

**THE USE OF SULPHADOXINE PYRIMETHAMINE AS INTERMITTENT  
PREVENTIVE TREATMENT FOR MALARIA IN PREGNANCY: A STUDY AT  
THE KPESHIE SUB METROPOLIS**

**PHILOMINA ADJOA NYAJRKOA WOOLLEY**

**SCHOOL OF NURSING,  
COLLEGE OF HEALTH SCIENCES,  
UNIVERSITY OF GHANA, LEGON.**

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**SUPERVISORS:**

**DR. ERNESTINA DONKOR**

**DR. MICHAEL F. OFORI**

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## **DEDICATION**

To Naa Lartele, Naa Anorkor and Nii Lartey, my lovely kids.

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## LIST OF ABBREVIATIONS

- ANC..... Antenatal Clinic
- CDC..... Centres for Disease Control
- CQ..... Chloroquine
- DOT..... Directly Observed Therapy
- GHS..... Ghana Health Service
- GNMCP Ghana National Malaria Control Programme
- G6PD..... Glucose 6 Phosphate Dehydrogenase
- Hb..... Haemoglobin
- HIV..... Human Immuno deficiency Virus
- IPT..... Intermittent Preventive Treatment
- IPTp..... Intermittent Preventive Treatment for pregnancy
- IPT-SP..... Intermittent Preventive Treatment using Sulphadoxine Pyrimethamine
- ITN..... Insecticide Treated bed Net
- LBW..... Low Birth Weight
- MOH..... Ministry of Health
- P. fal..... Plasmodium falciparum
- RBM..... Roll Back Malaria
- SP..... Sulphadoxine Pyrimethamine
- UNDP..... United Nations Development Programme
- UNICEF United Nations Children's Fund
- WHO..... World Health Organization

## ABSTRACT

In most endemic areas of the world, pregnant women are the main adult risk group for malaria. They are four times more likely to suffer attacks of symptomatic malaria than other adults. Malaria in pregnancy increases the risk of severe maternal anaemia, low birth weight and death. Studies have shown that Sulphadoxine Pyrimethamine prevents malaria in pregnancy and improves maternal haemoglobin and infant birth weight. The study investigated the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) in the Kpeshie sub-Metropolis. A quantitative research design was used. A total of 400 mothers who delivered at the La General hospital within the study period and consented to participate were recruited into this study using purposive sampling. Structured questionnaire was used to collect data, chart review of maternal records and babies' birth weight was also carried out. Data were analysed using statistical package for social sciences (SPSS) version 16.

The study established that the Directly Observed Therapy using Sulphadoxine Pyrimethamine is not being properly followed as stipulated by the Ghana Health Service. Majority of the mothers (69%) indicated knowledge of the use of Sulphadoxine Pyrimethamine during pregnancy but only 51 % of them actually used it. Only 13.1 % of the mothers took the recommended three doses of the SP. The number of times a mother took the SP the better her haemoglobin level ( $p = 0.005$ ). Finally, this study did not establish any clear relationship between the number of times a participant took SP and their infant birth weight ( $p = 0.78$ ). In conclusion, the use of Sulphadoxine Pyrimethamine in preventing malaria in pregnancy using the Directly Observed therapy is well known in Ghana but its use needs to be enhanced through proper education of both the Service Providers and the Pregnant women.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

Malaria is an enormous global health problem affecting young children and pregnant women. Every- year, millions of people have malaria attacks worldwide (Snow *et al*, 2005; Hay *et al*, 2009). The disease kills one to three million people and causes at least 100 million acute illnesses yearly (Narasimhan & Attaran, 2003; Challis *et al*, 2004; Uneke, 2007; Lagerberg, 2008). Its magnitude as a public health problem is manifested in the staggering toll in illness and suffering of people especially children and pregnant women (Lagerberg, 2008; Hay *et al*, 2009).

In Africa, the effect of malaria is profound, accounting for about 90% of all malaria deaths in the world (African Malaria Report, 2003; Breman *et al*, 2004; Pettifor *et al*. 2008; Mmbando *et al*, 2009). Again, malaria causes almost one million deaths in Africa, most of which are among pregnant women and children under five (Bames *et al*, 2009). In Ethiopia, malaria is the leading cause of morbidity and mortality. About 70% of the population is estimated to be at risk of malaria infection yearly (Yeshiwondim *et al*, 2009). In Tanzania, malaria is the leading cause of morbidity and mortality and accounts for about 30% of hospital admissions and 15% of deaths ( Mmbando *et al*, 2009). The disease remains a major cause of morbidity and mortality among children under five years of age and pregnant women in Nigeria (Okeke & Uzochukwu, 2009).

In Ghana, malaria continues to be a serious health problem, with an estimated 3.5 million cases being reported annually (Ghana Health Service, 2006). Malaria remains a major cause of poverty and low productivity. It is the leading cause of mortality in children under five years and

a significant cause of adult morbidity (Adams *et al* 2004; Asante & Asenso-Okyere, 2003; Ghana Malaria Action Alert, 2007).

Malaria is the most common (and preventable) cause of adverse birth outcomes. In Sub-Saharan Africa malaria in pregnancy poses a serious threat. It affects an estimated 24-25 million pregnant women annually (Bardaji *et al*, 2008; Uneke, 2008). In Ghana, malaria infection during pregnancy accounts for 13.5% of out patient visits. Again it accounts for 10.6% of admissions and 9.4% maternal mortality (Ghana Health Service, 2005).

Although malaria infection in pregnancy is usually asymptomatic, pregnant women are at risk of high densities of *P. falciparum*. This often contributes to adverse prenatal outcomes such as maternal anaemia, abortions, prematurity, intrauterine growth retardation and low birth weight (Uneke, 2008). Low birth weight related to malaria is the single greatest risk factor of neonatal and infant mortality (Guyatt & Snow, 2004). Low birth weight also has a risk for poor neurosensory, cognitive and behavioural development as well as school performance (Guyatt & Snow, 2004). Malaria in pregnancy also attributes to 5-12% low birth weight and 33% preventable low birth weight to pregnancy-associated malaria (Newman *et al*, 2003).

Anaemia caused by the infection of malaria is estimated to result in approximately 10,000 maternal deaths per year (Guyatt & Snow, 2001). Severe maternal anaemia increases the risk of maternal mortality. The increasing incidence of malaria in pregnancy and its effect on birth outcomes necessitated the global malaria campaign in 1955. The elimination campaign succeeded in Europe, North America, the Caribbean, parts of Asia and South-Central America. However, it failed in Sub-Saharan Africa. The factors to which its failure was attributed were technical challenges in executing the strategy (Tanner & Savigny, 2008). There was little a global support for malaria control in Africa. By 1992 the combination of a worsening malaria situation led to a renewed global focus on malaria control (Tanner & Savigny, 2008).

The World Health Organisation (WHO) in collaboration with the World Bank, United Nations Development Programme (UNDP) and United Nations Children's Fund (UNICEF) launched the Roll Back Malaria (RBM) initiative in 1998 (Narasimhan & Attaran, 2003; Yamey, 2004). The Roll Back Malaria initiative was developed to promote an effective control strategy to combat the disease. It emphasized a three-pronged package during pregnancy: intermittent preventive treatment, insecticide treated bed nets and case management of malaria illness during pregnancy. The goals of RBM were to expand the use of these interventions in all countries where malaria was endemic, especially in Sub-Saharan Africa where malaria accounts for 90 percent of deaths, and to reduce malaria deaths by half by 2010 (Narasimhan & Attaran, 2003; WHO, 2001).

Prior to the RBM initiative, the WHO in 1986 recommended that pregnant women living in malaria-endemic areas receive Intermittent Preventive Treatment (IPTp) with a safe and effective anti-malaria drug as part of routine Ante-Natal Care (ANC) (WHO, 1998).

In Ghana chloroquine has been used to treat malaria even among pregnant women; however, in the advent of the 21<sup>st</sup> century, complicated malaria following chloroquine administration was on the ascendancy. In the case of pregnant women, the malaria parasites in the pregnant woman's blood was affecting her health and that of the unborn baby. When the parasites get into the placenta they interfere with the transfer of oxygen and nutrients from the mother to the unborn baby (National Malaria Control Programme (NMCP), 2007). Following this development, the National Malaria Control Programme in collaboration with the Noguchi Memorial Institute for Medical Research, studied the efficacy of chloroquine country wide in 2002 and found that treatment failure following chloroquine ranged between 6% and 25% and parasite clearance rates were low (Ministry of Health, Ghana. 2007). These results prompted the search for alternative treatment for uncomplicated malaria. Ghana then changed its anti-malaria

drug policy selecting Sulphadoxine Pyrimethamine for Intermittent Preventive Treatment for pregnant women in 2004 (Ministry of Health, Ghana. 2007).

Intermittent Preventive Treatment for pregnancy (IPTp) is based on the use of anti-malaria drugs given in treatment doses at predefined intervals after quickening (16 gestational weeks) to reduce malaria Parasitemia and poor pregnancy outcomes. Intermittent Preventive Treatment for pregnancy is preferably provided as part of a comprehensive antenatal package with other products like haematinics and anti-helminthics. Every pregnant woman should also have access to Insecticide Treated Nets (ITNs) which should be used throughout the pregnancy as an additional method of preventing malaria (Ministry of Health, Ghana, 2007). According to the policy in Ghana, the dosage of Sulphadoxine-Pyrimethamine should be (Sulphadoxine 500mg plus Pyrimethamine 25mg) given at monthly interval for three times starting after 16 weeks of gestation. The drug is administered under the supervision of a qualified health worker (Directly Observed therapy [DOT]) regardless of whether a woman is infected or not. The pregnant women were screened for Glucose 6 phosphate dehydrogenase (G6PD) prior to the commencement of the therapy. A clinic based prevention approach of malaria using Sulphadoxine Pyrimethamine chemoprophylaxis against malaria in pregnant women has been adopted because Ghana has been identified as a malaria endemic area where malaria accounts for about 10% of maternal deaths and is also responsible for adverse birth outcomes. This study is to research into the administration of IPTp under DOT in order to have a deeper insight into its effects on maternal haemoglobin levels and infant birth weight, and make recommendations for policy makers.

## 1.2 Problem Statement

Intermittent preventive treatment is a policy that was initiated by the WHO in the year 1998 to reduce maternal malaria during pregnancy and has been adopted by most countries considered malaria endemic. Malaria has a devastating effect on birth outcomes for both the mother and foetus. Ghana, being a signatory to the millennium development goals, is committed to halting and reducing the incidence of malaria in pregnancy and its complications. Malaria parasites in pregnancy can exist in the blood and or in the placenta of a pregnant woman without producing symptoms. Sulphadoxine Pyrimethamine administered under directly observed therapy (DOT) is recommended by WHO as a chemoprophylactic drug of choice for pregnant women. The drug should be administered in three doses yet a greater number of pregnant women visit the clinic only once, and this makes the achievement of the desired effect doubtful. Malaria infection causes anaemia in pregnant women with an outcome of low birth-weight. IPTp - SP given under DOT is being implemented in all antenatal clinics throughout the country. At the La general hospital where the study was conducted, the total number of women who attended ANC in 2008 was 9,848 of which 4,156 pregnant women received the first dose of SP, 3,744 received the second dose and 1,580 pregnant women received the third dose of SP. In 2009 antenatal clinic attendance was 8,463. As much as 5,830 received the first dose of SP, 3,966 had the second dose and 1,778 received the third dose. Over the years, however, the implementation of IPTp - SP has been saddled with problems such as lack of supply and mothers unwillingness to use medicine during pregnancy. It is for these reasons that this study seeks to investigate the use of sulphadoxine pyrimethamine as intermittent preventive treatment for malaria in pregnancy. There is evidence that the IPTp-SP has generally been embraced in Ghana and is being

implemented in all antenatal clinics. However, the question is, to what extent is it being implemented? How has the IPTp-SP implementation influenced birth outcomes?

### **1.3 Aim of the study**

The aim of the study was to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) programme at the Kpeshie Sub-Metropolis and to assess its effects on infant birth weight and maternal haemoglobin levels.

### **1.4 Objectives of the study**

- To describe the use of Sulphadoxine Pyrimethamine using the Directly Observed Therapy approach.
- Assess the effects of Sulphadoxine Pyrimethamine on maternal haemoglobin levels.
- To determine the effect of Sulphadoxine Pyrimethamine on infant birth weight
- Evaluate the susceptibility of pregnant women on Sulphadoxine Pyrimethamine to malaria infection.

### **1.5 Significance of the study**

- The study will provide evidence that will influence the design of messages used to educate community members about the use of Sulphadoxine Pyrimethamine in pregnancy and its effects on birth outcomes.
- The findings of the study will serve as a reference material for future research.
- The study findings will also promote evidence-based practice to influence policy makers on implementation of intermittent preventive therapy for pregnant women.

## 1.6 Definition of terms

- **Maternal Anaemia:** This is anaemia occurring in pregnant women. Using WHO (Walraven, 2007) definition for anaemia, a cut off point for anaemia, haemoglobin (Hb) levels of 7mg/dl and below, are considered to be severe anaemia, Hb level above 7mg/dl to 10mg/dl are considered to be moderate anaemia, Hb levels of 10.1 to 10.99mg/dl are considered to be mild anaemia and Hb level 11 and above are considered to be normal Hb.
- **Birth weight:** The first weight of the newborn obtained after birth.
- **Low Birth weight:** Birth weight less than 2,500g.
- **Intermittent Preventive Treatment for Malaria in Pregnancy:** This is the administration of Sulphadoxine Pyrimethamine to pregnant women in treatment doses starting at 16 weeks or the first foetal kick, regardless of signs and symptoms of malaria.
- **Sulphadoxine Pyrimethamine:** Refers to the drug of choice currently used in the treatment of uncomplicated plasmodium malaria in pregnancy in Ghana.
- **Directly Observed Therapy:** Taking of Sulphadoxine Pyrimethamine by pregnant women in the presence of health personnel.
- **Malaria:** An infectious disease caused by a parasite called plasmodium which is transmitted through the bite of infected female Anopheles mosquitoes.
- **Pregnancy:** A state of carrying a growing foetus or embryo in the uterus.

## CHAPTER TWO

### LITERATURE REVIEW

This chapter reviews literature relevant to the purpose of this study: the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) and to assess its effects on maternal haemoglobin levels and infant birth weight. The review has been grouped under the following headings: malaria in pregnancy and its effect on maternal haemoglobin levels and infant birth weight, strategies to reduce malaria in pregnancy and challenges to malaria control in pregnancy.

