking IPT/Fansidar
- Sleeping under ITN every night
- Protective clothing during biting hours
- Keeping the surroundings clean
- Other: Specify

SECTION C: COMPLIANCE TO IPTp-SP

22. What were you counseled about IPT at antenatal clinic?
- It prevents consequences of malaria in pregnancy
- One should take 3 doses of Fansidar ….. 2
- The first dose should be taken in second trimester …..
- There should 4 weeks between each dose.

23. At what age of pregnancy did you start getting the IPT dosages?
- It should not be taken in the first trimester
- 13-20 weeks
- 17 – 20
- 21 and above weeks

24. How many IPT dosages did you take?
- Took one dosage
- Took two dosages
- Took three dosages
- Took more than three

25. Why were you not able to complete the 3 IPT dosages?
- No staff to supervise
- Started late and missed visits
- Did feel like taking any more Fansidar
- No Fansidar during some visits
- Don't like the tablets
- Other: Specify

26. Why did you take more than three dosages?
- Was told so
- Did not know
- Had malaria
- Other: Specify

27. Were the health providers always there to give you by supervision (DOTS)?
- Yes
- No

28. Do you believe IPT can prevent consequences of malaria in pregnancy?
- Strongly agree
- Agree
- Strongly disagree
- Disagree

29. At what age of pregnancy did you take the last dose of IPT?
- <36 weeks
- >36 weeks

30. How many times did you attend ANC visits?
- Times 1
- Times 2
- Times 3
- Times 4 and more

SECTION D: CHECKLIST: RECORDS REVIEW

A. RECORDS REVIEW

1. Review of antenatal records for the number of IPTp-SP dosages [ ]

2. Gestational age (weeks) recorded at first visit [ ]

3. Review of antenatal records for frequency of visits including this one [ ]

SECTION E. INFORMATION

THANK YOU FOR YOUR CO-OPERATION AND PARTICIPATION!

ANY COMMENTS ABOUT THE INTERVIEW?

.....

Appendix 3: Key Informant Interviews (For Health Care Workers)

Theme I: Demographics

Code number…… Geo code……

Sub-county…… Health facility……

1. Sex: Male [ ] Female [ ] 2. Place of work…… 3. Contact……

2. Rank (office or position held)……

Theme III: Knowledge

4. What are your roles in IPTp in this clinic? ……..

5. What is the current recommendation of IPTp-SP in Kenya……..

6. How helpful is the IPTp in the prevention of malaria in pregnancy? ……..

7. Are there dropouts in SP uptake? Yes [ ] No [ ]

8. If yes, what accounts for these drop outs?

……

9. What are some of the challenges you face in implementing the IPTp Programme?

a)……

b)……

10. Can the IPTp Programme be sustained? ……

12. What do you recommend in relation to the improvement of the IPTp Programme?

a)……

b)……

Theme III: Operations

I would like to know what you are doing or intend to do regarding IPTp. From this then specific experiences will be continuously probed for depth below surface responses. Probe for the following:

a) Workload

b) Availability of staff

c) Availability of drugs (stock level)

Theme IV: Attitudes of Mothers to IPTp

1. To what extent are mothers taking IPTp?

2. Please describe how prevention of malaria could be met (pro
arrangement).

Summary

Let's summarize some of the key points from our discussion.

Is there anything else?

Do you have any questions?

Thank you for taking the time to talk to me!

Appendix 4: Checklist for ANC unit observation

Code number: …….. Date……

Name of facility …… Sub-county ……

Health education program drawn for the quarter includes IPTp Yes ( ) No ( )

Health talk given at ANC on day of visit Yes ( ) No ( )

Presence of posters of IPTp/MIP on the wall Yes ( ) No ( )

Presence of ANC Monthly Data returns form Yes ( ) No ( )

SP stock available at ANC Yes ( ) No ( )

Practice of DOT observed Yes ( ) No ( )

SP given is recorded in ANC report Book Yes ( ) No ( )

SP given is recorded in ANC book of clients Yes ( ) No ( )

Presence of Adverse Event forms for SP Yes ( ) No ( )

Presence of water for DOT Yes ( ) No ( )

Presence of water for sale for DOT Yes ( ) No ( )

Availability of IPTp National protocol Yes ( ) No ( )

Availability of IPTp training manual Yes ( ) No ( )

Any additional observations made? ……

Appendix 5: Work Plan/Time Frame

Activity	**Year 2019**							**Year 2020**										**Year 2021**
Months	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Mar	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan - march
Proposal Writing																		
Proposal Defense																		
Study Approval																		
Data Collection																		
Data Analysis																		
Thesis Writing																		
Thesis Presentation & defense																		

Appendix 6: Research Ethics Certificate

fhi360
THE SCIENCE OF IMPROVING LIVES

FHI 360

certifies that

MUMA OMAR SHARIFF

has completed the

RESEARCH ETHICS TRA INING CURRICULUM

July 27, 2018

Appendix 7: Approval Letter From Institute of Research and Ethics Committee

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/203

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/203

Reference: IREC/2019/301
Approval Number: 0003550

30th January, 2020

Mumia Omar Shariff,
Moi University,
School of Public Health,
P.O. Box 4606-30100,
ELDORET-KENYA.

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
30 JAN 2020
APPROVED
P. O. Box 4606 - 30100 ELDORET

Dear Ms. Mumia,

FACTORS ASSOCIATED WITH COVERAGE OF INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA PREGNANCY, BUNGOMA COUNTY, KENYA

This is to inform you that ***MU/MTRH-IREC*** has reviewed and approved your above research proposal. Your application approval number is ***FAN:0003550***. The approval period is **30th *January, 2020 – 29th January, 2021.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MU/MTRH-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MU/MTRH-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MU/MTRH-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MU/MTRH-IREC***.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Sincerely,

DR. S. NYABERA
DEPUTY-CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SOD

Appendix 8 :Approval Letter From NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 526881

Date of Issue: 18/March/2020

RESEARCH LICENSE

This is to Certify that Ms. Mumo Omar Shariff of Moi University, has been licensed to conduct research in Bungoma on the topic: Factors Associated with Coverage of Intermittent Preventive Treatment for Malaria in Pregnancy. for the period ending : 18/March/2021.

License No: NACOSTI/P/20/4109

526881

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix 9: Letter of Approval From Bungoma County

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF BUNGOMA
MINISTRY OF HEALTH
OFFICE OF THE COUNTY DIRECTOR
HEALTH

Telegrams: "MEDICAL", BUNGOMA
Telephone: (055) 30230 Fax: (055) 30650
E-mail: docakatu@yahoo.com
When replaying please quote

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P.O. BOX 18-50200
BUNGOMA

Ref: CG/BGM/CDH/RESRC/VOL.II/137

DATE: 13TH JULY, 2020.

Mumar Omar Shariff
Moi University
School of Public Health

RE: RESEARCH AUTHORIZATION

Following your request for authority to carry out a study on **"Factors Associated with Coverage of Intermittent Preventive Treatment for Malaria in Pregnancy, Bungoma County, Kenya."**, I am pleased to inform you that you have been authorized to conduct your research as mentioned in your letter.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the County Director of Health. The soft copy of the same should be submitted through the online Research Information system.

Thank you

COUNTY DIRECTOR OF HEALTH
BUNGOMA COUNTY
P. O. Box 18-50200
BUNGOMA

ROBERT MOSE
FOR: COUNTY DIRECTOR OF HEALTH
BUNGOMA.

c.c.
- MOH - Bumula Sub County
- MOH - Kabuchai Sub County
- MOH - Kanduyi Sub County
- MOH - Kimilili Sub County