

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

FACTORS INFLUENCING THE USE OF ANEMIA PREVENTING
MEASURES AMONG ANTENATAL CLINIC ATTENDANTS IN THE
KINTAMPO NORTH MUNICIPALITY

The image shows a large, faint watermark of the University of Ghana crest in the background. The crest is a shield-shaped emblem with a blue and gold color scheme. It features three stylized trees at the top, a central scroll with a spiral design, and a banner at the bottom. The text 'BY OLIVIA LUMOR (10598816)' is overlaid on the central part of the crest.

BY

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MEASURES AMONG ANTENATAL CLINIC ATTENDANTS IN THE
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DECLARATION

I, Olivia Lumor, declare that this work is my own original work, investigations made by other people which were included in the preparation of this piece of work have been duly acknowledged and that this dissertation has not been presented elsewhere for a different degree.

..... Date.....

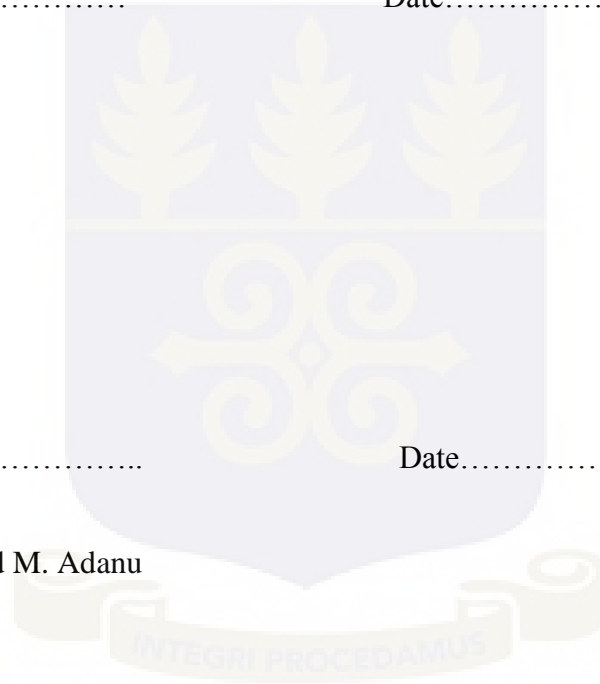
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Professor Richard M. Adanu

(Supervisor)



DEDICATION

I dedicate this dissertation to my husband James Asaah and my lovely kids Jason and Jeffrey.



ACKNOWLEDGEMENT

I thank the Almighty God for granting me good health, strength and understanding for the successful completion of this piece of work.

My deepest appreciation goes to Professor Richard Adanu my supervisor, for his insightful comments that put me in the right direction allowing this dissertation to be my own work. I could not have done this without his guidance.

I am most grateful to my family particularly my husband James Asaah and my mother Margaret Issaka for their prayers, unflinching support and continuous encouragement throughout my period of study. To my siblings Agnes Okyere and Solomon Okyere, I do appreciate your efforts.

I am highly indebted to the entire staff of the Kintampo North Municipal Health Directorate especially the Acting Municipal Director Ms Alice Vorletto and the Administrative Manager Mr. Tuku Eric. I would not have pursued this Masters programme without your support. I am also thankful to all the staff at the antenatal clinics for the support they gave me during the data collection.

I am grateful to the entire research team especially Francis Dzabeng; your dedication and commitment lead to the successful completion of this piece of work.

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ABSTRACT

Background: Anemia in pregnancy is a major public health problem that affects pregnant women in both developing and developed countries but pregnant women in developing countries are mostly affected. An estimated 41.8% of pregnant women worldwide are anemic. The World Health Organization has put in place some measures to help prevent anemia during pregnancy, which requires countries to integrate into their antenatal care. This study aimed at determining the factors influencing the use of all anemia preventing measures among antenatal clinic attendants in the Kintampo North Municipality.

Methods: A cross sectional study was conducted among antenatal clinic (ANC) attendants in the Kintampo North Municipality from May to June 2017. Purposive sampling technique was used to enroll 171 pregnant women at 36 weeks gestation and above in seven ANCs in the Municipality. Demographic data and information on use of all interventions were obtained from eligible participants using a structured questionnaire. Factors associated with use of the interventions were identified using multiple logistic regression.

Results: The use of all anemia preventing interventions among pregnant women was found to be 30%. Usage of iron supplements was 100%, while usage of ITNs and antihelminthics were 73% and 29% respectively. Use of more than three doses of IPTp with SP was 73%. Factors associated with use of the interventions at 95% CI were parity (OR = 3.54; CI 1.97 – 6.37), employment status (OR = 5.51; CI 2.32 – 13.09), gestational age at first visit (OR = 0.28; 95% CI 0.14 – 0.59) and frequency of subsequent visits

(OR= 0.18; CI 0.04 - 0.92). Availability of antihelminthics in the facility was strongly associated in the chi-square test ($\chi^2(1) = 10.86, p = 0.001$)

Conclusion: The study identified that use of all anemia preventing measures among pregnant women is quite low. Provision of anthelminthics to ANCs and health education on the benefits of the use of the interventions would be productive.



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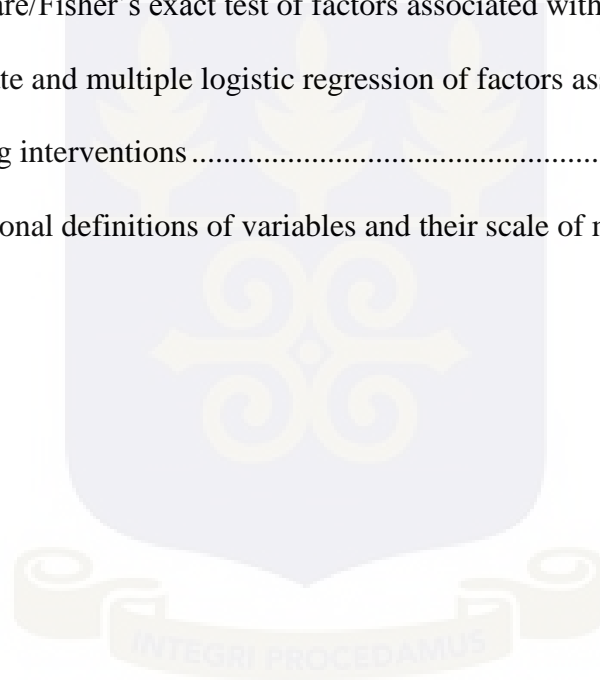
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LIST OF ACRONYMS

| | |
|-----------|--|
| ANC..... | Antenatal Clinic |
| CHPS..... | Community-based Health Planning and Services |
| CI..... | Confidence Interval |
| H/C..... | Health Center |
| Hb..... | Hemoglobin |
| Hct..... | Hematocrit |
| IPTp..... | Intermittent Preventive Treatment in Pregnancy |
| ITNs..... | Insecticide Treated bed Nets |
| MHD..... | Municipal Health Directorate |
| OR..... | Odds Ratio |
| PI..... | Principal Investigator |
| RAs..... | Research Assistants |
| RCTs..... | Randomized Control Trials |
| SP..... | Sulphurdoxine Pyrimethamine |
| WHO..... | World Health Organization |

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Anemia is known as the decline in the oxygen carrying ability of the red blood cells and it is best characterized by a reduction in hemoglobin or hematocrit concentration. Its definition is based on hemoglobin (Hb) or hematocrit (Hct) cutoffs according to age and sex established by the World Health Organization (WHO) (Sifakis & Pharmakides, 2000). Anemia is a public health problem that affects all age and sex groups in populations in both developing and developed countries. It has major consequences which does not only affect human health but also economic and social development. Children and pregnant women are mostly the group of people that are susceptible to anemia. According to the WHO, anemia in pregnancy is defined as Hb level below 11.0g/dL or Hct level below 33% during pregnancy (WHO, 2005; Stoltzfus & Dreyfuss, 1998).

Anemia in pregnancy is a major public health problem that affects pregnant women in both developing and developed countries, but pregnant women in developing countries are mostly affected. An estimated 41.8% of pregnant women worldwide are anemic. Anemia in pregnancy results from a wide range of causes. Worldwide, the major cause of anemia in pregnancy is iron deficiency. Iron deficiency is the cause of 50% of all cases of anemia during pregnancy. Iron requirements increases significantly during pregnancy, this is because iron is required to expand plasma volume, increase red cell mass and for the development of the placenta and the fetus. Iron deficiency during pregnancy causes

Hb concentration of the maternal blood to fall to an average of approximately 11.0 g/dl during the 36th week of gestation (World Health Organization, 2001a; WHO, 2005).

The leading cause of iron deficiency among pregnant women include increase iron requirements due to pregnancy poor absorption of iron from diets and low intake of iron. Hemolysis as a consequence of malaria, congenital hereditary defects in hemoglobin synthesis and glucose-6-phosphate dehydrogenase deficiency are also causes of anemia during pregnancy. Other causes are; blood loss associated with schistosomiasis, hookworm infestation and nutritional deficiency such as vitamin B12 and folic acid (World Health Organization, 2001a)

1.2 Problem Statement

Anemia in pregnancy is a key public health problem worldwide. Even though it affects pregnant women in both rich and poor countries, prevalence is higher in poor countries. Globally, 41.8% of pregnant women are known to be suffering from anemia in pregnancy. In America and Europe, anemia in pregnancy prevalence is 24.1% and 25.1% respectively. In the Western Pacific anemia affects 30.7% of pregnant women whereas in South East Asia and the Eastern Mediterranean it affects 48.2% and 44.2% respectively. As compared to other regions of the world, prevalence of anemia in pregnancy is highest in Africa with 57.1% of pregnant women being anemic (WHO, 2005). In Ghana, prevalence of anemia in pregnancy in urban areas in Accra is 34% (Engmann, Adanu, Lu, Bose, & Lozoff, 2008). In 2014 and 2015, the prevalence of anemia in pregnancy in the Kintampo North Municipal was 39.6% and 18.4% respectively. However, the prevalence

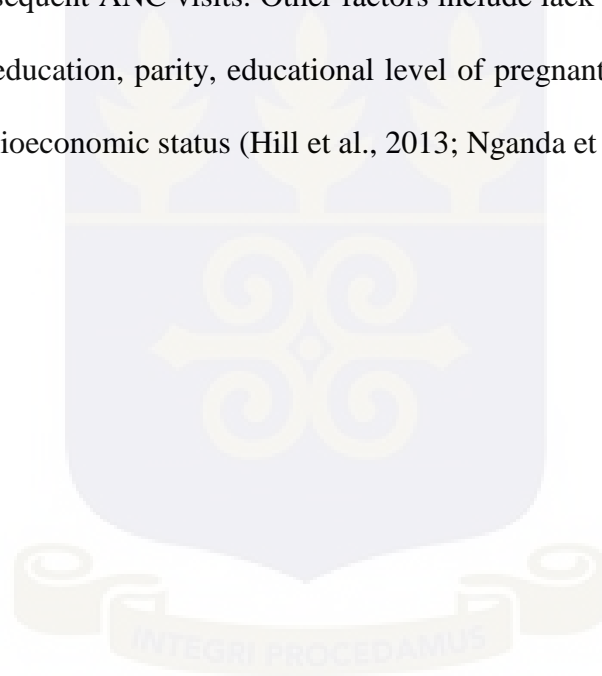
among women at 36 weeks gestation was 43% in 2014 and 24% in 2015 (Kintampo North Municipal Health Directorate, 2015).

