

**EFFECT OF NUTRITIONAL KNOWLEDGE OF
MOTHERS/CAREGIVERS ON THE NUTRITIONAL STATUS OF THEIR
UNDER-FIVE YEAR OLD CHILDREN IN WA MUNICIPAL, GHANA**

BY



ABU-NAA ZAHARI AMINBO

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BY

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**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON, IN
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DECLARATION

I, Abu-Naa Zahari Aminbo, certify that this dissertation is the results of an objective research supervised by Mr. Frank Ekow Atta Hayford and Dr. Joana Ainuson - Quampah of the School of Biomedical and Allied Health Sciences (SBAHS). All references mentioned in this dissertation have been fully acknowledged.

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DEDICATION

This research is dedicated to the entire my family, especially my mother, Mad. Habiba Seidu and my sister, Shakuu Saeed for their love, support and encouragement during this programme.



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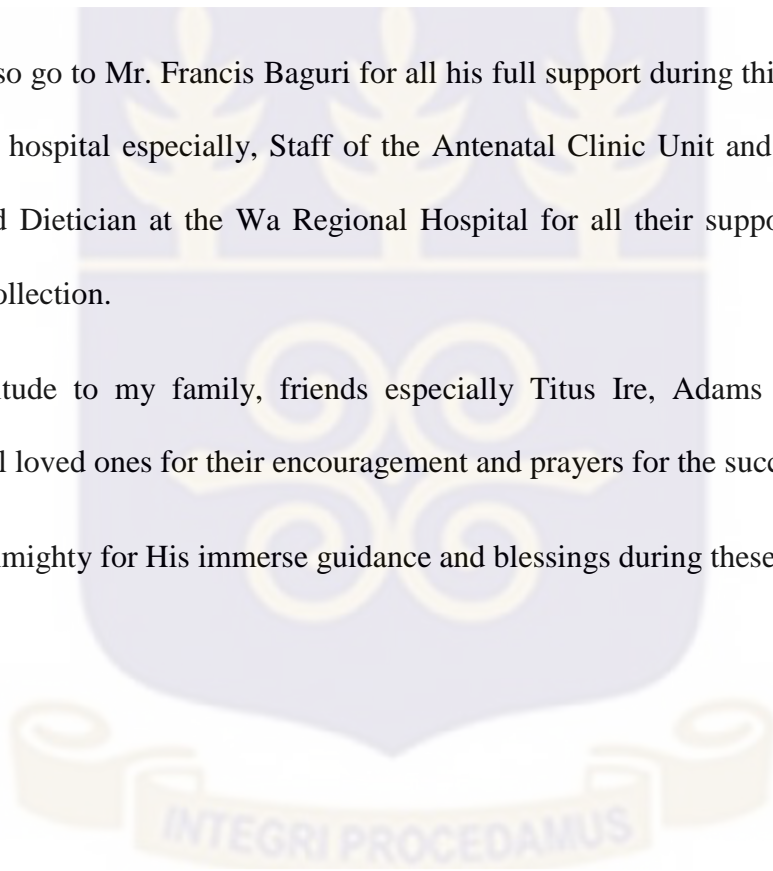
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ABSTRACT

Introduction: Nutritional knowledge refers to knowledge of concepts and processes related to nutrition and health. A mothers' perceptive of fundamental nutrition and health strongly affects the dietary habits of their children since they are the top principal care providers of their children. The various features of nutritional knowledge include: exclusive breast feeding, required age for starting complementary foods and the type of complementary foods to introduce, frequency of giving foods during the day, types of foods to give during diarrhoea and mothers'/caregivers' perceptions of nutritional state of their children. The study determined the relationship between nutritional knowledge of mothers/caregivers and nutritional status of their children under 5 years.

Method: A cross sectional study with 100 mothers as respondents was done in the Wa Regional Hospital using a structured questionnaire to collect information on their nutritional knowledge. Then 100 children 6-59 months attending growth monitoring in the Wa Regional Hospital were assessed for nutritional status using anthropometric measurements.

Results: Results showed that majority of the mothers/caregivers (56%) were married and were between the ages of 29-39 years. Most of the mothers had attained some level of education: 50% of the mothers had tertiary education, 37% had either primary/junior/senior high school education or only 13% had no form of education at all. Majority of the children who took part in the study were within the age range of 6-12 months old and female children (55%) formed a greater part of the population. Most mothers (76%) interviewed had very good nutrition knowledge, 13% had good nutrition knowledge, 7% had excellent nutrition knowledge and just 4% had fair knowledge in nutrition.

The prevalence rates of stunting, wasting and underweight among the children were 17%, 5% and 2% respectively. Children (10%) within the age range of 12-23 months old were more stunted; those within the same age range were found to be severely wasted (6%). However children (2%) within the age range of 24-35 months old were more underweight as compared to the other age groups. Also male children (9%) were found to be more stunted than female children within the study population.

Conclusion: The study concluded that mothers had very good nutrition knowledge. Generally, the nutritional status of the children was normal except for stunting which was higher than wasting and underweight. The study revealed no significant association between mothers'/caregivers' nutrition knowledge and the nutritional status of their children. Even though, majority of the mothers/caregivers appeared to have good nutrition knowledge, it did not seem to transform into appropriate infant feeding practices since prevalence of stunting, wasting and under-weight were of concern. Thus, there was no effect of the mothers/caregiver's nutrition knowledge on the nutritional status of their children.



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LIST OF ABBREVIATIONS

CDC	Centre for Disease Control
FAO	Food and Agriculture Organisation
GDHS	Ghana Demographic Health Survey
GHS	Ghana Health Survey
GSS	Ghana Statistical Service
MPHS	Ministry of Public Health
NBS	National Bureau of Statistics
NIHS	National Institute of Health Sciences
SCN	System Standing Committee on Nutrition
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organisation

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Nutritional knowledge involves having knowledge of concepts and processes related to nutrition and health (McKinnon, Giskes, & Turrell, 2014). Mothers' perceptive of fundamental nutrition and health strongly affects the dietary habits of their children since they are the top principal care providers of their children (Appoh & Krekling, 2005). Therefore, promoting maternal nutrition knowledge especially in developing countries would help improve on the nutrition of their children (Suresh, Ravishankar, Chaitra, Mohapatra, & Gupta, 2010). The various features of nutritional knowledge include; exclusive breast feeding, required age for starting complementary foods and the type of complementary foods to introduce, regularity of giving foods during the day, sorts of foods to give during diarrhoea and caregivers' perceptions of nutritional state of their children (Appoh & Krekling, 2005). Studies done by World Health Organization (WHO) approximated that; improper practices of feeding of infants were accountable for majority of malnutrition occurrences (WHO, 2006).

Malnutrition can be defined as alteration in nutritional status that carries the penalty of illness, dysfunction or death (Geissler & Powers, 2005). Worldwide, about 161 million children between the ages of 6 – 59 months were estimated to be stunted (short for age), wasting (small for height) was found to be 51 million with 17 million being seriously wasted and 99 million being too small for their age(UNICEF, 2014).

In developing countries, malnutrition is the most frequent nutritional condition and it continues to be the highest cause of death among children (Mahgoub, Nnyepi, & Bandeke, 2006). It is approximated that 150 million infants under 5 years are too small for their ages and more than 20 million suffer from severe malnutrition (Dabone, Delisle, & Receveur, 2011). Child malnutrition is a huge problem caused by many reasons including inadequate intake, diseases, improper practices, poor socio economic status and these sum up to illness and loss of lives yearly (Shettigar, Anisla, Maryes, Chaeko, Thomas, & Shukoor, 2013).

In under developed countries where the right breastfeeding and complementary feeding practices are not well practiced, under nutrition is usually very common (Lartey, 2008). About 47 million infants below 5 years are stunted in the sub-Saharan Africa, whereas in the Eastern and Southern Africa 24 million are stunted (UNICEF, 2009). The incidence of malnutrition among children below five years remains constantly high in Ghana, especially in the Northern Region, where, 33% of children below five years were stunted, 6.3% wasted, and 20% underweight (GDHS, 2014). Protein Energy Malnutrition (PEM) has been most prevalent, often resulting in poor growth and underweight. An estimated 54% lives lost in early years were related to PEM, making it the greatest root of child death in Ghana (GHS, 2005). Moreover, children below 5 years who are the most vulnerable age group constitute over 20% of the population of Ghana (Surabi, 2004).

A cross-sectional study by Amanuel, Gerezgiher, Hailemariam, & Kalayou (2013) in Ethiopia on assessing mothers' knowledge on infant and child feeding indicators using 541 mothers showed that, mothers' knowledge increases with educational status. An earlier study done in Luang prabang province in Laos in 2007 revealed that poor maternal education and poor nutrition knowledge were the key causes of malnutrition in infants (Phengaxy *et al.*, 2007).

Other reasons such as work status, income and age of the mother also had an effect on the diet of their children. It is therefore thought that caregivers with adequate nutritional knowledge should be able to choose healthy and nutritious foods for their children (Ozdogan, *et al.*, 2012). A study conducted by SunWoong, ChungJa, AeJung, & MiHyun (2000), confirmed that there was a link between nutritional knowledge of mothers and nutritional status of their children. A similar study by Vereecken & Maes in 2010 also found that high nutritional knowledge scores of mothers directly related with the diet scores of their children. As the nutritional knowledge levels of mothers increased, the more their children consume less fat and more dietary fiber foods (SunWoong, *et al.*, 2000). Since nutritional education for mothers will positively affect eating behaviours of children, mothers are therefore the most important people to provide that education to (Bevan & Reilly, 2011).