#### 2.1 Malaria in pregnancy

Pregnant women have been identified as the main adult group at risk of malaria and are about four times more likely to suffer malaria than non-pregnant adults (Kvinnoforum & Roll Back Malaria Partnership, 2006). Malaria infection during pregnancy results in a wide range of adverse consequences for the pregnant woman, the developing foetus and the newborn infant (WHO, 2004). The effect of infection on the mother may range from negligible to severe, depending on the level of immunity to malaria infection that the mother has acquired prior to pregnancy and the efficacy of these immune responses during her pregnancy (WHO, 2004). During pregnancy, the immune system of the pregnant women is said to be altered in the sense that the T-cell (cell-mediated) immunity is reduced whilst B-cell (antibody mediated) is increased (NMCP, 2009). Therefore, diseases which require cell mediated immune responses for protection such as malaria increase in pregnancy (NMCP, 2009). Malaria infection in the mother, especially in areas of low or unstable transmission, can result in abortion, stillbirth or congenita] infection (WHO 2004; Singh *et al*, 2005; Uneke, 2007; Fawole & Onyiaso, 2008). A WHO (2004) report indicated that in areas with stable malaria transmission (where prevalence during

pregnancy ranges from 10% to 65%), malaria during pregnancy contributes to approximately 2% to 15% of maternal anaemia, 8% to 14% of low birth weight (LBW), 8% to 36% of prematurity and 13% to 70% of intrauterine growth retardation. The report further stated that maternal malaria infection accounts for an estimated 3% to 8% of all infant deaths (WHO, 2004). In Ghana, it is recorded that malaria among pregnant women accounts for 28.1 % of OPD attendance, 13.7% of admissions and about 10% of maternal deaths (NMCP, 2007). These records show the devastating effects malaria can have on the pregnant woman.

### **2.1.1 Parasitemia**

Malarial infection during pregnancy is a major public health problem in tropical and subtropical regions throughout the world. In most endemic areas of the world, pregnant women are the main adult risk group for malaria (WHO, 2001; Uneke, 2007; Kabanywanyi *et al*, 2008).

Malaria during pregnancy has been widely evaluated in Africa South of the Sahara where 90% of the global malaria burden occurs (WHO, 2001; Uneke, 2007). Clerk *et al*, (2009) studied the epidemiology of malaria among pregnant women attending antenatal clinics in an area with intense and highly seasonal malaria transmission, using a quantitative method in rural northern Ghana and found that malaria Parasitemia was found to be high among participants (47%). Similarly, studies have shown malaria prevalence being higher in primigravidae and secundigravidae than multigravidae (Rogerson *et al*, 2000a; Rogerson *et al*, 2000b; Achidi *et al*, 2007). Malaria infection from these studies is suggestive that although pregnant women may be highly susceptible to malaria their parity that is. either primi-gravida or multi-gravida must be taken into consideration. With regards to symptoms of malaria in pregnancy, a study done in rural Mozambique by Bardaji *et al* (2008) used a quantitative method with a hospital based descriptive approach and studied clinical malaria in African pregnant women. The study found that

symptoms suggestive of malaria were very frequent among pregnant women attending a rural maternity clinic, however, less than a third of them were parasitaemic. The conclusion was that in the absence of microscopy or rapid diagnostic tests, a large proportion of women, including those in the first trimester of gestation, would be unnecessarily receiving antimalarial drugs. A study conducted in Southwestern Cameroon by Achidi *et al* (2007) found malaria parasites density significantly higher in younger women than in older women. However, in another study done in urban settings age and seasons were more important than gravidity as predictors of malaria (Rogerson *et al*, 2000b).

Mockenhaupt *et al* (2006) studied the detection and clinical manifestation of placental malaria in Southern Ghana using cross sectional quantitative method among 839 women. It was found that prevalence of *P. falciparum* was high. These findings indicate that the burden of malaria in pregnancy may be even more than thought and accentuate the need for effective anti-malarial interventions in pregnancy. Looking at the percentages of malaria parasitemia and the aparasitaemic nature of pregnant women, a lot more women may have an increase risk of developing maternal anaemia.

### **2.1.2 Maternal Anaemia**

Anaemia is the most common consequence of *P. falciparum* malaria infection. In Sub-Saharan Africa, it is estimated that between 200,000 and 500,000 pregnant women develop severe anaemia as a result of malaria (Steketee *et al*, 2001), and *P. falciparum* malaria in pregnancy is the primary cause of up to 10,000 maternal anaemia-related deaths in Sub-Saharan Africa annually (Guyatt & Snow, 2001; Uneke, 2007). Although anaemia during pregnancy may have multiple causes (HIV infection, inadequate nutrition, haemoglobinopathies and hookworm infection), the contribution of malaria is substantial (WHO, 2004). Severe maternal anaemia

increases the mother's risk of death. Malaria-related anaemia is estimated to cause as many as 10,000 maternal deaths each year in Africa (WHO, 2004). Guyatt & Snow (2001) reviewed twenty-six studies on the haemoglobin levels of pregnant women irrespective of the parity from areas with endemic malaria transmission and revealed that the median prevalence of severe anaemia in pregnant women is approximately 8.2% irrespective of the women's parity. In view of the fact that 26% of these cases are due to malaria, it is suggested that as many as 400,000 pregnant women may have developed severe anaemia as a result of infection with malaria in Sub-Saharan Africa. Women with moderate/severe anaemia had higher parasite prevalence and densities than women with mild/no anaemia (Rogerson *et al*, 2000b). Again, primigravid women had lower haemoglobin levels than multigravid women (Brabin *et al*, 2008). Studies have also shown that malaria Parasitemia was associated with low haemoglobin levels (Uneke, 2007; Brabin *et al*, 2008). A related study carried out in rural Malawi found that anaemia prevalence from all causes was as high as 69% (Huddle *et al*, 1999). Deficiencies of iron and inadequate diet were also factors identified to be related to malarial Parasitemia. On the other hand, in a study, about intra- uterine growth retardation, using a quantitative survey method, identified illiteracy and poor nutritional status as other factors associated with anaemia in primigravidae (Verhoeff *et al*, 2001). Gies *et al* (2008) in Burkina Faso found that though the prevalence of malaria infection was lower and did not translate into significant difference in maternal anaemia or birth weight, placenta insufficiency as a result of anaemia due to malaria may lead to low birth weight.

### **2.1.3 Malaria in pregnancy and Low Birth Weight**

Low birth weight has also been linked with malaria in pregnancy. Importantly, maternal malaria infection accounts for almost 30% of all the causes of LBW that can be prevented during

pregnancy (Steketee *et al.*, 1996; WHO, 2004). Guyatt & Snow (2004) reviewed the impact of malaria during pregnancy on low birth weight in sub Saharan Africa using empirical data in Africa and concluded that, in an area in which malaria is endemic, low birth weight due to malaria is about 19%.

Malaria - associated low birth weight is higher among primiparous women than among multiparous women (Brabin *et al.*, 2008; Wort *et al.*, 2006). A similar hospital-based study done in Ahmedabad, India identified and quantified the following risk factors for preterm and term low birth weight (LBW): poor pregnancy history, lack of prenatal care, clinical anaemia and hypertension (Mavalankar *et al.*, 1992). An increased number of malarial attacks in early pregnancy have also been found to be associated with increased risk of LBW (Cot & Deloron, 2003). Malaria infection during pregnancy has strongly been linked with intra uterine growth retardation (IUGR) (Braind *et al.*, 2007). A study done in Thailand also found that not only does malaria in pregnancy increase neonatal mortality by lowering birth weight but also having fever in a week before birth also contribute to premature birth (Luxemburger *et al.* 2001). On the contrary, in a study on malarial infection and birth weight in urban Zanzibar, Tanzania, LBW was reportedly associated with placental malaria, but it was found that there was no significant difference between primiparous and multiparous women on LBW (Matteelli *et al.*, 1996). A related study on the impact of endemic and epidemic malaria on the risk of stillbirth in two areas of Tanzania with different malaria transmission patterns, found that malaria exposure during pregnancy as a delayed effect on birth weight, but a more acute effect on stillbirth (Wort *et al.*, 2006). On the contrary, a comparison study carried out in Rwanda, on the effect of malaria on birth weight, using 12,526 deliveries from 11 different health centres, revealed that malaria in pregnancy did not contribute to low birth weight and gave factors such as improved socio-economic factors and good nutrition which also have effect on increased baby's birth weight

(Rulisa *et al*, 2009). The alarming effect of malaria in pregnancy to both mother and baby called for strategies in controlling malaria in pregnancy.

## 2.2 Strategies to control malaria in pregnancy

In Africa, the first malaria preventive strategies were implemented in the 1950s. They consisted of weekly or bi-monthly chemoprophylaxis with chloroquine (CQ) in West African countries and dapsone-pyrimethamine or Sulphadoxine-pyrimethamine (SP) in East Africa. A large number of trials demonstrated the efficacy of such a chemoprophylaxis in preventing LBW, maternal anaemia and placental malaria (Briand *et al*, 2007). Unfortunately, because of the growing resistance of parasites to these drugs and poor compliance of the women with the treatment, the strategies finally failed (WHO, 2004; Briand *et al*, 2007). Again, adverse effects, especially pruritus associated with CQ also contributed to the failure of the strategy (WHO, 2004).

In 1998, the WHO Expert Committee on Malaria recommended IPTp with Sulphadoxine-pyrimethamine for the control of malaria in pregnancy in areas of moderate to high transmission. The rate at which countries in Sub-Saharan Africa adopted IPTp with sulfadoxine-pyrimethamine as policy was initially slow (Crawley *et al*. 2007). The World Health Organization currently recommends a three-pronged approach to prevent these adverse effects in areas of Africa with high levels of transmission of *Plasmodium falciparum* malaria: Intermittent Preventive Treatment (IPT) with antimalarial drugs, Insecticide-Treated bed Nets (ITN), febrile malaria case management (CDC, 2004). The most promising preventive approach using antimalarial drugs for pregnant women is intermittent preventive treatment (IPT).

### 2.2.1 Intermittent Preventive Treatment for Pregnancy using Sulphadoxine Pyrimethamine

Intermittent Preventive Treatment for pregnancy is based on the use of antimalarial drugs given in treatment doses at predefined intervals after quickening. WHO recommends that in areas of stable transmission, IPT with an effective, preferably one-dose, antimalarial drug should be provided as part of antenatal care, starting after quickening (WHO, 2004). Sulfadoxine-pyrimethamine (SP) is currently the most effective single-dose antimalarial drug for prevention of malaria during pregnancy in areas of Africa where transmission of *P. falciparum* malaria is stable and where resistance to SP is low. SP is safe in pregnancy, efficacious in reproductive-age women in most areas and feasible for use by control programmes because it can be given as a single-dose treatment under observation by a health worker. Monitoring of antenatal programmes that are using IPT with SP has demonstrated high levels of IPT acceptance by pregnant women. Malawi has experienced wide-scale IPT programmes and found strong acceptance with the IPT regimen distributed in antenatal clinics and has consistently achieved coverage levels greater than 80% for the first dose (WHO, 2004). IPT - SP increased haemoglobin levels, reduced malaria Parasitemia of all parities and decreased the proportion of low birth weight (Rogerson *et al*, 2000a; Mbonye *et al*, 2006; Sirima *et al*, 2006; Brentlinger *et al*, 2007; Falade *et al*, 2007).

Assessing the disease burden a year after the implementation of a programme of intermittent preventive treatment in Koupela district in Burkina Faso, Sirima *et al* (2006), found that mothers who took one dose of IPTp-SP showed a significant reduction in the prevalence of peripheral Parasitemia; those who had two doses had reduction in the prevalence of placental Parasitemia and reduction in the risk of low birth weight was associated with mothers who took three doses of IPT-SP. Similarly, Hommerich *et al* (2007) investigated placental malaria after the

implementation of intermittent preventive treatment in pregnancy in southern Ghana, in 2000 and 2006 one year after the implementation of sulphadoxine pyrimethamine to evaluate its use. The study found a high level of compliance of SP in 2006 as compared to 2000, 77% took the SP once. 26% took it twice and 24%, thrice. The study found reduction in maternal anaemia, less malaria infection and increased birth weight though placental *P. falciparum* infection was seen in 11% of respondents in the study periods. Again, studies have recorded reduction in both placental and peripheral malaria infection, increase haemoglobin levels and birth weight as a result of IPT - SP (Shulman *et al* 1999; Falade *et al*, 2007; Menendez *et al*, 2010).

On the contrary, in a study that evaluated the effects of intermittent Sulphadoxine-pyrimethamine treatment in pregnancy on parasite clearance and risk of low birth weight in rural Malawi; Verhoeff *et al* (2001) found that though there was a difference in the prevalence of *Plasmodium falciparum* infection at first antenatal visit between primigravidae and multigravidae, mean haemoglobin concentration was significantly lower in primigravidae than in multigravidae. There was also no significant difference in parasite prevalence in peripheral or placental blood between women who had received one or two antenatal doses of SP. The multigravidae who had received two doses of SP had higher mean haemoglobin concentrations than those who had received just one though this difference was not seen in the primigravidae. Again, the study revealed that haematinic supplements given to the subjects contributed more to the increase in haemoglobin concentration than SP (Verhoeff *et al*, 2001). This may also be attributed to poor diet which can bring about placental insufficiency thereby resulting in low birth weight. Sleeping in insecticide treated net is believed to help prevent mosquito bites which will eventually prevent malaria in pregnancy.

### 2.2.2 Insecticide Treated Bed Net (ITN)

Most malaria-carrying mosquitoes bite at night; therefore, mosquito nets, if properly used and maintained, can provide a physical barrier to hungry mosquitoes (WHO, 2001). Insecticide treated bed net usage during pregnancy can prevent malaria in pregnancy and its complications of anaemia and low birth weight (Gamble *et al*, 2007). In a study, Wort *et al*, (2006) conducted a systematic review in Africa and Asia on insecticide-treated nets for the prevention of malaria in pregnancy found benefits of ITN to be different in the two continents. In Africa, it was found that women who slept under ITNs had lower numbers of parasites in their blood; miscarriages were much reduced by a third in women who were in their first few pregnancies. The overall proportion of babies who were low birth weight went down by nearly a quarter (Gamble *et al*, 2007). In a research done in Thailand, the women using ITNs were less anaemic and the miscarriage rate was again lower (Gamble *et al*, 2007), and that primigravidae benefits from ITN more than secondigravidae (Njagi *et al*, 2003). In a similar study conducted in Western Kenya, the use of Insecticide (Permethrin) Treated bed Nets (ITNs) on malaria in pregnancy raised haemoglobin levels, reduced prevalence of placental malaria by 35% and the prevalence of low birth weight also by 28% in the first four pregnancies. However, no beneficial impact was observed in gravidae five or higher (ter Kuile *et al*, 2003). On the contrary studies have shown that ITN did not have any significant effect on placental malaria, anaemia and low' birth weight (Browne *et al*, 2001). In Ghana studies w'ere conducted to assess the impact of insecticide treated bednets use on malaria and anaemia in pregnancy, findings revealed that placental malaria, anaemia and LBW remained high after the use of ITN (Browne *et al*, 2001; Kabanywany *et al*, 2008).

