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ANAEMIA AMONG CHILDREN UNDER FIVE YEARS IN SAKAGYANO COMMUNITY, EFFUTU MUNICIPALITY OF GHANA

BY

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DECLARATION

I, the undersigned, confirm that this dissertation is entirely my own work. Reference to, quotation from, and discussion of the work of any other person has been duly acknowledged in accordance with University of Ghana guidelines for the production of a dissertation. I further declare that this dissertation has not been submitted for any degree programme in this university or other universities elsewhere.

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DEDICATION

This dissertation is entirely dedicated to the Almighty God, my source and hope. Also to my loving and supportive family.

ACKNOWLEDGEMENT

I am grateful to God for seeing me through this course. My immense gratitude also goes to my husband and my kids for their support, encouragement and prayers throughout this course.

To my supervisor, I say thank you for your constructive comments and pushing me to bring the best out of this research within time.

My gratitude also goes to all the data collectors and participants who worked tirelessly with me under such short notice to make this research a reality.

ABSTRACT

Background: A survey was conducted to examine factors contributing to anaemia among children under five in Sakagyano community, its effects and also find out how parents prevent anaemia among children under five and investigate how parents manage children under five with anaemia.

Methods: Descriptive cross-sectional design and quantitative in nature using convenience sampling technique would be used to select 100 participants for the study. The study was done at Sakagyano among parents with children under-five years of age. Data was collected using a self-designed structured questionnaire. The data was analysed using STATA (version 15.0) and the results were presented in tables and charts.

Results: The findings from the 100 participants of the study on examining anaemia among children under five years revealed that, anaemia was found to be a major problem in the study area. Majority (78%) of the mothers' knowledge on anaemia was adequate. Also, the mothers (62%) knew how to prevent anaemia in children under five years.

Conclusion: The factors that were associated with anaemia in children under five years at Sakagyano were their nutritional knowledge and poor knowledge in handling the disease in children. Anaemia was found to be a major problem in this cohort of children and their mothers. Dietary factors and socio-demographic factors were the major factors associated with high levels of anaemia among the children and their mothers. Mothers should therefore, be sensitized on best practices for prevention of anaemia among both women and children.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Anaemia can be defined as a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs. It affects low, middle and high-income countries and has significant adverse health consequences as well as adverse impacts on social and economic development (WHO, 2011). It is a global public health problem with major consequences for human health and has affected more than 2 billion people worldwide. Among these affected population, children under five years is one of the most vulnerable groups (Wenlong et al, 2013). Anaemia is a major public health problem in developing countries. The global estimate of childhood anaemia indicates that 293.1 million of children under five years, approximately 43%, are anaemic worldwide and 28.5% of these children are residing in Sub Saharan Africa (McLean et al, 2009). It is considered to be a major public health problem with prevalence of 67%, equivalent to 83.5 million children in Sub Saharan Africa (McLean et al, 2009). Anaemia is one of the largest killers of children admitted to hospitals in Sub-Saharan Africa. Even where blood transfusions are available there is a significant case fatality rate of 6-18% (Schellenberg et al, 2003).

Anaemia is one of the most common causes of mortality of children admitted to hospitals in Sub-Saharan Africa. Anaemia can be managed without blood transfusion but even where blood transfusion is available there is still a significant case fatality rate of 6–18% (Schellenberg et al, 2003). In East Africa, approximately 75% of under-five children have anaemia with the prevalence's ranging between 44 and 76 % (Chatterjee et al, 2010). The risk factors for anaemia vary in different settings; they include having intestinal parasites, malaria, HIV infection, nutritional deficiencies and habit of taking tea with meals, haematological malignancies and chronic diseases like sickle cell disease (Magalhaes & Clements, 2011).

Anaemia in childhood may also result from factors such as poor socioeconomic status and maternal health status including presence of iron deficiency anaemia (Schellenberg et al, 2003). The hospital records from Bugando Medical Centre (BMC) indicate that many children are admitted with anaemia, and severe anaemia is stated to be amongst the top causes of admission and mortality in the paediatric wards. Unfortunately, the true burden remains unknown as no studies have been conducted in this setting.

Anemia in children is of particular interest since it impairs their mental, physical and social development; it causes negative behavioral and cognitive effects resulting in poor school performance and work capacity in later years (Ewusie et al, 2014). Iron deficiency is indicated as the most common cause of anemia in under-five children with a smaller proportion due to other micronutrient deficiency such as folate, Vitamin A and B12. Despite the serious health and social implications, prevalence of anemia remains a major public health concern and is indicated as one of the leading causes of infant mortality and morbidity in developing countries, in particular countries across Africa. (Ewusie et al, 2014).

Anaemia is characterized by a decreased quantity of red blood cells, often accompanied -by diminished hemoglobin levels or altered red blood cell morphology. Children may have issues with mental and motor development. (Kassebaum, et al 2014). Childhood anaemia is a major public health problem worldwide. It is associated with serious consequences including growth retardation, impaired motor and cognitive development, and increased morbidity and mortality. Estimates suggest that 47.4% of children under five years of age are anemic globally (Mohammed et al, 2013). Causes of anaemia can be multifactorial and often coincide, but the primary cause is a diet with inadequate iron sources (quantitatively and qualitatively); iron deficiency causes an estimated 50% of anemia cases worldwide (WHO, 2010).

In Haiti, the 2005-2006 national representative survey showed that 60.6% of children 6–59 months (approximately 610,000 children) and 75% of 6–23 months old children were anaemic. (Mohammed et al, 2013). Around 60% of African children below five years of age have anaemia. In sub-Saharan Africa, the prevalence of anaemia among preschool children ranges from 42% in Swaziland to 91% in Burkina Faso. However, studies conducted in Cape Verde revealed that prevalence of anemia in children under five years is near 50%. A study of anaemia in children along the coast of Tanzania reports a prevalence of 74%. Another study in the Democratic Republic of Congo estimates a prevalence of 43% (Ewusie et al, 2014). Furthermore, another study carried out on under-five years in Nigeria indicated a high prevalence of iron deficiency in non-anaemic under-five children presenting at the outpatient department and emergency room of a tertiary health facility in Enugu. It revealed that Forty-nine (27.5% [49/178]) of the study population were iron deficient (Ekwochi et al, 2013). Anaemia still remains a public health problem in all corners of the world, (Centre for Biotechnology Information, 2016) It is estimated that 293.1 million children under five years are suffering from anaemia and 28.5% of these children are from sub-Saharan Africa (Oscar et al, 2015). In Ghana, the latest nutritional survey conducted by the Ghana Health Service (GHS) indicates that children were anaemic (Demographic Health Survey, 2015).

1.2 Problem Statement

In 2014, a nutritional survey conducted by GHS showed, that children age 6-59 months old children and women age 15-49 had anaemia. Two-thirds of children in Ghana are anaemic, while 37% have moderate anaemia (Demographic & Health Survey, 2015). It is necessary that issues of anaemia in children under five years, which are preventable but have high morbidity and mortality rate be looked at in a broader, instead of a narrower perspective. Anaemia, especially when severe, is correlated with increased risk of preterm labor, low birth weight and child and maternal mortality and may predispose to infection and heart failure

(Kassebaum et al, 2014). It impairs the economy of the affected child's family as parents have to spend huge sums of money to hospitalize the child. It also threatens national development as it keeps claiming the deaths of the young ones who are to be future leaders for the entire country with even higher figures at the regional levels. In terms of the spatial distribution of prevalence of anaemia in children for the year 2005, anaemia in rural areas and urban areas were 84% and 68% respectively (Ronald et al, 2006). The Upper West and Upper East had the highest of prevalence rate of anaemia in children of 88% and 89% respectively while Greater Accra recorded 62% (Ronald et al, 2006).

Various studies have linked anaemia to a number of factors, and found that iron deficiency anaemia is a major threat to child and maternal health (Ronald et al, 2006). Generally, there have been several studies on anaemia in Ghana, but household characteristics have not been well explored. The major gaps in the study of anaemia in Ghana, therefore, are inadequate explanations of the spatial variations that have occurred in rural-urban areas of Ghana. Furthermore, the reasons for regional differences have also not received much attention. Moreover, household characteristics such as family composition, heads of household, household size, housing and type of households in which children dwell as well as household feeding practices have not been well explored as variables that could be associated with anaemia in children (Van et al, 2002). The WHO (2008), is of the view that the role of other factors rather than iron deficiency in the development of anaemia is not well appreciated by public health officials because for a long time anaemia has been confused with iron deficiency anaemia and it has influenced the development of strategies and programmes designed to control the immediate causes of anaemia whereas the myriad of remote causes are left untackled (WHO, 2008). It is on the basis of the problems mentioned above that the current study sought to find answers to mothers knowledge on anaemia which constitutes the

remote causes associated with anaemia among children under five years in Sakagyano, a community in the Effutu municipality of Ghana.

1.3 General Objective

The main objective of this study was to explore anaemia among children under five years in Sakagyano community, in the Effutu municipality of Ghana.

1.4 Specific objectives

The specific objectives were;

1. To identify mothers knowledge on the effects of anaemia on children under five years.
2. To assess anaemia prevention measures by mothers with children under five years
3. To investigate the management of anaemia by mothers with children under five years.
4. To examine mothers knowledge on factors contributing to anaemia among children under five years at Sakagyano in the Effutu municipality of Ghana.

1.5 Research Questions

1. What is the knowledge level of mothers on effects of anaemia on children under five years?
2. How do mothers prevent anaemia among children under five years?
3. How do mothers manage children under five years with anaemia?
4. What is the knowledge level of mothers on factors that contribute to anemia among children under five years?

1.6 Significance of the study

The findings of this research will therefore help to identify mothers knowledge on the factors that contribute to the cause of anaemia among children under five and suggest to appropriate authorities the possible ways of helping the mothers prevent it. This study is very necessary because it will help the management of health institutions within the study area to identify some of the nutritional problems of children under five years that cause anaemia. By this,

parents and healthcare institutions within the case study area will be able to find appropriate ways of improving the situation.

The study will also help the Ministry of Health as well to enhance maternal nutrition and children care. Apart from the Ministry of Health, the study will also help other stake holders in the health industry. It will also be beneficial to students who will want to study in this area. Lecturers can also rely on this study to solicit information that are necessary for lecturing purposes. Would-be researchers can also rely on this study for their researches.

1.7 Delimitations of the study

From all indications a research on prevalence of anaemia need to be done on all aspects of anaemia but this research was delimited to factors that contribute to prevalence of anemia among children under five years.