According to Sifakis & Pharmakides (2000), maternal anemia leads to antepartum hemorrhage and spontaneous abortion. It also causes postpartum hemorrhage maternal mortality (Sifakis & Pharmakides, 2000; Kalaivani, 2009). Additionally, maternal anemia leads to preterm delivery, low birth weight, congenital anomalies and fetal death (Rasmussen, 2001; WHO et al., 2012).

The common causes of anemia in pregnancy are iron deficiency and hemolysis as a result of malaria infection and helminthic infestation (WHO, 2004). These are preventable causes and the WHO has recommended a package of measures to help prevent these causes of anemia during pregnancy for countries to integrate into their antenatal care. Ghana is one of the countries that have integrated this policy into its antenatal care. The interventions are: daily iron supplementation throughout pregnancy, use of Insecticide Treated bed Nets (ITNs) throughout pregnancy, use of Sulphadoxine Pyrimethamine (SP) as Intermittent Preventive Treatment in pregnancy (IPTp) and antihelminthics in the second trimester of pregnancy. Because the causes of anemia for which these interventions target coexist, the WHO recommends that these interventions should not be done in isolation since they are known to significantly prevent anemia in pregnancy if not done in isolation (World Health Organization, 2001a).

In Ghana, 92% and 39% of pregnant women use iron supplements and antihelminthics respectively (Ghana Statistical Service & Ghana Health Service, 2015). Daily iron supplementation alone reduces maternal anemia by 70% (World Health Organization et al., 2012). In Tanzania, usage of at least one dose of SP as an IPTp among pregnant

women is 57% while 12% of pregnant women use at least two doses of SP as an IPTp (Nganda, Drakeley, Reyburn, & Marchant, 2004). IPTp with SP is known to prevent the occurrence of maternal anemia by 55% and reduce malaria by 90% (Brooker et al., 2007). In Kenya ITN use among pregnant women is 85%, use of ITNs prevents anemia in pregnancy by 47% (Kuile et al., 2003). Factors that are known to influence the use of ITNs and IPTp with SP among pregnant women are; lack of knowledge of pregnant women about interventions, gestational age at first antenatal clinic (ANC) visit and not returning for subsequent ANC visits. Other factors include lack of interventions in health facilities, health education, parity, educational level of pregnant women, inability to pay user fees, and socioeconomic status (Hill et al., 2013; Nganda et al., 2004).



1.3 Conceptual Framework

Explanatory Variables

Outcome Variables

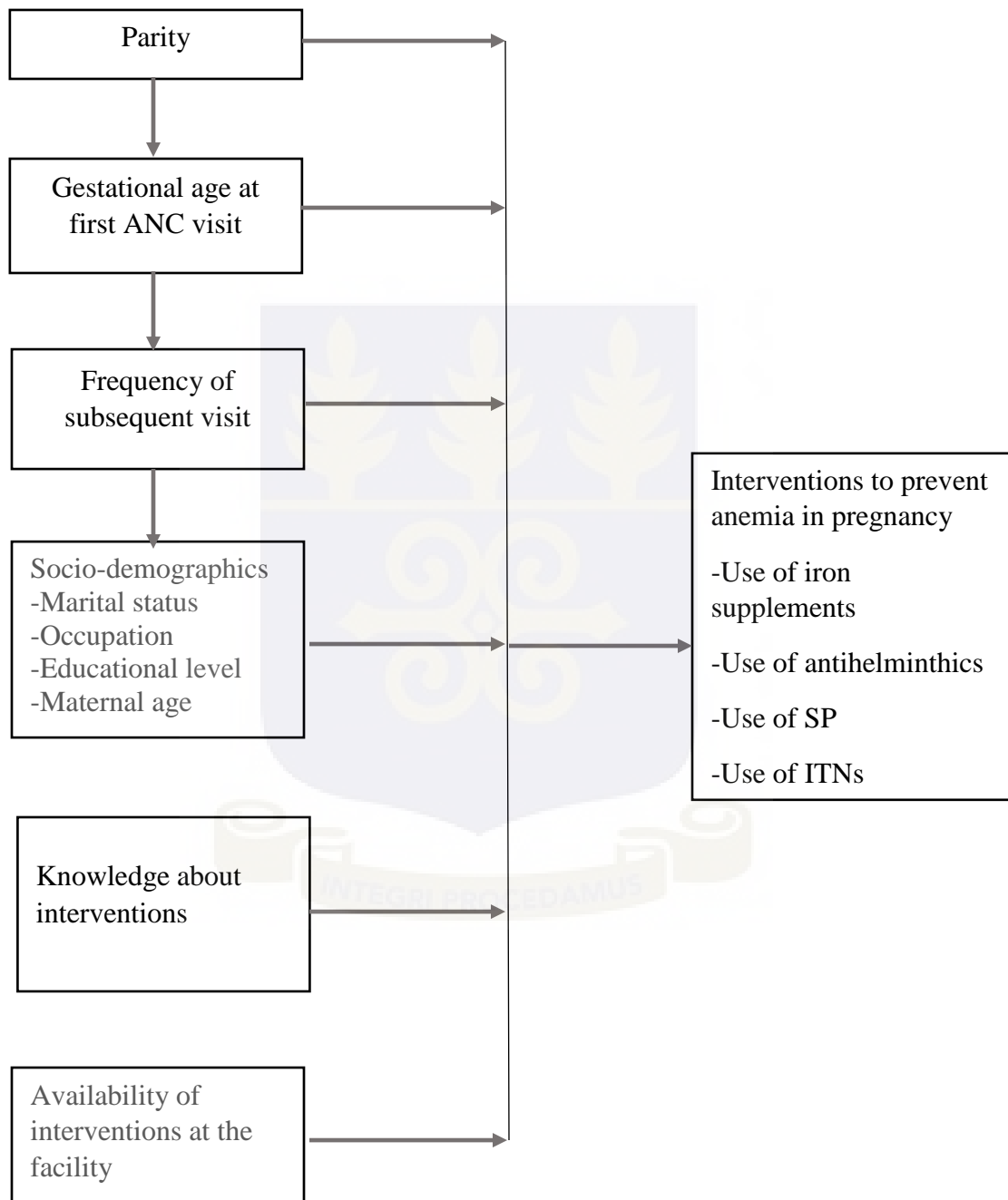


Figure 1: Conceptual framework of factors influencing use of anemia preventing measures.

1.3.1 Narrative to Conceptual Framework

Parity of a pregnant woman can influence her use of intervention. Primigravidaes are more likely to make their first ANC visit within the first trimester than multigravidaes.

This can increase their frequency of visits thereby increasing their use of interventions.

Gestational age at first ANC visit can influence the use of intervention; if a pregnant women reports to the ANC within her first trimester, she is more likely to use all interventions than when she reports latter in the second trimester. Gestational age at first visit can influence the frequency of subsequent visits. Pregnant women reporting to the ANC in their third trimester will make fewer visits and so cannot receive all required interventions. Women who delay ANC attendance until their pregnancy is advanced will have a very limited chance of receiving the required number of interventions.

Frequency of subsequent visits can increase or decrease a pregnant women's chance of using interventions. Intervention use increases with increasing visits to the ANC. If a woman does not go for her next visit, it means she will not get her next due intervention.

The socio-demographic characteristics of a woman can influence her use of interventions.

Wonmen with a higher educational background may make more frequent visits to the ANC because they have some amount of knowledge on the benefit of attending ANC and so they would be able to receive more interventions as compared women with low with low education. Women who have a regular source of income and those who are married would be able to afford transportation fare to ANC more frequently than those who are not. Maternal age can also influence the use of interventions. Younger women are likely to make subsequent visits as compared to older women.

Availability of intervention at the health facility can prevent a pregnant woman from using interventions. Lack of knowledge about intervention can influence intervention use.

Pregnant women who are unaware of the benefits or preventive value of interventions, their timing of the interventions and the number of interventions required are less likely to use or get the required number of interventions. Frequent periodic stock outs of interventions is a major barrier for pregnant women not using them (Hill et al., 2013; Kiwuwa & Mufubenga, 2008; Nganda et al., 2004).

1.4 Justification

Studies all over the world have shown that anemia in pregnancy greatly affects the health of the individual as well as economic and social development, it is a common public health problem which is a key threat to the lives of pregnant women in all countries and Ghana is not an exception. The WHO has put in place a package of interventions for countries to adopt in to their ANC services to help reduce the problem caused by anemia in pregnancy. As recommended by the WHO, these interventions are very effective if they are not done separately (WHO, 2001a). Worldwide, numerous studies have been done on the usage of these individual interventions including their effectiveness and factors that may be influencing the intervention usage among pregnant women, but not much is known about the use of all the interventions and the factors that influence their use among pregnant women.

Even though Ghana has included the use of this package of intervention as a part of its antenatal care component, information on the usage of all the interventions among pregnant women in the Kintampo North Municipality there is not available.