Kiwuwa & Mufiibenga (2008) studied the use of antenatal care, maternity services, intermittent presumptive treatment and insecticide treated bed nets by pregnant women in Luwero district, Uganda using cross-sectional, community-based household survey method. It was reported that bed net use was low among pregnant women and that mean age of pregnancy that bed net is used was 2.5 months. The study also found that primigravidae are more likely to use bed net than multigravidae. Most studies have also shown low compliance of ITN (D'Alessandro *et al*, 1996; Ordinioha, 2006; Eisele *et al*. 2009; Schantz-Dunn & Nour, 2009). Eisele *et al* (2009) surveyed the assessment of Insecticide-Treated Bednets use among children and pregnant women across 15 countries using standardized national surveys. The study found proportion of households' ownership of ITN among pregnant women, ranged from 3.3% to 44.2%, whereas the proportion of pregnant women who slept under an ITN the previous night ranged from 1.1% to 19.7% among all households surveyed. The review concluded that those who had low birth weight after the pregnant women had slept in ITN may be attributed to poor nutrition or improper use of ITN.

### **223 Case Management**

Case management of malaria illness is an essential component of malaria prevention and control during pregnancy in all areas where pregnant women are at risk of malaria (WHO, 2004). The recommended antimalarial drugs for treatment of uncomplicated malaria are Chloroquine (CQ) in CQ-sensitive areas and sulfadoxine-pyrimethamine (SP) in areas with CQ resistance. Quinine is another alternative in areas where both CQ and SP are not effective, and it is the drug of choice for treatment of uncomplicated malaria in the first trimester of pregnancy and severe malaria. WHO recommends that halofantrine, tetracycline, doxycycline and primaquine should

not be used during pregnancy: (WHO 2004; Nosten *et al.* 2007). Although, the above measures have been laid down, malaria control faces some challenges which need to be tackled.

### **2.3 Challenges to Malaria control**

The control of malaria in Africa and in Ghana particularly is a challenge in the face of late antenatal attendance. Human Immuno Deficiency virus (HIV), poverty and socio-cultural aspect of the people.

#### **2.3.1 Late Antenatal Clinic attendance**

Another challenge to the treatment of malaria in pregnancy is that most women solicit antenatal care late in their pregnancy. Although WHO recommends four antenatal care visits, one of which should take place before quickening, most pregnant women do not make a first antenatal care visit until 28 weeks of gestation (Simira *et al.*, 2006). The late delivery of a first dose of IPTp likely results in diminished effectiveness of the intervention (Simira *et al.*, 2006).

Pregnant women start ANC visit at varying periods during the gestational period. While some start very early, others also start late (van Eijk *et al.* 2006; Mpembeni *et al.*, 2007; Andres *et al.*, 2008; Kiwuwa & Mufubenga, 2008; Mrisho *et al.* 2009). While the norm is that the pregnant woman should start ANC visits as soon as she realises she is pregnant, there are a number of factors that prevent the women from attending the clinic early. Trinh & Rubin (2006) found that being a teenage status, financial constraints and low level of education make a woman more likely to attend ANC late. In a study done in Rural Southern Tanzania, Mrisho *et al.* (2009) found other concerns included fear of encountering wild animals on trips to where ANC care is provided and also being unsure of pregnancy.

Perceived lack of quality care in the ANC was also a reason for late first ANC visit (van Eijk *et al.*, 2006). Andres *et al.*, (2008) also identified the following reasons for late attendance among Tanzanian pregnant women, having had no problems during pregnancy, a long distance to travel from home to the clinic, inability to leave farm work to travel into town and inability to detect early pregnancy.

### **23.2 Human Immuno Deficiency Virus (HIV)**

Another challenge to malaria control is Human Immuno Deficiency Virus (HIV). Malaria control is particularly challenging in HIV infected women, who might constitute up to 40% of the antenatal population in Southern Africa (Menendez *et al.*, 2007). HIV infected pregnant women are more likely to fail anti-malaria treatment and require three or more doses of IPTp with SP to obtain the same effect achieved with two doses in HIV uninfected women (Guyatt & Snow, 2004; Menendez *et al.*, 2007). In countries with an HIV seroprevalence greater than 10%, it is more cost effective to provide three or more doses to all women than differential dosing by HIV status of the women (Menendez *et al.*, 2007). Malaria infection was said to have increased with HIV infection irrespective of the parity and two doses of SP were inadequate to clear the malaria parasite (Verhoeff *et al.*, 2001). A study on impairment of a pregnant woman's acquired ability to limit *Plasmodium falciparum* by infection with human immunodeficiency virus type-1 revealed that HIV positive women showed higher Parasitemia than HIV negative women. HIV infected pregnant women were also found to have lower immunity against *P falciparum* (Steketee *et al.*

### **2.3.3 Poverty**

Another challenge to malaria control is poverty. Again, malaria is understood to be both a disease of poverty and a cause of poverty. Not only are poor people at increased risk of malaria infection and death, but also they are less likely to be able to pay either for effective malaria treatment or for transportation to a health facility capable of diagnosing and treating the disease. Both direct and indirect costs associated with a malaria episode represent a substantial burden on the poorer households and this poses a challenge to treatment (Adams *et al*, 2004). The cost of malaria cure was 1% of the income of the rich and 34% of the income of the poor in the Kassena-Nankana District of Ghana (Adams *et al*, 2004). Furthermore, fixed incomes and high fees imply that consumption of other goods or services, possibly health and education could be reduced (Adams *et al*, 2004). In addition to the above, money to pay for transport especially for the places where accessing health care involves long distance from the woman's village is a problem (Mrisho *et al*, 2009). A comparison of income in malarious and non-malarious countries indicate that average GDP in malarious countries in 1995 was US\$ 152 compared with US\$ 826 in countries without intensive malaria (Sachs & Malaney, 2002). Again, malaria infection has a profound effect on the mobility of human populations and the construction of new settlements, with consequent impact on economic growth and development (Sachs & Malaney, 2002).

### **2.3.4 Socio-cultural**

To better treat and control malaria, people's perception and understanding of the disease should be considered. Individual perception of illnesses determined the treatment seeking behaviour (Sharma *et al*, 2001; Mumuni & Rossi, 2008). Essi *et al* (2008) studied social and cultural aspects of malaria and its control in central Cote d'Ivoire using a cross sectional survey. The study found that residents did not consider malaria as a serious disease or one that could be fatal.

They sought treatment only to alleviate the discomfort of the illness and because a health centre was nearby.

Again, although people were aware of malaria-related symptoms and their association with mosquitoes, folk perceptions were common. In terms of treatment, a wide array of modern and traditional remedies was employed, often in combination (Ess6 *et al*, 2008). Individuals with a sound knowledge of the causes and symptoms of malaria continued to use traditional treatments and only a few people sleep under bed nets, whereas folk beliefs did not necessarily translate into refusal of modern treatments (Ess£ *et al*, 2008). Similarly, Ahorlu *et al*, (2005), also found out that though people were well informed about malaria transmission, most people did not use appropriate protection against mosquito bites, and only a few use bed nets.

People living in malaria endemic communities have varying levels of knowledge about malaria. While majority of people have reasonable knowledge about malaria (Hausmann, 2000; Alaii *et al*. 2003; Ahorlu *et al*, 2005; Esse *et al*, 2008; Hlongwana, 2009), few also lack the adequate knowledge about the disease and hence its prevention (Falade *et al*, 2005). In a study that employed both qualitative and quantitative methods in studying the influence of cultural perception of causation, complications and severity of childhood malaria on determinants of treatment and preventive pathways, “too much work” and “too much sun” were the two most-often mentioned causes of malaria (Falade *et al*, 2005). The participants did not perceive malaria as a serious disease. Convulsions and anaemia were not perceived as complications of the disease and were preferentially treated by traditional healers (Falade *et al*. 2005). About fifty percent of children with malaria were treated at home. Choice of drugs used was based on previous experience and advice from various members of the community. Symptoms described as “iba lasan” which means “ordinary fever”, conform to the clinical case definition of malaria. Cultural practices that are likely to influence appropriate treatment seeking include cultural

perception of malaria as ordinary fever, wrong perceptions of severe malaria, and fathers role as decision makers (Falade *et al.* 2005).

On the contrary, a qualitative study conducted in Western Kenya to find out the community's perceptions about insecticide treated bed Nets (ITNs) and its use in controlling malaria found out that malaria was a fatal disease and needs prevention. In spite of this, the use of ITN and other preventive measures were low (Alaii *et al.*, 2003). A number of studies have revealed that pregnant women have reasonable knowledge about malaria, however the use of bed nets to prevent malaria remains low (Alaii *et al.* 2003; Esse *et al.* 2008; Hlongwana, 2009). Esse *et al.* (2008) further explained the strong influence of socioeconomic status on the use of preventive measures which was also related to the perceived cost of the method in question. Individuals from the wealthiest group more frequently cited prevention of malaria with comparatively expensive methods such as insecticide spray and bed nets. Conversely, the poorest respondents used fumigating coils more often since they were perceived to be cheaper. Some people also mentioned environmental measures of protection against mosquito bites such as the removal of vegetation and stagnant water bodies. Ordinioha (2006) in his study on the perception of bed nets and malaria prevention amongst users of insecticide-treated bed net in a semi-urban community in South-South Nigeria found most respondents (84.8%) preferring the Insecticide Treated Net (ITN) because it ensures a good night sleep free from the nuisance of mosquitoes. However, 48.31% complained of heat, and 26.40% complained of the task of having to mount the net every night. A similar research on mothers' perceptions regarding bed nets and malaria was conducted before and after a randomized controlled trial of insecticide (permethrin) - treated bed nets (ITNs) in Western Kenya. Mothers from intervention villages were more knowledgeable about the use and maintenance of bed nets and re-treatment with insecticide. Both groups specified advantages of ITNs. Mothers noted ITN use provided other benefits apart

from offering protection against mosquito bites and hence preventing malaria. These included protection against bedbugs and falling roof debris (Alaii *et al*, 2003). Intervention homes used significantly fewer mosquito coils, insect spray, medicines, and burned cow dung less often compared with those in control villages. Again, mothers from the intervention group were willing to spend more on regular bed net and for re-treating a bed net than mothers from the control group (Alaii *et al*, 2003). The study emphasized the fact that the purchase of bed nets and insecticide would still not be a household priority despite the two (2) years experience of their use. The studies above indicate that people have sound knowledge about malaria and its signs and symptoms; however a lot of people will seek traditional treatment though modern remedies are available.

In summary, the strategies for malaria control in pregnancy have had several phases such as residual spraying, bi-weekly chloroquine, and now IPTp-SP. Review of literature has provided an insight that there is widespread recognition that IPTp - SP increases haemoglobin levels and birth weight. Maternal haemoglobin level irrespective of parity has increased with IPTp-SP even with one dose. Infant birth weight increases with the use of IPTp-SP. However, in a few studies, no significant difference was found between taking SP and maternal haemoglobin levels and infant birth weights. Some of the studies also showed resistance to SP and emphasized the need for more potent drug. Challenges like poverty, HIV and Socio-cultural beliefs pose a threat to the use of IPTp-SP.

Most of the studies reviewed from Africa including Ghana were done in rural settings where people have to travel to attend ANC. In Ghana, only a few studies have been done to investigate the use of SP in the prevention of malaria in pregnancy using the Directly Observed Therapy approach. At Kpeshie Sub Metropolis where the study was conducted, no such study has been carried out to investigate the use of sulphadoxine pyrimethamine in preventing malaria

## Preventive treatment for malaria in pregnancy

in pregnancy. This study however was carried out in the city where health facilities are readily available and much education on diet has been going on.

## **CHAPTER THREE**

### **METHODOLOGY**

This chapter describes the design and methods including the population and sample, the data collection and analysis process as well as the reliability and validity of the research. The study aims to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) programme at the Kpeshie Sub-Metropolis and to assess its effects on infant birth weight and maternal haemoglobin levels.

#### **3.1 Research Design**

A research design is the overall plan for addressing a research question, including specifications for enhancing the integrity of the study (Polit & Hungler, 2001). In this study a quantitative research design was employed using a descriptive comparative approach. A quantitative research design is defined as the study of phenomena that lend themselves to precise measurement and quantification, often involving a rigorous and controlled design (Polit & Hungler, 2001). In quantitative study, the research design spells out the strategies the researcher plans to adopt to develop information that is accurate and interpretable. This method is considered appropriate for this study as it spells out the strategies to adopt and develop information that is accurate and interpretable. Quantitative design was employed because responses provided were quantified numerically for easy categorization as well as analysis. Again, structured procedures and formal instruments were used to collect information. A comparative approach was used in looking at mothers who have used the Sulphadoxine Pyrimethamine (SP) according to the government's policy and mothers who did not use the SP.

### **3.2 Research Setting**

The study was carried out at La General Hospital, Accra. The setting was chosen because about 80 pregnant women are seen there daily and therefore respondents would be readily available for interviewing.

The Kpeshie Sub-Metropolis is a suburb of Accra in the Greater Accra Region. It has a projected population of 233,210 in the 2000 census and an annual growth rate of 4.4%. The La General Hospital is located in the Kpeshie district and it is a referral hospital for several public and private clinics in and beyond the district. The La General Hospital was established as a polyclinic in September 1963 and was elevated to the status of a district hospital in the second quarter of 2004. The district shares boundaries with three Sub-Metropolitan areas. It is bounded to the west by Osu Clotey Sub-Metropolitan, to the North by the Ayawaso Sub-Metropolitan, and to the East by the Tema Municipal Assembly and it is bounded on the South by the Gulf of Guinea.

La General Hospital is a primary care facility and it occupies a unique position within the framework of health care delivery in the country. As a Government Health Institution, it serves as a referral point for both private and quasi-government clinics and hospitals in the Kpeshie Sub-Metropolitan area. It has a bed capacity of 116 with staff strength of 278 made up of 15 Medical and Dental Officers, and 170 nurses. The rest are Paramedicals. Medical Assistants and temporary workers.

The vision of the hospital is to promote health, alleviate pain, and provide quality care to all clients and patients who report at the hospital. The average daily out patient attendance is 600 and on average 25 clients is admitted daily.

The La General Hospital has three labour suites in the labour ward and six beds in the first stage rooms. The average daily delivery is 20 and about 610 deliveries are conducted monthly. Eleven midwives work at the labour ward. At the Antenatal clinic about 80 pregnant women are seen daily (La General Hospital Annual Report. 2009). The hospital attends to people from different parts of the country.

### **3.3 Target Population**

All mothers who were antenatal clinic attendants and delivered at the La General Hospital within the study period. Mothers who were sickling positive, had twin deliveries and those with babies of abnormalities were excluded from the study. This is because the above-mentioned categories of women were already prone to maternal haemoglobin disorders and low birth weight infants.

### **3.4 Sample Size and Sampling Technique**

Using data collected from the hospital in 2009, where 7,318 deliveries were recorded out of an expected 9000 with an estimated 610 deliveries per month, an estimated 1,830 deliveries were expected over a three month period at about 20 deliveries per day. In this study 400 women who delivered at the hospital during the three (3) month period were enrolled. Purposive sampling was used to select participants who had taken SP and those who did not take SP during gestation, and this sample was used to investigate the effect of SP. The purposive sampling method is a non-probability sampling strategy in which the researcher's knowledge about the population and its element is utilized to handpick the cases to be included in the sampling (Polit & Hungler, 2001). Participants were selected on the basis of predetermined inclusion criteria. In this study, mothers who had attended antenatal clinic and had come to be delivered at the labour

ward were used for the study. This is because the researcher also had interest in taking the birth weight of the babies.