1.8 Operational definition of terms

Anaemia: is a decrease in the ability of the blood to carry oxygen because of a reduction in the red blood cells oxygen or a reduction in the amount of hemoglobin that they contain.

Prevalence: it is the ratio of a number of occurrences of a disease

Susceptibility: a state of being easily affected.

Morbidity: the relative incidence of a particular disease.

Mortality: the ratio of deaths in an area to the population of that area; expressed per 1000 per year.

Unemployed: someone who is not working

Apperentice: someone who is learning a trade.

Cohabitation: people who are leaving together but are not married.

Kontomire: a green leafy vegetable (cocoyam leaves) grown in Africa.

1.9 Organisation of the study

The study was organised into five main chapters. The chapter one gave an introduction to the topic. It however discussed the background of the study, statement of the problem, objectives of the study, research questions, significance of the study, delimitation of the study, definition of terms and organisation of the study. Chapter two looked at some works by other researchers on the topic. It reviewed relevant literature on the topic. In chapter three, the methods of data collection were covered. Chapter four of the study was devoted to the presentation and analysis of data. In this, the data obtained was critically analysed based on questionnaires obtained. In chapter five, the summary of this study, conclusion on the subject of discussion and recommendations were made to the management of health care organisations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section sought to explore other researches and related studies in line with the topic, Anemia among children under five years. This section was classified into three areas. This included theoretical framework, empirical framework and conceptual framework.

2.1 Theoretical review

2.1.1 Overview of anaemia

Anemia is a decrease in the total amount of red blood cells (RBCs) or hemoglobin in the blood, or a lowered ability of the blood to carry oxygen (Kassebum et al, 2014). When anemia comes on slowly, the symptoms are often vague and may include feeling tired, weakness, shortness of breath or a poor ability to exercise. Anemia that comes on quickly often has greater symptoms, which may include confusion, feeling like one is going to pass out (Magalhaes & Clement, 2011), loss of consciousness, or increased thirst. Anemia must be significant before a person becomes noticeably pale. Additional symptoms may occur depending on the underlying cause. Anaemia is a decrease in the ability of the blood to carry oxygen because of a reduction in the red blood cells or a reduction in the amount of haemoglobin that they contain (WHO, 2011). Anemia situation in Ghana is believed to be indifferent from that in other parts of Africa and that of other parts of the world. It has gained grounds as a result of inadequacy in iron and nutrients such as folic acid and Vitamin B12 in diet and parasitic infections (malaria and Hookworm). Haemoglobin is a pigment within the red blood cells that binds to oxygen. It is an essential component of the red blood cells (RBCs), and low levels result in decreased incorporation of haemoglobin into red blood cells (Abouzahr & Royston, 2012). In the United States, 12% of all women of child bearing age have iron deficiency. Studies have shown iron deficiency without anaemia results in poor

school performance and lower IQ in teenage girls (WHO, 2011). Since haemoglobin is the only structure that carries oxygen to the tissues, a reduction in its normal level will have a serious consequences on the body as a whole and life threatening because without oxygen there will be no life.

2.1.2 Causes of anaemia

According to Ewusie (2014), blood loss as a result of gastro intestinal bleeding, gynecologic disturbances, trauma or surgery, peptic ulcers or chronic blood loss, among others are the causes of anaemia in children. Decreased red blood cell production which is as an Iron deficiency, a lack of vitamin B12, thalassemia and a number of neoplasms of the bone marrow. Increased red blood cell break down as a result of a number of genetic conditions such as sickle cell anemia, infections like malaria and some autoimmune diseases among others (WHO, 2008). Maternal factors which include age at birth, parity and birth intervals. The age of a mother can increase a risk factor of both the mother and the child. This may be as a result of old age or below age terms or under aging of a woman which comes with risk factors for mortality (Villamor, 2002).

High fertility rates, especially when accompanied by short birth intervals, are detrimental to children's nutritional status. In most countries in sub-Saharan Africa, families have scarce resources to provide adequate nutrition and health care for their children. As the number of children per woman increases, fewer household resources are available for each child. High fertility also has a negative impact on maternal health, thus influencing a mother's ability to adequately care for her children. The most widely used measure of current fertility is the total fertility rate, which is defined as the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed age-specific rates.

Information on the length of birth intervals provides insight into birth spacing patterns. Research has shown that children born too soon after a previous birth are at increased risk of anaemia and increased risk of mortality, particularly when that interval is less than 24 months. These according to Osório (2002) are referred to as biological factors which might come from several factors of which anaemia could be vital for both the mother and the baby which is associated with increased risk of morbidity and mortality (Bagchi, 2004) Environmental contamination as one of the determinants includes intensity of household crowding, water contamination, and household food contamination or potential faecal contamination. These indicators could also affect child health especially in the area of diarrhoea and worm infestation which could result in anaemia in children (Boadi & Kuitunen, 2005). A household's source of drinking water is linked with its socioeconomic status. Poor households are more likely to obtain drinking water from contaminated sources such as surface water or open wells. Without an adequate supply of good-quality water, the risks of food contamination, diarrheal disease, and malnutrition rise. Infants and children from households that do not have a private tap are at greater risk of being anaemic than those from households with this amenity. Among the households surveyed with children under five years, 30 percent use piped water, 46 percent obtain their drinking water from a well, and 25 percent use surface water.

Inadequate sanitation facilities result in an increased risk of diarrheal disease, which contributes to anaemia in children. In Ghana, 63 percent of households surveyed with at least one child under five years have access to a latrine, 30 percent have no facilities, and only 7 percent of surveyed households have access to a flush toilet. Nutrient deficiency, in terms of nutrient availability to infant or to the mother during pregnancy and lactation has been identified as a possible factor that could affect child survival (Osório, 2002). It is very prominent in developing countries which have resulted into over 50% of iron deficiency

anaemia in the world as a result of chronic malnutrition and under nutrition. Iron-deficiency anemia is the most common form of nutritional deficiency worldwide. This type of nutritional deficiency develops slowly and does not manifest symptoms until anemia becomes severe. Diets that are heavily dependent on one grain or starch as the major staple often lack sufficient iron intake. Iron is found in meats, poultry, fish, grains, some cereals, and dark leafy greens (such as spinach). Foods rich in vitamin C increase absorption of iron into the blood. Tea, coffee, and whole-grain cereals can inhibit iron absorption. Anemia is common in children 6-24 months of age who consume purely a milk diet and in women during pregnancy and lactation. Iron-deficiency anemia is related to decreased cognitive development in children, decreased work capacity in adults, and limited chances of child survival. Severe cases are associated with the low birth weight of babies, perinatal mortality, and maternal mortality. The worldwide anemia prevalence data indicate that normal dietary intakes of iron are insufficient to cover for these increased requirements for a significant proportion of pregnant women. Providing iron supplements to pregnant women during this critical period is one of the most widely practiced public health measure to prevent and treat anemia.

(Paliakara et al, 2009) has found that under nutrition is the underlying cause of 3.5 million child deaths globally leading to 35% of disease burden. Again, 11% of the total disease burden worldwide is due to maternal and child under nutrition (Black et al, 2003). WHO & UNICEF (2003), have also established that 10 million children die every year globally as a result of malnutrition. Malnutrition is one of the most important health and welfare problems among infants and young children in Ghana. It is a result of both inadequate food intake and illness. Inadequate food intake is a consequence of insufficient food available at the household level, improper feeding practices, or both. Improper feeding practices include both the quality and quantity of foods offered to young children as well as the timing of their introduction. Improper feeding practices, in addition to diarrheal disease, are important

determinants of anaemia. WHO and UNICEF recommend that all infants be exclusively breastfed from birth until six months of age. In other words, infants should be fed only breast milk during the first six months of life. In Ghana, the introduction of liquids, such as water, sugar water, and juice; formula; and solid foods takes place earlier than the recommended age of about six months. This practice has a deleterious effect on nutritional status for a number of reasons. First, the liquids and solid foods offered are nutritionally inferior to breast milk. Second, the consumption of liquids and solid foods decreases the infant's intake of breast milk, which in turn reduces the mother's supply of milk. Third, feeding young infants liquids and solid foods increases their exposure to pathogens, thus putting them at greater risk of diarrheal disease resulting in anaemia.

UNICEF and WHO recommend that solid foods be introduced to infants around the age of six months because breast milk alone is no longer sufficient to maintain a child's optimal growth. Thus, all infants over six months of age should receive solid foods along with breast milk. For older infants and toddlers, breast milk continues to be an important source of energy, protein, and micronutrients. Studies have shown that, in some populations, breast milk is the most important source of vitamin A and fat among children over 12 months of age. Breastfeeding older infants also reduce their risk of infection, especially diarrhea. Additionally, breastfeeding up to 24 months can help reduce a woman's fertility, especially in areas where contraception is limited. Other determinants that could affect children and possibly lead to anaemia are injury and personal illness control in the area of the use of preventive services as immunisations, malaria prophylactics or antenatal care and use of curative measures for specific conditions (Mosley & Chen, 1999). Measles is estimated to kill two million children a year, all in developing countries. It is one of the most common diseases during childhood in areas with low immunization coverage. Measles not only increases the risk of death but is also a cause of anaemia. The occurrence of measles in poor

environments is associated with faltering growth, vitamin A deficiency, and immune suppression. Although infants are not protected from measles after birth by their mother's breast milk, they are protected while in the womb by their mother's measles antibodies. These antibodies can last up to 15 months in infants, but due to malnutrition, last only eight or nine months in children in developing countries. Therefore, measles vaccination is an important child health strategy.

2.1.3 Types of anaemia in children

According to Scholl et al, (2000), anaemia is a common problem in children. About 20% of children are diagnosed with anemia at some point. A child who has anemia does not have enough red blood cells or hemoglobin. Hemoglobin is a type of protein that allows red blood cells to carry oxygen to other cells in the body. There are many types of anemia, a child may have one of the following:

- **Iron deficiency anemia.** Too little iron in the blood. Iron is needed to form hemoglobin. This is the most common cause of anemia.
- **Megaloblastic anemia.** Red blood cells are too large. One type of megaloblastic anemia is **pernicious anemia**. In this type, there is a problem absorbing vitamin B_{12}, important to making red blood cells.
- **Hemolytic anemia.** Red blood cells are destroyed. There are many different causes, such as serious infections or certain medications.
- **Sickle cell anemia.** An inherited type of anemia with abnormally shaped red blood cells. It is a type of hemolytic anemia.
- **Cooley's anemia (thalassemia).** Another inherited type of anemia with abnormal red blood cells.
- **Aplastic anemia.** Failure of the bone marrow to make blood cells.