1.2 PROBLEM STATEMENT

Earlier research shows persistently high rates of under nutrition with 8 in 10 children beneath 5 years of age in Ghana suffering from some form of under nutrition, including stunting; wasting; iron deficiency anaemia, and deficiencies in iodine, and vitamin A (GSS, 2009). According to report by (GDHS, 2014), 19% of children beneath five are stunted or too short for their age, chronic malnutrition. Stunting is more common in rural areas (22%) than urban areas (15%). For instance, stunting ranges from 10% in the Greater Accra region to 33% in the Northern region with Upper West region recording 22.2%.

A study conducted by Adeba, Garoma, Gemedo, & Gawma, (2014) showed that infants within the ages of 6-59 months are at higher risk of stunting due to the start of complementary foods exposing the child to external contaminants.

Another research reported by Mohieldin, Ibrahim & Alshiek, (2010) revealed that malnutrition prevalence was higher among children who were no longer exclusively breastfed. This is supported by the findings from GSS, (2009) which showed that stunting was high among children between the ages of 6-59 months and it has been attributed to the poor transition from exclusive breastfeeding to the introduction of weaning feeding.

However, in Ghana not much work has been done in the northern part, hence the need to investigate the impact of levels of maternal nutrition knowledge in feeding practices and nutritional status of their children in the Wa Municipality.

1.3 SIGNIFICANCE OF THE STUDY

On completion of this research, the findings will help implement appropriate strategies intended at improving the nutritional status of children and also to assist experts (dietitians, nurses, etc) in managing and preventing childhood malnutrition. Additionally, in order for a nation to better endorse modification and improve infants' health, it is important to offer more insight into association between maternal knowledge and nutritional status of children.

1.4 RESEARCH HYPOTHESIS

There is no association between mothers/caregivers nutritional knowledge and the nutritional status of their children under-five (6-59 months) years.

1.5 AIM OF THE STUDY

The aim of the study was to determine the relationship between nutritional knowledge on infant feeding practices of mothers/caregivers and the nutritional status of their children under 5 years (6-59 months) attending growth monitoring programme in the Wa Regional Hospital.

1.5.1 SPECIFIC OBJECTIVES

1. To assess nutrition knowledge of mothers/caregivers on breastfeeding and complementary feeding practices during a growth monitoring programme.
2. To assess the nutrition status of their children by determining their anthropometric indices.
3. To determine the association between knowledge on feeding practices of mothers/caregivers and the nutritional status of their children, to ascertain if there is any effect of knowledge on nutrition status respectively.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 NUTRITION

Nutrition is defined as the "science of food, the nutrients and other substances therein, their action, interaction and balance in relation to health and disease, and the processes by which the organism ingests, absorbs, transports, utilizes and excretes food substances"(Lagua & Claudio, 2004). Sufficient nutrition through best infant and young child feeding practices is vital for the growth of a child to its fullest potential in the early life. Healthy eating habits in childhood are very important in the prevention of malnutrition and acute child nutrition problems. Nutritional status can be defined as the evidence of nutrition of a person, and the type of nutrients consumed and the body's ability to utilize these nutrients for its metabolic requirements is needed in assessing it (Amosu, Degun, Atuolomah, & Olarenwaju, 2011).

Mothers are usually responsible for their children's eating habits and preferences (Nicklas & Hayes, 2008). Therefore, mother's nutrition knowledge is the key to a child's nutritional status outcome; their perceptive of basic nutrition strongly affect the care they give. Malnutrition and poor nutritional status can arise in families with ample income, food and health services as a result of inadequate nutrition knowledge (FAO, 2011). Children suffer from malnutrition if their foods do not offer them with enough nutrients for protection and development, or their inability to fully make use of the foods they consume due to disease.

2.2 CONCEPT OF MALNUTRITION

One of the biggest problems in the world is child malnutrition which is the root cause of childhood deaths worldwide and efforts to reduce it should be of ultimate priority (Wiejesingh, 2010). Under nutrition, a form of malnutrition among children globally and more so in less developed countries is one of the most common causes of morbidity and mortality (WHO, 1999). Under nutrition has been the cause of deaths in about 10.9 million children below five years that occur yearly, making it a civic health concern in most less developed countries (Amsalu & Tigabu, 2008). In the year 1990, the prevalence of child malnutrition in the world declined relatively but there was an increase in Africa (Blossner, deOnis, & Pruss-Ustun, 2005). One-third of all deaths of children below five years are as a result of malnutrition (United Nations (UN), 1992). In 2011, a report from WHO concluded that about 178 million children below five years globally were too short for their age; while 115 million were underweight (WHO, 2011). About 195 million children below five years are malnourished with 90% of them living in Sub-Saharan Africa and South Asia (Black *et al.*, 2008). Majority of these deaths (about two-thirds) are often linked with inappropriate feeding practices (Eskezyiaw, Desta, & Genet, 2017). Inappropriate feeding practices according to WHO (2000), are one of the main reasons of high morbidity in children of the less developed nations. About 19 million children around the world have been estimated to be severely acutely malnourished at any period of time and these children have a greater than nine fold higher chances of dying compared to a healthy child (Deconinck, Bahwere, Diene, Bernardo, & Adou, 2011).

Ways of decreasing child mortality in many poor-resource countries through careful principal health care have targeted mainly on the avoidance and management of particular infectious diseases, with little efforts being geared towards improving children's underlying nutritional status (Rao *et al.*, 2005). Almost one-third of children in developing countries are underweight or stunted. Under nutrition results in constant bouts of infectious diseases, causing an approximated 3.5 million avoidable maternal and child deaths yearly (Scaling up Nutrition, 2008). Sub-Saharan Africa carries the burden of the impact caused by malnutrition, as almost half of deaths occurring there are caused by that (Rajaratnam, *et al.*, 2010).

Malnutrition is insufficient, excessive or imbalance consumption of dietary energy and nutrients and it appears in many different forms such as under nutrition, over nutrition and micronutrients deficiencies (Babatunde, Olagunju, Fakayade, & Sola-Oja, 2011). Malnutrition is a condition of nutrition where by the weight for age, height for age and weight for height indices are below -2 Z-score of the National Center for Health Statistics (NCHS). Children who are undernourished are at a higher risk of poor intellectual, physical and physiological development, greater chances of infections and finally death (Katona & Katona-Apte, 2008). The causes of malnutrition are numerous but the most direct causes are inadequate diet and diseases which are themselves affected by a set of fundamental factors: household food insecurity, poor maternal/ child caring practices and poor availability to health care and healthy environment (Muller & Krawinkel, 2005). In order to find answers and effectively meet the requirements of the most at risk individuals in the society, the immediate and underlying causes of malnutrition must be understood (UNICEF, 2013). One of the significant markers of child health is malnutrition, it is an important causative factor to infant and child death, poor nutritional status during childhood also has inferences to adult economic achievement and health (Victora *et al.*, 2008).

Nutrition is an important aspect of child growth and development and the first two years of a child's life is usually the best period for improving upon the wellbeing of a child (Ali, Weobong, & Naah, 2006). A child needs the right kind of nutrition in order to grow well and attain optimal development. The word nutrition means 'the process of nourishing or being nourished, it is the process by which a living organism assimilates food and uses it for growth and replacement of tissues. "Nutrients are substances that are essential to life which must be supplied by food" (Basavanthappa, 2008). The problem of malnutrition exists in every part of the world and it affects individuals, the communities and the nation as a whole. The most affected are children, women and the elderly (Khor, 2003). In many countries, malnutrition is associated with mother's education, childcare practices, food availability, household size and many more (Iram & Butt, 2006).

2.3 PREVALENCE OF MALNUTRITION IN CHILDREN AGED 6-59 MONTHS

Worldwide, the predominance of stunting, underweight and wasting in children beneath five years are 26%, 16%, and 8%, respectively (Unicef, WHO, & Bank, 2012). According to a report from WHO (2009a), approximately half of the world's populace, suffers from inadequate nutrition. In less developed countries, occurrence of malnutrition among children below five years is very high with nearly one third of these children being stunted.

Over 6 million children die (55 % of the 12 million children under 5 years of age) each year in less developed nations from infectious diseases and these deaths can be accredited to malnutrition (Sendeku & Agegnehu, 2007). Under nutrition is commonly found in poor-resource countries and this is usually due to inappropriate breastfeeding and complementary feeding practices (Lartey, 2008). Approximately 230 million children below five years are considered to be persistently malnourished in less developed countries (Van de Poel *et al.*, 2008).

Reports from FAO, (2008), showed that, about 54% of deaths among children of this age in less developed countries are attributed with malnutrition. Also 41% of under-five children are malnourished and deaths as a result of malnutrition are increasing in Sub-Saharan Africa. For example, in Sub-Saharan Africa about 35 % of children are stunted, while 29 % are underweight (Leenstra *et al.*, 2005).

In Kenya, demographic health survey, reported that 35.3% of under-five children are stunted, 6.7% were wasted and 16.3% were underweight Kenya National Bureau of Statistics (KNBS), (2010). Also, a survey by Schofield, 2009 carried out in Mathare, Nairobi with an estimated population of 423,000 people reported a severe acute malnutrition (SAM) rate of 0.2% translating into a caseload of 169 cases. A study by Siddiqi, Haque, & Goni, (2011) in Bangladesh, with children below five years reported the high incidence of stunting and underweight. For instance, 42% and 40% of children beneath five years were stunted and underweight, respectively. Another study in Mongolia showed the predominance of stunting to be 15.6%, wasting was 1.7% and underweight was 4.7% (Otgonjargal, Bradley, Woodruff, Batjarga, & Davaalkham, 2012). In South Sudan, the prevalence rate of acute malnutrition is regarded one of the highest in the world; about one child in every five children (22%) suffers from moderate to severe acute malnutrition (USAID, 2007).