### **3.5 Data Collection Tool**

A structured questionnaire was employed in getting information from the participants under study. Questionnaire was used because of its advantage of anonymity and its objectivity in obtaining data. Closed ended questions were used. Closed- ended questions were used because it has the advantage of comparing responses and also easy to count answers which facilitate analysis (Loiselle, & Profetto-McGrath, 2004). Existing records (Ante - natal cards and Labour charts) of respondents were used because of its economical and convenient source of information. An existing record has its disadvantage of not having the entire set of all possible records but this was dealt with using the questionnaire method. The questionnaire was grouped into three sections: Demographic characteristics of respondents, Use of Sulphadoxine pyrimethamine and Insecticide Treated Nets and finally Chart review (See Appendix B). Information that was solicited through the questions included: parity of respondents, antenatal visits, use of sulphadoxine pyrimethamine, knowledge of malaria in pregnancy, haemoglobin levels of respondents as well as their baby's birth weight

### **3.6 Data Collection Procedure**

The data were obtained within a three-month period (February to April, 2009) by the researcher. Prior to the commencement of the data collection, an introductory letter from the School of Nursing was sent to the authorities of La General Hospital to seek approval (See Appendix C). Five visits were made to the hospital in a week. The participants under study were recruited from the labour ward through the nurses in charge who introduced the researcher to the

prospective participants. A detailed explanation of the purpose, objectives and relevance of the study was carefully explained to participants. They were also informed about the possible risks and benefits of the study. Participants were assured of anonymity and confidentiality of any information given; the voluntary nature of the study was also made known to them. Mothers who agreed to participate in the study were given a consent form to sign/thumbprint. The need to respond to all questions was emphasized. They were given the chance to ask questions and appropriate answers were provided. Respondents were given the questionnaires to complete. Mothers who could not read and write were interviewed in the local language using the questionnaire by the researcher. In addition, the chart review section of the questionnaire was completed by the researcher using the records (Babies birth weight and mothers haemoglobin levels) of each mother.

### **3.7 Analysis of Data**

Data were analysed using Statistical Package for Social Sciences (SPSS) version 16. Chi square was used to establish the association between SP intake and weight of babies, and between mothers' haemoglobin levels and SP intake. Paired sample, t test and cross tabulation were used to further find the relationship between SP intake and birth weight and maternal haemoglobin levels. P values less than 0.5 ( $p < 0.05$ ) were considered significant.

### **3.8 Validity and Reliability**

To ensure confidence in the data, reliability and validity of measuring instrument were used. Reliability is the degree of consistency or accuracy with which an instrument measures the attribute it is designed to measure and validity is the degree to which an instrument measures what it is intended to measure (Polit & Hungler, 2001), The questionnaire was reviewed by peers

and the researcher's supervisors who checked for validity, as well as language use to ensure that the data that was produced answered the research questions. Experts in the content area were consulted to analyse the adequacy of items in the questionnaire. Pre-testing of questionnaire was done on 10 mothers at the Legon Hospital Labour Ward to ascertain whether respondents would have similar interpretations, for example reasons for attending antenatal clinic and type of antenatal malaria drugs used were added to the questionnaire. This hospital has similar characteristics as La General Hospital.

### **3.9 Ethical Considerations**

To obtain ethical clearance to conduct the study, the proposal was submitted to the Institutional Review Board of the Noguchi Memorial Institute for Medical Research, University of Ghana, Legon. The major issues that were considered in the process of gaining ethical approval were gaining access to the research setting, informed consent, and confidentiality and anonymity of respondents.

In obtaining access to the hospital, the researcher obtained letters of introduction from the School of Nursing, University of Ghana, Legon, and with these letters, the researcher approached the Administration, and the Nursing Division of the La General Hospital for negotiation and approval. They were given an explanation of the purpose and significance of the study and the processes that were involved in the study. The administrator of the hospital was assured of confidentiality and anonymity of respondents.

Informed consent is based on the right to full disclosure and self-determination of the individual (Polit & Hungler, 2001). The researcher arranged and met with respondents at the hospital where they were given full details of the study - the purpose and significance of the

study, processes involved their role and the role of the researcher. They were informed that they could decide not to be part of the research or withdraw at any point during the study and that refusal would not affect their care at the hospital. The inconvenience of having to sacrifice their time to respond to the questionnaire was also explained to them.

To ensure voluntary participation, participants were informed that they could opt out from the study without being penalised or having the service withdrawn. Participants were also assured of confidentiality and anonymity, thus the study did not ask for any information that would identify individual responses with the respondent's name. In the event of any publication or presentation resulting from the research, no personally identifiable information would be shared because participants' names were not linked to the responses (See Appendix A1 & A2).

## CHAPTER FOUR

### FINDINGS

This chapter presents results of the data collected from 400 respondents who responded to the questionnaire. The data were analysed using Statistical Package for Social Sciences (SPSS) version 16. Chi square, cross tabulation and paired t- test were used to establish the association between sulphadoxine pyrimethamine intake and weight of babies and between mothers' haemoglobin levels and SP intake. Tables, charts and appropriate graphs have been drawn to further explain relationships. The analyses were categorized under specific headings in relation to the objectives of the research. Some of the headings included: demographic data of respondents, antenatal clinic attendance, use of sulphadoxine pyrimethamine and infant birth weight.

#### 4.1 Demographic data of respondents

**Table 4.1 Characteristics of Study Participants**

	Number of Women n=400(%)	Primigravidae n=155(%)	Secondigravidae n=121(%)	Multigravidae n=124(%)	P-value
<b>*Age in years</b>					
<20years	30 (7.5)	25(16.1)	5(4.1)	.	0.000*
20 -30 years	253 (63.3)	111 (71.6)	93 (76.9)	49 (39.5)	
31 - 40 years	113(28.3)	19(12.3)	22(18.2)	72(58.1)	
41 years and above	4(1.0)	-	1 (0.8)	3 (2.4)	
<b>Religious Affiliation</b>					
Christianity	381 (95.3)	147 (94.8)	116(95.9)	118(95.2)	0.748
Islamic	16( 4.0)	7(4.5)	4(3.3)	5 (4.0)	
Traditional Religion	2 (0.50)	1 (0.6)	-	1(0.8)	
Others	1(0.3)	-	1(0.83)	-	
<b>^Occupation</b>					
Civil Servants	19(4.8)	11(7.1)	5(4.1)	3 (2.4)	0.000*
Traders	172(43.0)	38 (24.5)	52 (43)	82(66.1)	
Unemployed	40(10.0)	26(16.8)	9 (7.4)	5(4.0)	
Private	160(40.0)	72 (46.5)	55 (45.5)	33(26.6)	
Others	9 (2.3)	8(5.2)	"	1(0.8)	
<b>^Educational Level</b>					
No formal Education	26 (6.5)	4 (2.6)	9 (7.4)	13 (10.5)	0.006*
Primary'	55(13.8)	18(11.6)	15(12.4)	22(17.7)	
Middle School	25 (6.3)	2(1.3)	4(3.3)	19(15.3)	
JSS	195 (48.8)	83 (53.5)	67 (55.4)	45 (36.3)	
SSS	64(16.0)	33 (21.3)	17(14.1)	14(11.3)	
Tertiary	35 (8.8)	15(9.7)	9 (7.4)	11 (8.9)	
<b>*Marital Status</b>					
Married	339 (84.8)	112(72.2)	108 (89.3)	119(96)	0.000*
Single	61 ((15.3)	43(27.7)	13 (10.7)	5 (4.0)	
Divorced/separated	-	-	-	-	
Widowed	-	-	-	-	

\* $p < 0.05$  The chi square test used for comparison of parity and other demographic characteristics revealed that Gravidity of respondents depends on their age, edt^atwRaUevel, occupation and



marital status and it was significant, (n) - The sample under each category and figures in parenthesis are corresponding percentages of the actual values observed.

Four hundred women were selected for the study at La General Hospital. Patient characteristics have been summarised in table 4.1 above. Out of the 400 participants, 155 were primigravidae, 121 were secundigravidae and 124 were multigravidae. From the data, it is obvious that the majority (253) of the respondents fall in the age range 20 to 30 years and they formed 63.3% and the minority of the respondents (4) of the age range were from 41 years and above and they formed 1 %.

Among the primigravidae respondents, the age range 20 to 30 years were the majority (111) and this formed 71.6%. None of the participants interviewed in the age range 41 years and above was primigravidae.

Again, participants who fell within the age range of 20 to 30 years among the secundigravidae respondents were the majority (93), they formed 76.9%. Mothers aged 41 years or more formed the rest of this category.

Most of the respondents from the multigravidae age group were between the ages of 31 and 40 years and this was followed by respondents who were 20 to 30 years and they were 49 (39.5%). None of the respondents from the teenage group was multigravidae. Again, as a woman advanced in age, the number of her children increases.

The study participants were predominantly Christians. As the data indicates, 381 (95%) were Christians and, the rest of respondents were Moslems. Among the Christians as many as 147 were primigravidae and they formed 94.8%. No primigravidae was recorded in the "others category" such as Buddhism and Hinduism. Again, among secundigravidae, Christian religion was the majority 116 (95.9%) of respondents. Multigravidae religious affiliation of the respondents followed the same trend; majority of respondents 118 (95.2%) were Christians.

From the table it can be concluded that gravidity of a woman does not depend on her religious affiliation ( $p = 0.748$ ).

The occupation of respondents was grouped into five categories. From table 4.1 above, traders and those who do private work such as hairdressers, seamstresses and caterers formed the majority of the respondents 172 (43%) and 160(40%. Among the primigravidae respondents, those who do private jobs were the majority 72 (46.5%). Civil servants were the least among the primigravidae. Among the secundigravidae respondents, private workers were the majority 55 and they formed 45.5% while civil servants were the least. Traders formed the majority of the participants 82 and they were 66.1%, among the multigravidae respondents. From the above table, gravidity' depends on occupation ( $p = 0.000$ ).

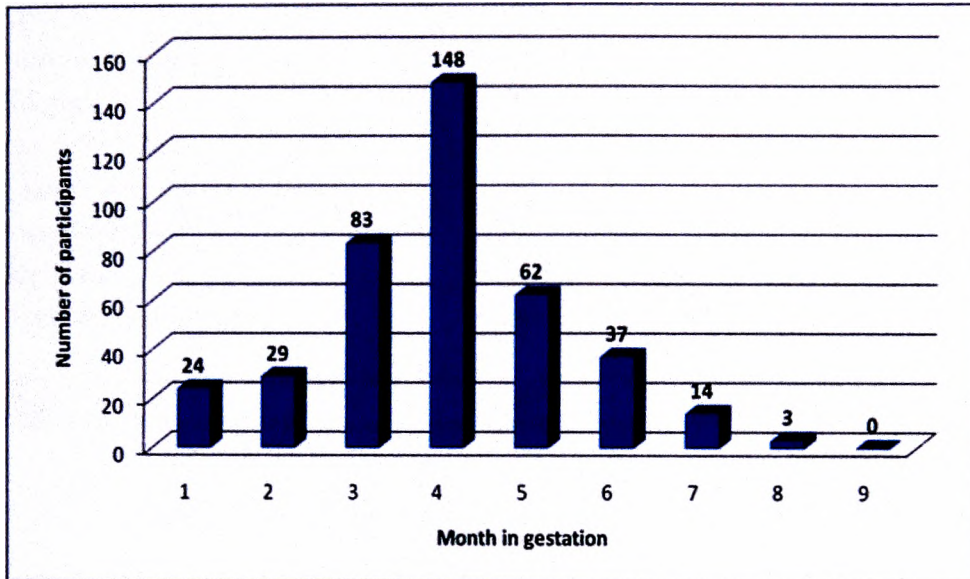
Gravidity depends on education as indicated from table 4.1 ( $p = 0.006$ ). Out of the 400 participants, junior secondary School (JSS) graduates formed the majority 195 (48.8%) of the respondents; followed by graduates from senior secondary school, 64 (16%), and the least 25 (6.3%) respondents were middle school leavers. Out of the total of 155 primigravidae respondents 83 (53.5%) were from the JSS group and they formed the majority. Among the 121 secundigravidae respondents, middle school leavers were the least 4 (3.3%). respondents with no formal education and tertiary education recording equal figures of 9 (7.4%). Among the multigravidae educational level, JSS leavers were the highest 45 (36.3 %) of the respondents.

The majority of the respondents were married women, thus out of the 400 respondents. 339 (84.8%) were married. Primigravidae of this category were 112 (72%). The secundigravidae among married women were 108 (89.3%) and multigravidae in this category were 119 (96%). Respondents who were single and never married were least among the respondents in each of the categories (Primigravidae, secundigravidae and multigravidae). None of the participants was

divorced or widowed. It is obvious from the above table that gravidity of respondents depends on mothers who are married (Table 4.1).

#### 4.2 First Antenatal clinic Attendance

Figure 4.1 Gestational Month of first antenatal visit among Respondents



The figure above shows respondents' first antenatal clinic attendance. Each of the 400 respondents of the study attended ANC at varying stages of their pregnancy. The majority of the respondents' first antenatal clinic visits were in the fourth month and this constituted 37% of the respondents. The third month followed with 83 (20.8%) respondents. Respondents who started ANC at the eighth month were 3 (0.75%), with none of the participants starting the clinic at the ninth month (Figure 4.1).

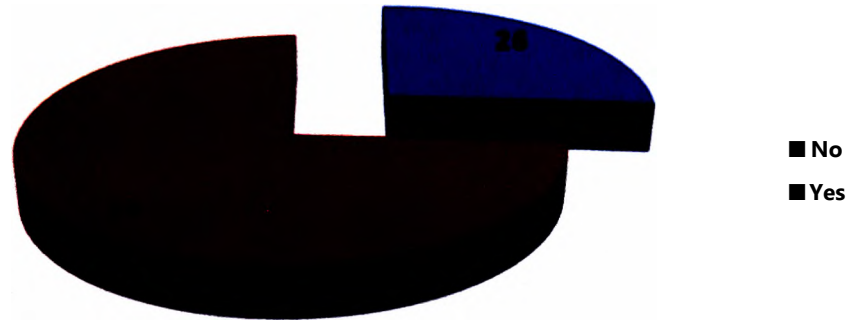
**421 Reasons for Late ANC attendance****Table 4.2 Respondents' reasons for Late ANC attendance**

<b>Reasons</b>	<b>Frequency</b>	<b>Percent</b>
To prevent more drugs	2	0.5
Minor	7	1.8
Not Sick	158	39.5
To confirm pregnancy	46	11.5
Was Sick	64	16.0
Was in the village	3	0.8
Wanted the pregnancy to mature	6	1.5
Wanted to be healthy	24	6.0
No reason	36	9.0
Was asked to start ANC later	54	13.4
<b>Total</b>	<b>400</b>	<b>100.0</b>

Participants were asked the reasons for which they first attended ANC. The majority (39.5%) responded they were not sick therefore they stayed a little longer. This is followed by pregnant women who came to the hospital because they needed medical attention (Table 4.2).