Consequently, the study, aimed to determine the factors that influence the usage of all the anemia preventing interventions among ANC attendants in the Kintampo North Municipality.

The findings of the study would provide knowledge about the number of pregnant women who use all anemia preventing interventions and factors such as parity, educational level, knowledge about interventions, gestational age at first ANC visit, frequency of subsequent visits and availability of interventions at health facilities that may influence the use of these interventions.

Findings of this study would be helpful in management decision making to improve antenatal services in the Kintampo North Municipality. The findings of the study can also be beneficial in planning and allocating of resources to ANCs in the municipality. It would also help to reduce the consequences that anemia in pregnancy has on both the mother and the fetus as well as the municipality as a whole.

1.5 Objectives

1.5.1 General Objective

To determine the proportion of pregnant women at 36 weeks gestation and above who use all the anemia preventing interventions during pregnancy and factors influencing the use of these interventions among ANC attendants in the Kintampo North Municipal.

1.5.2 Specific Objectives

1. To estimate the proportion of pregnant women who are taking iron supplements
2. To determine the proportion of pregnant women who received antihelminthics in their second trimester.
3. To estimate the proportion of pregnant women who have received 3+ doses of sulphadoxine pyrimethamine.
4. To determine the proportion of pregnant women using insecticide treated bed nets.
5. To identify the factors influencing the use of iron supplements, antihelminthics, SP and ITNs among pregnant women

1.6 Research Questions

1. What proportion of pregnant women are taking iron supplements?
2. What proportion of pregnant women received antihelminthics in their second trimester?
3. What proportion of pregnant women have received 3+ doses of sulphadoxine pyrimethamine?
4. What proportion of pregnant women use insecticide treated bed nets?
6. What factors influence the use of iron supplements, antihelminthics, SP and ITNs among pregnant women?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter reviews various works that have been done in the area of use interventions to prevent anemia in pregnancy and factors that influence the use of these interventions. It looks at both theoretical and empirical evidence that has already been undertaken in the field of study through systematic reviews and meta-analyses to serve as a guide to compare and contrast the findings of this study. This chapter's review relates to the following variables being studied; use of iron supplementation, antihelminthics, insecticide treated bed nets and sulphadoxine pyrimethamine during pregnancy to help prevent anemia during pregnancy. Other variables under study are parity of pregnant women, gestational age at first ANC visit, frequency of subsequent visits, knowledge of mother about interventions, maternal age, occupation, marital status, educational level of mother and availability of interventions at health facility.

2.2 Use of Iron Supplementation to Prevent Anemia during Pregnancy

During pregnancy, iron deficiency is the commonest cause of anemia. Iron deficiency anemia occurs when iron stores in the body dwindle and the amount of iron supplied to the tissues is reduced (Stoltzfus & Dreyfuss, 1998). Globally the prevalence of anemia in pregnancy is 41.8% (WHO, 2005). Half of this burden is due to iron deficiency (World Health Organization, 2001a) A number of interventions exist to help prevent the deficiency of iron leading to anemia during pregnancy, daily iron supplementation in pregnancy is one of these interventions (Stoltzfus & Dreyfuss, 1998). Daily iron supplementation in pregnancy reduces anemia in pregnancy by 70% and iron deficiency

by 50% (World Health Organization et al., 2012). During pregnancy, there is increased requirement of iron due to physiological changes. These requirements are hard to meet through diet and so routine supplementation with iron is recommended by the World Health Organization (WHO) as part of antenatal care model (World Health Organization, 2001b).

In accordance with the WHO guidelines for anemia prevention during pregnancy, Ghana has adopted routine iron supplementation as a component of antenatal care. The Ghana Statistical Service and Ghana Health Service, (2014) indicates that 92% of women use iron supplementation during pregnancy

A study conducted in the University Hospital of Zurich to establish the risk factors and prevalence of decreased iron stores and anemia in early pregnancy, indicated that 50.2% of the respondents were anemic, out of which 31.7% was due to iron deficiency (Bencaiova, Burkhardt, and Breymann, 2012). Another study conducted by Engmann, Adanu, Lu, Bose, and Lozoff (2008) which sought to determine the prevalence and identify risk factors for iron deficiency and anemia in pregnant Ghanaian women from urban areas also established that 34% of the respondents were anemic, 16% had iron deficiency, and 7.5% had iron deficiency anemia.

Anemia in pregnancy has both maternal and fetal consequences. It exposes both mother and fetus to increased life threatening morbidities and subsequently mortality. Maternal effects of anemia during pregnancy are antepartum hemorrhage as a result of placenta praevia or abruption and spontaneous abortion (Sifakis & Pharmakides, 2000). Anemia in pregnancy can bring about postpartum hemorrhage as well as other morbidities which can subsequently lead to pulmonary edema and death (Kalaivani, 2009). It increases

maternal mortality; forty percent of all maternal deaths are related to anemia (WHO, 2001a). Fetal effects of maternal anemia include preterm delivery and low birth weight (Rasmussen, 2001). According to World Health Organization et al., (2012) congenital anomalies and fetal death are also consequences of maternal anemia to the fetus

2.3 Use of Antihelminthics to Prevent Anemia during Pregnancy

Heavy blood loss as a consequence of helminthic infestation such as hookworm, trichuris and ascariasis another cause of anemia during pregnancy (WHO, 2005). Helminthic infestation leads to poor appetite and vomiting, worsening iron status by causing reduction in the intake of dietary iron. It also causes diarrhea which increases the excretion of dietary iron. Hookworms are considered to be important cause of iron-deficiency anemia in pregnant women (Torlesse & Hodges, 2001). As anemia during pregnancy is a major threat to maternal and fetal life, the WHO recommends treatment with antihelminthics during the second trimester in areas where hookworm prevalence is greater than 20% (WHO, 2004). Hookworm is most prevalent in areas with poor resources, where there is limited access to proper sewage treatment and sanitation, and places where night soil is used in agriculture (Humphries et al., 2013).

Worldwide hookworms infection affect an approximated 44 million pregnant women (Torlesse & Hodges, 2001). In Indonesia, pathogenic intestinal helminthes infected 69.7% of pregnant women (Nurdiati, Sumarni, Suyoko, Hakim, and Winkvist, 2001). Hookworm prevalence in the Kintampo North Municipal is 45% (Humphries et al., 2011). Hookworm prevalence in Northern part of Ghana is known to range between 50.6% to 86.9% (Yelifari et al., 2005; Ziem, Olsen, Magnussen, Horton, & Agongo,

2016). Ghana has adopted the WHO guidelines for antihelminthic use during pregnancy into its antenatal care services. In 2014, 39% of pregnant women took antihelminthics (Ghana Statistical Service & Ghana Health Service, 2015).

Widespread infestations of soil transmitted helminthics are found in the tropics and subtropics. *Ascaris* infestation occurs most in coastal regions of West Africa, Central Africa, Southeast Asia, and China. Highest rates of *Trichuris* infestations are found in Southern India, Southeast Asia and Central Africa. Hookworm infestations however, reach their highest prevalence throughout sub-Saharan Africa as well as China and Southeast Asia. 1.2 billion *Ascaris* infestations occur worldwide. Approximately 50% of these infections are in China where Ascariasis prevalence is still high. 700 million *Trichuris* infestation and 800 million hookworm infestation occur globally. Highest prevalence of Hookworm infestation occur in China and sub-Saharan Africa with 200 million infestation each year (De Silva et al., 2003).

A single dose of antihelminthic administered in the second trimester of pregnancy is not linked with maternal anemia in the third trimester (Salam, Haider, Humayun, & Bhutta, 2015). However, antihelminthics improve anemia status by decreasing intestinal blood loss, improving the absorption of nutrients, and increasing appetite. Moreover, antihelminthic treatment alone may not significantly improve maternal anemia status if food nutrients or supplements are not available (Imhoff-Kunsch & Briggs, 2012). Imhoff-Kunsch & Briggs, (2012) did meta-analysis for four randomized control trials (RCTs) and three observational studies and concluded that, in all four RCTs antihelminthic use in pregnancy greatly reduced the prevalence of helminthic infestation. All the three observational studies indicated that use of antihelminthics in pregnancy enhanced

maternal iron status, two of these studies revealed beneficial effects on birth weight, and other two studies found a beneficial effect on survival of infant.

2.4 Prevention of Anemia in Pregnancy through the Prevention of Malaria in Pregnancy

Among pregnant women living in regions of low and stable transmission anemia is significantly caused by malaria. It is a major public health problem and affects nearly 50 million pregnant women every year in malaria endemic areas, with significant risks not only for the mother but also for the developing fetus and the new born (Wilson et al., 2011). Pregnant women living in regions where the transmission of malaria is unstable or low, have very little acquired immunity to malaria and so have a high risk of severe malaria, symptomatic malaria and consequently anemia and its adverse birth outcomes such as stillbirth, preterm delivery and miscarriage. Occurrence of symptomatic infections in regions where the transmission of malaria is steady is less frequent but pregnant women continue to be susceptible of severe anemia and its associated consequences for both mother and fetus (WHO/AFRO, 2004; Sifakis & Pharmakides, 2000; Rasmussen, 2001).

A lot of studies have revealed the existence of placental and peripheral parasitaemia in places of Africa where the transmission of malaria is steady. The median prevalence of maternal malaria infection in pregnancy in these studies was 27.8%. Approximately one in every four pregnant women in places of Africa where transmission is steady has infection with malaria as at their time of delivery. Nearly 26% of cases of severe anemia in pregnant women are caused by malaria. This means that, the prevention of malaria

among pregnant women will also be helpful in the prevention of anemia (Desai et al., 2007).

Among Ghanaian pregnant women, malaria accounts for 9.4% of deaths, 10.6% of admissions and 13.8% of outpatient department (OPD) attendance (Wilson et al., 2011). Malaria-associated anemia predisposes pregnant women to premature labor, placenta previa, placental abruption, as well as death (Steketee, 2003)

Currently, the WHO recommends some measures for the control and prevention malaria in places of Africa where there is moderate to high malaria transmission. These interventions include the administration of at least 3 doses of sulfadoxine pyrimethamine(SP) as intermittent preventive treatment (IPTp) with starting in the second trimester with an interval of one month apart until the time of delivery and the usage of insecticide treated nets (ITNs) (WHO, 2014). Meta-analyses of trials on these interventions indicate that malaria prevention during pregnancy eliminates perinatal mortality by 27%, 38% of the possibility of acquiring severe maternal anemia and 43% of low birth weight. In Africa, an estimated 100 000 infant deaths occur annually due to low birth weight which is attributable to malaria in pregnancy (Desai et al., 2007).