Asurveyed conducted with 1740 children using MUAC, found that the predominance of acute malnutrition was 6.3%, with the occurrence being considerablyelevated among girls (8.3%) than boys (4.5%) and 11.0% in children aged 6–11 months compared to 5.4% in older children (Nyirandutiye, Ag Ikane, & Fofana, 2011).

During the Household Health Survey carried out in Sudan by the Federal Ministry of Health in 2006, it was stated that 41% of children were underweight, 15% were severely underweight, and stunting affected about 43% of underfives with 24% being severely stunted (FAO, 2005). In a rural community of Osun state, Nigeria, the prevalence rate of underweight was 23.1% whilst the prevalence in Kwara State (Nigeria) was 22.0% for underweight (Babatunde, Olagunju, Fakayade, & Sola-Oja, 2011).

Malnutrition is considered as one of the primary health concerns in Ghana. Nationally, the prevalence rate severely and moderately stunted is 5% and 19% in children under-five respectively. Also, 5% of children under five years are wasted and less than 1% being severely wasted with 11% of children below five years being underweight and 2% severely underweight (GDHS, 2014). In the Northern Region of Ghana, 32.5% of children below five years are stunted, 12.9% wasted, and 21.8% underweight (GSS, GHDS, ICF Macro, 2008). Available data from (GSS, 2011) also shows that, almost 13% of children beneath five years were moderately or severely too small for their age and 3% are considered as severely underweight. The results also concluded that nearly 23% were moderately or severely stunted, and 7% were severely stunted. Six percent of the children were moderately or severely wasted and 1% was considered severely wasted. However mothers who had higher level of education had children being less likely to be underweight (9%) and stunted (13%) compared to those whose mothers have no form of education (17% and 29%, respectively).

2.4 CAUSES OF MALNUTRITION

In accordance to the conceptual framework of nutrition by UNICEF, nutritional status is manipulated by three broad aspects: food, health and care.

Availability of affordable, varied, nutritious food; proper mother and child-care practices; good quality health services; and a fit environment including good water, sanitation and good hygienic

practices positively affects the nutritional status of children (UNICEF, 2013). The various factors causing malnutrition can be put into three groups: immediate causes, underlying causes and basic causes. The immediate causes of malnutrition involve insufficient food consumption and communicable diseases; the underlying causes include household food insecurity, insufficient mother and child care practices, poor quality health care and fit environment. The basic causes are formal and non-formal institutions, political, economic, and ideological structures and systems (Benson, 2005). All these groups of factors causing malnutrition are interrelated; one group influences the other. For example, food, health and care are influenced by social, economic and political factors hence for a country to be able to find appropriate and effective solutions to curb malnutrition, the immediate and underlying causes of under nutrition should be properly understood (UNICEF, 2013).

However, in children below five years the factors particularly accountable for malnutrition include weight of child at delivery, parity, age and sex of child, socio economic conditions, living standards, water and sanitation, food intake, weaning practices and mother's education (Jesmin, Yamamoto, Malik, & Haque, 2011). Low dietary consumption is a contributing factor of malnutrition in children below five years of age, and most of the above mentioned factors directly or indirectly contribute to the occurrence of malnutrition. During weaning periods and the second year of life, both chronic and acute malnutrition start to build up faster.

In addition, diseases like diarrhea are usually noted as one of the common causes of malnutrition in this age group (UNICEF, 1987). Worldwide statistics confirms malnutrition and lack of good sanitation the major contributing factors to early childhood deaths (UNICEF, 2012).

2.5 FACTORS AFFECTING MALNUTRITION

2.5.1 Diarrhoea

Diarrhoea is defined as the passage of three or more loose or liquid stools per day or more frequent than normal for the individual. It is often accompanied by vomiting, dehydration, and exhaustion and housebound (WHO/UNICEF, 2009). Various types of microorganisms are the leading cause of diarrhea and these organisms come into contact with individuals through contaminated food or drinking water or from person to person as a result of poor hygiene. Fluid loss due to diarrhoea has lethal results and also one of the major causes of child malnutrition (WHO, 2012). Diarrhoea and malnutrition are said to be interrelated, that is, diarrhoea may result in malnutrition due to reduced dietary intake, mal-absorption and mal-digestion and malnutrition may cause diarrhoea and other intestinal infections due to a weakened immune system (Nel, 2010). Acute diarrhoea is usually the rapid onset of diarrhoea, generally over hours rather than days and duration time of less than one week while chronic diarrhoea is generally more slow in onset and lasts for more than one or two weeks (UNICEF, 2009).

In developing countries most especially, diarrhoea is noted to be the second leading cause of child malnutrition in those below the ages of five. It has been estimated that there are about 2.5 billion episodes and 1.5 million deaths yearly in these countries (Fischer Walker, Friberg, Binkin, Young, & Walker, 2011). About 88% of diarrhoea disease is due to contaminated water supply and poor sanitary conditions. Therefore, better water delivery systems reduce diarrhoea occurrences by between 6% and 25%, and good sanitary conditions also reduce diarrhoea occurrences by 32%.

Again, sanitation interventions involving hygiene tutoring and endorsement of hand washing can lead to a decrease in cases of diarrhoea occurrences by 45% (Tumwine, 2005). In early life, the frequency of diarrhoea is relatively high and is coupled with a bigger risk of malnutrition. After

birth, prevalence of diarrhoea increases sharply and peaking between the ages of 9-18 months (SCN, 2006). Reports from WHO/UNICEF (2009) states that repeated episodes of diarrhoea places children under greater risk of poor nutritional status and undernourished children are also at a bigger risk of prolonged episodes of diarrhoea. A study conducted by Echoka (2007), on barriers of child nutrition security revealed a high proportion of household with malnourished children, with 43% having diarrhoea. A similar study by Takanashi *et al* (2009) in Viet Nam showed the prevalence of children below five years of age with diarrhoea to be about 11%. Children in families where the mothers less often washed their hands were most affected. Children under five years who are exposed to frequent episodes and duration of infections especially diarrhoea are at a higher risk of malnutrition. This is because these infections turn to damage mucosal surfaces required for absorption, lessening the efficiency of conservation and utilization of nutrients (Waswa, 2005). In Kenya, statistics shows that 16% of mortality among children less than five years of age is caused by diarrhoeal diseases (MPHS, 2010).

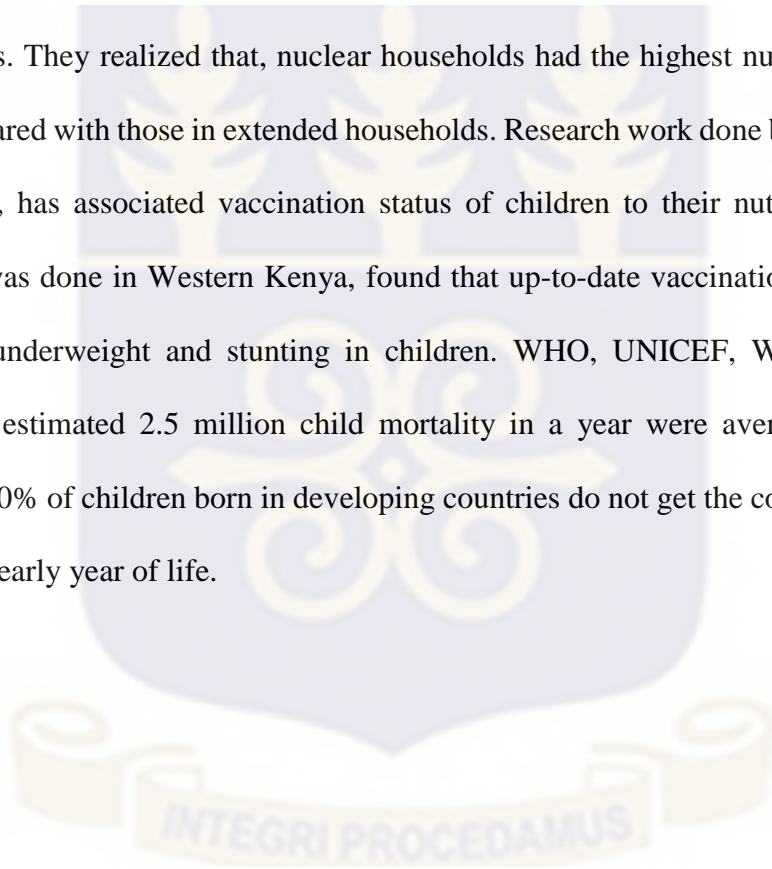
2.5.2 Vaccination Status of Children

Most childhood infectious diseases which are likely to cause malnutrition can be reduced through early vaccination of children under-five years (Bloss, Wainaina, & Bailey, 2004).

Vaccination is one of the keys to reducing deaths in children and reducing these deaths does not only mean providing children with vaccines but also anti-malarial bed nets, life-saving drugs, sanitary conditions and clean water (WHO, UNICEF, World Bank, 2009).