### 4.3 Knowledge of signs of malaria in pregnancy

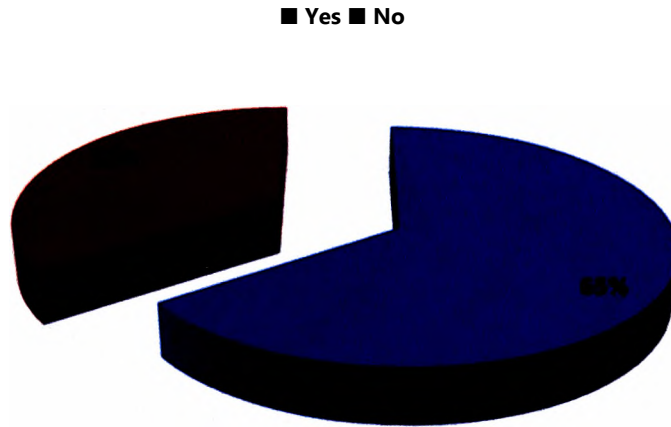
Figure 42 Respondents knowledge of signs of malaria in pregnancy



Participants were asked if they knew about the signs of malaria when pregnant. The majority of the respondents studied (74%) knew the signs of malaria when pregnant. The rest (26%) claimed they did not have any knowledge of the signs of malaria when pregnant (figure 42).

### 4.3.1 Use of Anti malaria Drug

Figure 4.3 Anti malaria Drug used



A high number of respondents took anti - malaria drugs (Figure 4.3). Out of the 400 respondents, 65.2% took a type of anti- malaria drug during pregnancy, only a 35% did not take any type of anti-malaria drugs during their gestation.

### 4.3.2 Types of anti malaria Medications used

Figure 4.4: Responses to types of anti malaria drugs used

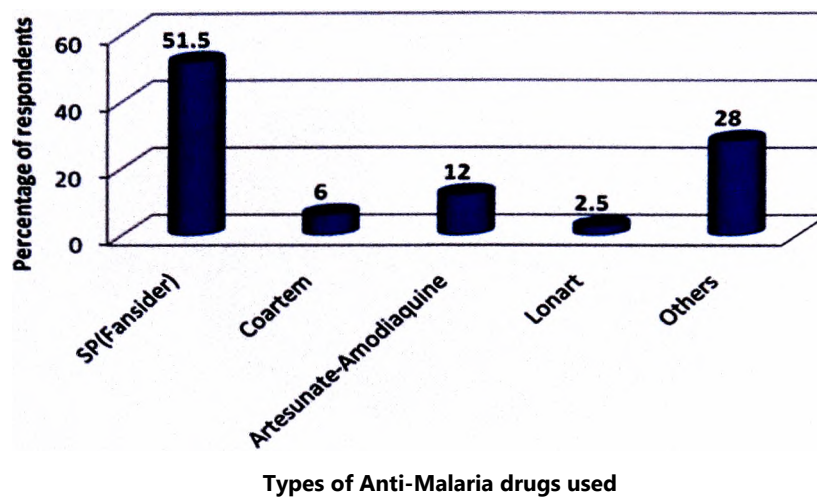
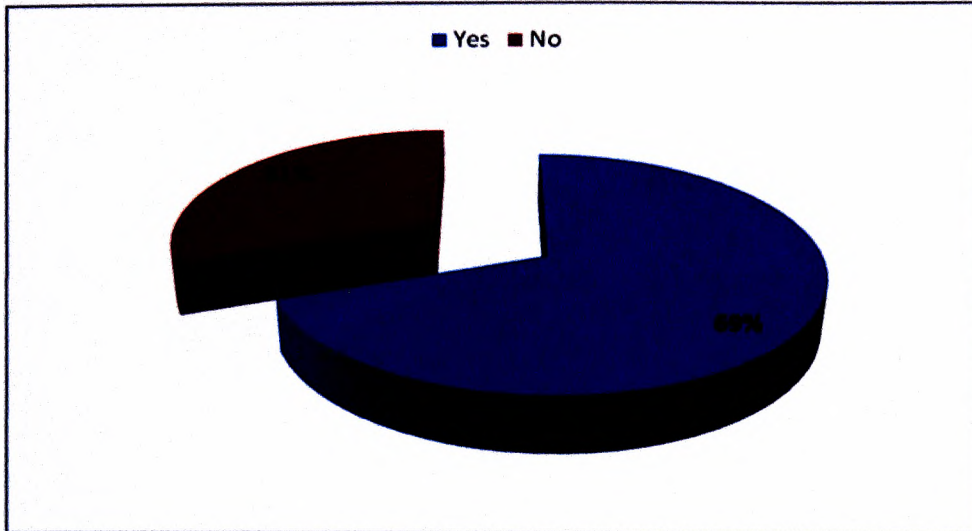


Figure 4.4 shows the different types of anti-malaria drugs used by respondents. Various forms of anti-malaria drugs apart from the SP were used by respondents. Out of the 261 respondents who took anti malaria drugs, majority of them 51.5% took SP (Fansidar). A few of the respondents took other orthodox anti malaria medicines such as Artesunate- Amodiaquine (12%), Coartem (6.0%) and lonart (2.5%). The rest (28%) took other traditional anti malaria medicines such as herbal mixtures (Figure 4.4).

#### 4.4 Awareness of Sulphadoxine Pyrimethamine (SP)

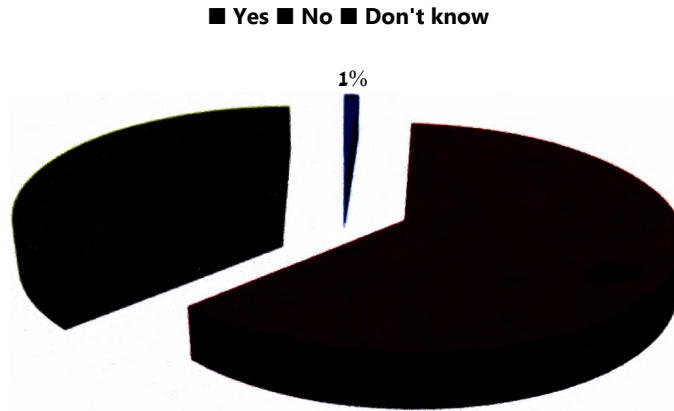
Figure 4.5 Knowledge of Sulphadoxine Pyrimethamine (SP)



Participants were asked whether they have ever heard of SP (Fansider) use during pregnancy. The majority of the respondents (69%) had heard about Sulphadoxine Pyrimethamine usage during pregnancy (Figure 4.5).

#### 4.4.1 Allergy to Sulphur Drugs

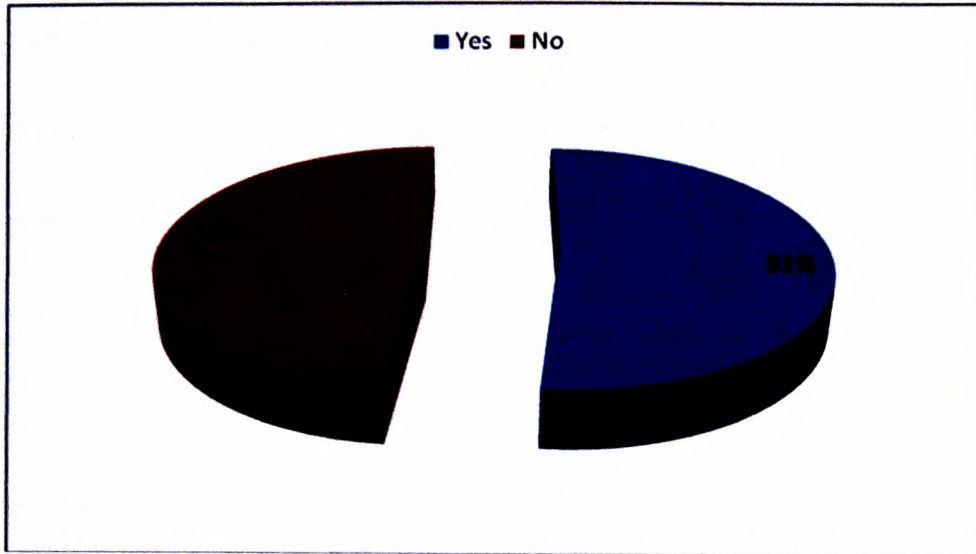
Figure 4.6 Allergy to Sulphur Drugs



The figure above (Figure 4.6) shows participants response to the question on whether they are allergic to sulpha drugs. A number of them (62%) claimed they were not allergic to sulphur drugs. Only 1% indicated that they were allergic to sulphur drugs. A few of the participants (37%) did not know whether they were allergic or not to sulphur drugs.

#### 4.4.2 Intake of Sulphadoxine Pyrimethamine

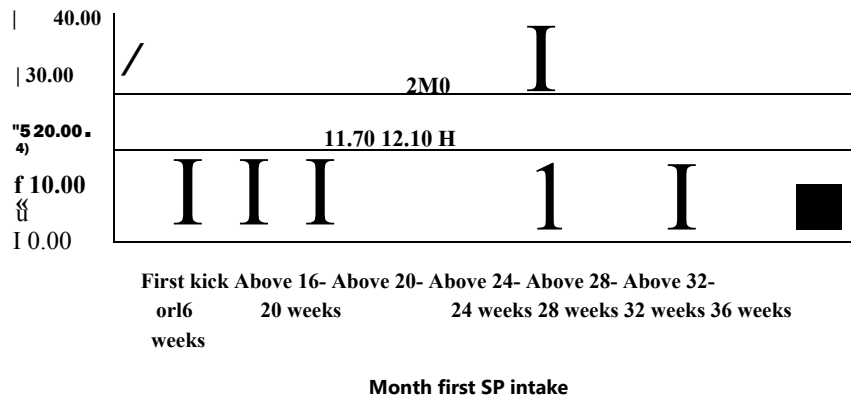
Figure 4.7 Intake of Sulphadoxine Pyrimethamine



Even though majority (69%) of the respondents studied have heard about SP (Figure 4.5), only about a half (51%) of them responded that they used sulphadoxine pyrimethamine. This was also confirmed from their antenatal record cards (Figure 4.7).

4.4.3 Gestational Weeks at which SP was first used

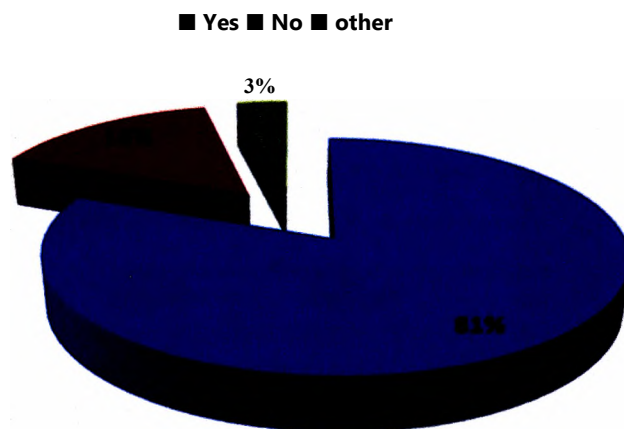
Figure 4.8 Weeks in Pregnancy at which SP was first used



Most of the participants (34.7%) first intake of SP was above 24 to 28 weeks of their gestation. This is followed by participants who took the SP above 20-24 weeks. Only 11.7% took the SP at the right time of their gestation as recommended by the Ghana Health Service (Figure 4.8).

#### 4.4.4 Directly Observed Therapy with SP

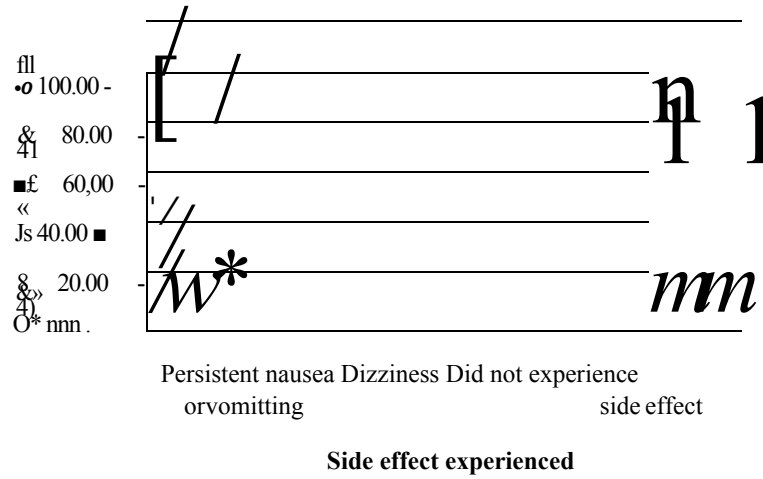
Figure 4.9 Directly Observed Therapy with SP



Among the 206 respondents who took the SP majority (81.1%) took it under Directly Observed Therapy (DOT). A few of the respondents (16%) did not take the drug under Directly Observed Therapy whilst the rest (3%) took part of the drug under DOT and part not under DOT (Figure 4.9).

4.4.5 Side effects after taking SP

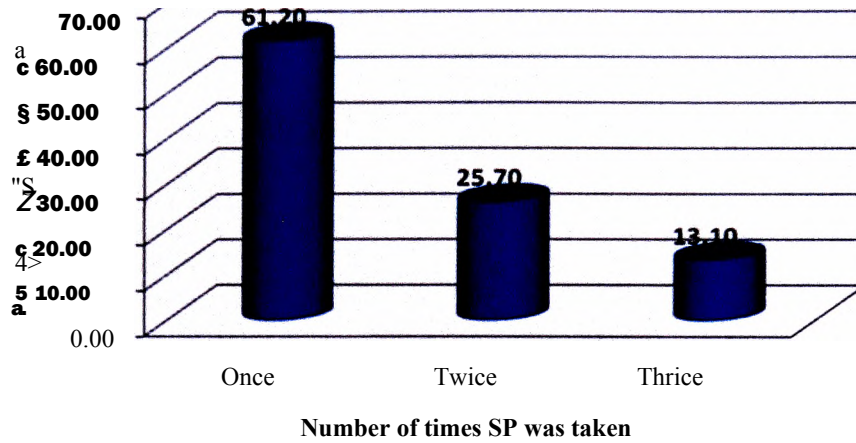
Figure 4.10 Side effects after taking SP



Participants were asked if they had experienced any form of side effect after taking the SP. Side effects experienced among respondents who took SP was very low, about 3% said they did experience some form of side effects such as persistent nausea or vomiting and dizziness when they took the SP. The majority (97.1%) did not experience side effects (Figure 4.10).