Also, Institute of Medicine (2008) noted that children's anemia can be classified by the size of their red blood cells;

Microcytic anaemia: this means that the child's red blood cells are smaller than normal. The most common cause is iron deficiency.

Normocytic anaemia: this means the child's red blood cells are normal in size. This type of anemia has many causes and may require other special types of blood tests

Macrocytic anemia: this means the child's red blood cells are larger than normal. This is the rarest type of anemia in children and it is caused by vitamin B12 deficiency**.** (University of Rochester Medical center, 2016).

2.1.4 Diagnosis

Most anaemias in children can be diagnosed with these blood tests: Hemoglobin and hematocrit. This is often the first screening test for anemia in children (Makubi, et. al., 2012). It measures the amount of hemoglobin in the blood and the amount of red blood cells in the blood sample. Most anemias in children can be diagnosed with these blood tests:

Hemoglobin and hematocrit. This is often the first screening test for anemia in children. It measures the amount of hemoglobin in the blood and the amount of red blood cells in the blood sample.

Complete blood count or CBC. If hemoglobin or hematocrit is abnormal, a complete blood count may be done. This test adds important information about the blood, including the size of red blood cells (called the *mean corpuscular volume*, or *MCV*).

Peripheral smear. This test involves a smear of blood on a slide that is examined under a microscope. By looking at a child's blood cells under a microscope, a lab specialist may be able to diagnose a type of anemia that causes red cells to grow or develop abnormally.

Reticulocyte count. Reticulocytes are immature blood cells. A reticulocyte count measures the percentage of newly formed red blood cells in the child's blood sample. Anemia caused by not enough red blood cells being made results in a low reticulocyte count (Lwambo et al, 2012). Anemia caused by too many red blood cells being lost, causes a high reticulocyte count.

2.2 Empirical research

2.2.1 Factors that contribute to prevalence of anemia in under 5 years

Valkov et al (2014) conducted a cross – sectional study on prevalence of anaemia in under five-years-old children in three remote areas in the North of Kazakhstan. The study revealed that the overall prevalence of anaemia was 48.6%, 44.9% and 40.0% in Aktobe, Pavlodar and North Kazakhstan counties, respectively. The prevalence of moderate and severe anaemia was 17.9% and 1.6% in Aktobe, 20.3% and 0% (0-1.4) in Pavlodar and 15.2% and 0.8% in North Kazakhstan counties. No difference in the prevalence of anaemia between urban 44.7% and rural 43.9% settings was observed and they conclude that nearly a half of under 5 years old children in Northern counties of Kazakhstan have anaemia, which is comparable to other developing settings. Younger children were more likely to have anaemia. No geographic or urban-rural variations in the prevalence of anaemia were found. Measures directed at the prevention and control of anemia, including supplementation and fortification programs are needed to improve the situation.

A cross – sectional house hold – based study was carried out in Cape –Verde to assess the prevalence of anaemia among under five years. The study revealed that worse household

conditions of family were strongly associated with anemia among their children as compared to children whose families were living under better conditions. However, unfavorable living and sanitary conditions can expose children to parasitic infections and consequently diarrhea and loss of iron in the feaces. Thus, actions to improve housing and sanitation of the population should be taken into consideration. Semedo et al (2014). Ngnie-Teta et al (2013) on the prevalence and risk factors of anemia among children 6–59 months Old in Haiti showed that, one main reason is the decrease in iron requirements and increase in iron intakes with age. According to Ewusie et al (2014)'s study done in Ghana, mostly in rural areas, beef, eggs and other kinds of haeme-containing foods (meat) are only introduced to the diet of children after weaning, which is often after 18–24 months. The determinants of anaemia look similar with little variation according to geographical region. In Tanzania, a study done at MNH showed anaemia was positively associated with malaria, malnutrition, nutritional deficiencies, HIV infection and low socioeconomic status [Villamor et al, 2000]. Similar results were obtained from studies done in Kenya, Ghana, Burkina Faso and Mali, (Magalhaes & Clements 2011). In addition to these factors, a Brazilian study revealed that a short duration of breastfeeding was associated with anaemia. Helminthes and Schistosoma infections were additional factors in Burkina Faso, Mali and Ghana (Netto et al, 2011)

In another descriptive, cross-sectional study of children aged 6–59 months (completed) were conducted in 2005, 2008 and 2011. Hemoglobin levels were measured to diagnose anemia (hemoglobin <110 g/L) and data were collected on independent variables such as age, sex, area of residence (urban or rural), daycare center enrollment, birth weight, breastfeeding history, and maternal anemia during pregnancy. Prevalence was higher in children aged 6–23 months than in those aged 24–59 months throughout. Daycare enrollment emerged as a protective factor in all three years. Prevalence of exclusive breastfeeding for six months

increased over the study period; lack of breastfeeding was found to be associated with anemia in 2005. Maternal anemia at onset of and during pregnancy was a significant risk factor in 2011.

Simbauranga et al, (2015) studied on Prevalence and factors associated with severe anaemia amongst under-five children hospitalized at the Paediatric wards of Bugando Medical Centre, Mwanza, Tanzania. A total of 448 under-five children were recruited into the study. The overall prevalence of anaemia was 77.2 % (346/448) with mild, moderate and severe anaemia being 16.5, 33 and 27.7 % respectively. Microcytic hypochromic anaemia was detected in 37.5 % of the children with anaemia. Out of 239 children with moderate and severe anaemia, 22.6 % (54/239) had iron deficiency anaemia based on serum ferritin level less than12 µg/ml. The study revealed that factors associated with severe anaemia included unemployment of the parent, malaria parasitaemia and presence of sickle haemoglobin.

However, for younger children less than 2 years, the prevalence among those who were still being breastfed was significantly higher, 87.3%, than those who had been weaned, 74.2% (Ewusie et al,. 2014). Common causes of anaemia in Ghana according GHS among all age group are through infection such as malaria, malnutrition, hookworm infestation, heavy menstrual bleeding and severe haemorrhage results from trauma or injury. (Yiadom, 2008).

2.2.2 Prevention of anaemia

It was identified that, anaemia prevention and control measures should be maintained and strengthened: interventions for women of childbearing age, fostering exclusive breastfeeding of infants through their sixth month, and encouraging compliance with recommendations on complementary feeding per Cuba's nutritional guidelines for children aged <2years. (Gisela et al, 2011). The public health impact of anaemia is probably highest in malaria endemic areas where iron deficiency also tends to be common. Clinical trials have been done to compare different anaemia treatments. In Ifakara Tanzania, the use of ferrous sulphate and

antimalarial extended for three months and improving compliance have benefit for anaemic children in malaria endemic area as there is significantly increase in packed cell volume [Schellenberg et al, 2004]. In addition the supplementation of low dose micronutrient including poly visol which contains vitamins A, D, E, C, B1, B2, Niacin, B6 with either iron or prophylaxis SP contribute to significant haemoglobin improvement [Ekvall et al, 2000]. In Kenya children with complicated malaria who were transfused according to WHO guidelines at discharge the mean haemoglobin was low similar to non-transfused children and most of them remained moderate to severely anaemic. Transfusion does not influence higher increase in haemoglobin concentration [Akech et al, 2008]. At BMC the recommended management of mild and moderate anaemia includes oral haematinics. In patients with severe anaemia apart from blood transfusion, oral haematinics are also recommended (BMC, 2011).

One of the strongest weapons in the fight against malaria is the use of insecticide-treated mosquito nets (ITNs) while sleeping. Research has shown that malaria incidence rates fall dramatically with the use of ITNs. It is on record that more people living in Afram Plains in Ghana sleep under bednets, be it treated or non-treated due to high presence of mosquitoes and malaria in the area (Crookson, 2006). A randomized control trial in Kasena-Nankana district in Ghana showed that out of 80% of women who had nets 70% of women used them frequently (Brown, Maude and Binka, 2001) and a study by Okra et al, (2002) showed that, 87% of respondents were interested in the future use of treated nets, mostly because they felt it would provide them with better protection against mosquitoes. Otchere (2011), studied on the frequency of ITN use among pregnant women and children under-five, it was reported that out of those who have accepted and owned the nets, 162(90%) frequently hang their nets on the bed whilst 17(10%) do not hang on bed.

A survey was undertaken in Kenya to determine the prevalence and risk factors of anaemia among children aged between 6 months and 14 years. This study utilized data from 11,711

children across Kenya, within the ages of 6 months to 14 years, who provided blood samples for testing. The prevalence of anaemia among children in this age group, in Kenya, was estimated to be 28.8%. The results of this study can provide insights to develop policies for intervention of anaemia in a two pronged manner. Firstly is maternal education. Maternal education was found to have a protective effect on risk of anaemia. The government should focus on providing information to young mothers on adequate nutrition for their young babies. Information on food products including indigenous African foods, which contain relevant vitamins and iron, will go a long way in reducing anaemia prevalence in the country. Secondly, up scaling interventions on malaria and ensuring that these interventions cover most parts of the country will lead to reduction in anaemia cases, (Ngesa & Mwambi, 2014). Ewusie et al (2014) researched into prevalence of anemia among under-5 children in the Ghanaian population. The overall prevalence of anemia was 78.4%; where 7.8% of the children had severe anemia, 48% had moderate and 22.6% had mild anemia. This study revealed that the prevalence for children from low income households was significantly higher than children from high income household.