For the six common childhood infectious diseases: diphtheria, pertussis, tetanus, measles, poliomyelitis, and tuberculosis, WHO have recommended early vaccinations in developing countries (Bondy, Thind, Koval, & Speechley, 2009). Over the years, new vaccines have been

introduced in addition to the original for the six infectious diseases. These include vaccines against hepatitis B, *Haemophilus influenzae* type b (Hib) disease, mumps, pneumococcal disease, rotavirus and rubella (WHO, UNICEF, World Bank, 2009). However, in Nepal, it was found that vaccination status of children were associated with socio-cultural setting of children, where they live, parental education, parental income and access to quality health care services (Bhandari, Shrestha, & Ghimire, 2007). Similar studies by Bronte-Tinkew & DeJong, (2004), in the Caribbean, also revealed that household structure and socio-economic resources influenced a child vaccination status. They realized that, nuclear households had the highest number of vaccinated children as compared with those in extended households. Research work done by Bloss, Wainaina, & Bailey (2004), has associated vaccination status of children to their nutritional status. The research which was done in Western Kenya, found that up-to-date vaccination status negatively correlated with underweight and stunting in children. WHO, UNICEF, World Bank (2009), reported that an estimated 2.5 million child mortality in a year were averted by vaccination however, about 20% of children born in developing countries do not get the complete vaccination planned for their early year of life.



2.6 NUTRITIONAL KNOWLEDGE OF MOTHERS/CAREGIVERS AND MALNUTRITION

The health and nutrition education of mothers/caregivers is intended to improve upon the health and nutritional status of children since nutritional knowledge and skills will be gained by the mothers. In Ghana, poor maternal education in nutrition has been shown as the major contributing factor to poor childcare practices (Johnson, *et al.*, 1994).

Nutrition education is defined as “any set of learning experiences designed to facilitate voluntary adoption of eating and other nutrition related behaviour conducive to health and well-being” (Contento, 1995). Nutritional knowledge involves breastfeeding practices, age for introducing complementary foods and the sort of complementary foods being introduced, regularity of feeding, types of foods being fed during diarrhoea and the hygiene of mothers (Appoh & Krekling, 2005).

Nutrition knowledge is a requirement for changes in behaviour and attitude of mothers towards nutrition (Latham, 1979). Research has shown that maternal education in child weaning plays an important part in infants’ development and WHO growth parameters of children in less developed nations (Wilson *et al.*, 1998). Health and nutrition education are normally aimed at mothers who usually attend antenatal clinics and child welfare centers (CWC) in the various health facilities, most of whom were illiterates (UN, 1992). According to Aidam, Perez-Escamilla, & Lartey, (2005), maternal nutrition knowledge is associated with the ability of mothers to practice recommended feeding practices. Findings from a study done in Luang prabang province in Laos points to the main causes for childhood malnutrition as being inadequate education of mothers/caregivers, poor levels of nutrition knowledge and limited intake of meat and eggs (Phengxay *et al.*, 2007).

Furthermore, studies have indicated that educational level of mothers was a major factor influencing nutrition knowledge of mothers (Beavers, Margaret, & Jan, 1992). Research work done by Nekesa (2012), in Kenya showed that demographic and socioeconomic features such as age, level of education, marital status and source of family foods were found to influence the nutritional knowledge and practices of primary caregivers. Seligman, Laraia, & Kushel (2010) noted that nutritional knowledge of mothers was one of the main factors affecting the nutrition of infants under 3 years old. High predominance of stunting among children 12-35 months is attributed to poor transition to complementary foods and feeding practices and this may be due to lack of nutrition knowledge of mothers (Badake, *et al.*, 2014). A study by Poh *et al.*, (2012), it is found that nutrition knowledge of mothers/caregivers greatly influenced children's eating practices in a positive way. In a different study, it was stated that nutrition education for mothers will positively affect eating habits of children. Therefore, mothers are the most important sources in providing nutrition knowledge to (Bevan & Reilly, 2011). Further studies have shown that the ability of mothers to implement appropriate feeding practices was due to adequate nutrition knowledge (Kimani-Murage, *et al.*, 2011).

Strong evidence suggests that caregivers with adequate nutrition knowledge through frequent counselling have been able to improve upon their child's feeding behaviours such as food preparation practices, choosing of high quality foods and many more, thus reducing the risk of malnutrition in these children (Shi, Zhang, Wang, Caulfield, & Guyer, 2010). A research by Akeredolu, *et al.*, (2014), concluded that there was a considerable association between nutrition knowledge of mothers and the nutrition status their children. They also found out that even though mothers appeared to have adequate nutrition knowledge, it did not actually reflect on their infant feeding practices.

But similar works by Sule, *et al.*, (2009) in Two-rural communities in Nigeria disagreed with these findings. They found out that there was a positive influence of nutrition education level of mothers on the feeding practices of children.

2.7 IMPACT OF NUTRITION KNOWLEDGE ON NUTRITIONAL STATUS

Nutritional status is the indication of the nutrition of a person; it can be assessed by the type of nutrients take in and the body's capability to make use of these nutrients for its metabolic needs (Amosu, Degun, Atuolomah, & Olarenwaju, 2011). For a person, sufficient nutrition ensures accurate growth and physical development, and potential of immune system from conception to old age (David, 2002). Throughout the first five years of a child's life, a mother is the primary care provider; hence the mother's nutritional knowledge is vital for good quality health and overall nutritional status of the child. Inadequate knowledge can result in malnutrition and poor nutritional status can arise in households with enough income, food and health services (FAO, 2011). According to Aphane, Chadha, & Oluoch, (2003), nutrition education of caregivers play a vital task in enhancing the nutrition knowledge and the feeding practices of caregivers in relation their children, which add to the betterment of the children's nutritional status. Previous works by Akeredolu, Osisanya, Seriki-Mosadolrun, & Okorafor, (2014) showed the significant influence of maternal nutrition knowledge on children's dietary intake. According to WHO, (2003) lack of food is not a greater determinant of malnutrition as compared to mother's inadequate knowledge of appropriate foods and feeding practices. However, works carried out by Akeredolu, Osisanya, Seriki-Mosadolrun, & Okorafor, (2014) in Lagos state, Nigeria showed that the probability of being fed properly does not increase with nutrition knowledge.

2.8 FEEDING PRACTICES (BREAST FEEDING AND COMPLEMENTARY FEEDING)

For an infant to achieve the best nutrition, appropriate breastfeeding and complementary feeding practices must be available (Faber & Bernade, 2007). Appropriate feeding practices are age-definite, and are also distinct with very thin age ranges. They follow a variety of steps, from exclusive breastfeeding, which starts immediately after delivery, to the transition of the child to complementary foods (Sumit, 2012). Feeding practices of mothers are influenced by knowledge and awareness. For example, there can be a wide discrepancy in the nutritional states of children in families with comparable levels of income availability and resources and this may be due to differences in feeding practices (UN, 1992). Breast milk provides children with the right nutritional content during the first six months of their lives by improving upon their immunity preventing infections and diseases like diarrhoea that can cause malnutrition (WHO, 2010). Studies have shown that children who were breastfed for 4 months and below were 1.6 times more expected to be stunted than those breastfed longer months (Mohieldin, Ibrahim, & Alshiek, 2010). In the first six months of an infant's life, breast feeding has been found to be the most appropriate choice of intercession in saving children's lives. It can prevent about 13-15% of the 9 million childhood deaths of under five years in developing countries like Ghana (Nigeria Demographic and Health Survey, 2008). At the age of six months, children need solid foods in addition to breast milk and the transition from exclusive breast feeding to introducing solid foods in addition to breast milk should be timely and carefully done (Nigeria Demographic and Health Survey, 2008).

Studies have shown that weaning plays a significant role in the growth, intellect, and development of infants whereas improper weaning practices are linked with malnutrition (Wilson, *et al.*, 1998).

Stunting may occur if children do not receive enough quantities of solid/weaning foods after six months of age even when they have been exclusively breastfed (Black, *et al.*, 2008). Studies done

by WHO, (2006), shows that, improper feeding practices of children were accountable for one-third of the cases of malnutrition. These improper practices include failure to practice exclusive breastfeeding for 6 months, premature ab lactating after 6 months, and solids foods too late. The delay in introducing complementary foods to infants above six months may result in an insufficient amount of nutrient consumption, hold-up in development of eating behaviours and oral-motor skills (Sultan & Zuberi, 2003). Also, poor feeding practices are associated with cultural practices and traditional beliefs (Lindsay, Machads, Sussner, Hardwick, & Peterson, 2008). Appropriate feeding practices by mothers have been estimated to be able prevent about 6% of childhood deaths among children below five years of age (Black, Morris, & Bryce, 2003). Reports from (WHO, 2007) shows that in less developed countries only about one-third (36%) of mothers practiced exclusively breast feeding for the first six months and lack of instant and exclusive breastfeeding has resulted in about 1.5 million deaths of infants. Only 46% of children below six months are exclusively breastfed in Ghana and 21.1% of children between 0-5 months are exclusively breastfed (GSS, 2011). Also, only 68% of breast feeding children aged less than three years receive complementary foods (GSS, GHS, & ICF Macro, 2008). However, research has shown that breastfeeding can enhance the nutritional status and also decrease the morbidity and mortality of children (UNICEF, 2004).

In Ghana, improper feeding practices are known to be one of the main results of malnutrition in infants and young children below five years of age (Ezzati, Lopez, Rodgers, Vander Hoorn, & Murray, 2002).