4.4.6 Number of times Sulphadoxine Pyrimethamine was taken

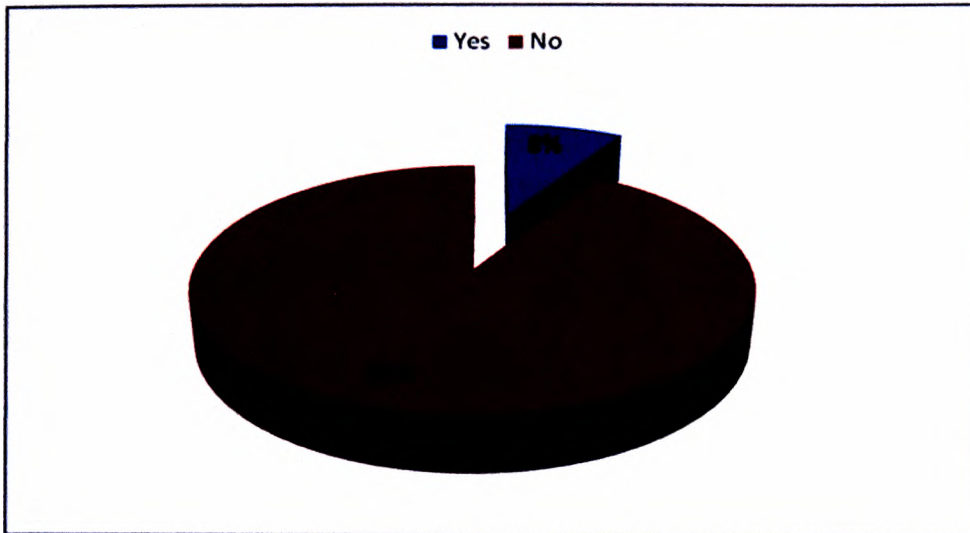
Figure 4.11 Number of times Sulphadoxine Pyrimethamine was taken



The figure above indicates the number of times participants took SP. Respondents who took SP once were the majority (61.2%). This is followed by respondents who took SP twice (25.7%) and thrice (13.1%) respectively (Figure 4.11).

#### 4.4.7 Malaria Symptoms after taking Sulphadoxine Pyrimethamine

Figure 4.12 Malaria Symptoms after taking Sulphadoxine Pyrimethamine



Participants were asked whether they did have malaria symptoms after they had used SP. Among respondents who took SP, 92% claimed they did not show malaria symptoms after taking SP, whilst the rest 8% indicated that they had malaria symptoms after taking the SP (Figure 4.12).

#### 4.5 The use of Insecticide Treated bed Net (ITN)

Figure 4.13 Sleeping under Insecticide Treated bed Net

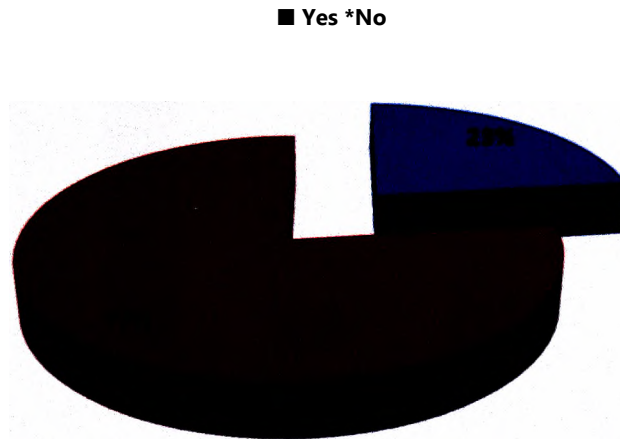
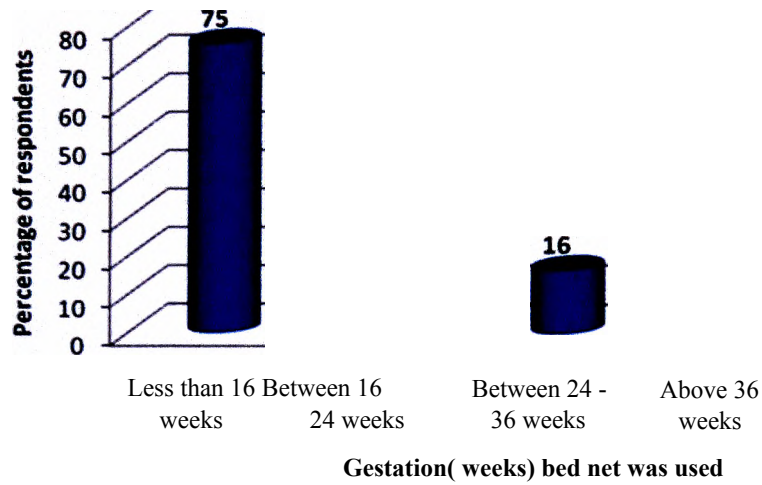


Figure 4.13 indicates that the bulk of the respondents (77%) did not sleep under insecticide treated bed nets, with only 23% responding that they slept under insecticide treated nets (Figure 4.13).

#### 4.5.1 Gestational age in weeks of Insecticide Treated bed Net used

Figure 4.13.1 Gestational age in weeks of Insecticide Treated bed Net used



Out of the 92 respondents who did sleep under ITN, 75% did so before they reached 16th week of gestation, nine percent (9%) did so between 16 and 24 weeks, and 16% also did so between 24th and 36th weeks of their gestation. None of the respondents slept under ITN when they were above the 36th week of their gestation



## 4.6a Influence of Educational background on Low Birth Weight

Table 4.3a Influence of Educational Background on Low Birth

Infant Birth Weight					
Level of Education	Underweight		Normal Weight		Total
	Count	%	Count	%	
No Formal Education	0	0	26	100	26
Primary'	2	3.6	53	96.4	55
Junior Secondary	5	2.6	190	97.4	195
Middle School	3	12.0	22	88.0	25
Senior Secondary	4	6.3	60	93.8	64
Tertiary	3	8.6	32	91.4	35
<b>Total</b>	<b>17</b>	<b>4.3</b>	<b>383</b>	<b>95.8</b>	<b>400</b>
<b><math>X^2 = 8.492</math> <math>p &lt; 0.1</math></b>					

Respondents' level of education was ascertained if their level of education had an influence on their babies' birth weight. Birth weight of 2.5 kilograms and above was considered to be of normal birth weight and birth weight of below 2.5 kilograms was considered as underweight. Middle school leavers had the highest percentage of underweight babies (12%), followed by mothers with tertiary level of education with 8.6%, of the mothers with no formal education, none of their babies were underweight.

Using chi square analysis, the  $p = 0.13$ , implies that educational level does not significantly affect the weight of a baby. Thus there exists no significant relationship between the baby's weight and the mother's educational level.

**4.6b Maternal Age and Infant Birth weight****Table 4.3b Cross tabulation of Maternal Age and babies weight**

Age in years	Weight Indicator for the child				Total
	Underweight		Normal Weight		
	Count	%	Count	%	
Less than 20 years	3	0.8	27	6.8	30
20 to 30 years	7	1.8	246	61.5	253
31 to 40 years	7	1.8	106	26.5	113
41 years and above	0	0	4	1	4
<b>Total</b>	<b>17</b>	<b>4.4</b>	<b>383</b>	<b>95.8</b>	<b>400</b>
<b><math>\chi^2 = 15.033</math> <math>p &lt; 0.01</math></b>					

A cross tabulation of respondents age and infant birth weight was done to verify if there exist any relationship. The above table indicates that the age 20-30 and 31 -40 years were respondents with the high percentage of low birth weight. Ages 41 years and above did not have underweight (Table4.3b). This might be probably because they were multiparous (confirming the belief that multiparous women tend to have big babies'). Using Chi square test to find if there exist a relationship between maternal age and infant birth weight, from the test,  $p = 0.017$  which indicates that maternal age improves the weight of their babies.

#### 4.7 SP intake during Gestation and Infants' Birth Weight

**Table 4.4 A cross tabulation of the number of times Sulphadoxine Pyrimethamine was taken and the Weight of Babies**

No. of times SP was taken	Weight Indicator for the child		Total
	Underweight	Normal weight	
Once	7	119	126
Twice	2	51	53
Thrice	2	25	27
<b>Total</b>	<b>11</b>	<b>195</b>	<b>206</b>
$X^2= 0.497$ $p < 0.7$			

The number of times of taking SP seems not to have influence on baby's weight. Birth weight of 2.5 kilogrammes and above was considered to be of normal birth weight and birth weight of below 2.5 kilogrammes was considered as low birth weight. As many as 119 out of the total of 126 who took the SP only once had a normal birth weight, seven (7) out of this number were underweight and this reduces as we move to respondents who had taken the SP twice and thrice respectively (Table 4.4).

Using chi square analysis, the number of times a pregnant woman takes SP seems not to have any influence on the weight of the baby ( $p = 0.78$ ).

**4.8: Mean Birth Weight of Respondents' Babies****Table 4.4.1: Descriptive Statistics of Babies' Weight by Intake of SP**

<b>SP Intake</b>		<b>Number</b>	<b>Mean (Kg)</b>	<b>Std. Deviation</b>
Baby's Weight	<b>Yes</b>	206	3.152	0.4761
	<b>No</b>	194	3.258	0.4841

The table above is a descriptive statistics of the weight of babies whose mothers took SP and those whose mothers did not take the SP. The mean birth weight of babies of mothers who took SP was 3.152kg with a standard deviation of 0.4761 whereas the mean birth weight of babies whose mothers did not take the SP was 3.258Kg and a standard deviation of 0.4841 (Table 4.4.1).

#### 4.9 Effect of SP intake on haemoglobin (Hb) level

**Table 4.5 A Cross Tabulation of the number of times Sulphadoxine Pyrimethamine**

**I was taken and Haemoglobin level**

espon dents	No of times SP was taken	Anaemia level in pregnant women				Total
		Severe	Moderate	Mild	Normal	
with	Once	0	30	33	63	126
Haem	Twice	1	11	15	26	53
oglob	Thrice	0	7	4	16	27
in	Total	1	48	52	105	206
$\chi^2 = 3.153$ $p < 0.005$						

(Hb) levels of 7mg/dl and below were considered to be severely anaemic, those with Hb level above 7mg/dl to 10mg/dl were considered to be moderately anaemic, respondents with Hb levels of 10.1 to 10.99mg/dl were considered to be mildly anaemic and Hb level 11 and above were considered to have normal Hb. It was observed that haemoglobin levels of pregnant women increase according to the number of times the respondents took SP. Out of the 27 respondents who took the SP three times, 16 of them had normal Hb of 11 mg/dl and above; four had mild anaemia; seven had moderate anaemia; and none of the respondents had a severe anaemia of 7mg/dl and below (Table 4.5).

Chi Square analysis indicated that haemoglobin level of pregnant women significantly affected by the number of times respondents took SP,  $p = 0.005$ . Hence it can be concluded that haemoglobin level of pregnant women is dependent on the number of times respondents took SP.

Using Spearman's correlation, the haemoglobin level and the number of times SP was taken, indicated the existence of a strong positive significant relationship ( $p = .009$ ). Thus the number of times a pregnant woman took SP, the more improved her haemoglobin level.

**4.9.1 Respondents Hb levels at the first visit and at 36 weeks of gestation.****Table 4.6 Respondents' Hb levels at the first visit and at the 36 weeks of gestation**

	<b>Mean</b>	<b>N</b>	<b>Std. Deviation</b>	<b>Std. Error Mean</b>
<b>HB 1<sup>st</sup></b>	9.714	400	1.4292	0.0715
<b>HB 36</b>	10.524	400	1.4696	0.0735
<b>t =-0.8095 p&lt; 0.0001</b>				

A paired sample analysis was used to check if there exist differences in the haemoglobin level of pregnant women at the first visit and at 36 weeks (Table 4.6).

Using paired samples test, to find the differences between haemoglobin level at first visit and at the second visit, the study showed a significant difference between the haemoglobin level in pregnant women at the first visit and at 36 weeks ( $p = 0.000$ ). Pair wisely, the means of this pair wise haemoglobin level is negative ( $-0.8095$ ). This implies that in all cases, haemoglobin level at 36 weeks exceeds haemoglobin level at the first visit.

**4.9.2 Haemoglobin levels of those who took SP and those who did not take the SP during gestation**

**Table 4.7 Group Statistics of respondents who took SP and those who did not**

SP INTAKE	N	Mean	Std. Deviation	Std. Error Mean
Yes	206	10.941	1.3684	0.0953
No	194	10.080	1.4465	0.1039
<b>p &lt; 0.0001</b>				

Two-independent sample t-test was used to check if there is a significant difference between haemoglobin level of the respondents who took SP and that of respondents who did not take SP (Table 4.7). Using the two independent sample t- test, a significant difference between the haemoglobin level of respondents who took SP and that of those who did not take SP ( $p = 0.000$ ) was established, in other words those who took SP had an improved haemoglobin levels than those who did not take SP. The mean Hb level for those who took SP was  $10.94 \pm 1.37$  whilst those who did not use the SP were Hb of  $10.08 \pm 1.45$ . Thus it could be concluded that SP has significant influence on haemoglobin levels.

## CHAPTER FIVE

### DISCUSSION

In this chapter, the findings of the study on 400 respondents who participated in the study on the use of Sulphadoxine Pyrimethamine as Intermittent Preventive Treatment for malaria in Pregnancy and its effects on Maternal Haemoglobin Levels and Infant Birth Weight have been discussed in relation to available research evidence. The discussion was based on the following topic: Demographic characteristics of the respondents, the use of Sulphadoxine Pyrimethamine as Directly Observed Therapy approach, effects of Sulphadoxine Pyrimethamine on maternal haemoglobin levels, the relationship between maternal intake of Sulphadoxine Pyrimethamine and infant birth weight, the susceptibility of pregnant women on Sulphadoxine Pyrimethamine to malaria infection and the use of Insecticide Treated bed net during pregnancy.

#### 5.1 Demographic Characteristics of Study Participants

Maternal age and parity are two closely related demographic factors. They are commonly included in obstetric care records because of their influence on pregnancy complications and outcomes. Majority of the study participants (63%) were between 20 to 30 years out of which, 71.6% were primigravidae. Only 1% of the participants were aged 41 years and above and were mainly multigravidae. This study did not establish any clear relationship between SP intake and maternal age but found maternal age significantly affecting infant birth weight ( $p = 0.017$ ). This finding is in support of other studies done in Africa and Asia which also identified a strong correlation between neonatal birth weight and maternal age. that is the older a woman the heavier her baby (Rich-Edwards et al, 2003; Gyaat & Snow. 2004; Emamghorashi & Heydari, 2008).