2.3 Conceptual Framework

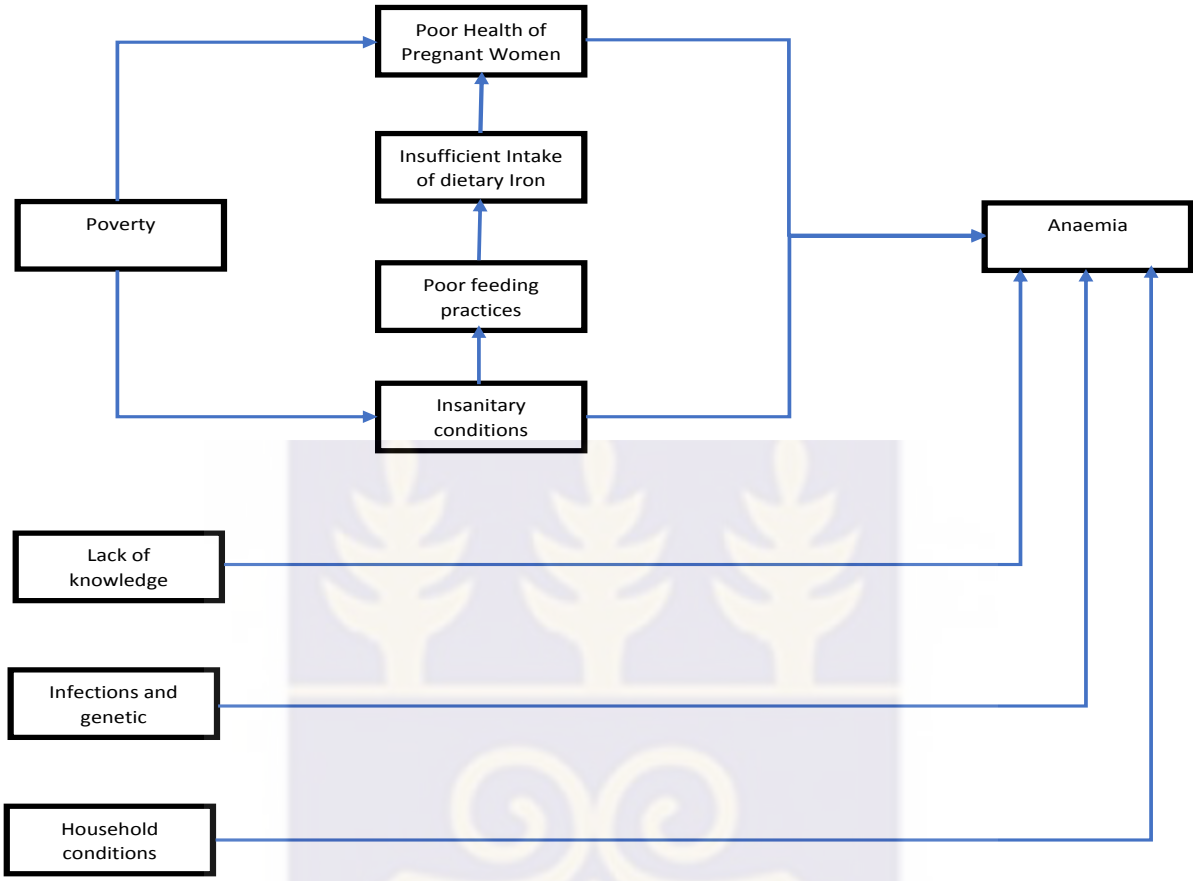

Figure 1: Anaemia in children under five at Sakagyano

Figure 1: Anemia in children under five at Sakagyano

Source: Author's construct

From the conceptual framework above, poverty results in household crowding, water contamination, and household food contamination or potential faecal contamination. These indicators could also affect child health especially in the area of diarrhoea and worm infestation which could result in anaemia in children (Boadi & Kuitunen, 2005). A household's source of drinking water is linked with its socioeconomic status. Inadequate

sanitation facilities result in an increased risk of diarrheal disease and all of these contribute to anaemia in children.

Lack of knowledge results in nutrient deficiency, in the infant or to the mother during pregnancy and lactation has been identified as a possible factor that could affect child survival (Osório, 2002). Iron-deficiency anemia is the most common form of nutritional deficiency worldwide. This type of nutritional deficiency develops slowly and does not manifest symptoms until anemia becomes severe. Diets that are heavily dependent on one grain or starch as the major staple often lack sufficient iron intake. Iron is found in meats, poultry, fish, grains, some cereals, and dark leafy greens (such as spinach). Foods rich in vitamin C increase absorption of iron into the blood. Tea, coffee, and whole-grain cereals can inhibit iron absorption.

Improper feeding practices include both the quality and quantity of foods offered to young children as well as the timing of their introduction. Improper feeding practices, in addition to diarrheal disease, are important determinants of anaemia. Measles is estimated to kill two million children a year, all in developing countries. It is one of the most common diseases during childhood in areas with low immunization coverage.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

Quantitative research design was used for this study. The rationale for the approach was to obtain an extensive description on the factors that contribute to anaemia in children under five years in the Sakagyano community.

3.2 Research Setting

The study was conducted in the Sakagyano community in the Winneba district of the Effutu municipality of Ghana. Sakagyano has a population size of 8,411. It has a municipal hospital and a health care center that deliver their services to all the people and some people from neighboring communities. The healthcare centre has both antenatal and postnatal section, child welfare clinic and a family planning unit. The health Centre usually refers medical cases to the Municipal Hospital for further management. Sakagyano is a town along the Atlantic coast, 30 km (19 miles) to the West of Winneba. Their main occupation is fishing and it is a popular destination for tourists, backpackers and international volunteers seeking beaches (Effutu Population Report, 2010). Ethnically, they are made up of the Effutus and Fantes.

3.4 Study Population

The target population was mothers with children under five, with a total population of 100 household dwellers in Sakagyano community. These people were chosen as the target population because they had the characteristics that the researcher was looking for.

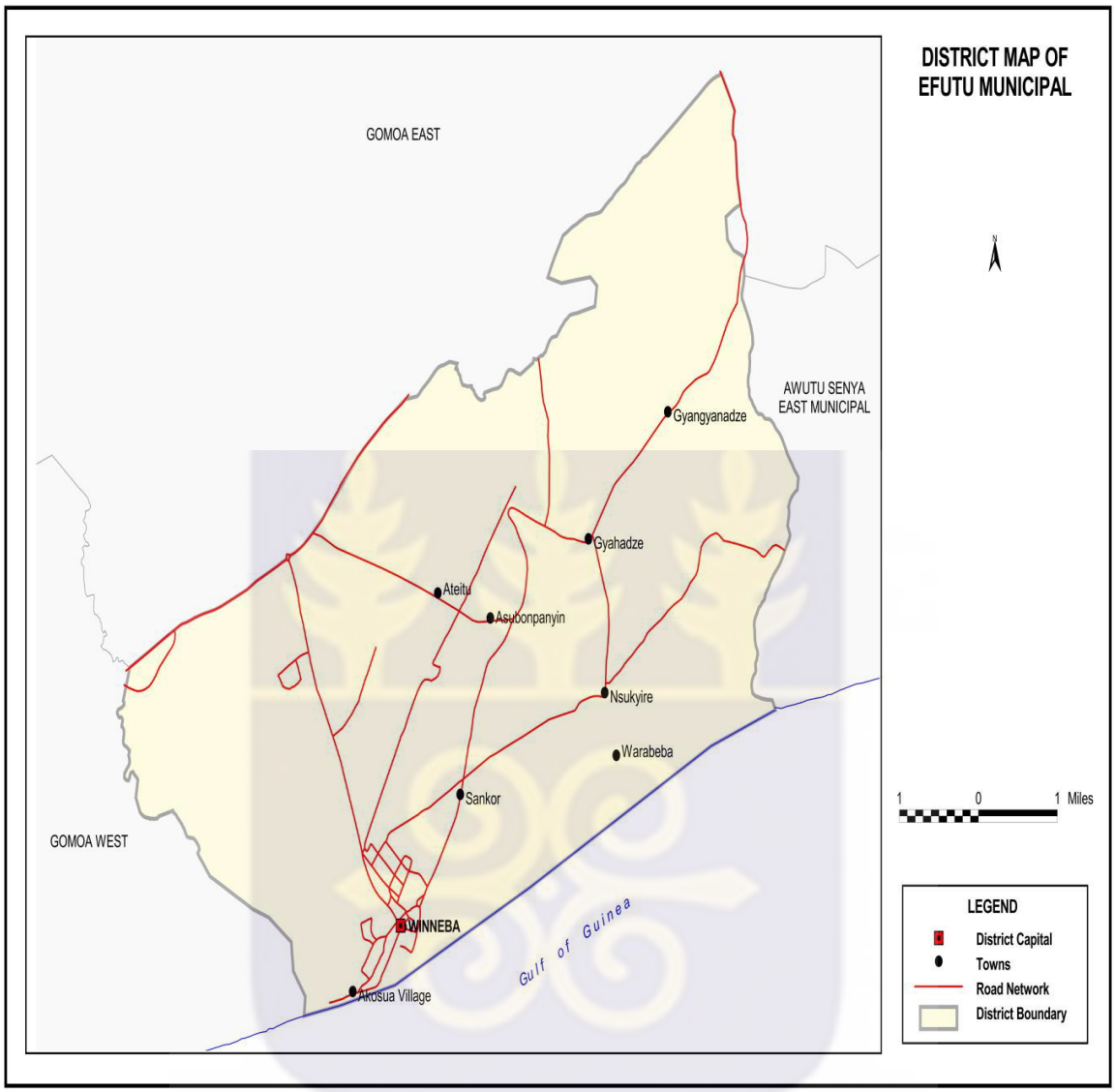

Figure 2 Map of Affutu

3.4.1 Inclusion Criteria

The research included all parents with children under five years of age and were residence of Sakagyano.

3.4.2 Exclusion Criteria

This excluded all parents whose children were above five years and those households are without under five children.

3.5 Sampling Method

Simple random sampling method was used in selecting the respondents. This method is a probability sampling technique where each respondent has equal chances of being selected are selected because of their accessibility and proximity. This method was chosen because it provided easy access to the subjects needed for the study; it is simple, cheap, quick, and has accurate representation of the larger population. Depending on the inclusion criteria, qualified parents with their children were approached and were asked to pick from a bowl containing pieces of folded papers, on which one(1) and two(2) are written. All those who picked one(1) formed the sample size for the study.

3.6 Sample Size

A total of one hundred (100) dwellers including children under five was selected for the study. A simple random sampling method was used in selecting the 100 study subjects. The sample frame was the total number of households within the study communities. Each household then constituted a sample unit. The sample size was obtained using statistical population proportion method, for minimum sample size calculation (Yamane, 1997):

N = the sampling frame (total number of parents with under five children in Sakagyano

= 500

e = the margin of error. 10% (0.10) was used

n = the minimum sample size of parent with children under five in Sakagyano

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{500}{1+500(0.1)^2}$$

$$= \frac{500}{1+500\,(0.01)}$$

$$= \frac{500}{5.01}$$

$$= 99.8$$

$$= 100$$

Based on the above calculation, a minimum sample unit of 100 was obtained from the target group.