2.5 Use of Sulphadoxine Pyrimethamine to Prevent Malaria during Pregnancy

The most effective way of using antimalarials in the prevention of malaria in pregnant women is through intermittent preventive treatment. Currently, in areas of Africa where resistance to SP is low and where transmission of malaria is stable, SP is the antimalarial drug which is given as a single dose and is effective for the prevention of malaria during pregnancy. SP use in pregnancy is safe, effective in women of reproductive age in most places and easier for control programs to use because it can be given under observation by a health care provider as a single dose treatment (WHO/AFRO, 2004)

IPTp with SP is linked to decrease in low birth weight, neonatal deaths maternal anemia and antenatal maternal parasitemia and so it is recommended for use in malaria endemic areas in sub-Saharan Africa. IPTp with SP is provided to pregnant women at antenatal care (ANC) visit for the prevention of malaria. It should be administered as a directly observed therapy (DOTs) beginning in the second trimester and continue till delivery, with an interval of one month between doses (WHO, 2014). This recommendation by the WHO is based on studies performed in the 1990s in Kenya and Malawi, where malaria transmission is all year round (WHO/AFRO, 2004).

IPT with SP is known prevent the occurrence of anemia by 55% and reduces malaria by 90% (Brooker et al., 2007). A study which assessed the effectiveness of IPTp with SP at the individual level in primigravidae and secundigravidae in rural Burkina Faso also indicated that, the usage of IPTp with SP is linked with significant low risk of acquiring placental and peripheral malaria. It added that one IPTp with SP dose can prevent infection with malaria by 62% and two doses can prevent 90% of infection with malaria as compared to no IPTp with SP (Gies, Coulibaly, Ouattara, & D'Alessandro, 2009).

Initial report of ongoing studies monitoring the effectiveness of IPTp with SP suggest that the effectiveness of IPTp with SP could be increased if the dose regimen is increased to three. As indicated by a meta-analysis which is not published, 7 randomized trials revealed more benefits associated with three or more doses of SP as compared to the normal two dose routine. (WHO, 2012). 57% pregnant women have taken IPTp with SP once and 12% have received IPTp with SP twice (Nganda et al., 2004).

2.6 Use of Insecticide Treated bed Nets (ITNs) to Prevent Anemia in Pregnancy

The second preventive intervention for malaria prevention during pregnancy is the usage of ITNs. ITNs lessen human contact with mosquitoes by repelling them and also by killing the mosquitoes when they come into contact with ITNs, thus driving mosquitoes away from the surroundings or from the environs of sleepers. Documented effects of ITNs in numerous studies on the reduction of sickness and death related to malaria are being used to promote usage in African countries through the private and public sector (Who/Afro, 2004). Insecticide-treated nets have been safely and successfully used to prevent and control malaria morbidity and mortality in the African and Western Pacific Regions. In sub-Saharan Africa, use of ITNs is increasing gradually, with a shift from project based to operational implementation (WHO, 2000). The usage of ITNs throughout pregnancy reduces placental and peripheral parasitaemia consequently preventing anemia, increasing mean birth weight, increasing maternal hemoglobin concentrations and decreasing the risk of fetal loss. Use of ITNs must be an essential part of malaria prevention strategies for among pregnant women living in places in Africa where there is malaria endemicity (Gamble, Jp, & Fo, 2007). The use of ITNs alone provides

significant protection against anemia in primigravidae, however, combining ITNs and IPTp with SP give an added protection against anemia (Njagi, Pascal, John, & Mugo, 2003).

A study conducted in Western Kenya to assess the impact of ITNs use during pregnancy concluded that, ITNs use is linked with a reductions of 47% in the occurrence of severe malarial anemia and 38% in the occurrence of malaria parasitemia. It added that the overall proportion of self- reported ITN use is 85% (Kuile et al., 2003).

ANC can distribute ITNs for free and advocate for its use through education of pregnant women. Distribution of ITNs can be supported through public and private sector programs. National programs can explore partnerships with community-based health providers and nongovernmental organizations to ITNs (WHO/AFRO, 2004)

2.7 Factors that may Influence use of Interventions to Prevent Anemia in Pregnancy

Lack of knowledge about interventions can influence the use of interventions. Among barriers to receiving IPTp with SP mentioned by women are associated with their ignorance about IPTp with SP. For example, women were unaware of the preventive value or the benefits of IPTp with SP, why they were given SP, the number of SP doses required, dosage and the timing (Hill et al.,2013). Knowledge and high socioeconomic status is an indicator for the use of ITNs whiles availability of SP at ANC is an indicator for SP use. Insufficient training of staff, lack of basic facilities and drug shortages impede delivery of interventions. Pregnant women who did not receive SP reported that it was offered to them at the ANC. Frequent periodic shortage of SP was another reason why pregnant women did not receive SP. Health education is also an indicator for use of

interventions. Pregnant women who reported to the ANC early have a greater chance of participating in health education sessions and so they will use SP as an IPTp because they are informed about what it is and what it does (Nganda et al., 2004; Hill et al., 2013; Muhumuza, Namuhani, Balugaba, Namata, & Ekirapa Kiracho, 2016)

Pregnant women who did not return for their second or subsequent visits were not able to receive their second or subsequent doses of SP. Pregnant women making three or more ANC visits used more interventions as compared to those who made less than three visits. Gestational age at first ANC visit is associated with frequency of subsequent visits. Pregnant women who reported for their first ANC late in their second or third trimester were more likely to make fewer subsequent visits before delivery and so are less likely to use all interventions to prevent anemia in pregnancy. Parity is a key determinant of intervention use, primigravidae were more likely to receive SP as compared to multigravidae because they were more likely to make their first ANC visit within their first trimester. Women with high educational background would receive interventions compared to women with no or less educational background. Practices in private health care facilities, are usually different from those in government facilities; private health care facilities often fail to adhere to national guiding principles on interventions. They tend to put charges on some interventions which are for free thereby creating inconsistencies within national programs (Hill et al., 2013).

CHAPTER THREE

3.0 METHODS

3.1 Introduction

This chapter describes the procedures that were carried out in order to achieve the objectives of the study. It provides information on the study type, study sites, study population and study variables. It also provides information on the sampling methods, data collection methods, data analysis procedure and ethical clearance.

3.2 Study Design

A cross-sectional design was used to gather quantitative data achieve the objectives of the study because the study pertains to a large population and aims at quantifying the variables at a point in time. The study was conducted in seven ANCs in health facilities among pregnant women. During the study ANC attendants were studied to determine the proportion that has had all interventions to prevent anemia during pregnancy and the factors that influence the use of these interventions. The entire duration of the study was six (6) months and fieldwork was done for a period of four weeks between 1st and 30th May 2017.

3.3 Study Location/Area

The study was conducted in the Kintampo North Municipality in the Brong-Ahafo Region of Ghana. The Municipality is one of the 27 municipals/districts in the Brong Ahafo Region with a projected population of 109,448 and an expected pregnancy of 4,378 for the year 2016. It has average annual ANC registrants of 4,715, a monthly 36 weeks gestation and above ANC attendants of 178 and an average yearly SP4 coverage of

21%. It is divided into 7 sub-municipals, 1 of which is in the urban settings. It has 17 facilities that provide antenatal services, 3 of which are in the urban settings and the remaining 14 in the rural settings. Facilities in the urban settings comprise of one (1) government hospital, 1 private hospital and 1 private maternity home. Facilities in the rural settings include four (4) health centres (H/C) and ten (10) community-based health planning and services (CHPS) compounds (KNMHD, 2016).

3.4 Sampling

3.4.1 Sample Size Determination

Sample size for the study was determined using the formula $n = (z^2 pq)/d^2$ where

N = sample size

Z = z value for 95% confidence interval = 1.96

P = estimated proportion = 21% = 0.21

Q = 1-p = 1 - 0.21 = 0.79

D = distance on either side of the mean in confidence interval = 5% = 0.05

$N = (1.96^2 \times 0.21 \times 0.79) / 0.05^2$

N = 254 + 10%

N = 279

10% of the calculated sample was added to the sample size to cater for refusals and non-respondents. Therefore the total sample size would be 279.

Assumption on estimated proportion: per the WHO guidelines, if interventions are followed correctly, by the time mother is due for her fourth dose of SP, she would have had all interventions (including required minimum of 3rd dose of SP) to prevent anemia

during pregnancy (WHO, 2014). The average annual SP4 coverage of Kintampo North which is 21% (KNMHD, 2015) was used as the estimated proportion.

Because the period allocated for data collection is limited (four weeks) and the number in the target population for that period is less than the calculated sample size, the total population was studied. The average monthly 36 weeks and above gestation and the proportionate sample distribution is as shown in Table 1.

Table 1: Proportionate distribution of sample size by facility

| Name of Health Facility | Average Monthly 36weeks+ gestation Attendance | Proportionate sample distribution |
|---|---|--------------------------------------|
| Kintampo Municipal Hospital (urban) | 90 | 90 |
| Glory Prince of Peace Maternity Home (urban) | 51 | 51 |
| Yizura Hospital (urban) | 9 | 9 |
| New Longoro H/C (rural) | 4 | 4 |
| Dawadawa H/C (rural) | 9 | 9 |
| Kunsu H/C (rural) | 7 | 7 |
| Gulumpe CHPS (rural) | 8 | 8 |
| Total | 178 | 178 |

3.4.2 Sampling Method

To make the study representative, study participants were grouped as urban and rural.

Facilities in both settings are as indicated in table 2 above.

Study sites and respondents were selected using non-probability sampling technique.

Because the duration of the study was short, facilities with an average attendance of four and above for pregnant women at 36 weeks gestation and above in a month were used for the study. Respondents were added to the study (if they provide consent) as and when they report to the facility for the entire duration of data collection.