Concerning maternal education, Junior Secondary School graduates formed the majority (195) of the study participants out of which 83 of them were primigravidae, with 67 and 45 of them being secundigravidae and multigravidae respectively, This study also did not establish any relationship between SP intake, and educational level, no significant relationship was found between the women's educational level and birth weights ( $p = 0.131$ ). One would have thought that the more educated a participant the better enlightened on malaria prevention the individual would be and hence an improved birth outcome such as infant's birth weight. This was not so, probably because most of the mothers who had higher birth weights were older women who were multiparous, have had previous experiences in pregnancy and therefore could take good care of themselves. It could also hold that intake of adequate nutrition and parental genetic factors might have also played a role in the increased infant birth weights.

## **5.2 The use of Sulphadoxine Pyrimethamine as Directly Observed Therapy approach**

The study found that majority of the respondents attended antenatal clinic during the second trimester which is consistent with other studies done in other parts of Africa (van Eijk *et al*, 2005; Kiwuwa & Mufubenga, 2008). Only about 4% of the respondents started the ANC in the third trimester which is contrary' to reports from other studies which indicated a high number of women attending their first ANC during the third trimester (van Eijk *et al*, 2006; Mrisho *et al*, 2009). This finding indicates that mothers normally commence the intake of SP at a later age of their gestational period, which is contrary' to WHO and Ghana Health Service recommendations (WHO, 2004; MOH, Ghana. 2007). The reason may be attributed to the health providers delaying in giving the mothers the first dose after the first kick which is an evidence of policy violation.

In the area of ANC attendance, various reasons were given by the pregnant women for attending the ANC either early or late. This is consistent with other studies done in other parts of Africa which also identified varying reasons for attending ANC either early or late (van Eijk *et al*, 2006; Mpembeni *et al*. 2007; Andres *et al*, 2008; Kiwuwa & Mufubenga, 2008; Mrisho *et al*, 2009). Most of the participants who attended the ANC early did so because they were either sick or had been treating infertility or came to confirm their pregnancy. Other reasons which also came out clearly from the study included those who said they preferred to stay at home a little longer for the pregnancy to advance. There were those who also said they were advised by relatives or friends to attend ANC late in order to avoid medications. Others believed that ANC is just for palpation so they should come at the latter months of their pregnancy. On the other hand, being a teenager was identified as one of the causes of attending ANC late because more than 50% of the teenage respondents (Less than 20 years) did attend ANC after sixteen weeks of pregnancy and this lead to a situation where they were unable to take the specified three doses. Feeling shy, lack of finances and fear of parents were other reasons given for late attendance of ANC by teenagers. These factors were similar to those in other studies done in other African countries (Trinh & Rubin, 2006; Mpembeni *et al*, 2007). Trinh & Rubin (2006) also identified that being a teenager, financial constraints and less education are some of the factors which make a woman more likely to attend ANC late.

Sulphadoxine pyrimethamine is the drug of choice in most African countries including Ghana (WHO, 2004). This study found high SP awareness (69.5%) among participants as reported in other studies in Africa (Nsimba, 2006; Akinleye *et al*. 2009). The high SP awareness could be attributed to a lot of advocacy on IPTp and malaria involving stakeholders in Ghana. There has also been political involvement in creating awareness of malaria in pregnancy, as well as advertisements on the print and electronic media. However, the study revealed that though

about 70% of the participants were aware of the use of SP during pregnancy, less than 45% actually received the SP during pregnancy. Other studies from Nigeria and Kenya have also reported much awareness but low intake of SP (Akinleye *et al*, 2009; van Eijk *et al* 2005). Some of the reasons given for not taking the SP in this study included lack of supply of the drug, some participants also said it depended on the consulting room one goes to and others confirmed that the SP was given to their friends but they did not bother to ask why they were not given. Similar studies done in a rural Local Government Area of Ekiti State in Nigeria by Akinleye *et al*, (2009) also found that lack of supplies of the drug was responsible for pregnant women not benefiting from the SP regimen. Drug availability and massive education of the pregnant women was attributed to high use of SP among pregnant women (Olliaro *et al*, 2008; Ndyomugenyi *et al*, 2009).

Ghana adopted the policy guidelines of Intermittent Preventive Treatment for pregnancy (IPTp) using SP after WHO recommendation that countries with endemic malaria should change their treatment guidelines of malaria (MOH, Ghana, 2007). In Ghana the recommended guidelines for IPTp that was adopted stated that pregnant women should be given SP under DOT in treatment doses starting from the first foetal kick or the 16<sup>th</sup> week regardless of the presence of malaria symptoms (MOH, Ghana, 2007). In this study, out of the 126 participants, who took the SP, only 13.1% took the recommended dose of the SP (three times). A little over 25 % took the SP two times and 61.2% took it only once. The reasons for the guidelines not being followed might be that there were shortage of the SP and also most of the clients though were aware of the SP did not bother to enquire why they were not given the SP. Another reason might be lack of adequate knowledge of the SP guidelines of the health personnel. The regimen not being followed as stipulated in the guidelines is not surprising because in a related study done in other African countries such as Malawi and Kenya, the recommended dose of SP was also not followed; many

of the women took the SP twice and in some instances once instead of the recommended three doses (Rogerson *et al*, 2000a; van Eijk *et al*, 2005).

The study found that only 11.7% of those who received the SP started the therapy at the first foetal kick or 16 weeks as recommended. The reason for this might be that most mothers start ANC during the second trimester (20 weeks) of their pregnancy and also most people thought they were not sick so did not need to attend hospital. Non availability of the SP might have also contributed to the few mothers starting the SP at the recommended period of their gestation. Nevertheless with the few of the respondents that received the SP, majority of them took the drug under supervision (Directly Observed Therapy). The study also established that some of the respondents were given the SP to be taken home, others were given a prescription to buy at a Pharmacy and also some of the respondents established that they took the first dose under DOT and the subsequent ones were given to them to take home. These variations are in contrast to the Government of Ghana guidelines on DOT (Ghana Health Service, 2006). However, these findings are not different from what pertained in a rural southern Nigeria where IPTp use among pregnant women was very low and there was also poor adherence to the Directly Observed Therapy (DOT) scheme (Akinleye *et al*, 2009).

### **S3 Effects of Sulphadoxine Pyrimethamine on maternal haemoglobin levels**

Another finding that came out clear from this study was that the haemoglobin levels of those who took the SP exceeded respondents who did not take the drug ( $p = 0.000$ ). This finding is consistent with a study done in Malawi by Rogerson *et al*, (2000a) that reported increase maternal haemoglobin levels in respondents who took SP as against those who did not use SP. Again, this study established that the haemoglobin levels of pregnant women increased according to the number of times respondents took SP. Using Chi Square analysis haemoglobin levels of

pregnant women were significantly affected by the number of times respondents took SP ( $p = 0.005$ ). A number of studies conducted in Ghana and other African countries did establish similar findings (Rogerson *et al*, 2000a; Mbonye *et al*, 2006; Hommerich *et al*, 2007; Sirima *et al*, 2007). On the contrary, a study done in Gabon reported the use of intermittent preventive treatment with sulfadoxine-pyrimethamine in addition with bed net was associated with a reduction in maternal anaemia only in multigravidae (Bouyou - Akotet *et al*, 2010). This study found mothers haemoglobin level at 36 weeks exceeding their haemoglobin levels at the first visit ( $p = 0.000$ ). The reason for this could be that at the first visit mothers were yet to receive the sulphadoxine pyrimethamine and therefore the haemoglobin level increased after the use of SP.

#### **S.4 The effect of Sulphadoxine Pyrimethamine on infant birth weight**

A number of studies have reported the improvement of infant birth weight by the use of SP during pregnancy (Shulman *et al*, 1999; Falade *et al*, 2007; Menendez *et al*, 2010 ) However, this study could not establish any relationship between infant birth weight and SP intake ( $p = 0.78$ ), including the number of times a respondents took SP. This means that the number of times respondents took SP did not influence the mean birth weight of respective infants. This could be attributed to intake of improved nutrition which probably improved their haemoglobin level and increased their infant birth weight, the use of Insecticide Treated Bed net which prevented the mothers from having malaria and therefore improved their babies' weight or probably the use of herbal concoction which improved mothers' haemoglobin level. Other reason might be their build up or physique as well as that of their partners.

SP intake not significantly impacting on infant birth weight is in support of other studies done in rural Senegal and Burkina Faso respectively which also did not have significant improvement in birth weight of babies after mothers have taken SP (Gies *et al*, 2008; Olliaro *et*

*al.* 2008), in this study probably, this could be due to the fact that the sample size was not large enough to show a significant difference in babies weight among those who took the SP and those who did not. Again maternal nutrition could have also contributed to the infants' birth weight. Contrary to other studies done in Africa, infant birth weight increased after the use of SP in pregnancy (Falade *et al.*, 2007; Hommerich *et al.*, 2007; Mbonye *et al.*, 2008).

### **S.S The susceptibility of pregnant women on Sulphadoxine Pyrimethamine to malaria infection**

Another finding which came out clearly is respondents\* knowledge of malaria during pregnancy. Over 70% of the respondents indicated that they have some knowledge about malaria when pregnant. This result is consistent with other studies done in Africa (Hausmann. 2000; Alaii, *et al.* 2003; Esse *et al.*, 2008; Hlongwana, 2009). Majority of respondents of this study said they had malaria symptoms during pregnancy, this results is similar to other studies done in Nigeria (Baidaji *et al*/ Houmsou *et al.*, 2010). Intake of anti - malaria drug during pregnancy among respondents was high. Over 60% of the respondents said they took anti- malaria drug during pregnancy. The study also found that among respondents who took SP, majority (92%) claimed they did not have malaria symptoms after taking SP whilst the rest had malaria symptoms. Although majority did not show symptoms of malaria which indicates the efficacy of sulphadoxine pyrimethamine, the few that indicated that they showed malaria symptoms after taking the SP also suggested that it could be that the parasites were resistant to the drug. However, this could not be ascertained because there was no laboratory confirmation of this. Other studies done in Ghana and other African countries also confirm similar findings (Shulman *et al* 1999; Falade *et al.*, 2007; Msyamboza *et al.*, 2009).

### **5.6 Insecticide Treated bed Net (ITN) use during Pregnancy**

The story of Insecticide Treated Net (ITN) used among the study participants was not different from what was observed for the SP usage. Only 23% slept under ITN with the majority of the respondents confirming they never slept under ITN. Though respondents were aware of the benefits of bed net, a lot of the mothers explained they were not using it because of the heat. The results supported what other studies found about people having reasonable knowledge on ITN but with low patronage (Hausmann, 2000; Alaii *et al*, 2003; Ess6 *et al*, 2008; Hlongwana, 2009). Despite these short falls, some studies have established a high level usage of ITN among pregnant women with most of the women having the knowledge that malaria in pregnancy causes foetal problems (van Eijk *et al*, 2005; Kabanywany *et al*, 2008). The reason for the high usage of ITN found in these studies could be attributed to high publicity and maternal awareness of the benefits associated with its use. It was also revealed in the study that pregnant women who use ITN invariably are those who have been sleeping under bed net even before they got pregnant. This may suggest the strong awareness of malaria in pregnancy in this specific group as found in the study by Kabanywany *et al* (2008).

In summary, this chapter has discussed the major findings of the study under the following headings: Demographic characteristics of respondents, the use of Sulphadoxine Pyrimethamine as Directly Observed Therapy approach (DOT), Effects of Sulphadoxine Pyrimethamine on maternal haemoglobin levels, the effect of Sulphadoxine Pyrimethamine on infant birth weight, the susceptibility of pregnant women on Sulphadoxine Pyrimethamine to malaria infection and Insecticide Treated bed Net use. It came out clear from the study that the DOT therapy approach using Sulphadoxine Pyrimethamine is not being followed in the study area as in the policy guidelines of the Ministry of Health, Ghana. Some of the respondents were

given the SP to take at home. Others took the first dose using DOT and the subsequent ones at home. Again about half of the respondents though attended ANC were not given the drug at all. Only a few of the respondents took the recommended three doses. It was also established by the study that majority of the women started ANC late in the second trimester and this delayed the first dose of the SP. Another finding of the study was that SP intake increases maternal haemoglobin level and that the more a pregnant woman took the SP her haemoglobin level improves. The study found that babies' weights were not influenced by the intake of SP, the reason for this might be that a baby's weight might be influenced by a number of variables such as intake of adequate nutrition which increased their infant birth weight and it could also be genetically influenced. Only a few of the respondents claimed to have had malaria after the intake of SP. Finally, it came out clearly from the study that less than a quarter of the respondents slept under Insecticide Treated bed Net and those who used ITNs were those who had been using ITN even before they got pregnant.

## CHAPTER SIX

### SUMMARY, IMPLICATION, LIMITATION, RECOMENDATION AND CONCLUSION

This chapter presents a summary of the findings of this study, and its implications for future research. The limitations of the research, have been outlined, and useful recommendations have been given thereof. Final comments on all of these are captured in the last part of this chapter, the conclusion.

#### 6.1 Summary

Ghana changed its Anti- Malaria Drug Policy in 2004 and adopted Sulphadoxine Pyrimethamine (SP) for Intermittent Preventive Treatment for Pregnant women (IPTp). The study investigated the use of SP as IPTp using the Directly Observed Therapy and its effect on Maternal Haemoglobin Levels and Infant Birth Weight at the Kpeshie Sub Metropolis. The aim of the study was to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) programme at the Kpeshie Sub-Metropolis (La General Hospital) and to assess its effects on infant birth weight and maternal haemoglobin levels. All mothers who attended antenatal clinic and had their babies delivered at the La General Hospital within the study period were included in the study. Mothers who were sickling positive, had twin deliveries, and those with babies with abnormalities were excluded from the study. In addition, mothers who did not grant their consent were not captured by the study. Four hundred (400) mothers were enrolled into the study. A quantitative research design was employed using a descriptive comparative approach. The main instrument of data collection was the structured questionnaire. Antenatal cards and labour charts were also reviewed for maternal haemoglobin levels and infant birth weight.

Data were analysed using Statistical Package for Social Sciences (SPSS) version 16. Frequency charts and percentage tables were presented. Chi square and Paired sample t- test were further used to establish the association between SP intake and weight of babies; mothers' haemoglobin levels and SP intake and also between the following: SP intake and birth weight and maternal haemoglobin levels. The p values less than 0.5 ( $p < 0.05$ ) were considered significant.

The findings from this study indicated that the majority (69%) of the mothers had knowledge about Sulphadoxine Pyrimethamine but a few (51 %) of them used it. The study also established that the Directly Observed Therapy using Sulphadoxine Pyrimethamine is not being properly followed as stipulated by the Ghana Health Service. Another major finding from this study was that most mothers start the antenatal clinic in the second trimester (20 weeks) and this made them miss the recommended time of starting the SP, leading to just few mothers (13.1%) taking the recommended three doses of the SP.

Also, the study found that SP intake influenced mothers' haemoglobin levels significantly, that is a mother's intake of SP correlated positively with her haemoglobin levels ( $p = 0.005$ ). Again, it was established that mothers who took SP during gestation had higher haemoglobin levels as compared to mothers who did not take SP during gestation ( $p = 0.000$  using independent sample t- test).