3.7 Research Instrument

A structured questionnaire was used as the instrument for collecting data. This was because questionnaires enable the researcher to be consistent in asking questions and data yielded is easy to analyze. The instrument consists of 32 items divided into five sections. Section A seeks to obtain demographical information of participants, such as age of the respondents, gender, educational, marital status, occupation and monthly expenditure. Section 'B' finds out about mothers knowledge on factors causing anaemia among children under five, section 'C' also seeks to examine mothers knowledge on the effects of anaemia on children under

five, section D examines how mothers prevent anaemia among children under five in the house. Lastly, section 'E' seeks to find out how anaemia is managed by mothers with children under-five years in Sakagyano community. (See Appendix A)

3.8 Data Collection Procedure

Data was collected using a structured questionnaire. Participants were informed of the purpose of the study and a structured questionnaire administered to them to answer per information provided on the sheet. A research assistant was coached to assist in collecting answered questionnaire due to language barrier. Guidance was provided where necessary. Two days were used in collecting data, on day one, questionnaires were administered in the morning and evening whiles on day 2, questionnaires were administered only in the morning.

3.9 Validity and Reliability Testing

The research instrument was given to the supervisor for acceptance and to check whether it is sufficiently comprehensive in seeking the proper range of responses and whether the questions have content and face validity. Reliability of the tool was ensured by accurate and careful phrasing of each question to avoid ambiguity and leading respondents to a particular answer. This is done to discover failure which was removed before the tool was deployed. Respondents were informed of the purpose of the study and of the need to respond truthfully.

3.10 Pretesting

A pilot study is a small scale study conducted before the main study on a limited number of subjects from the same population as intended for the study to test methodology (Burns & Groove, 2005). The pilot study was done in order to evaluate clarity of the questionnaire after which necessary amendments were made to the final questions. The pilot study was done to find out how feasible the study was, validity of the data collection tool and how possible it

would be to process and analyze the data to be collected. The pilot study was conducted at Ponkorekyir, a suburb of Effutu and was done in just a day.

3.11 Ethical Consideration

An approval letter was taken from University of Ghana, School of Public Health and given to the Regional health directorate, District health directorate and the assemblyman of Sakagyano to carry out the study in the area. A verbal and written consent was also obtained from the study participants explaining the purpose of the study. Likewise, confidentiality and anonymity of the study was reassured. During the administration of the questionnaire, participants chose not to answer any individual question or all the questions and also had the liberty to withdraw from the study at any time. Participant information provided on the questionnaire was handled with strict confidentiality, name or personal identification information will not be published in any report. Information submitted were not shared with anybody who is not part of the study. There was no compensation for participating in this study, however, light refreshment was served.

3.12 Data Analysis

Data was cleaned, coded and entered into STATA®, a statistical package for data processing and analysis (version 15.0). Frequencies and percentages were used to describe demographic characteristics of respondents and as well as responses of respondents on their knowledge on anaemia. Composite mean score on knowledge questions were used to compute was used to the knowledge score of each respondents. All knowledge questions answered right were scored one (1) and those that were answered wrongly or ‘don’t know’ were scored zero (0). The highest mean score for each respondent was one (1) with the lowest being zero (0). Respondents who had a 0.8 or above mean score on each of the knowledge section were classified as high knowledge while those who had below 0.8 mean score were classified as

low level of knowledge on anaemia. Overall knowledge scores was computed from all the three knowledge section on anaemia.

The Pearson's chi-square test of association was used to determine the strength of relationship between demographic characteristics of respondents and knowledge level of respondents. The simple and multiple logistic regression model was used to quantify the demographic influence of respondents on their level of knowledge on anaemia. All significant association and influence were determine at a 0.05 level of significance.

CHAPTER FOUR

RESULTS

4.1 Background characteristics

From the table below, a total of 100 participants were recruited into the study, with 39% of them within the age bracket of 15 to 26 years, 46% within the age bracket of 27 to 36 years and 15% of them were within the age bracket of 37 to 46 years. Majority (51%) of the participants had 3 or 4 children. Majority (52%) of them were traders while 35% of them were unemployed. 46% of them were Christians with 13% of the participants having no formal education. 46% of the participants were married while 30% of them were single.

Table 4.1: Background characteristics of participants

Variables	Frequency (N=100)	Percentage
Age in years		
15-26 years	39	39
27-36 years	46	46
37-46 years	15	15
Number of children		
1-2 children	22	22
3-4 children	51	51
5 or more children	27	27
Employment status		
Unemployed	35	35
Trader	52	52
Apprentice	13	13
Religion		
Christianity	46	46
Islamic	38	38
Traditional	16	16
Highest level of education		
None	13	13
Primary	51	51
JHS/SHS	36	36
Marital status		
Single	30	30
Married	48	48
Others (Divorce/ separated/Widowed)	22	22

4.2 Knowledge level of participants

The overall mean score of participants' knowledge on anaemia was 0.65 ± 0.17 with 22% of the participants having high knowledge on Anaemia. 28.6% of the participants had high knowledge on causes of anaemia with a mean score of 0.64 ± 0.23. Mean scores of 0.63 ± 0.27 and 0.68 ± 0.26 of were recorded for knowledge on symptoms and effects of anaemia respectively with a third of the participants scoring high on the symptoms and 29% scoring high on the effects. (Table 4.3).

Table 4.2: Knowledge of Participants on Anaemia

Variables	Agree (%)	Disagree (%)	Don't know (%)
Cause of Anaemia			
Insufficient Iron in diet	97	0	3
Feeding practices(early weaning)	69	10	21
Diseases (Malaria and Hookworm)	28	11	61
Household conditions (e.g. unfavourable living and sanitary conditions)	29	16	55
Lack of breastfeeding	70	10	20
Mat ernal anaemia during pregnancy	64	12	24
Low income status of household contributes to the cause of anaemia	87	3	10
Symptoms of Anaemia			
Body weakness	96	0	4
Irritability	51	7	42
Dizziness	38	18	44
Pale skin and mucous membrane	34	26	40
Breathlessness	49	26	25
Headache	52	21	27
Sleeplessness	95	1	4
Effect of Anaemia			
Stunted growth	94	0	6
Poor School performance	42	7	51
Developmental problems	34	16	50
Lack of concentration	48	17	35
Infections	92	1	7

Table 4.3: Summary of knowledge level of respondents

Variables	Frequency	Percentage
Knowledge level on causes of Anaemia *(Mean ± SD)*	0.63 ± 0.24	
Low	72	72
High	28	28
Knowledge level on symptoms of Anaemia *(Mean ± SD)*	0.62 ± 0.28	
Low	67	67
High	33	33
Knowledge level on effect of Anaemia *(Mean ± SD)*	0.67 ± 0.28	
Low	72	72
High	28	28
Overall knowledge level on Anaemia *(Mean ± SD)*	0.63 ± 0.19	
Low	80	80
High	20	20

SD: standard deviation

4.3 Association between socio-demographic characteristics and knowledge on causes of anaemia

The Pearson's chi-square test of association was used to assess the knowledge level of participants on causes of anaemia. Highest level of educations and marital status of participants were two demographic characteristics that showed significant association with knowledge on causes of anaemia.

Among those with high level of knowledge on cause of anaemia, majority of them has JHS as their highest level of education while majority of those with low level of knowledge on causes of anaemia had primary education as the highest level of education. Also among those with high knowledge level on causes of anaemia majority of them were either separated or divorce while majority of those with low level of education on causes of anaemia were married. (Table 4.4)

Table 4.4: Association between background characteristics and knowledge on causes of Anaemia

	Knowledge on cause of Anaemia			
Variables	**Low (%)**	**High (%)**	**χ^2-value**	**P-value**
Age in years			0.97	0.617
15-26 years	30(28.1)	9(10.9)		
27-36 years	30(43.06)	15(12.9)		
37-46 years	11(15.28)	4(14.29)		
Number of children			2.85	0.241
1-2 children	18(25)	4(14.29)		
3-4 children	33(45.83)	18(64.29)		
5 or more children	21(29.17)	6(21.43)		
Employment status			3.23	0.199
Unemployed	25(34.72)	10(35.71)		
Trader	35(48.61)	17(60.71)		
Apprentice	12(16.67)	1(3.57)		
Religion			2.64	0.268
Christianity	33(45.83)	13(46.43)		
Islamic	25(34.72)	13(46.43)		
Traditional	14(19.44)	2(7.14)		
Highest level of education			10.62	0.005**
None	7(9.72)	6(21.43)		
Primary	44(61.11)	7(25)		
JHS	21(29.17)	15(53.57)		
Marital status			19.61	<0.001***
Single	22(30.56)	8(28.57)		
Married	42(58.33)	6(21.43)		
Others (Divorce/ Separated)	8(11.11)	14(50)		

χ: Pearson's chi-square. %: column percentage. *: p-value<0.05. **: p-value<0.01. ***: p-value<0.001

4.4 Factors influencing the knowledge level of participants on causes of anaemia

The simple and multiple logistic regression model was used to assess the factors that have influence on the knowledge level of respondents on causes of anaemia. Respondents with primary education and JHS as their highest level of education had 97% (AOR: 0.03, 95% CI: 0.00-0.35) and 93% (AOR: 0.07, 95% CI: 0.01-1.06) lesser odds of having high knowledge on causes of anaemia compared to those with no formal education respectively. With marital status, respondents who were either divorced or separated had a 10.82 (AOR: 10.82, 95% CI: 0.96-121.7) higher odds of having high knowledge on causes of anaemia compared to those

who were single while those who were married had a 62% (AOR: 0.28, 95% CI: 0.07-2.24) lesser odds of having high knowledge on causes of anaemia compared to those who were single. (Table 4.5)

Table 4.5: Factors influencing participants' knowledge on causes of anaemia

	Knowledge on causes of Anaemia					
	Simple logistic model			Multiple logistic model		
Variables	**UOR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age in years			0.619			0.203
15-26 years	Ref			ref		
27-36 years	1.61	0.61 - 4.24		0.27	0.04 - 1.63	
37-46 years	1.21	0.31 - 4.75		0.13	0.01 - 1.35	
Number of children			0.249			0.929
1-2 children	Ref			ref		
3-4 children	2.45	0.72 - 8.37		0.87	0.1 - 7.46	
5 or more children	1.29	0.31 - 5.28		1.22	0.1 - 14.5	
Employment status			0.263			0.158
Unemployed	Ref			ref		
Trader	1.21	0.48 - 3.09		4.04	0.71 - 22.88	
Apprentice	0.21	0.02 - 1.82		0.58	0.03 - 9.72	
Religion			0.295			0.424
Christianity	Ref			ref		
Islamic	1.32	0.52 - 3.34		1.94	0.46 - 8.11	
Traditional	0.36	0.07 - 1.82		0.47	0.05 - 4.12	
Highest level of education			0.008**			0.015*
None	Ref			ref		
Primary	0.19	0.05 - 0.72		0.03	0 - 0.35	
JHS	0.83	0.23 - 2.99		0.07	0.01 - 1.06	
Marital status			<0.001***			0.003**
Single	Ref			ref		
Married	0.39	0.12 - 1.28		0.38	0.07 - 2.24	
Others (Divorce/ Separated)	4.81	1.47 - 15.77		10.82	0.96 - 121.7	

UOR: unadjusted odds ratio. AOR: adjusted odds ratio. ref: reference category. CI: confidence interval. *: p-value<0.05. **: p-value <0.01. ***: p-value <0.001

4.5 Association between Socio-demographic characteristics and knowledge on causes of anaemia

The Pearson's chi-square test of association from table 4.6, showed that parity and marital status of respondents were the two main demographic characteristics of respondents that showed significant association with knowledge of respondents on symptoms of anaemia. A high majority (78.8%) of the participants that had high knowledge on symptoms of anaemia had 3 or 4 children while 37.3% of those with low knowledge on symptoms of anaemia had also 3 or 4 children. With marital status, most (48.5%) of the respondents that had high knowledge on symptoms of anaemia had either divorced or separated while most (59.7%) of those with low level of knowledge were married.