3.5 Study Variables

3.5.1 Dependent Variables

Use of iron supplements, use of antihelminthic, use of SP and use of ITNs

3.5.2 Independent Variables

The primary independent variables were parity of mother, gestational age of mother at first ANC visit, frequency of subsequent visits, knowledge of pregnant women about interventions and availability of interventions at health facility. Other variables include; educational level of mother, maternal age, occupation and marital status. Appendix 3 (Tables 9a and 9b) shows the variables under study, their scale of measurement and the statistical methods that were used to analyze them.

3.6 Study Population

The study was conducted among pregnant women at 36 weeks gestation and above attending ANC in selected seven (7) health facilities providing ANC services in the Kintampo North Municipality. These facilities are;

1. Kintampo municipal hospital
2. Yizurah hospital
3. Glory prince of peace maternity home
4. New longoro H/C
5. DawadawaH/C
6. KunsuH/C
7. Gulumpe CHPS

3.6.1 Inclusion Criteria

Pregnant women at 36weeks gestation and above

3.6.2 Exclusion Criteria

Pregnant women 36weeks gestation and above who do not take sulphonamides due to medical conditions and all pregnant women below 36 weeks gestation

3.7 Pretest

Pretesting of questionnaires was done a week before the actual start of the study in Asantekwa CHPS, compound which is in the study area but was not part of selected facilities. This was done to ensure that the questions were meaningful and consistent. Identified errors were rectified before data collection. After the pretest, additional option (not at all) was added to options in question 10 (See Appendix 2).

3.8 Data Collection Method/Techniques and Instrument

A structured questionnaire made up of open and closed ended questions was administered to obtain data on all the variables under study.

3.9 Data Collection Procedure

Data collection was done by a five-member team, comprising the principal investigator (PI) and four research assistants (RAs). A one-day training session was organized for the four RAs. They were trained on issues on privacy and confidentiality, consent seeking before interview, how to ask questions and how to pick information from respondent's maternal health records booklet. Three of the RAs were located in facilities in the urban settings for the entire duration of the study because these facilities provide daily ANC services. The PI and one RA collected data from the other four facilities in the rural settings per their ANC schedules.

3.10 Data Processing and Statistical Analysis

Data were processed using Microsoft excel before it was exported to STATA version 14 for analysis. The use of anaemia preventing measures in pregnancy, outcome variable was reported as a proportion with a confidence interval. The socio demographic data of respondents and other independent variables were presented on a frequency distribution table. Cross tabulation with a chi square test was performed to determine the association between the outcome and independent variables. Logistic regression was done to determine the strength of association between the independent variables that are associated with the outcome variable. The strength of associations was reported as odds ratios with 95% confidence interval. Statistical significance was set at $p < 0.05$ for all analyses.

Descriptive analysis was performed on the background characteristics of respondents. Frequencies were generated to describe the distribution covariates and coverage of interventions for all participants, while continuous variables were presented as arithmetic mean and standard deviation. Pearson's chi-square and Fisher's exact test were used for comparison of proportions. Univariate analysis was employed to assess the crude association between potential predictors and the intervention uptake. Multiple logistic regression was used to estimate associations between each dependent variable and the independent variables after controlling for other covariates. To estimate the multivariable model, backward stepwise elimination procedure was used to only retain factors significantly associated with study outcomes, using a $P\text{-value} < 0.20$. In the final model, only variables significantly associated with study outcomes were retained. $P\text{-values}$ less than 0.05 was considered statistically significant. STATA software version 14 was used to perform all analysis.

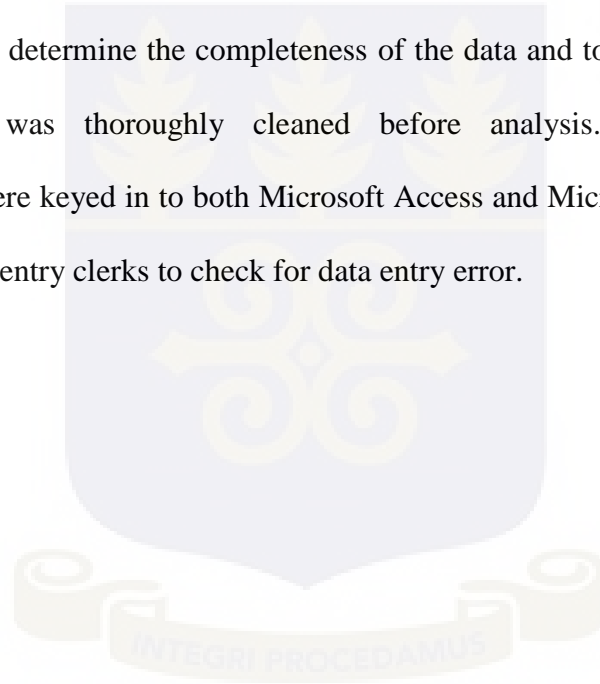
3.11 Ethical Issues

1. Ethical clearance was obtained from the Ghana Health Service Ethical Review Committee (Approval Number: GHS-ERC: 29/12/2016) through the School of Public Health – University of Ghana (Appendix 4).
2. Approval was also sought from the Kintampo North Municipal Health Directorate and all heads of facility as well as unit heads in the study sites.
3. Participation was voluntary and the decision to participate depended on the individual participants. Participants were informed that they could withdraw from the study at any time and that the decision to participate in the study or refusal depended on them. They were also made to understand that refusal to participate in the study or withdrawal from the study would not be a reason for compromised quality of care on the day of interview or after. Informed consent was sought from participants before interview. Appendix 1 is a copy of the informed consent form
4. Study procedure as well as confidentiality and privacy issues were explained to participants clearly in a language they understand. Participants were made to understand that their identity would not be disclosed and would not be traceable since the questionnaire use codes and not names. Participants were informed that findings from the study would be used solely for academic purpose for which it is intended for and would not be disclosed to a third party.
5. Completed questionnaires and study documents are filled under lock and key would not be accessed by unauthorised personnel. Computer files from the study are password protected to avoid unauthorised access.

There was no reward of any kind for participants and this was explained to participants before they decide to participate in study. The PI has no conflict of interest regarding the conduct of this study.

3.12 Quality Control

Each questionnaire was pre-labelled with a unique respondent identification number for easy identification and retrieval. Questionnaires were cross-checked daily by the PI after data collection to determine the completeness of the data and to make corrections where possible. Data was thoroughly cleaned before analysis. Data from complete questionnaires were keyed in to both Microsoft Access and Microsoft Excel 2013 by two (2) different data entry clerks to check for data entry error.



CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This chapter presents the findings of the study. For clarity of understanding, results are categorized according to the various objectives of the study and presented in Tables. Findings on the demographic background of respondents are presented. Analysis on proportions and factors studied are also presented.

4.2 Background Characteristics of Respondents

A total of 171 questionnaires were administered, they were all used for analysis because they did not contain any errors or missing values. The ages of respondents were between 15 and 45 years with a mean of 27.4 ± 6.4 years. Teenagers (15-19 years) constituted 9.9% (17) of the respondents. Average monthly income for employed respondents was between GH¢ 20.00 and GH¢ 1500.00. Most of the respondents, 98.8% (169) resided within the municipality while 1.2% (2) resided outside the municipality. More than half, 62.6% (107) resided within Kintampo township. Table 2 gives a detailed description of the respondents.

Table 2: Background characteristics of respondents (n=171)

| Variables | Frequency | % |
|-----------------------------|------------------|----------|
| Age group | | |
| 15 - 24 | 60 | 35.1 |
| 25 – 29 | 51 | 29.8 |
| 30 – 34 | 36 | 21.1 |
| 35 + | 24 | 14.0 |
| Parity | | |
| None or once | 68 | 39.8 |
| Twice or three times | 75 | 43.9 |
| Four or more | 28 | 16.4 |
| Marital status | | |
| Unmarried | 41 | 24.0 |
| Married | 130 | 76.0 |
| Education level | | |
| None | 54 | 31.6 |
| Primary | 22 | 12.9 |
| JHS | 68 | 39.8 |
| Secondary+ | 27 | 15.8 |
| Employment status | | |
| Employed | 133 | 77.8 |
| Unemployed | 38 | 22.2 |
| Monthly income (GH¢) | | |
| ≤100 | 139 | 81.3 |
| 101 > | 32 | 18.7 |

4.3 Proportion of respondents using interventions

The proportion of respondents who had all four anemia preventing interventions was 29.8% (51), the remaining 70.2% (73) had less than the four interventions. Uptake of SP1 was 9.4% (16) while SP2 was 17.5% (30). Uptake of SP3, SP4 and SP5 was 26.3% (45), 36.8% (63) and 9.9% (17) respectively. All the respondents were on iron supplements which they took daily. Majority of the respondents 94.2% (161) owned an ITN of which about 81.9% (140) obtained it free of charge from the health facility. Table 3 below shows the use of interventions among respondents.