Another study which was done in Sudan shows that the primary causative factors which result in stunting in under-fives were found to be lack of colostrum, length of breastfeeding, pre-lacteal feeds, type of complementary foods being introduced, age at which solid foods were introduced

and method of feeding (Nguyen, 2009). Malnutrition accounts for about 60% of 10.9 million deaths amongst children under five with improper feeding practices in the early stages of life contributing to over two-thirds of these deaths. Usually, less than 50% of these infants are exclusively breastfed in the first four months and early or late introduction of nutritionally inadequate or unsafe complementary feeding are also recorded (WHO, 2003). A study conducted by Edmond, Quigley, Amenga-Etego, Owusu-Agyei, & Kirkwood, (2006) revealed that among 10,000 infants in rural Ghana, neonatal deaths could be decreased by 24% if 99% of infants initiated breastfeeding on day one of life and 31% if 99% of infants started breastfeeding within the first hour, saving 867,000 and 1,117,000. In addition, works done by Olack, *et al.*, (2011), found the link between chronic malnutrition to the timing and sort of weaning foods being initiated to infants. A study conducted to find the relationship between dietary factors and stunting concluded that deprivation of colostrum, period of breastfeeding, pre lacteal feeds, age of initiation of complementary foods, regularity of feeding, style of feeding and first food given at time of complementary feeding were notably related with stunting (Beka, Wambui, Zewditu, & Girum, 2009). Research work on the nutritional status of under-five children and whether infant feeding practices are associated with nutrition in Anganwari areas of Urban Allahabad by Dinesh, Goel, & Poonam (2006), concluded that poor breastfeeding and complementary feeding practices were a significant risk factors for undernutrition.

Pelto *et al.*, (2004) showed that feeding practices could be improved if nutrition education is given to caregivers by knowledgeable healthcare workers. This may result in caregivers increasing the frequency of feeding, dietary diversity and improving on the protein and energy intake of their children (Vitolo, Rauber, Campagnolo, Feldens, & Hoffman, 2010). A current study by Akeredolu,

et al., (2014) revealed that complementary feeding practices of mothers were not adequate. About 76% of mothers in the study introduced weaning and solid foods to their infants at an early age. However, similar studies have shown that introducing complementary foods to infants very early can expose them to risk of infections and diseases leading to malnutrition (John, Safari, Kimambo, James, & Welaimiara, 2015). Due to the importance of complementary feeding to infants under the age of 24 months, the WHO recommended that all children should be exclusively breastfed for the first six months after which they should receive solid foods that are nutritious, safe and adequate while breast feeding continues until 2 years or more (WHO, 2003). Regardless of these recommendations, complementary feeding practices in less developed countries are still not ideal adding to malnutrition, failure to thrive, morbidity and mortality amongst children found in these countries (WHO, 2000).

2.9 MEASURING NUTRITIONAL STATUS OF CHILDREN UNDER 5 YEARS

2.9.1 Anthropometric Methods

Several methods such as anthropometric methods, biochemical tests, clinical signs and symptoms and dietary assessment methods can be used either alone or together to determine the nutritional status of children (Gibson, 2005).

In assessing the nutritional status of people in a population, anthropometric measures are used, and they are important markers of a child's nutritional status. Some of the measurements includes; height-for-age (HFA), weight-for-age (WFA) and weight-for-height (WFH).

Using measurement of both weight and height will give a complete representation of the nutritional status of a population (Victora, *et al.*, 2008).

2.9.1.1 Length/Height-for-age (Stunting): Length/height for age presents an indicator of poor growth in a child. Reports from Ghana Demographic Health Survey (GDHS, 2014), revealed that children below five years with height-for-age score below minus two standard deviations (-2SD) from the median of the reference populace, are considered short for their age, or stunted. Those below minus three standard deviations (-3SD) are severely stunted. Stunting results from the inability to grow enough in length/height in relation to age and it reflects the accumulated effects of insufficient nutrient intake and/ or repeated episodes of illness, especially diarrhoea, and their interaction (WHO, 1995). Stunting is considered as chronic malnutrition and it has been noted to be more prevalent in children between the ages of 12-35 months, signifying that weaning practices need to improve upon (Otgonjargal, Woodruff, Batjargal, Gereljaral, & Davaalkham, 2012).

2.9.1.2 Weight-for-age (Underweight): It is a combined index of both height-for-age and weight-for-height and does not differentiate between the two.

A child is said to be underweight if he/her weight measures are below minus two standard deviations (-2SD) from the median of the reference population while those with below minus three standard deviation (-3SD) severely underweight (GDHS, 2014).

Underweight shows chronic or acute malnutrition or both, a child could have a normal weight-for-length/ height relationship but classified as “underweight” because the child is stunted (WHO, 1995).

2.9.1.3 Weight-for-height (Wasting): This index compares the body’s mass to body’s length and defines the present nutritional status of a child and arises from the inability of the child to gain sufficient weight in accordance with his/her height. A weight-for-height measure of a child below minus two standard deviations (-2SD) from the median of the reference population is considered

wasted or too thin for the height and those with a weight-for-height below minus three (-3SD) are also considered severely wasted (GDHS, 2014). Wasting reveals recent shortage in energy intake and/ or recent acute illness, especially diarrhoea. It identifies a currently malnourished child or population of children, hence a useful indicator for both clinical and epidemiological purposes (WHO, 1995).

2.9.2 Reference Standards

The is the accepted reference population used to determine weight-for-height, weight-for-age and height-for-age, as markers of a child's nutritional status is the U.S. National Center for Health Statistics, the U.S. Centers for Disease Control, and the World Health Organization (NIHS/CDC/WHO) growth reference.

Studies have shown that well nourished children below five years trail comparable growth patterns internationally (Van de Poel, O'Donnell, & Van Doorslaer, 2007). However, this reference standard has been disparaged as unsuitable for generality because of the cultural similarity of the model upon which it was founded and also majority of mothers were using of feeding bottles in the sample population.

Also insufficient capacity of occurrences throughout the stage of fast growth have caused imprecise categorization of early childhood growth curves (Prost, *et al.*, 2008). To reply to these disparagements, WHO carried out the Multi-Center Growth Reference Study (MGRS) between 1997 and 2003 and in 2006 came out with new growth standards for children from delivery to sixty months of age. Healthy children in India, Norway, Oman, the United States, Brazil and Ghana, living under the most approving conditions were used for this study.

In the first six months of life children were solely breastfed and introduction of solid foods started from six months and above (Ergo, Gwatkin, & Shekar, 2009). Expressions of these nutritional indices are usually done in standard deviation units (z-scores) from the median of the reference population (Prost, *et al.*, 2008). Several studies have been done to compare the NIHS/CDC/WHO growth reference and the new WHO growth reference and it was concluded that, the new WHO growth standards were more standard and more responsive to malnutrition (Van den Broeck, Willie, & Younger, 2009). A study by Prost, *et al.*, 2008, amongst children below five years in Northern Malawi saw a prevalence of 2.9, 6.1, and 8.5 fold higher for stunting, underweight, and wasting respectively when using the WHO standards compared to the NCHS/CDC/WHO reference.

2.10 GROWTH MONITORING (GM)

Growth monitoring is the process of following the growth rate of a child in comparison to a standard by periodic, regular anthropometric measurements in order to measure growth adequacy and identify irregularities early. It is not used occasionally to measure the anthropometry of a child in order to establish nutritional status devoid of determining the growth velocity over a period of time; that is nutritional status observation or nutrition evaluation (Griffiths & Rosso, 2007).

In the early stages of chronic systemic and endocrine disease of an infant, growth monitoring is used as a selection tool to identify nutritional deficiency. Even in the lack of nutrition education, growth monitoring has been recommended to have the ability to significantly influence child mortality (Khadilkar *et al.*, 2007).

There is a number of roles growth monitoring plays: Assessment role, this role permits for early finding of growth failure and helps to start the appropriate action in response to irregular patterns of growth; Educational role, in teaching mothers and caregivers on how nutrition, physical activity,

genetics and illness can affect growth, it is used as a guide and, in doing so, inspire and assist individual ideas and improved appropriate child care practices; Promotional and motivational role, this particular role seeks to offer regular contact with principal health care services and make possible their utilization.

It raises mothers' and caregivers' awareness and dedication to child growth and nutrition (Dietitians of Canada and Canadian Pediatric Society, 2010). Weight charts are usually used to provide the graphic illustration of a child's weight-for-age during growth monitoring programmes. A malnourished or sick child will have a slower pace of weight gain than a well-nourished (Ashworth, Shrimpton, & Jamil, 2008).

2.10.1 Growth Monitoring and Promotion (GMP)

Growth monitoring and promotion (GMP) is defined as a prevention activity comprising of GM linked with promotion (usually counselling) that add to understanding about child growth; improves childcare practices; increases demand for other services, as needed; and serves as the core action in combined child health and nutrition program, where needed.

It is not used as a dimension to determine levels of malnutrition in a child during nutrition examination program; or for periodic nutrition estimation; or to monitor a population to choose or decide appropriateness of children for food enhancement, therapeutic feeding, or other services. GMP does not necessarily lead to decrease in malnutrition or in early child death on a public health scale; however, it is intended to influence family-level choices and individual child nutritional effects (Griffiths & Rosso, 2007).

One of the most commonly promoted methods of growth monitoring is weighing and charting growth. Weight gain is assumed to be the most sensitive indicator of growth and is universally applicable (Lofti, 1988). Growth monitoring can also be used as an access point for community

recruitment and social exploit, especially when its data are combined and used for community-level evaluation and investigation of child malnutrition, aiming at supplementary feeding and reporting prevalence of underweight (Ashworth, Shrimpton, & Jamil, 2008).



CHAPTER THREE

3.0 STUDY DESIGN AND METHODOLOGY

3.1 STUDY DESIGN

A cross-sectional design was used for this study as it was aimed at determining the nutritional knowledge, attitudes and practices of mothers/caregivers at a specific point in time.

3.2 STUDY SITE

The study was carried out at the Regional Hospital at Wa in the Upper West Region of Ghana. The Wa Regional Hospital is a major referral hospital in the region that takes care of major conditions that cannot otherwise be managed at other hospitals in the Region (Regional Hospital Health Administration, 2014). The hospital performs a double purpose as a regional hospital and a municipal hospital and it serves as the main referral centre in the Region.