Table 4.6: Association between background characteristics and knowledge on symptoms of Anaemia

	Knowledge on Symptoms of Anaemia			
Variables	**Low (%)**	**High (%)**	**χ^2-value**	**P-value**
Age in years			0.34	0.844
15-26 years	26(38.81)	13(39.39)		
27-36 years	30(44.78)	16(48.48)		
37-46 years	11(16.42)	4(12.12)		
Number of children			15.49	<0.001***
1-2 children	18(26.87)	4(12.12)		
3-4 children	25(37.31)	26(78.79)		
5 or more children	24(35.82)	3(9.09)		
Employment status			4.09	0.129
Unemployed	19(28.36)	16(48.48)		
Trader	39(58.21)	13(39.39)		
Apprentice	9(13.43)	4(12.12)		
Religion			3.27	0.195
Christianity	35(52.24)	11(33.33)		
Islamic	23(34.33)	15(45.45)		
Traditional	9(13.43)	7(21.21)		
Highest level of education			3.27	0.195
None	6(8.96)	7(21.21)		
Primary	37(55.22)	14(42.42)		
JHS	24(35.82)	12(36.36)		
Marital status			21.62	<0.001***
Single	21(31.34)	9(27.27)		
Married	40(59.7)	8(24.24)		

Others (Divorce/ Separated)	6(8.96)	16(48.48)

χ: Pearson's chi-square. %: column percentage. *: p-value<0.05. **: p-value<0.01. ***: p-value<0.001

4.6 Factors influencing the knowledge level of participants on causes of anaemia

Age of respondents, religious affiliation, highest level of education, and marital status were the demographic characteristics of respondents that showed significant influence with respondents' knowledge on symptoms of anaemia from the logistic model in table 4.7.

Respondent within the age ranges 27 to 36 years and 37 to 46 years of age inclusive had 98% (AOR: 0.02, 95% CI: 0.00-0.26) and 90% (AOR: 0.00 – 4.20) lesser odds of having high knowledge on symptoms of anaemia respectively compared to those within the age range of 15 to 26 years of age. Respondents who were either divorced or separated had a 56.3 times odds of having high knowledge on symptoms of anaemia compared to those who were single (AOR: 56.3, 95% CI: 17.6 – 182.7). (Table 4.7).

Table 4.7: Factors influencing participants' knowledge on causes of anaemia

	Knowledge on symptoms of Anaemia					
	Simple logistic model			Multiple logistic model		
Variables	**UOR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age in years			0.845			0.013*
15-26 years	ref			ref		
27-36 years	1.07	0.43 - 2.63		0.02	0 - 0.26	
37-46 years	0.73	0.19 - 2.73		0.10	0 - 4.2	
Number of children			0.001**			0.174
1-2 children	ref			ref		
3-4 children	4.68	1.39 - 15.77		3.05	0.3 - 31.14	
5 or more children	0.56	0.11 - 2.83		0.27	0.01 - 8.25	
Employment status			0.135			0.535
Unemployed	ref			ref		
Trader	0.40	0.16 - 0.99		0.95	0.13 - 7.19	
Apprentice	0.53	0.14 - 2.04		3.56	0.3 - 42.08	
Religion			0.201			0.005**
Christianity	ref			ref		

Islamic	2.08	0.81 - 5.31		16.21	2.7 - 97.27	
Traditional	2.47	0.75 - 8.2		13.30	1.29 - 136.74	
Highest level of education			0.211			<0.001***
None	ref			ref		
Primary	0.32	0.09 - 1.13		0.01	0 - 0.12	
JHS	0.43	0.12 - 1.56		0.00	0 - 0.02	
Marital status			<0.001***			<0.001***
Single	ref			ref		
Married	0.47	0.16 - 1.39		0.76	0.11 - 5.11	
Others (Divorce/ Separated)	6.22	1.84 - 21.09		56.31	17.61 - 182.68	

UOR: unadjusted odds ratio. AOR: adjusted odds ratio. ref: reference category. CI: confidence interval. *: p-value<0.05. **: p-value <0.01. ***: p-value <0.001

4.7 Association between Socio-demographic characteristics and knowledge on effects of anaemia

The Pearson's chi-square test of association showed that age of respondents, parity, and employment status of respondents were demographic characteristics that were significant associated with knowledge on effect of anaemia. Most (53.6%) of the respondents who had high knowledge on effect of anaemia were within the age range of 15 to 26 years, 35.7% of them had 1 or 2 children , while 42.9% of the respondents with high level of knowledge on effect on anaemia were traders. (Table 4.8).

Table 4.8: Association between background characteristics and knowledge on effect of Anaemia

	Knowledge on effect of Anaemia			
Variables	**Low (%)**	**High (%)**	**χ^2-value**	**P-value**
Age in years			23.77	<0.001***
15-26 years	24(33.33)	15(53.57)		
27-36 years	43(59.72)	3(10.71)		
37-46 years	5(6.94)	10(35.71)		
Number of children			6.42	0.04*
1-2 children	12(16.67)	10(35.71)		
3-4 children	42(58.33)	9(32.14)		
5 or more children	18(25)	9(32.14)		
Employment status			12.70	0.002**
Unemployed	28(38.89)	7(25)		

Trader	40(55.56)	12(42.86)		
Apprentice	4(5.56)	9(32.14)		
Religion			2.08	0.353
Christianity	30(41.67)	16(57.14)		
Islamic	29(40.28)	9(32.14)		
Traditional	13(18.06)	3(10.71)		
Highest level of education			2.3	0.317
None	8(11.11)	5(17.86)		
Primary	35(48.61)	16(57.14)		
JHS	29(40.28)	7(25)		
Marital status			5.27	0.072
Single	19(26.39)	11(39.29)		
Married	33(45.83)	15(53.57)		
Others (Divorce/ Separated)	20(27.78)	2(7.14)		

χ: Pearson's chi-square. %: column percentage. *: p-value<0.05. **: p-value<0.01. ***: p-value<0.001

4.8 Factors influencing the knowledge level of participants on causes of anaemia

The multiple logistic regression model showed that age of respondents and employments status of respondents were demographic characteristics of respondents that showed significant influence on respondents' knowledge on effect of anaemia. Respondents within the age range of 37 to 46 years of age had a 26.6 odds of having high knowledge on effects of anaemia compared to those within the age range of 15 to 26 years (AOR: 26.6, 95% CI : 1.31-540.55), while those within the age range of 27 to 36 years of age had 89% (AOR: 0.11, 95% CI: 0.01-0.91) lesser odds of having high knowledge on effects of anaemia compared to those within the age range of 15 to 26 years. (Table 4.9)

Table 4.9: Factors influencing participants' knowledge on effect of anaemia

	Knowledge on effect of Anaemia					
	Simple logistic model			**Multiple logistic model**		
Variables	**UOR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age in years			<0.001***			<0.002**
15-26 years	ref			ref		
27-36 years	0.11	0.03 - 0.42		0.11	0.01 - 0.91	
37-46 years	3.20	0.91 - 11.2		26.5	1.31 -	

				7	540.55	
Number of children			0.047*			0.22
1-2 children	ref			ref		
3-4 children	0.26	0.09 - 0.78		0.40	0.05 - 3.11	
5 or more children	0.60	0.19 - 1.91		0.06	0 - 1.43	
Employment status			0.006**			0.036*
Unemployed	ref			ref		
Trader	1.20	0.42 - 3.43		0.71	0.08 - 5.93	
Apprentice	9.00	2.13 - 37.98		8.26	1.12 - 60.76	
Religion			0.36			0.323
Christianity	ref			ref		
Islamic	0.58	0.22 - 1.52		0.98	0.14 - 7.05	
Traditional	0.43	0.11 - 1.74		0.16	0.02 - 1.76	
Highest level of education			0.325			0.419
None	ref			ref		
Primary	0.73	0.21 - 2.59		0.32	0.02 - 4.66	
JHS	0.39	0.1 - 1.55		0.15	0.01 - 2.73	
Marital status			0.105			0.332
Single	ref			ref		
Married	0.79	0.3 - 2.05		2.44	0.44 - 13.67	
Others (Divorce/ Separated)	0.17	0.03 - 0.88		0.41	0.01 - 13.16	

UOR: unadjusted odds ratio. AOR: adjusted odds ratio. ref: reference category. CI: confidence interval. *: p-value<0.05. **: p-value <0.01. ***: p-value <0.001

4.9 Association between Socio-demographic characteristics and knowledge on effects of anaemia.

Age, parity, highest level of education and marital status were demographic characteristics of respondents that showed significant association with their overall knowledge level on anaemia from the Pearson's chi-square test of association. (Table 4.10)

Table 4.10: Association between background characteristics and overall knowledge on Anaemia

	Overall knowledge on Anaemia			
Variables	**Low (%)**	**High (%)**	**χ^2-value**	**P-value**
Age in years			6.07	0.048*
15-26 years	36(45)	3(15)		
27-36 years	33(41.25)	13(65)		
37-46 years	11(13.75)	4(20)		

Number of children			15.63	<0.001***
1-2 children	22(27.5)	0(0)		
3-4 children	33(41.25)	18(90)		
5 or more children	25(31.25)	2(10)		
Employment status			1.45	0.484
Unemployed	27(33.75)	8(40)		
Trader	41(51.25)	11(55)		
Apprentice	12(15)	1(5)		
Religion			3.99	0.136
Christianity	38(47.5)	8(40)		
Islamic	27(33.75)	11(55)		
Traditional	15(18.75)	1(5)		
Highest level of education			11.63	0.003**
None	7(8.75)	6(30)		
Primary	47(58.75)	4(20)		
JHS	26(32.5)	10(50)		
Marital status			15.96	<0.001***
Single	26(32.5)	4(20)		
Married	43(53.75)	5(25)		
Others (Divorce/ Separated)	11(13.75)	11(55)		

χ: Pearson's chi-square. %: column percentage. *: p-value<0.05. **: p-value<0.01. ***: p-value<0.001

4.10 Factors influencing the knowledge level of participants on causes of anaemia

The multiple logistic regression model showed that religion, and highest level of education were factors that had significant influence on the overall knowledge level of respondents on anaemia after adjusting for their other socio-demographic characteristics.