However, the study was unable to establish any relationship between SP intake and infant birth weight ( $P = 0.78$ ). This study established that most mothers did not show malaria symptoms after taking SP. A few of the mothers who indicated that they showed malaria symptoms after taking the SP also suggested it could be that the parasites were resistant to the drug. However, this could not be ascertained because there was no laboratory confirmation to this effect.

## **6.2 Implications for Practice, Administration and further Research**

The study has identified certain significant issues that must be addressed to ensure that the administration of the SP to pregnant women during antenatal period is done properly to benefit the mothers and their unborn babies. The objective of administration of the SP is to prevent malaria in pregnancy, prevent anaemia in pregnancy and reduce the incidence of low birth weight. These objectives cannot be met if the practitioners do not perform their duties diligently to ensure that pregnant women receive their SP as recommended. All practitioners must be educated on the policy regarding IPTp-SP so that they will administer it to their clients in the prescribed manner during their ANC visits. Inadequate supply of the drugs will also lead to the pregnant women not receiving the recommended doses of the IPTp-SP. Management therefore must ensure the constant availability of the drugs. Management should also consistently review the performance of staff and identify ways of motivating them to perform better in terms of the IPTp - SP administration.

The study also revealed the need for further research. For example further studies could be conducted to investigate why mothers who took the SP gave birth to babies of low birth weight. The reasons for all the women not adhering to the SP regimen could also be investigated.

## **6.3 Limitations to the study**

The present study has certain limitations that need to be taken into account when considering the study and its contributions. The selection of the sample size and the use of non-probability-sampling method naturally bring forth many limitations as far as the generalisation of the results of the study is concerned. However, the aim of the study was not to generalise but to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy at the Kpeshie Sub - Metropolis. In this regard one can

only make inferences out of the findings. The study however brings forth some fruitful and interesting possible avenues for future research that might be needed in relation to the theme and settings of the study.

The setting was an urban community with high level of literacy, moderate to high economic status of the women and lots of education on SP going on in the media. The findings may not be generalised to rural areas where literacy, economic and socio-cultural status of the women are different and void of adequate education on the use of Sulphadoxine Pyrimethamine in preventing malaria in pregnancy.

These notwithstanding, the results are useful in providing insight into the use of SP as IPTp through the Directly Observed Therapy in the prevention of malaria in pregnancy.

#### **6.4 Recommendations**

The following recommendations based on the findings of the study would help to make the IPTp-SP programme more effective and beneficial to the target group

- There should be high availability' of SP at all ANC clinics to enable all pregnant women gain access and take the drug at the right time.
- There is the need for constant in-service training of health care providers on the administration of SP.
- Pregnant women must also be educated on the IPTp-SP guidelines so they could enquire about or demand for the SP if they are not given.
- The mass media must be involved in educating the general population and potential mothers in particular about the policy and benefits of the IPTp-SP guidelines. This will help increase their awareness about the policy.

- Intermittently service providers must be retrained to refresh their knowledge on Directly Observe Therapy.
- The practice where some clients were given SP only after they complained of malaria symptoms also contradicts the guidelines of the IPTp-SP. Practitioners should be educated to desist from this practise and hence provide service or administer the drug as prescribed in the policy.

## **6.5 Conclusion**

The study has provided an insight into the use of SP in pregnant women at the Kpeshie Sub Metropolis. Some benefits of the usage of SP during pregnancy have been outlined. Most mothers have knowledge about the use of SP during pregnancy and its use as IPTp using the Directly Observed Therapy. Nevertheless this approach at the Kpeshie Sub Metropolis is faced with a lot of challenges. It is revealing that there is the need to re-enforce training of health workers and to educate pregnant women and the general public on the use of SP during pregnancy to make it effective so as to realise the goal of the policy that initiated and recommended its use.

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## Appendix A

### PARTICIPANT INFORMATION SHEET

**Title of Project:** The use of Sulphadoxine Pyrimethamine as intermittent preventive treatment for malaria in pregnancy: A study at the Kpeshie Sub Metropolis.

**Researcher:** Philomina Adjoa Nyarkoa Woolley. I am a master's student at the school of Nursing, University of Ghana, Legon. I would like to invite you to participate in a study of mothers who have attended antenatal clinic and delivered at the labour ward at the La General Hospital. This study is being carried out as part of my Master's programme.

#### **Introduction**

This information sheet contains information about a research on the use of Sulphadoxine Pyrimethamine as Intermittent Preventive Treatment for malaria in Pregnancy: A study at the Kpeshie Sub-Metropolis. To ensure that you are well informed to make the decision about participating in the study, you are to read this information before giving your consent by signing this form. Please seek explanation if you have any concerns about the information.

**Purpose of the study:** The main purpose of the study was to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) programme at the Kpeshie Sub-Metropolis and to assess its effects on infant birth weight and maternal haemoglobin levels.

#### **How was I chosen to participate in the study?**

The study is being conducted at the labour ward of the La General Hospital. You have been chosen as a mother who has delivered at the hospital during the study period.

**Benefits and risk:** Participants will not experience psychological, emotional, social or physical risk or discomfort as a result of participating in this research. Though the benefit of this research may not be immediate the outcome may help in the development of programmes and services that may be used to improve maternal health in the country.

**Cost of participating**

The questionnaire will take about 30 minutes to complete. Being a nursing mother, I understand your time is valuable. Your decision to participate in this study will improve maternal health in the country.

**Can I join the study?**

Yes you can join the study. If you choose to participate, please complete the questionnaire and your antenatal card and labour form will be used to complete part of the questionnaire.

**Confidentiality:** Any information given in this research will not be given out to a third party.

Your participation in this study does not ask for any information that would identify who the responses belongs to. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared because your name will not be written in the research.

**Voluntary' Participation:** Participants can in their free will decide either to take part in the research or not. In the course of the study if you wish to decline you may do so without fear of losing health care or any form of adverse effects.

**How will I find out about the study results?**

Once the writing is completed, copies will be made available at the School of Nursing library. University of Ghana, Legon. Findings of the study will be made available to the investigations review board and nursing administration of the La General Hospital. It is intended that the

outcome of the study will be done where all stakeholders will be invited. It is hoped that the entire work will be published. You may also request for the findings.

**Participant concerns**

If you have questions or concerns about the study, please do contact the researcher, Philomina A.

N. Woolley on 0244685702 or philo woolleyfajyahoo.com

**Appendix B**

**INFORMED CONSENT**

**Title of Project:** The use of Sulphadoxine Pyrimethamine as intermittent preventive treatment for malaria in pregnancy: A study at the Kpeshie Sub Metropolis.

Researcher: Philomina Adjoa Nyarkoa Woolley. M Phil student. School Of Nursing, College of Health Sciences, University of Ghana, Legon.

**Purpose of the Study:** The main purpose of the study is to investigate the use of Sulphadoxine Pyrimethamine in the prevention of malaria in pregnancy using the Directly Observed Therapy (DOT) programme at the Kpeshie Sub-Metropolis and to assess its effects on infant birth weight and maternal haemoglobin levels.

**Consent:** Please circle the appropriate answers.

Do you agree to participate in the study? Yes/No

Do you understand the message that the information sheet is giving? Yes/No

Do you understand that if you agree to participate in the research study, it would involve completing a questionnaire and your ante-natal card and labour forms will be used? Yes/No

Do you understand that you will not be paid for participating in the study? Yes/No

Do you know what the information you will give will be used for? Yes/No

Do you understand that you can withdraw from the study at any time? Yes/No

Do you understand that your participation in the study will not affect your care at the hospital?

**Yes/No**

Have you had the chance to ask questions about the study? Yes/No

**Your right as a participant**

This research was reviewed and approved by the Institutional review board (IRB) of the Noguchi Memorial Institute for Medical Research (NMIMR). This is the committee that reviews research studies in order to help protect participants. If you have any questions about this study, please contact Rev. Dr. Ayete-Nyampong, chairman of the NMIMR-IRB on Tel: 0208152360

Other persons whom you can contact for more information about the study are:

Dr. Emestina Donkor, Department of Maternal Health, School of Nursing, University of Ghana, Legon.

Dr. Micheal F. Ofori, Noguchi Memorial Institute of Medical Research, University of Ghana, Legon.

**Volunteer Statement**

I have had enough information on the purpose, methods, risks and possible benefits of the study. Satisfaction answers have been given to my questions. I do understand that my participation in this study is voluntary.

Signature/ Thumbprint of participant

Date

**Declaration**

The information outlined above has been fully explained to the volunteer. There was sufficient access to information including risk and benefits related to make an informed decision. I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

Preventive treatment for malaria in pregnancy

Signature of investigator

Date

**Appendix C**

**QUESTIONNAIRE ON THE USE OF SULPHADOXINE PYRIMETHAMINE AS  
INTERMITTENT PREVENTIVE TREATMENT FOR MALARIA IN PREGNANCY**

Please answer all questions truthfully. Kindly tick with a mark (V) or indicate as appropriate.

**SECTION A**

**BIOGRAPHICAL DATA**

1. How old are you?  
(a) Less than 20 years (b) 20- 30 years (c) 31 - 40 years (d) 41 years and above
2. Religious Affiliation  
(a) Christianity (b) Islamic (c) Traditional Religion (d) Other Specify
3. Educational Background  
(a) No Formal Education (b) Primary Level (c) Junior High school Level  
(d) Senior Secondary school Level (e) Tertiary Level
4. Marital Status  
(a) Married (b) Single (c) Separated (d) Divorced (e) Widowed \_\_\_\_\_
5. Occupation  
(a) Civil Servant (b) Trader (c) Farmer (d) Unemployed  
(e) Private (f) Other Specify
6. Number of Children excluding the current one  
(a) None (b) One (c) Two (d) Three (e) Four (f) Above Four
7. Age of last child

(a) 0 -2 years (b) 3 - 4 years (c) Above Four years (d) Other Specify

8. At what month did you start the ANC? .....Any Reason?

9. Place of Residence

**SECTION B**

**ANTI MALARIA USAGE**

10. Did you show any sign of malaria when you were pregnant?

(a) Yes (b) No

11. Did you take anti malaria drug?

(a) Yes (b) No \_\_\_\_\_

12. What type of Anti malaria did you take?

(a) Chloroquine (b) Fansider (SP) (c) Coartem (d) Artesunate- Amodiaquine

(e) Lonart (f) Other Specify.....

**USE OF SULPHADOXINE PYRIMETHAMINE**

13. Have you heard about Sulphadoxine Pyrimethamine (Fansider) use during pregnancy?

(a) Yes (b) No

14. Are you allergic to Sulphur drugs?

(a) Yes (b) No

15. Did you take Sulphadoxine Pyrimethamine (Fansider)?

(a) Yes (b) No

**If no to question 18 skip to question 21**

16. At what stage of your gestation were you given the Sulphadoxine Pyrimethamine?  
(a) First kick or 16 weeks (b) Above 16- 20 weeks (c) Above 20- 24 weeks -----  
(d) Above 24 -28 weeks (e) Above 28- 32 weeks (f) Above 32-36 weeks -----
17. Did you take it under Directly Observed Therapy (Swallowed it in presence of a health worker)? (a) Yes (b) No
18. Did you experience any side effect such as (Write the figure (s) as applicable)  
(a) Skin rash (b) Joint pains (c) Persistent nausea / vomiting (d) Unusual fatigue  
(e) Dark Urine (f) Paleness (g) Sore throat (h) Other Specify
19. How many times did you take the Sulphadoxine Pyrimethamine?  
(a) Once (b) Twice (c) Thrice
20. Did you sleep under Insecticide Treated Bed Net?  
(a) Yes (b) No
21. At what stage of your gestation did you sleep under the Insecticide Treated Bed Net?  
(a) Before 16 weeks (b) 16 -24 weeks (c) Above 24 weeks -36 weeks  
(d) Above 36
22. Did you take any type of Antihelminthic?  
(a) Yes (b) No
23. Did you have malaria symptoms after taken the Sulphadoxine Pyrimethamine (a) Yes (b) No

**SECTION C**

**Chart Review**

Preventive treatment for malaria in pregnancy

Baby's Measurement

Baby's weight at birth.....

**Mother's Haemoglobin Level**

Mother's haemoglobin level at first visit:.....

Mother's haemoglobin level at 36 weeks:.....

Initials of Interviewer..... Date

**SCHOOL OF NURSING**  
**COLLEGE OF HEALTH SCIENCES**  
UNIVERSITY OF GHANA

Telephone: 500149/502255/500381/502258  
Ext 6155 (Head of Department)  
Ext 6236 (Secretary)  
513250-Direct  
Fax: 513255  
E-mail: nureing@ug.edu.gh  
SON/F.II



PO BOX LG-3  
GHANA

January 26, 2009

Oof Rot.....

Your Rot.....

Hie Medical Superintendent  
La General Hospital  
Accra.

Dear Sir/Madam,

**LETTER OF INTRODUCTION**  
**PHILOMINA A.N. WOOLLEY**

I write to introduce to you the above-named M.Phil student of the School of Nursing, University of Ghana, Legon. She is seeking your permission to collect data for her research on the topic "Evaluation of the use of sulphadoxine pyrimethamine (SP) as intermittent preventive treatment for pregnancy (IPTP) on maternal haemoglobin levels and infant births weight".

It would be appreciated if you could give her the necessary assistance.

Thank you.

Yours faithfully,

Comfort Affann (Mrs.)  
LECTURER

Cc: TbeDDNS  
La General Hospital  
Accra.

The DDNS  
Maternity Unit  
La General Hospital  
Accra,

**NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH  
INSTITUTIONAL REVIEW BOARD**

(UNIVERSITY OF GHANA)

Phone: 500374 501178  
Fax: (233)21 502182  
Email: Director@noguchi.mimeom.net  
Telex No 255b UGL GH



P.O. Box LG581  
Legon  
Ghana

My Ref. No DF 22

14<sup>th</sup> January, 2010

Your Ref. No:

**ETHICAL CLEARANCE**

FEDERAL.WIDE ASSURANCE FWA 00001824

IRB 0001276

NMIMR-IRB CPN 017/08-09

IORG 0000908

On 14<sup>th</sup> January 2010, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB), at a full board meeting reviewed and approved your protocol titled:

**TITLE OF PROTOCOL**

Evaluation of the use of Sulphadoxine Pyrimethamine (SP) as Intermittent Preventive Treatment for Pregnancy (IPTP) on Maternal Haemoglobin levels and Infant Birth Weight: A study at the Kpeshie Sub Metropolis

**PRINCIPAL INVESTIGATOR**

Mrs. Philomena Woolley (Student)

Please note that a final review report must be submitted to the Board at the completion of the study. Your research records may be audited at any time during or after the implementation.

Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.

Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.

This certificate is valid till 13<sup>th</sup> January 2010. You are to submit annual reports for continuing review.

Signature of Chairman:

Rev. Ur Samuel Avete-Nampong  
(NMIMR-IRB Chairman)

cc: Professor Alexander K. Nyurko  
Director, Noguchi Memorial Institute  
for Medical Research, University of Ghana, Legon