The Municipality has a family population of 102,264 with a total of 9,592 houses and children comprises of a larger proportion of the household structure making up for about 42.0 percent of the population.

3.3 SAMPLE SIZE DETERMINATION

Sample size was calculated using Magnani (1997) formula as follows

$$n \geq \frac{Z^2(P)(1 - P)}{E^2}$$

n = minimum sample size, P = is the proportion of variable of interest in the population. For unknown proportion, 0.5 is assumed, therefore, the unknown proportion is assumed to be 0.5. At 95% confidence level, Z-score is 1.96 and at an allowable error (E) of 10%.

Therefore,

$$n \geq \frac{1.96^2(0.5)(1 - 0.5)}{0.1^2}$$

$$n \geq 96 \approx 100$$

A total of 100 study participant were recruited for this study

3.4 SAMPLING TECHNIQUE

Purposive sampling (for non-probability data) was used to identify the target population on the basis of the age of the child.

3.5 STUDY PARTICIPANTS

The target population included mothers with children 6-59 months attending growth monitoring programme at the regional hospital willing to participate in the study. If a mother has more than one child in the same age range, both children are included in the study.

3.5.1 Inclusion Criteria

All children within the age range of 6-59 months who attended the GMP were included in the sample and measured.

3.5.2 Exclusion Criteria

Mothers with children between 6-59 months who declined to participate in the study were excluded.

3.6 DATA COLLECTION

A structured questionnaire (Appendix III) which had two main sections was used for data collection:

Section 1 comprised of background characteristics of participants and section 2 included anthropometric measurements. Ten respondents from a different health care centre were used to test the questionnaire. These respondents were excluded from the main study. During the pre-testing, time taken to complete a questionnaire was noted and sequence of questions and understanding of the questions by the respondents were also noted. The results from the pre-test were used to modify the questionnaire accordingly.

3.6.2 Demographic and Socio-economic Data

Demographic and socio-economic data were collected using the questionnaire. Data on maternal marital status, educational levels, age, occupation of the parents, sources of income, sex and age of the child and the size of the household were collected.

3.6.3 Qualitative Data: Nutritional Knowledge

Nutritional knowledge data was collected using a using modified and structured version of validated WHO (2010) questionnaire (Appendix III) for mothers/caregivers. Information was collected on nutrition messages on breastfeeding and complementary feeding.

3.6.4 Anthropometric Measurements

3.6.4.1 Height: Measurement was based on recumbent length or standing height. Length measurement was carried out for children less than 2 years (over 85 cm) of age and height measurement for those over two years or those who can stand on their own.

The length or height was measured and reported to the nearest cm using an Infantometer for those below twenty-four months and stadiometer for those above two years or those who could stand by themselves.

3.6.4.2 Weight: Weight measurement was reported to the nearest 0.1 kg. Ideally, weight was determined with the child wearing no clothing or just wearing one layer of undergarments. The weight was measured using hanging plastic pants and a Salter scale for measuring weight of children.

3.6.4.3 MUAC: Mid-upper arm circumference was taken for using the left arm of the child. The arm was bent at the elbow to make a right angle. MUAC tape was placed at zero which is shown by the two arrows, on the tip of the shoulder and the tape was pulled to the tip of the elbow.

The midpoint of the arm was marked with a pen. The arm was then straightened, the tape placed around the marked area and the reading taken twice to get an average.

3.6.4.4 Age determination: Information on age was obtained from the weighing card or similar document, with verbal confirmation on date of birth from the mother/caregiver. Age was calculated in months to at least one decimal place.

3.6.5 Recruitment and Training of Field Assistants

Two research assistants were recruited based on ability to read, write and able to speak one of the local languages. The training took two days and areas covered were study objectives, the use of survey equipment, interviewing technique, anthropometric measurements and the filling of the questionnaires.

3.7 ETHICS

Ethical approval of the research was obtained from the Ethical and Protocol Review Committee of the School of Biomedical and Allied Health Sciences, College of Health Sciences, University of Ghana and the research unit of the administration of the Wa Regional hospital.

On the field, detailed explanations of the purpose of the research, risk and benefits were made known to participants. Consent forms were given to participants to sign and those who could not sign thumb printed. Subjects were at liberty to stop as and when they wanted.

3.8 DATA MANAGEMENT AND ANALYSIS

Hard copy files were kept for all the questionnaires received. Analysed data was stored by the researcher under strict restrictions on password protected computers and all hard copies were kept under lock and key in the supervisor's office. Also all protocols were observed to ensure complete confidentiality of participants before, during and after the research period.

3.8.1 Data Quality Control

The research assistants were adequately trained and closely supervised to ensure good quality data collection. The weighing scales were checked for accuracy and calibrated every morning. All the

questionnaires were checked for completeness before administering them each day. In the field, storage of data materials and questionnaires were in secure plastic folders securely kept.

3.8.2 Data Analysis

Data were entered into Microsoft excel and transferred into IBM statistical package for social sciences (SPSS) version 20 for analysis.

Background characteristics of mothers and children were summarized as percentages of one categorical variable using FAO guidelines (2014). Percentage scores were used in the study to determine the level of nutrition knowledge among mothers/caregivers using Whati, (2005) norm reference performance-rating scale for nutrition knowledge (table 1). Also a question under the knowledge and practices is said to be correct if it falls within WHO recommendations for infant and young child feeding practices. Chi-square was used to measure associations (nutritional knowledge and nutritional status). This was used to determine whether there was a significant association between the two variables (nutritional knowledge and nutritional status). The level of significance was set at $p < 0.05$

Table 1: Ratings of nutrition knowledge

SCORE	PERFORMANCE SCORE (%)	INTERPRETATION
1	<34	Very poor
2-4	34-51	Fair
5	52-57	Good
6-8	58-75	Very good
9-10	76+	Excellent

Whati (2005). <Less than, % percentage

CHAPTER FOUR

4.0 RESULTS

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE STUDY PARTICIPANTS

The results of the study were based on interviews on one hundred (100) study participants. Majority of the participants were married (97.0%) with very few of them being single (3.0%). Most of the participants were within the age range 29-39 years (56%), followed by the age range of 18-28 years which had a percentage of 41 and lastly, age range of 40-50 years (3%). Almost all the participants had some form of formal education with majority of them having tertiary education (50%), those who had senior high school education recorded the next highest percentage of 18. Very few of the participants had some level of primary education (7%). Those who had no education at all recorded 13%. Dagaabas and Waalas represented majority of the tribes that is 38% and 41% respectively. Other tribes which included the Sisaala, Akans etc recorded the least percentage of 21% (table 2). From table 2; many of the mothers that took part in the study had some form of employment ranging from trading to other jobs like hairdressing, sewing among others. A greater number of the mothers were public sectors workers, 41%, 29% were unemployed, 15% of the mothers did other kinds of jobs, 14% were traders with only 1% being farmers. Majority of the mothers received regular cash income, 59.0% and 41% do not receive salaries. Also, 31% of the mothers receive financial subvention however, 69% of them do not receive any form of financial subvention. Most of the fathers were public sector workers and those into other kinds of jobs recording a percentage of 29, 15% and 6% were traders and farmers respectively (table 3).

Table 2: Socio-demographic characteristics of the mothers/caregivers

Characteristics	Percentage
N = 100	
Age Group	
18-28	41 %
29-39	56 %
40-50	3 %
Marital Status	
Single	3 %
Married	97 %
Level of Education	
None	13 %
Primary/Junior/Senior High	37 %
Tertiary	50 %
Ethnicity	
Walu	41 %
Dagaa	38 %
Others	21 %
Religion	
Christianity	42 %
Muslim	58 %

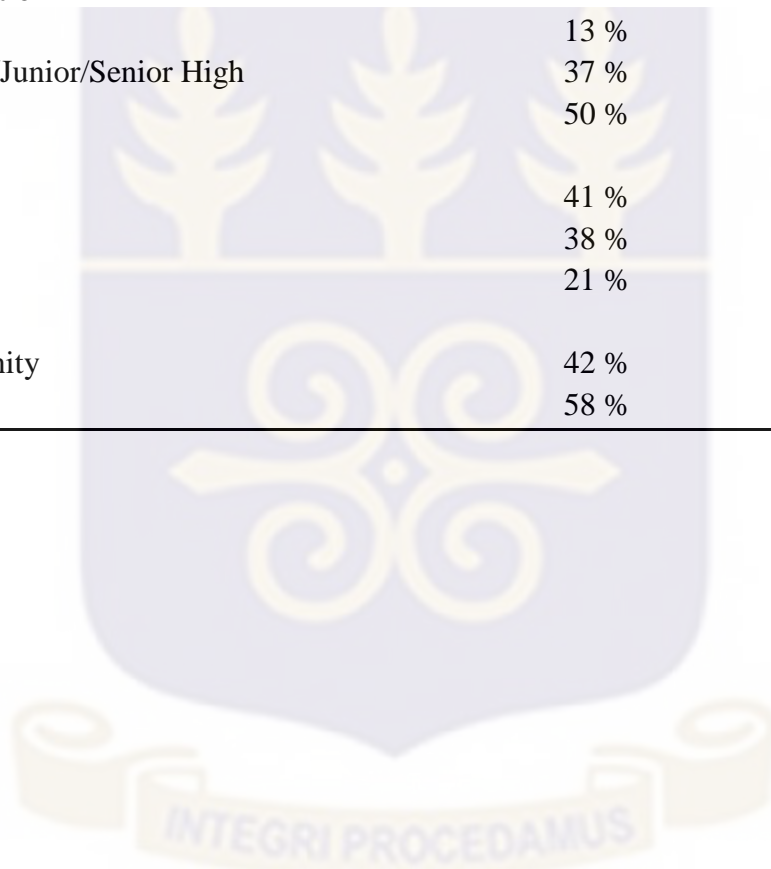


Table 3: Socio-economic characteristics of the mothers/caregivers

Characteristics	Percentage (N = 100)
Occupation of mothers/caregivers	
None	29 %
Trading	14 %
Public/Civil servant	41 %
Others	16 %
Do you have a regular cash income/ are you a salaried worker	
Yes	59 %
No	41 %
Do you receive any form of financial subvention?	
Yes	31 %
No	69 %
If yes, in what form?	
Regular	14 %
Casual	17 %
Occupation of the father	
Farmer	6 %
Trading	15 %
Public/Civil servant	50 %
Others	29 %
Does he earn enough to buy food and essentials for all the family?	
Yes	95 %
No	5 %

4.2 FOOD SECURITY

Table 4 shows the food security of the mothers/caregivers. Majority of the mothers/caregivers (94%) fed children ranging from 1-4 per-household and 6% of mothers/caregivers fed 5-8 number of children per-household. A small number of the mothers/caregivers representing 26% took part in farming while 74% of them did no form of farming.