Those respondents in the Islamic and traditional religion had a 97% (AOR: 0.03, 95% CI: 0.00-0.32) and 98% (AOR: 0.02, 95% CI: 0.00-0.58) lesser odds respectively of having high knowledge on anaemia both compared to the Christians.

Respondents who had primary education as their highest level of education had a 37% less odds of having high knowledge on anaemia compare to those with no formal education, while on the other hand respondents with JHS level of education have a 20.87 odds of having high knowledge on anaemia compared to those with no formal education. (Table 4.11)

Table 4.11: Factors influencing participants' overall knowledge on anaemia

	Simple logistic model			Multiple logistic model		
Variables	**UOR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age in years			0.07			0.945
15-26 years	ref			ref		
27-36 years	4.73	1.24 - 18.08		1.36	0.18 - 10.57	
37-46 years	4.36	0.84 - 22.54		1.52	0.12 - 19.27	
Number of children			0.52			0.57
1-2 children	ref			ref		
3-4 children	0.91	0.32 - 2.54		1.37	0.19 - 9.89	
5 or more children	0.28	0.03 - 2.51		4.91	0.26 - 93.95	
Employment status			0.169			0.144
Unemployed	ref			ref		
Trader	1.94	0.69 - 5.45		4	0.79 - 20.32	
Apprentice	0.32	0.04 - 2.75		0.53	0.04 - 7.64	
Religion			0.007**			0.018*
Christianity	ref			ref		
Islamic	0.1	0.02 - 0.44		0.03	0 - 0.32	
Traditional	0.45	0.12 - 1.67		0.02	0 - 0.58	
Highest level of education			0.001**			0.009**
None	ref			ref		
Primary	0.76	0.19 - 3.07		0.63	0.08 - 5	
JHS	6.5	1.7 - 24.93		20.87	1.49 - 293.07	
Marital status			0.07			0.945
Single	ref			ref		
Married	4.73	1.24 - 18.08		1.36	0.18 - 10.57	
Others (Divorce/ Separated)	4.36	0.84 - 22.54		1.52	0.12 - 19.27	

UOR: unadjusted odds ratio. AOR: adjusted odds ratio. ref: reference category. CI: confidence interval. *: p-value<0.05. **: p-value <0.01. ***: p-value <0.001

4.11 Perceptions of parents on methods of prevention of anaemia

96% of the respondents agreed that exclusive breastfeeding help prevent anaemia among children, 89% of them also agreed that adequate iron and vitamins helps reduce the risk of anaemia among children and four out of every 5 of the respondents agreed that sleeping

under insecticide treated nets helps to reduce the risk of mosquito bites among children (Table 4.12)

Table 4.12: Perception of parents on measures of preventing Anaemia among children

Variables	Agree (%)	Disagree (%)	Don't know (%)
Exclusive breastfeeding help prevent Anaemia	96	0	4
Adequate Iron and vitamins help reduce the risk of Anaemia	89	1	10
Sleeping under ITN's reduce the risk of mosquito bite	80	2	18

%: row percentage

4.12 Perception of parents on measures of managing Anaemia among children

Figure 4.1 shows the perception of respondents on measures that help manage anaemia among children. 98% of the respondents agreed that "Kontomire" stew can help manage anaemia among anaemic children, 97% of them said garden peas ("Abeduro") helps to manage anaemia among children.

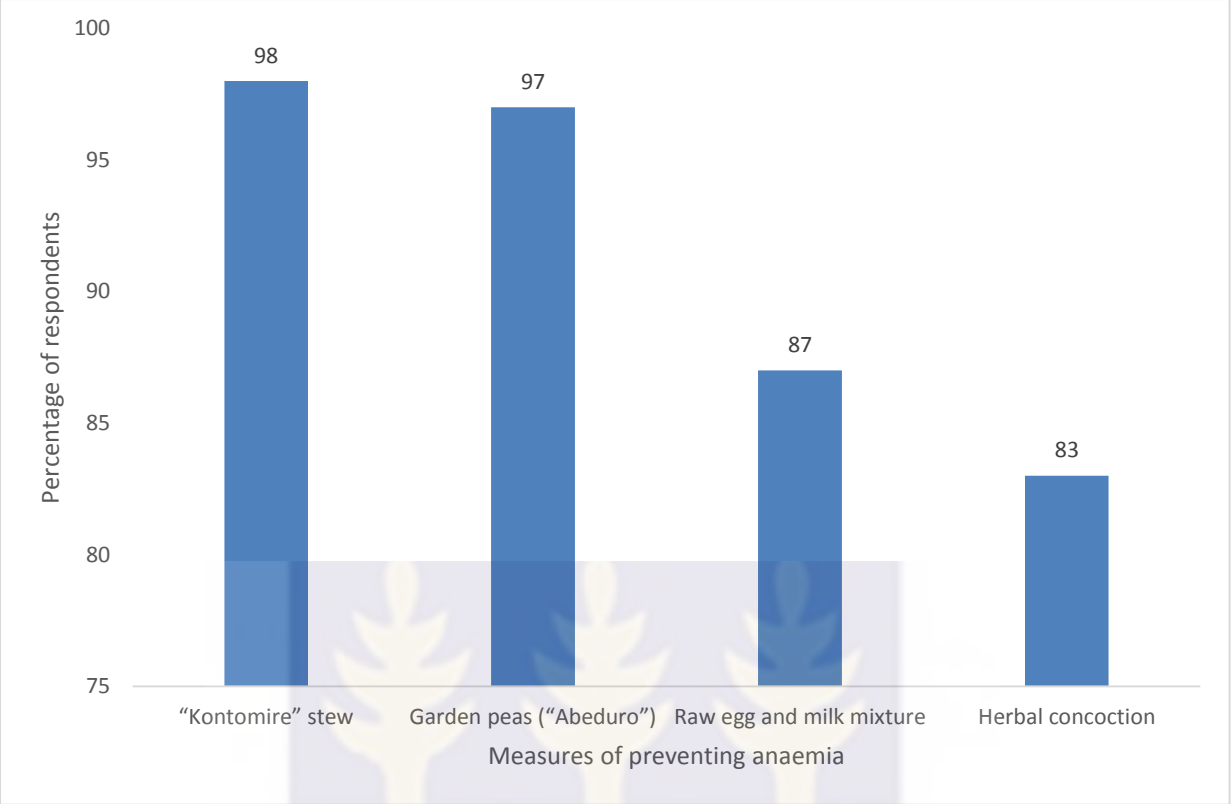

Figure 3: Perception of parents on measures of managing Anaemia among children

4.13 Summary

The analyses of the data obtained focused on socio-demographic characteristics of respondents, knowledge of mothers on factors causing anaemia among children under five years, mothers knowledge on the effects of anaemia on children under five years, anaemia prevention measures by parents with children under five years and the management of anaemia by parents with children under five years.

CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

The chapter five of this study on exploring anaemia among children under five years presents the discussion of findings. This is based on the information which was collected during data

5.2 Discussion of Findings

The main objective of this study was to explore anaemia among children under 5 years in Sakagyano community, in the Effutu municipality of Ghana. Specific objectives of the study included examine mothers knowledge on factors causing anaemia among children under five at Sakagyano in the Effutu municipality of Ghana, identify mothers knowledge on the effects of anaemia on children under five years, assess anaemia prevention measures by parents with children under five years and investigate the management of anaemia by parents with children under five years. In assessing the objectives of the study, the questionnaire was used as the main research instruments to collect data from the respondents.

The first objective of the study was to assess the factors that cause anaemia among children under five years. Significantly, poor feeding practices, insufficient iron in diet, unfavorable living and sanitary conditions, lack of breast feeding and low income status of household were found to be factors that cause anaemia in children. It was found that, lack of iron in the dieting of children under five years are the major causes of anaemia in children. In the view of Chatterjee et al, (2010), iron-deficiency anemia can be caused by diets low in iron. A child gets iron from the food in his or her diet. But, only a small amount of the iron in food is actually absorbed by the body. In their view full-term newborns, born to healthy mothers, have iron that they get during the last 3 months of pregnancy. Again, infants of mothers with anemia or other health problems may not have enough iron stored and infants born early may not get enough iron and that at 4 to 6 months of age, the iron stored during pregnancy is at a

low level. In this view, the American Academy of Pediatrics (AAP) recommends feeding your infant only breast milk for the first 6 months but breast milk does not have a lot of iron, so infants that are breastfed only, may not have enough iron. The signs of anemia do not show up immediately, or they may be mild. Symptoms included fatigue, weakness, dizziness, headache and low body temperature. The others are pale skin, rapid or irregular heartbeat, shortness of breath and irritability.

The second objective of the study was to identify mothers knowledge on the effects of anaemia on children under five years and in responses, majority of the respondents agree that anaemia affects the children in terms of growth and development. Accordingly, some of the respondents further noted that it also affect children's concentration and causes infections in children under five years. By implication when children under five years, get anaemia, it stunts their growth. According to Ngesa & Mwambi (2015), untreated anemia in children can have a serious effect on a child's growth. Anemia may affect mental development and function. This often leads to attention problems, delays in reading ability and poor school performance. From 2000 to 2010, in children aged 1 month–5 years, pneumonia, diarrhea and malaria claimed most lives. Anemia, the inability of erythrocytes to provide adequate oxygen to the body's tissues, is also recognized as a direct cause of death when it is severe. Additionally, it is recognized that mild and moderate anemia may also contribute to mortality risk.