Table 3: Proportion of respondents on interventions (n=171)

| Interventions | Frequency | % |
|--|------------------|----------|
| SP dose | | |
| <3 | 46 | 26.9 |
| 3+ | 125 | 73.1 |
| ITN use | | |
| No | 46 | 26.9 |
| Yes | 125 | 73.1 |
| Iron supplement intake | | |
| Yes | 171 | 100.0 |
| Antihelminthic taken in 2nd trimester | | |
| No | 120 | 70.2 |
| Yes | 51 | 29.8 |

4.3.1 Comparison between intervention users and non-users

Gestational age at first ANC visit ranged between 9 and 28 weeks with a mean of 15.7 \pm 5.3 weeks. Iron supplements, SP and ITN were available in all the facilities at the time of data collection, however antihelminthics were not available in two out of the seven facilities (Kintampo Municipal Hospital and Kunsu Health Center). It is however interesting to note that even though some facilities had antihelminthics in stock, respondents were not provided with some. In Gulumpe CHPS, none of the respondents was given antihelminthic, whereas in Glory Prince of Peace only 5% (2) of the respondents were given antihelminthic (Tables 4, 5 and 6)

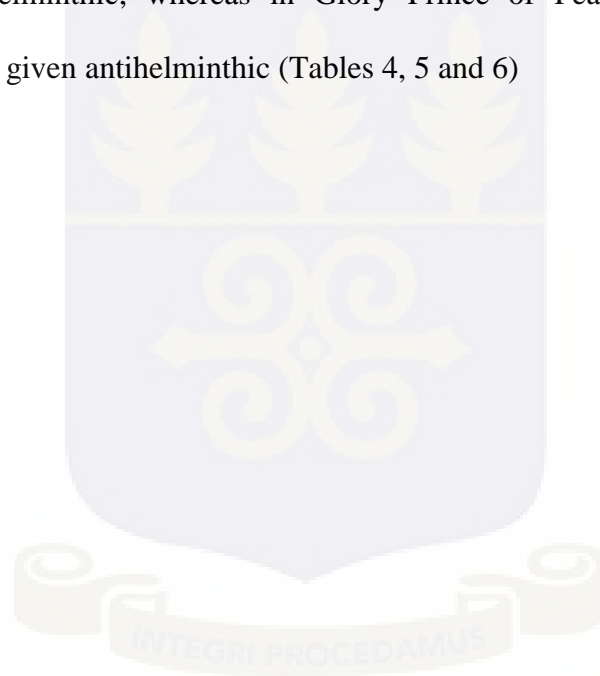


Table 4: Comparison between ITN users and non-users (n=171)

| Variables | Total(%) | ITN use | |
|--|------------|------------|-------------|
| | | No n(%) | Yes n(%) |
| Age group | | | |
| 15 – 24 | 60(35.1) | 14(23.3) | 46(76.7) |
| 25 – 29 | 51(29.8) | 14(27.5) | 37(72.5) |
| 30 – 34 | 36(21.1) | 11(30.6) | 25(69.4) |
| 35 + | 24(14.0) | 7(29.2) | 17(70.8) |
| Parity | | | |
| None or once | 68(39.8) | 24(35.3) | 44(64.7) |
| Twice or three times | 75(43.9) | 16(21.3) | 59(78.7) |
| Four or more | 28(16.4) | 6(21.4) | 22(78.6) |
| Marital Status | | | |
| Unmarried | 41(24.0) | 9(22.0) | 32(78.0) |
| Married | 130(76.0) | 37(28.5) | 93(71.5) |
| Education level | | | |
| None | 54(31.6) | 14(25.9) | 40(74.1) |
| Primary | 22(12.9) | 6(27.3) | 16(72.7) |
| JHS | 68(39.8) | 18(26.5) | 50(73.5) |
| Secondary+ | 27(15.8) | 8(29.6) | 19(70.4) |
| Employment Status | | | |
| Employed | 133(77.8) | 37(27.8) | 96(72.2) |
| Unemployed | 38(22.2) | 9(23.7) | 29(76.3) |
| Gestational age at first ANC | | | |
| 1-13weeks | 77(45.0) | 12(15.6) | 65(84.4) |
| 14-26weeks | 89(52.1) | 33(37.1) | 56(62.9) |
| 27-40weeks | 5(2.9) | 1(20.0) | 4(80.0) |
| Frequency of ANC visit | | | |
| As scheduled | 164(96.0) | 42(25.6) | 122(74.4) |
| Whenever I don't feel well | 7(4.0) | 2(28.6) | 5(71.4) |
| Knowledge of anemia prevention during pregnancy | | | |
| Yes | 149(87.1) | 38(25.5) | 111(74.5) |
| No | 22(12.9) | 8(36.4) | 14(63.6) |
| Availability of ITN in the facility | | | |
| Yes | 171(100.0) | - | - |

Table 5: Comparison of characteristics of SP users (n=171)

| | SP Dose | | |
|--|------------|-------------|-------------|
| | Total (%) | <3 n (%) | 3+ n (%) |
| Age group | | | |
| 15 – 24 | 60(35.1) | 12(20.0) | 48(80.0) |
| 25 – 29 | 51(29.8) | 16(31.4) | 35(68.6) |
| 30 – 34 | 36(21.1) | 12(33.3) | 24(66.7) |
| 35 + | 24(14.0) | 6(25.0) | 18(75.0) |
| Parity | | | |
| None or once | 68(39.8) | 21(30.9) | 47(69.1) |
| Twice or three | 75(43.9) | 17(22.7) | 58(77.3) |
| Four or more | 28(16.4) | 8(28.6) | 20(71.4) |
| Marital Status | | | |
| Unmarried | 41(24.0) | 10(24.4) | 31(75.6) |
| Married | 130(76.0) | 36(27.7) | 94(72.3) |
| Education level | | | |
| None | 54(31.6) | 19(35.2) | 35(64.8) |
| Primary | 22(12.9) | 10(45.5) | 12(54.5) |
| JHS | 68(39.8) | 10(14.7) | 58(85.3) |
| Secondary+ | 27(15.8) | 7(25.9) | 20(74.1) |
| Employment | | | |
| Employed | 133(77.8) | 39(29.3) | 94(70.7) |
| Unemployed | 38(22.2) | 7(18.4) | 31(81.6) |
| Gestational age at first ANC | | | |
| 1-13weeks | 77(45.0) | 8(10.4) | 69(89.6) |
| 14-26weeks | 89(52.1) | 35(39.3) | 54(60.7) |
| 27-40weeks | 5(2.9) | 3(60.0) | 2(40.0) |
| Frequency of ANC visit | | | |
| As scheduled | 164(95.9) | 42(25.6) | 122(74.4) |
| Whenever I don't feel well | 7(4.1) | 4(57.1) | 3(42.9) |
| Knowledge of anemia prevention during pregnancy | | | |
| Yes | 149(87.1) | 34(22.8) | 115(77.2) |
| No | 22(12.9) | 12(54.5) | 10(45.5) |
| Availability of SP in facility | | | |
| Yes | 171(100.0) | 46(26.9) | 125(73.1) |

Table 6: Comparison of antihelminthic uptake in the second trimester (n=171)

| | Antihelminthic taken in 2nd trimester | | |
|--|--|--------------------|---------------------|
| | Total(%) | No n(%) | Yes n(%) |
| Age group | | | |
| 15 – 24 | 60(35.1) | 43(71.7) | 17(28.3) |
| 25 – 29 | 51(29.8) | 35(68.6) | 16(31.4) |
| 30 – 34 | 36(21.1) | 26(72.2) | 10(27.7) |
| 35 + | 24(14.0) | 16(66.7) | 8(33.3) |
| Parity | | | |
| None or once | 68(39.8) | 43(63.2) | 25(36.8) |
| Twice or three | 75(43.9) | 56(74.7) | 19(25.3) |
| Four or more | 28(16.4) | 21(75.0) | 7(25.0) |
| Marital Status | | | |
| Unmarried | 41(24.0) | 26(63.4) | 15(36.6) |
| Married | 130(76.0) | 94(72.3) | 36(27.7) |
| Education level | | | |
| None | 54(31.6) | 35(64.8) | 19(35.2) |
| Primary | 22(12.8) | 17(77.3) | 5(22.7) |
| JHS | 68(39.8) | 53(77.9) | 15(22.1) |
| Secondary+ | 27(15.8) | 15(55.5) | 12(44.4) |
| Employment | | | |
| Employed | 133(77.8) | 95(71.4) | 38(28.6) |
| Unemployed | 38(22.2) | 25(65.8) | 13(34.2) |
| Gestational age at first ANC | | | |
| 1-13weeks | 77(45.0) | 66(85.7) | 11(14.3) |
| 14-26weeks | 89(52.1) | 52(58.4) | 37(41.6) |
| 27-40weeks | 5(2.9) | 2(40.0) | 3(60.0) |
| Frequency of ANC visit | | | |
| As scheduled | 164(95.9) | 113(68.9) | 51(31.1) |
| Whenever I don't feel well | 7(4.1) | 7(100.0) | 0(0.0) |
| Knowledge of anemia prevention during pregnancy | | | |
| Yes | 149(87.1) | 102(68.5) | 47(31.5) |
| No | 22(12.9) | 18(81.8) | 4(18.2) |
| Availability of Antihelminthics in facility | | | |
| Yes | 72(42.1) | 46(63.9) | 26(36.1) |
| No | 99(57.9) | 74(74.7) | 25(25.3) |

4.4 Factors associated with use of interventions

The chi-square test showed a strong association between gestational age at first visit (X^2 : 27.49, p value <0.001), availability of antihelminthics in the facility (X^2 :10.87, p value 0.001) and use of all the interventions. Knowledge of anemia prevention during pregnancy was also shown to be significantly associated with the use of the interventions (X^2 :4.53, p value 0.033) (Table 7)



Table 7: Chi-square / Fisher's exact test of factors associated with use of interventions (n=171)

| Variable | <4 interventions n(%) | 4 interventions n(%) | Total n(%) | X ² (P value) |
|--|--------------------------|-------------------------|---------------|-------------------------------|
| Age group | | | | X ² =1.43(0.699) |
| 15 – 24 | 22(36.7) | 38(63.3) | 60(35.01) | |
| 25 – 29 | 24(47.1) | 27(52.9) | 51(29.8) | |
| 30 – 34 | 16(44.4) | 20(55.6) | 36(21.1) | |
| 35 + | 11(48.3) | 13(54.2) | 24(14.0) | |
| Parity | | | | X ² =2.50(0.287) |
| None or once | 34(50.0) | 34(50.0) | 68(39.8) | |
| Twice or three times | 28(37.3) | 47(62.7) | 75(43.9) | |
| Four or more | 11(39.3) | 17(60.7) | 28(16.4) | |
| Marital Status | | | | X ² =0.30(0.586) |
| Single | 16(39.0) | 25(61.0) | 41(24.0) | |
| Married | 57(43.8) | 73(56.2) | 130(76.0) | |
| Education level | | | | X ² =3.90(0.275) |
| None | 27(50.0) | 27(50.0) | 54(31.6) | |
| Primary | 11(50.0) | 11(50.0) | 22(12.9) | |
| JHS | 23(33.8) | 45(66.2) | 68(39.8) | |
| Secondary+ | 12(44.4) | 15(55.6) | 27(15.8) | |
| Employment status | | | | X ² =2.47(0.116) |
| Employed | 61(45.9) | 72(54.1) | 133(77.8) | |
| Unemployed | 12(31.6) | 26(68.4) | 38(22.2) | |
| Gestational age at first ANC visit^a | | | | X ² =27.49(<0.001) |
| 1-13weeks | 16(20.8) | 61(79.2) | 77(45.0) | |
| 14-26weeks | 54(60.7) | 35(39.3) | 89(52.1) | |
| 27-40weeks | 3(60.0) | 2(40.0) | 5(2.9) | |
| Frequency of ANC visit^a | | | | X ² =2.46(0.138) |
| As scheduled | 68(41.5) | 96(58.5) | 164(95.9) | |
| Whenever I don't feel well | 5(71.4) | 2(28.6) | 7(4.1) | |
| Knowledge of anemia prevention during pregnancy | | | | X ² =4.53(0.033) |
| Yes | 59(39.6) | 90(60.4) | 149(87.1) | |
| No | 14(63.6) | 8(36.4) | 22(12.9) | |
| Availability of Antihelminthic at facility | | | | X ² =10.87(0.001) |
| Yes | 20(27.8) | 52(72.2) | 72(42.1) | |
| No | 53(53.5) | 46(46.5) | 99(57.9) | |