Ninety-five percent of the participants answered yes to being able to provide food for their families throughout the year and 5% said they were not able to provide food throughout the year.

Table 4: Adequate food security and food intake

	Percentage (N = 100)
Do you have any land on which you grow food?	
Yes	26 %
No	74 %
Are you able to provide food for the family throughout the year?	
Yes	95 %
No	5 %
How many children do you have?	
1-4	94 %
5-8	6 %
How many people do you feed in your household?	
1-4	53 %
5-8	41 %
9-12	4 %
≥ 13	2 %

4.3 INFANT DEMOGRAPHY AND INCIDENCE OF DISEASE

The nutritional status of one hundred (100) children, 45 males and 55 females was assessed. Majority of the children were within the age group of 6-12 months (43%), followed by 19-24 months, 26% then 13-18 months which had a percentage of 17. 25-30 months and greater than 30 months recorded the least distribution of 8% and 6% respectively.

More of the mothers answered (84%) “Yes” to their children falling sick, and only 18% answered “No”. Most of the infants (66%) had suffered from diarrhoea and 34% not having fallen sick with diarrhoea. 15% of the children had their diarrhoea lasting for a maximum of 2 days, 25% had diarrhoea for 3 days and 12% had it for more than 5 days (table 5).

Table 5: Infant/Young children demography and incidence of disease

	N = 100
Age (months), mean \pm SD	16.55 \pm 8.06
Birth weight (Kg), mean \pm SD	2.99 \pm 0.42
Age group, mean (%)	
6-12	43 %
13-18	17 %
19-24	26 %
25-30	8 %
>30	6 %
Gender, mean (%)	
Male	45%
Female	55%
Has your child been falling sick? Mean (%)	
Yes	82%
No	18 %
How often does your child fall sick, mean (%)	
Once in a week/ Twice in a week	4 %
Once in a month	34 %
More than once in a month	44%
Never been sick	18%
Has your child had diarrhoea before?, mean %	
Yes	66 %
No	34 %
How long did it last?, mean %	
1-2 day	15 %
3 days	25 %
4-5 days	14 %
> 5 days	12 %
How recent was it?, mean %	
< 1 month	22 %
1 month ago	22 %
More than a month ago	22 %

4.4 BREASTFEEDING PRACTICES OF MOTHERS/CAREGIVERS

Table 6 shows that majority of the mothers (92%) breastfed on the very first day of delivery and 52% of the mothers' breastfed within 30 minutes after delivery. During the time of the data collection, 71% of the mothers were still breastfeeding and 29% had already stopped breastfeeding. Those who were not breastfeeding weaned their children from 18 months and above. All the mothers/caregivers had already introduced water at the time of the study since the children were from the ages of 6 months and above. Twelve percent (12%) introduced water to the children at the age of 0-3 months and 88% introduced their children to water from 4-9 months. On the average, most of the mothers (94%) breastfed more than 6 times during the day and night.

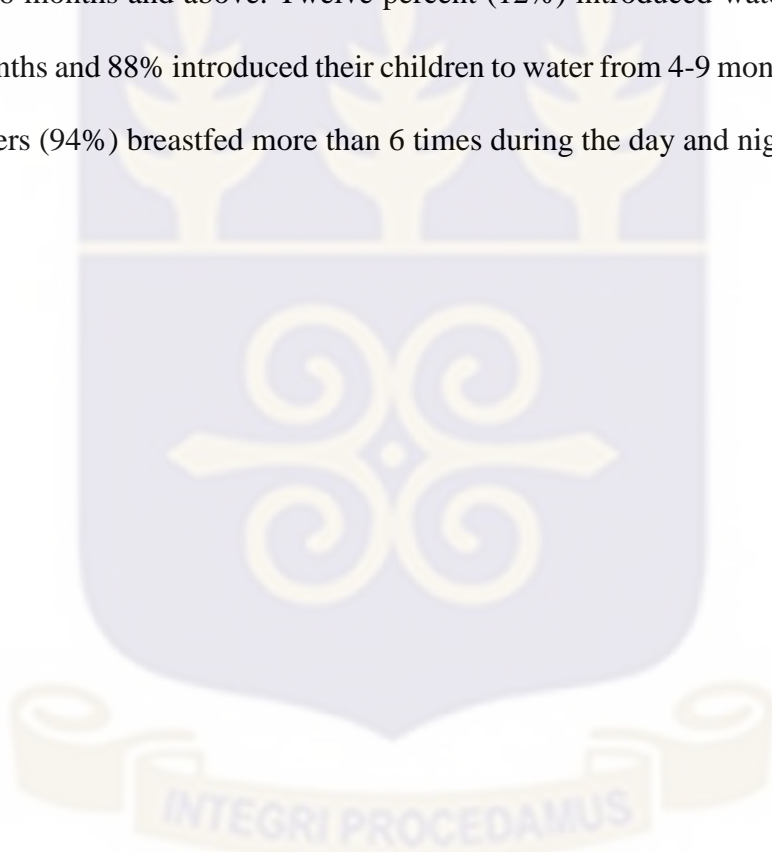


Table 6: Mothers/caregivers breastfeeding practices

		N = 100
When did you start breastfeeding this child?, mean %		
The very first day after delivery		92 %
The second to fourth day		5 %
Others (specify)		3 %
If breastfeeding began on day one, please indicate the hours after delivery breastfeeding commenced?, mean %		
Within 30 minutes after birth		52 %
Within one hour after birth		30 %
Within two hours or more after birth		18 %
Are you still breastfeeding your child?, mean %		
Yes		71 %
No		29 %
What age did you stop breastfeeding the child, mean %		
2-12 months		5 %
13-18 months		6 %
>18 months		18 %
Still breastfeeding		71 %
Do you give water to your child?, mean %		
Yes		100 %
No		0 %
What age of the child did you start?, mean %		
0-3 months		12 %
4-9 months		88 %
Do you give the child breast milk anytime the child asks for?, mean %		
Yes		98 %
No		2 %
On the average how many times do you breastfeed your child in a day, mean %		
Three times to five times		13 %
Six times		26 %
Others		61 %
How many times do you breastfeed during the night?, mean %		
Two times		10 %
Three times		18 %
Four times		19 %
Five times		11 %
Six times		9 %
Others		33 %

4.5: COMPLEMENTARY FEEDING PRACTICES

Due to the age range of infants in the sample population, majority of the mothers (92%) had already started complementary feeding with only 8% not having introduced complementary foods yet (table 7). Most of the children (76%) were introduced to complementary foods at the ages ranging from 3 to 6 months and 14% of children in the population were introduced to foods from the ages of 6 to 9 months. Forty-one percent of the children were fed three (3) times in a day and 10% were fed more than four (4) times in a day. Mothers/caregivers in the study did not give snacks, 66% answered 'no' to not providing their children with any form of snacks and only 34% gave snacks. 45% of the children were given some type of formula foods; 7% of the children were given Synthetic Milk Adaptation (SMA), 10% were given Lactogen, majority of the children (27%) took Cerelac (cereal based infant food) and only 2% were given other types of formula foods. However, 55% of the children did not take any type of formula foods. Also, it shows that 86% of mothers did not feed with feeding bottles designed with 'nipple' tips (table 7).