With respect to the prevention measures, majority of the parents noted that they provide adequate iron and exclusive breastfeeding for the children. Chatterjee et al, (2010) agreed that breastfed babies have been found to have sufficient iron stores for nine months or longer. Human milk remains an important part of baby's diet, even after the introduction of solids. They continue that parents are to continue iron-fortified formula for at least one year, which is usually until the infant is eating adequate amounts of other dietary sources of iron.

In examining how to manage anaemia by parents with children under five years, it was clear that majority of the respondents agree that they prevent anaemia by providing kontomire stew and raw egg and milk mixture for children under five years. According to Mohammed, et. al. (2013), in order to prevent anemia with children under five years, it is important to eat a balanced healthy diet rich in iron, reduce tea and coffee intake as they make it harder for your body to absorb iron and increase vitamin C intake as it may help iron absorption. They add that, a baby's diet can affect his or her risk for iron-deficiency anaemia. Example, cow's milk is low in iron. For this and other reasons, cow's milk is not recommended for babies in their first year.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The chapter six of this study on exploring anaemia among children under five years presents the conclusions and recommendations to health facilities and parents to enhance the quality of diet of children under five years. Besides, it would help parents to put in place measures that would prevent anaemia in children under five years.

6.1 Conclusions

Anemia is one of the most serious public health problems affecting people in both developing and industrialized countries. The findings on the study on exploring anaemia among children under five years revealed that, mothers knowledge on anaemia in children under five years were primarily caused by insufficient iron in diet, feeding practices, household conditions, lack of breastfeeding and maternal anaemia during pregnancy. This leads to bodily weakness, dizziness, headache and sleeplessness among children under five years. Again, as a result of the diseases, anaemia affects children by stunting the growth of the children and also affecting their concentrations. In order to prevent anaemia in children under five years, parents adopt a coping strategy which is to provide kontomire, garden peas and raw egg and milk mixture to the children as well as ensuring exclusive breast feeding and providing adequate iron and vitamins which reduce the risk of anemia. Although anemia continues to be a public health problem, anemia prevention and control measures should be maintained and strengthened: interventions for women of childbearing age, fostering exclusive breastfeeding of infants through their sixth month, and encouraging compliance with recommendations on complementary feeding per children's nutritional guidelines aged less than 5 years. Further evaluation is needed to identify the causes of anemia in the population of preschool children.

6.2 Recommendations

Based on the objectives of the study, the following recommendations are made to prevent anaemia in children under five years.

1. The most important factors that were associated with anaemia in children under five years were their nutritional knowledge and poor knowledge in handling the disease in children. Anaemia was found to be a major problem in this cohort of children and their mothers. Dietary factors and socio-demographic factors were the major factors associated with high levels of anaemia among the children and their mothers. It is therefore recommended that mothers should be sensitized on best practices for prevention of anaemia among both women and children.
2. One of the challenges that was realized with the respondents was about the lack of exclusive breastfeeding with a substantive number of respondents. It is important that, exclusive breastfeeding must be well encouraged. Health education and Health promotion activities must be intensified to reduce the risk of anaemia in children under five years.
3. Further research, by comparing subgroups of the population with high and low prevalence, is required to determine potential risk factors associated with the prevalence of childhood anemia.

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APPENDIX

Appendix A: Questionnaire

UNIVERSITY OF GHANA, LEGON

SCHOOL OF PUBLIC HEALTH

I am an MPH student from the University of Ghana, Legon, conducting a research on Anaemia in children under 5 years at Sakagyano in the Effutu municipality of Ghana. Data/information collected would be used basically for academic work and it will be treated confidential. Kindly tick [ ] the correct answer in the boxes corresponding to the various question, and provide your own answers where applicable.

SECTION A: BACKGROUND OF RESPONDENT

1. Age (years)

a) 15 – 26 [ ]

b) 27 – 36 [ ]

c) 37 - 46 [ ]

2. How many children do you have?

a) 1 -2 [ ]

b) 3 -4 [ ]

c) 5 – 6 [ ]

d) 7 and above [ ]

3. Employment Status

a) Unemployed [ ]

b) Trader [ ]

c) Apprentice [ ]

d) Public servant [ ]

e) Others please (specify) ……

4. Religion.

a) Christianity [ ]

b) Islamic [ ]

c) Traditional [ ]

d) Others (please specify) ……

6. Level of education

a) No education [ ]

b) Primary [ ]

c) J.H.S [ ]

d) S.H.S [ ]

e) Tertiary [ ]

f) Others (please specify) ……

7. Marital status.

a) Single [ ]

b) Married [ ]

c) Divorced [ ]

d) Separated [ ]

e) Widowed [ ]

f) Attached /Cohabitation [ ]

8. Nationality

a) Ghanaian [ ]

b) Foreigner [ ]

c) Others (Please Specify)……

SECTION B: WHAT CAUSES OFANAEMIA IN CHILDREN UNDER 5 YEARS.

Please kindly tick where appropriate.

1. Agree
2. Disagree
3. Don't Know

CAUSES	AGREE	DISAGREE	DON'T KNOW
Insufficient Iron in diet			
Feeding practices(early weaning)			
Diseases (Malaria and Hookworm)			
Household conditions (e.g. unfavorable living and sanitary conditions)			
Lack of breastfeeding			
Maternal anaemia during pregnancy			
Low income status of household contributes to the cause of anaemia			

SIGNS AND SYMPTOMS OF ANEMIA IN CHILDREN UNDER 5 YEARS

SIGNS AND SYMPTOMS	AGREE	DISAGREE	DON'T KNOW
Body weakness			
Irritability			
Dizziness			
Pale skin and mucous membrane			
Breathlessness			
Headache			
Sleeplessness			

SECTION C: WHAT ARE THE EFFECTS ANAEMIA AMONG CHILDREN UNDER FIVE YEARS.

EFFECTS	AGREE	DISAGREE	DON'T KNOW
Stunted growth			
Poor School performance			
Developmental problems			
Lack of concentration			
Infections			

SECTION D: HOW DO PARENTS PREVENT ANAEMIA IN CHILDREN UNDER FIVE YEARS

ITEM	I AGREE	I DISAGREE	I DON'T KNOW
Exclusive breastfeeding help prevent Anaemia			
Adequate Iron and vitamins help reduce the risk of Anemia			
Sleeping under ITN's reduce the risk of mosquito bite			

SECTION E: HOW PARENTS MANAGE ANAEMIA AMONG CHILDREN UNDER FIVE YEARS.

HOME REMEDIES	I AGREE	I DISAGREE	I DON'T KNOW
'Kontomire stew"			
Garden peas (Abeduro)			
Raw egg and milk mixture			
Herbal concoction			

Appendix B: Consent form for women with children under five years

RESEARCH TITLE: Anaemia among children under five years in Sakagyano in the Effutu municipality of Ghana.

Principal Investigator: Dorothea Opare, Department of Population, Family and Reproductive Health, School of Public Health, College of Health Sciences, University of Ghana, P. O. Box LG 13, Legon.

Contact: Mobile; 0506594910

Email: afakyie@yahoo.com

General Information About The Study

This is a research study being undertaken by graduate student of the School of Public Health, University of Ghana, as part of the requirements for the Master of Public Health degree. The study seeks to examine factors contributing to anaemia among children under five in Sakagyano community, its effects and also find out how parents prevent anaemia among children under five and investigate how parents manage children under five with anaemia.

Procedures:

The study would engage mothers with children below five years in Sakagyano community. The focus is on mothers with children under five years with a total population of 68 household dwellers in Sakagyano community. If you are eligible and agree to participate, you will be required to respond to some questions. The questionnaire is about your background and a set of questions on how you perceive the causes, effects, prevention and management of anaemia. It is expected to last for 30 minutes.

It will be appreciated if you could participate in this study. This is purely academic research which forms part of my work for the award of a Master's Degree in Public Health.

Risks and Discomforts

The procedures involved in this study are non-invasive but may psychologically cause minimal discomfort to the participants.This is because participants may share some personal or confidential information or they may feel uncomfortable talking about some of the issues outlined.

Possible benefits

There is no direct benefits to the participant of the study. However, the information provided, will help us to assess the causes and effects of anaemia on children under five years in Sakagyano.

Voluntary participation and right to refuse

Your participation in this study is voluntary. During the administration of the questionnaire, you can choose not to answer any individual question or all the questions. Additionally, you are at liberty to withdraw from the study at any time. However, I will encourage you to fully participate in the study since your opinions are important in helping us to assess the causes and effects of anaemia on children under five years in Sakagyano.

Anonymity and Confidentiality

You are assured that whatever information is provided on the questionnaire will be handled with strict confidentiality. Your name or personal identification information will not be published in any report. Information submitted would not be shared with anybody who is not part of the study. Some staff of the research team may sometimes review the research the questions, but no unauthorized individual(s) will be able to access your information.

Compensation

There is no compensation for participating in this study. However, we will give you light refreshments to commend you for the participation in the study and also helping us with information on perception of quality of service delivery at this Hospital.

Contact for additional Information

If you have questions later, you may contact: Dorothea Opare, Department of Population, family and Reproductive Health. University of Ghana School of Public Health College of Health Sciences P. O. Box LG 13, Legon Mobile: 0506594910 Email: afakyie@yahoo.com

Your rights as a participant if you have any questions about your rights as a research participant, you can contact the Administrator of the Ghana Health Service Ethical Review Committee at the following address:

Hannah Frimpong

GHS-Ethical Review Committee Research and Development

Division Ghana Health Service

P. O. Box MB 190, Accra

Office: 0302 681 109 Mobile: 024 451 6482

Email: Hannah.Frimpong@ghsmail.org

Voluntary Consent

I _____, declare that the above document describing the purpose, procedures as well as risks and benefits of the research titled "**ANAEMIA AMONG CHILDREN UNDER FIVE YEARS, IN SAKAGYANO**" has been thoroughly explained to me in English/Twi/ Ga language. I have been given the opportunity to have any questions about the research answered to my satisfaction. I hereby voluntarily agree to participate as a subject in this study.

_____ _____/_____/_____

Signature or Mark of Participant Date

If participant cannot read the form themselves, a witness must sign here.

I, _____ was present while the purpose, procedures as well as risks and benefits were read to the participant. All questions were answered and the participant has voluntarily agreed to participate as a subject in this research study.

……... _____/_____/_____

Signature of witness Date

Researcher's statement:

I, _____, certify that the nature and purpose, the potential benefits and possible risks associated with participating in the study have being explained to the above individual in the English/Twi/Ga language. The participant has freely agreed to participate in the study.

…… _____/_____/_____

Signature of person who obtained consent. Date