^a =Fisher's exact test

4.5 Multiple Logistic Regression of Factors Associated with use of Interventions

The unadjusted analysis shows an association between parity and the use of anemia preventing interventions during pregnancy. Women with a parity of two or three had 1.68 the odds of using all interventions compared to women with a parity of zero or one (uOR = 1.68; 95% CI 1.05 – 2.68). After adjusting for the other factors in the model, the association between parity and use of the interventions remained significant (aOR = 3.54; 95% CI 1.97 – 6.37). Women who had junior high school education had 1.96 times the odds of using the interventions compared to women who had no education (uOR = 1.96; 95% CI 1.18 – 3.24). Compared to employed women, the use of the interventions during pregnancy among unemployed women was over two times better (uOR = 2.17; 95% CI 1.09 – 4.3) in the crude analysis and remained significant in the adjusted analysis (aOR = 5.51; 95% CI 2.32 – 13.09). Women who made their first visit to the ANC in their second trimester had 0.35 odds of using the interventions as compared to those who made the first visit in their first trimester (uOR = 0.65; 95% CI 0.42 – 0.99). After adjusting for the other factors, the association was still significant (aOR = 0.28; 95% CI 0.14 – 0.59) (Table 8).

Table 8: Univariate and multiple logistic regression of factors associated with use of anemia preventing interventions

| | uOR(95%CI) | aOR(95%CI) |
|---|--------------------|---------------------|
| Age group | | |
| 15-24 | 1 | - |
| 25 – 29 | 1.12(0.65 - 1.95) | - |
| 30 – 34 | 1.25(0.65 - 2.42) | - |
| 35 + | 1.18(0.53 - 2.64) | - |
| Parity | | |
| None or once | 1 | - |
| Twice or three | 1.68(1.05 - 2.68)* | 3.54(1.97 - 6.37)** |
| Four or more | 1.55(0.72 - 3.31) | 4.57(1.76 -11.89)** |
| Marrital status | | |
| Unmarried | 1 | - |
| Married | 1.28(0.9 - 1.81) | - |
| Education | | |
| None | 1 | - |
| Primary | 1(0.43 - 2.31) | - |
| JHS | 1.96(1.18 - 3.24)* | - |
| Secondary+ | 1.25(0.58 - 2.68) | - |
| Employment status | | |
| Employed | 1 | - |
| Unemployed | 2.17(1.09 - 4.3)* | 5.51(2.32 -13.09)** |
| Gestational age at 1st ANC visit | | |
| 1-13weeks | 1 | - |
| 14-26weeks | 0.65(0.42 - 0.99)* | 0.28(0.14 - 0.59)** |
| 27-40weeks | 0.67(0.11 - 4.01) | 0.20(0.03 - 1.26) |
| Knowledge on Anaemia prevention | | |
| Yes | 1 | - |
| No | 0.57(0.24 - 1.37) | - |
| Availability of Antihelmintic | | |
| Yes | 1 | - |
| No | 0.88(0.59 - 1.32) | 0.69(0.35 - 1.34) |
| Frequency of subsequent visits | | |
| As scheduled | 1 | - |
| Whenever I don't feel well | 0.4(0.08 - 2.07) | 0.18(0.04 - 0.92)* |

**p-value < 0.001 *p-value <0.05; CI: Confidence Interval; aOR: Adjusted Odd Ratio; uOR: Unadjusted Odd Ratio

CHAPTER FIVE

5.0 DISCUSSIONS

5.1 Introduction

This chapter discusses the findings of the study. The discussions are in line with the objectives of the study.

5.2 Proportion of Respondents using Anemia Preventing Interventions

The study revealed that 57% of pregnant women use all interventions to prevent anemia during pregnancy. Even though this coverage is low considering the 20.4% prevalence of anemia among pregnant women in the study area (KNMHD, 2016), there are no similar studies to compare this findings with. The proportion of pregnant women using individual anemia preventing measures have been well documented in studies conducted all over the world. Generally, use of iron supplements during pregnancy has a high coverage, while the Ghana Statistical Service and Ghana Health Service (2014)?? reported 92% coverage for Ghana, Gebreamlak, Dadi, & Atnafu (2017) reported 99% coverage for Akaki Kaliti Sub-city in Ethiopia. In this study, use of iron supplement among pregnant women was 100%, this is similar to what has been reported in other studies.

ITN use among pregnant women in this study was 73.1%, even though this finding is in line with a study conducted in Western Kenya (Kuile et al, 2003) which reported 85% it contradicts National Malaria Control Programme (2013) which reports use of ITN among pregnant women in Ghana as 33%. The reason for the high usage recorded in this study could be increase in ITN ownership due to free distribution of ITNs in ANCs and child welfare clinics in the country since 2013.

There is some amount of disparity in use of IPTp with SP among pregnant women across studies worldwide. A descriptive cross sectional study conducted among pregnant women in Simiyu Region in Tanzania (Sambili et al., 2016) indicated that 62% of the women had one dose, 27% had two doses and 11% had three doses of IPTp with SP. Nganda et al., (2004) reported that 57% of women had one dose while 12% had two doses. However, results of this study revealed that 9.4% of the women had one dose, 17.5% had two doses and 26.3% had 3 doses of IPTp with SP. The differences observed could be as a result of country specific policy regarding use of IPTp with SP during pregnancy and the difference in methods employed in the various studies.

Use of antihelminthic among pregnant women was found to be 39% in Ghana (Ghana Statistical Service & Ghana Health Service, 2015). Similarly, this study recorded 29.8% usage. The low usage of antihelminthic observed in this study and other studies is possibly due to lack of staff understanding of the benefits of the management of worm infestation in anemia prevention and also because antihelminthics are not provided free of charge to ANC as the other interventions. For instance, in Gulumpe H/C, antihelminthics were available but none of the respondents interviewed there were given some. Kunsu H/C did not have any antihelminthic in stock and respondents did not know that the use of antihelminthic was one of the measures of anemia prevention during pregnancy. Kintampo municipal hospital, the main referral facility in the municipality did not have any antihelminthic at the ANC. Kintampo North Municipal has a hookworm prevalence of 45% (Humphries et al., 2011) and per the WHO guidelines antihelminthic treatment should be done in the second trimester in areas where hookworm prevalence is greater than 20% (WHO, 2004).

5.3 Factors associated with use of anemia preventing measures.

Uses of anemia preventing measures are known to be associated with factors such as high socio-economic status, frequent periodic shortage and late clinic attendance. Other factors include frequency of subsequent visit, parity, gestational age at first visit, educational background, type of facility and health education (Hill et al., 2013; Kiwuwa & Mutubenga, 2008 & Nganda et al., 2004). Even though this study did not include all the above mentioned factors, the association between the factors studied and the outcome variable were similar to previous studies. This study, however, has a different outcome variable, use of all anemia preventing measures, which captures aspects of outcome variables in previous studies.

Although Nganda et al., (2004) reported an association between use of IPTp with SP and maternal age, it indicated that there was no association between use of ITNs and maternal age. This current study's finding confirms that there is no association between maternal age and the use of all the intervention. The reason for the lack of association was not clear in this study, further studies are needed to ascertain the reason for this.

The findings of this study demonstrated that there is a positive association between parity and the use of anemia preventing measures. This is consistent with Kiwuwa & Mutubenga, (2008) and Hill et al., (2013) which identified parity as a key determinant to use of the interventions. It was noted in this study and previous studies that primigravidaes were more likely to use the interventions compared to multigravidaes, lack of previous pregnancy experience could possibly be a reason for this. Contrary to Hill et al., which recorded a strong association between marital status and use of ITN, the

findings of this study did not reveal any association. The reason for this inconsistency could be the way the outcome variable was measured in this study.

In the univariate analysis, there was an association between educational background and use of interventions but the multivariate analyses did not show any association. This findings is similar to that of Ngimuh, Fokan, Anchang-Kimbi, & Wanji, (2016) which reported no association between educational background and use of ITNs and IPTp with SP.

Employment status is known to be associated with use of anemia preventing measures among pregnant women in most studies (Ngimuh et al., 2016; Muhumuza et al., 2016; Hill et al., 2013) Results of this study are similar to that of these previous studies. Possible reason for this association could be due to the fact that employment is linked with income generation which partly eliminates the problem of accessibility to health facilities.

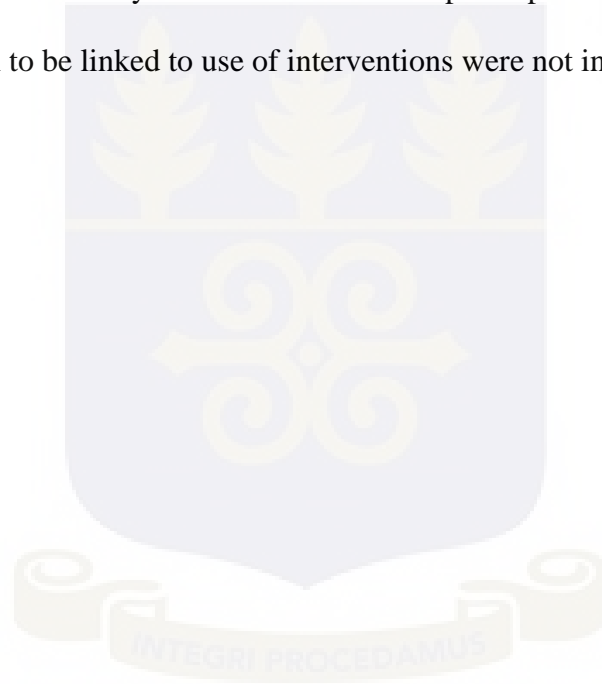
The strong association observed between gestational age at first visit and use of the interventions is in line with Hill et al., 2013 which reported similar findings. Early initiation of ANC attendance means that there will be high number of subsequent visits which make a woman more likely to receive the interventions.

The Chi-square test showed a strong association between the availability of antihelminthics in the facility and use of the intervention, surprisingly no association was found in the multivariate analyses.

The association between frequency of subsequent visit and the use of the intervention reported in Kiwuwa & Mutubenga, 2008 is similar to the findings of this study.

5.4 Limitations

1. A major limitation of this study is that the non-probability sampling technique employed is a source of selection bias and should be considered when interpreting the findings of this study
2. Another possible limitation in this study was information bias. Some of the information that the respondents gave in answering the questions may not be the true case on the ground.
3. Factors such as early clinic attendance and participation in health education that are shown to be linked to use of interventions were not included in this study.



CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter draws conclusions from the study and makes recommendations based on the study findings.

6.2 Conclusions

The use of anemia preventing measures among pregnant women in the Kintampo North Municipality in this study was quite low. Factors that significantly influenced the use of all anemia preventing measures among pregnant women were parity, employment status, gestational age at first ANC, frequency of subsequent visits and availability of antihelminthic in the health facility.

6.3 Recommendations

Based on the established findings, the following recommendations are made:

1. Antihelminthics used in pregnancy should be made available to all antenatal clinics.
2. In addition to giving out the intervention, health education targeting especially multigravidaes should be reinforced on the importance of their use. Public health authorities and actors can undertake mass awareness campaign to educate mothers on early initiation and continual attendance of ANC
3. Regular refresher training on the benefits and timing of the interventions should be conducted for all ANC staff.
4. Future studies should employ a larger sample size and a probability sampling technique to avoid bias.

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APPENDIX

Appendix 1: Informed Consent

INFORMED CONSENT FORM FOR PREGNANT WOMEN AT 36 WEEKS GESTATION AND ABOVE WHO ARE BEING INVITED TO PARTICIPATE IN A RESEARCH ON THE TITLE “ FACTORS INFLUENCING USE OF ANEMIA PREVENTING MEASURES AMONG ANTENATAL CLINIC ATTENDANTS IN THE KINTAMPO NORTH MUNICIPALITY”

This form is divided into two; the first part which is the information sheet, contains information about the research which you should know. Part two is the certificate of consent which you would have to sign or thumbprint if you agree to participating in the study. You will be given a copy of this form if you agree to be part of the study.

PART ONE: INFORMATION SHEET

INTRODUCTION

I am going to provide you information and invite you to participate in a study to determine the factors influencing the use of anemia preventing measures among antenatal clinic attendants in the Kintampo North Municipality. Anemia in pregnancy is a common problem among pregnant women in this Municipality and it has bad effects for both mother and the fetus.

Participation in this study is voluntary and the decision to participate depends on you. You can talk to anyone about this study before you decide to participate or not. You can choose not to participate or redraw from this study at any time and this would not affect the quality of care you will receive today or any other day you visit this facility.

STUDY PROCEDURE

You will need to spend about an extra forty-five (45) minutes than you do on your normal visits. You will be asked a few questions about yourself and your current pregnancy.

RISKS AND DISCOMFORTS

Apart from having to wait a little longer than you do on your normal visits, there are no any discomforts or risks associated with participating in this study.

BENEFITS

There are no benefits of any kind in participating in this study.

CONFIDENTIALITY AND PRIVACY

Information collected from this study will be confidential and only the principal investigator will have access to this information. Questionnaire will use numbers and not names and so the information you provide will not be traceable to you. Only authorized persons (Ghana Health Service Ethics Review Committee and the School of Public Health in the University of Ghana) will have access to the findings of this study

Approval for this study was given by the Ghana Health Service Ethics Review Committee which is a committee whose aim is to ensure clients of the Ghana Health Service who partakes in research are free from harm. If you desire to find out more about the ethics review board, you can contact

Hannah Frimpong

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PROBLEMS OR QUESTIONS

If you have any problems or questions about this study, you can contact the principal investigator or her supervisor on the following contact addresses below;

1. Olivia Lumor(Principal Investigator)
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2. Professor R. M. Adanu(Supervisor)
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PART TWO: CERTIFICATE OF CONSENT

I have read or have had someone read to me in a language I understand the entire information and processes about this study. I have been given the chance to ask questions about the study and the questions that I have asked have been well answered.

I hereby consent voluntarily to participate in this study.

Signature/Thumbprint of Participant.....

Date: Day.....Month.....Year.....

Statement by the person taking consent

I have read and explained the information sheet to the potential participant.

I confirm that the participant was given the opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly. I confirm that consent was given voluntarily by the participant.

Participant has been provided with a copy of this informed consent form.

Name of person taking consent.....

Signature of person taking consent.....

Date: Day.....Month.....Year.....

Appendix 2: Questionnaire

QUESTIONNAIRE ON FACTORS INFLUENCING USE OF ANEMIA PREVENTING MEASURES AMONG ANTENATAL CLINIC ATTENDANTS IN THE KINTAMPO NORTH MUNICIPALITY.

HEALTH FACILITY CODE:

RESPONDENT'S ID:

DATE OF INTERVIEW: DAY.....MONTH.....YEAR.....

BACKGROUND INFORMATION OF RESPONDENT

Please I am going to ask you a few questions about yourself.

1. What is your date of birth? (Please write corresponding numbers in the space below)

Day.....Month.....Year.....

2. How old were you at your last birthday?

Age (years).....

3. What is the name of your area of residence?

4. What is your marital status? (Please check appropriate box)

1 Single 3 Cohabiting 5 Widowed

2 Married 4 Divorced

5. What is your highest level of education? (Please check appropriate box)

1 None 4 Secondary

2 Primary 5 Tertiary

3 JHS

6. What is your occupation? (Please check the appropriate box)

- | | | | |
|-----------------|--------------------------|---------------------------|--------------------------|
| 1 Student | <input type="checkbox"/> | 6 Hair dresser/Seamstress | <input type="checkbox"/> |
| 2 Unemployed | <input type="checkbox"/> | 7 Teacher | <input type="checkbox"/> |
| 3 Farmer | <input type="checkbox"/> | 8 Nurse | <input type="checkbox"/> |
| 4 Trader/Hawker | <input type="checkbox"/> | 9 Food vendor | <input type="checkbox"/> |
| 5 House wife | <input type="checkbox"/> | 10 others (specify)..... | |

7. What is your average monthly income? (GHC).....

USE OF ANEMIA PREVENTING MEASURES DURING PREGNANCY

8. Did you sleep under an ITN last night? (Please check appropriate box)

- 1 Yes 2 No

9. Do you own an ITN? (Please check appropriate box)

- 1 Yes 2 No

10. If yes, how often do you sleep under an ITN? (Please check appropriate box)

- 1 Always 2 Sometimes 3 Not at all

11. Were you given an ITN in the facility at your first visit? (Please check appropriate box)

- 1 Yes 2 No

12. Are you taking iron supplements? (Please check appropriate box)

- 1 Yes 2 No

13. If yes, how often (Please check appropriate box)

- 1 daily
2 weekly
3 monthly

From question 14 & 15, look in mother's maternal health record booklet to confirm responses.

Appendix 3: Definition of variables and their scale of measurement

Table 9a: Operational definitions of variables and their scale of measurement

| Variable | Type of variable | Operational Definition | Scale of Measurement | Objective |
|---------------------------------------|-------------------------|--|-----------------------------|------------------|
| Use of all anemia preventing measures | Dependent | Number of pregnant women who have received all four interventions divided by total number of pregnant women in the sample population multiplied by 100 | Ratio | General |
| Use of iron supplements | Dependent | Medication of iron supplements at any point in time during the current pregnancy | Norminal | One |
| Use of antihelminthics | Dependent | Medication of antihelminthics at any time after the second trimester during the current pregnancy | Nominal | Two |
| Doses of SP received | Dependent | Number of SP doses respondent has received during current pregnancy as at the interview day | Countinous | Three |
| ITN use | Dependent | Slept under an ITN the night before the interview | Nominal | Four |

Table continues

Table 9b: Operational definition of variables and their scale of measurement


| Variable | Type of variable | Operational Definition | Scale of Measurement | Objective |
|--|-------------------------|---|-----------------------------|------------------|
| Parity | Independent | No of deliveries of participant as at day of interview | Continuous | Five |
| Gestational age at 1 st ANC | Independent | Gestational age of respondents at 1 st ANC visit | Continuous | Five |
| Knowledge of interventions | Independent | Respondents idea about prevention of anemia in pregnancy | Nominal | Five |
| Educational level | Independent | Respondents highest level of education attained | Ordinal | Five |
| Age | Independent | Age at last birthday of respondent on the day of interview | Continuous | Five |
| Marital status | Independent | Marital status of respondent on the day of the interview | Nominal | Five |
| Occupation | Independent | Occupation of respondent on the day of the interview | Nominal | Five |
| Availability of interventions | Independent | Availability of individual interventions in the health facility on the day of interview | Nominal | Five |

Appendix 4: Ethical Approval Letter

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

My Ref. GHS/RDD/ERC/Admin/App/17/344
Your Ref. No.



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

Olivia Lumor
School of Public Health
University of Ghana
P. O. Box 2, Kintampo
Brong Ahafo Region, Ghana

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

| | |
|------------------|---|
| GHS-ERC Number | GHS-ERC:29/12/2016 |
| Project Title | "Factors influencing use of anaemia preventing measures among antenatal clinic attendants in the Kintampo North Municipality" |
| Approval Date | 14 th March, 2017 |
| Expiry Date | 13 th March, 2018 |
| GHS-ERC Decision | Approved |

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report **after completion** of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

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

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

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

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