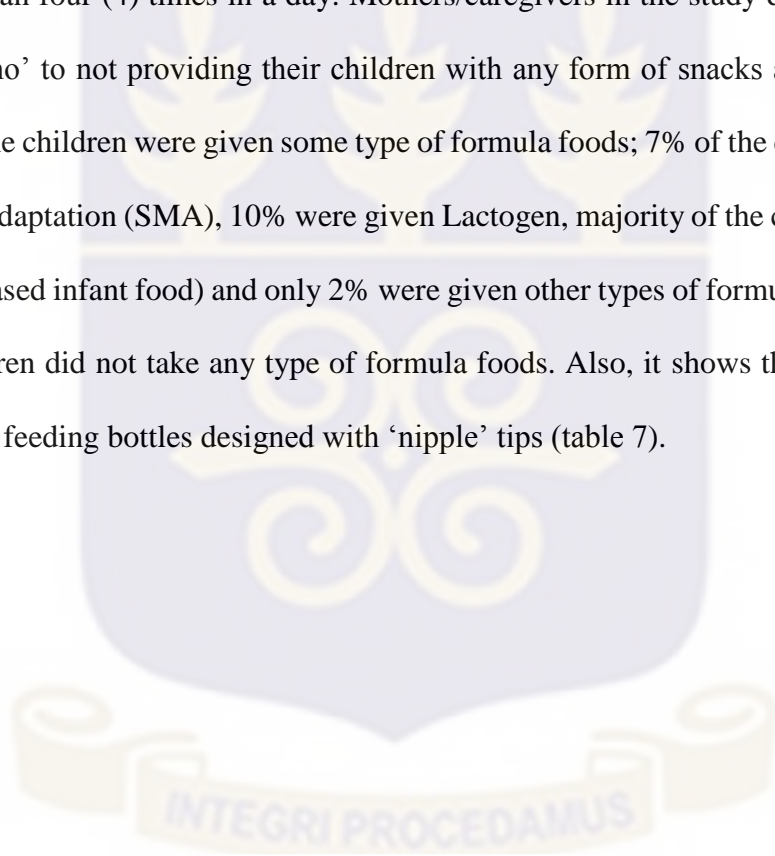


Table 7: Mothers/caregivers complementary feeding practices

	Frequency (N = 100)
Have you started giving complementary foods to the child?, mean %	
Yes	92 %
No	8 %
What age of the child did you start?, mean %	
After 3 to 6 months	76 %
After 6 to 9 months	14 %
What type of weaning food do you give to your child?, mean %	
Porridge	84 %
Weani mix	9 %
T.Z	66 %
Rice (cooked)	44 %
Others	15 %
How many times do you give the child complementary foods?, mean %	
2 times	24 %
3 times	41 %
4 times	18 %
> 4 times	10 %
Do you normally give the child snack in between the main meals?, mean %	
Yes	34 %
No	66 %
Do you give your child any infant formula?, mean %	
Yes	45 %
No	55 %
What type of formula do you give your child?, mean %	
SMA	7 %
Lactogen	10 %
Cerelac	27 %
Others	2 %
Do you feed the child with a feeding bottle which has nipple?, mean %	
Yes	14 %
No	86 %

Note: T.Z :Tuo Zaafi; SMA : Synthetic Milk Adaptation. Some mothers had not introduced complementary foods at the time of the study, types of complementary foods given was a multiple answer question so some mothers picked more than one food, some mothers do not give any kind of formula foods

4.6 KNOWLEDGE ON BREASTFEEDING AND COMPLEMENTARY FEEDING PRACTICES

From the table 8, it shows that 66% of the mothers said that a child should be breastfed till 24 months and above, only 2% said 6 months or less. Also for the age at which a baby should be introduced to complementary foods, 88% chose 6 months and only 8% chose 4 months as their answers. Seventy-five percent of the mothers agreed that a baby is introduced to complementary foods at 6 months because the breast milk is usually not sufficient at that age, 19% of the mothers said they did not know the reason why complementary foods are given at 6 months, 6% of the mothers gave other reasons like “because food is readily available” to explain why complementary foods are introduced. With reference to table 8, 98% and 95% of mothers thought it was good to give different types of foods and preparing these foods was not difficult respectively.

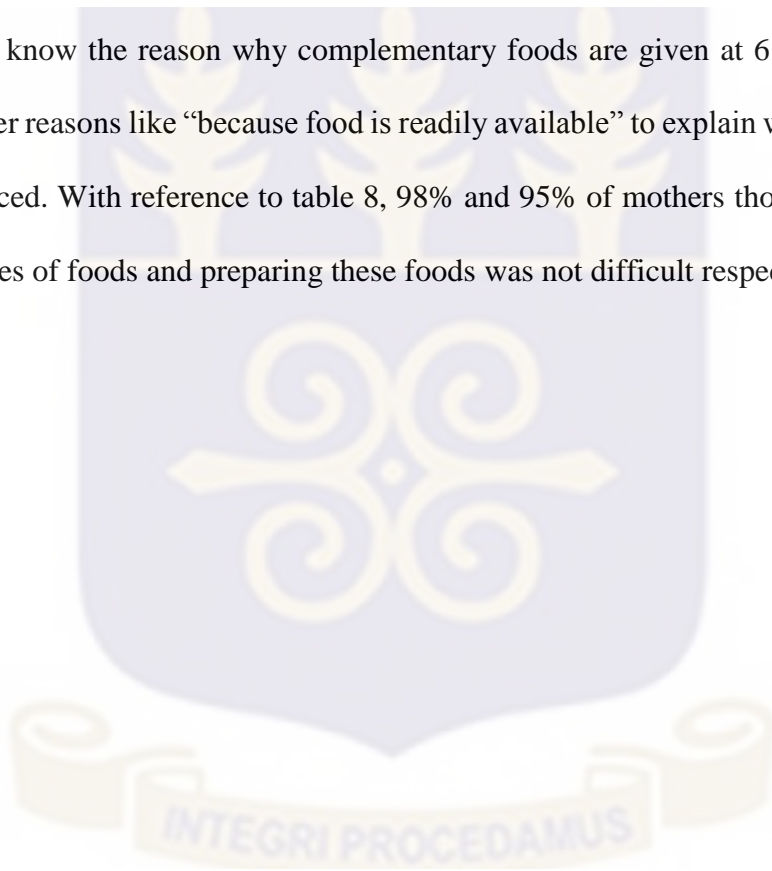


Table 8: Mothers/caregivers' knowledge on breastfeeding and complementary feeding

	Frequency (N = 100)
How long is it recommended that a woman breastfeeds her child?, mean %	
6 months or less	2 %
6–11 months	8 %
12–23 months	24 %
24 months and more	66 %
At what age should babies start eating foods in addition to breast milk?, mean %	
At 4 months	8 %
At 6 months	88 %
Other	4 %
Why is it important to give foods in addition to breast milk to babies from the age of six months?, mean %	
Breast milk alone is not sufficient	75 %
Other	6 %
Don't know	19 %
How good do you think it is to give different types of food to your child each day?, mean %	
Not sure	2 %
Good	98 %
How difficult is it for you to give different types of food to your child each day?, mean %	
Not difficult	95 %
So-so	2 %
Difficult	3 %
Reasons why it is difficult, mean %	
It is expensive	1 %
It is stressful	3 %
How good do you think it is to feed your child several times each day?	
Good	100 %

Note: So-so: it is neither difficult nor easy. Some mothers said giving different types of food was not difficult so percentages for the reason why it was difficult do not add up to 100

According to fig 1, mothers were asked about fortification of porridge given to their children. Sixty-three percent of the mothers thought adding milk could improve the nutritional quality of porridge, 23% says groundnut paste can be added, 20% and 19% also said other foods (like palm oil, egg yolk, etc.) and powdered fish can be added respectively. However, 24% of the mothers did not know how to fortify their children’s porridge.

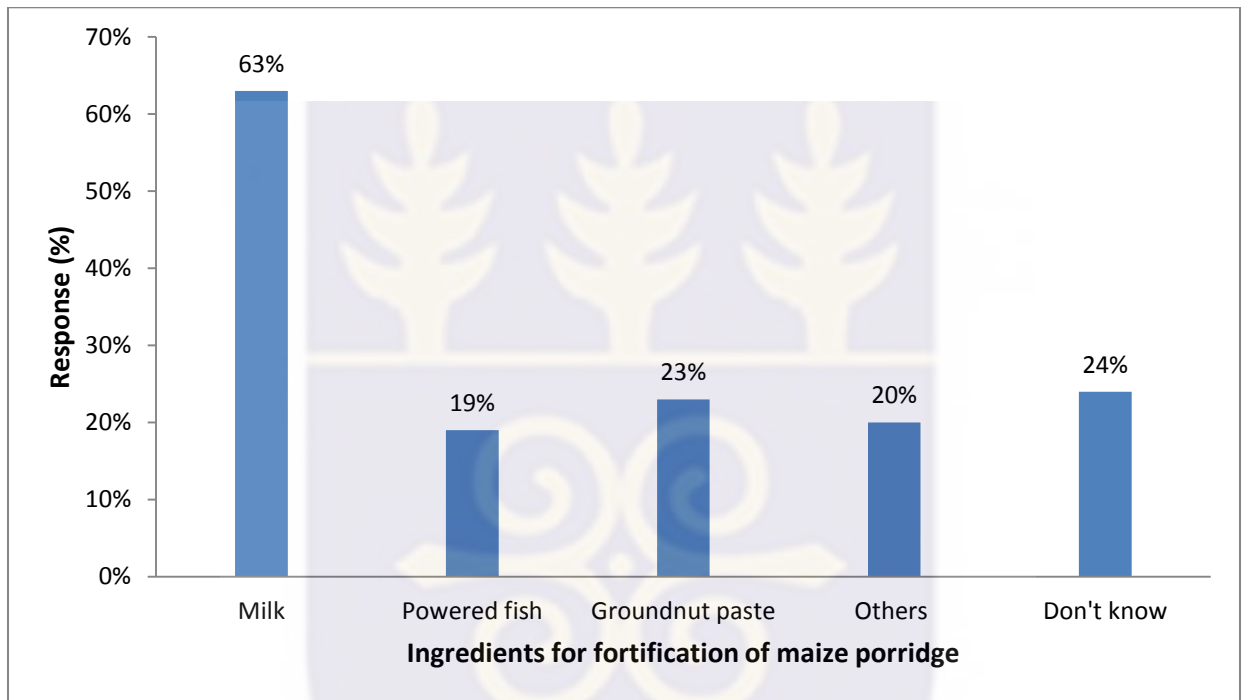
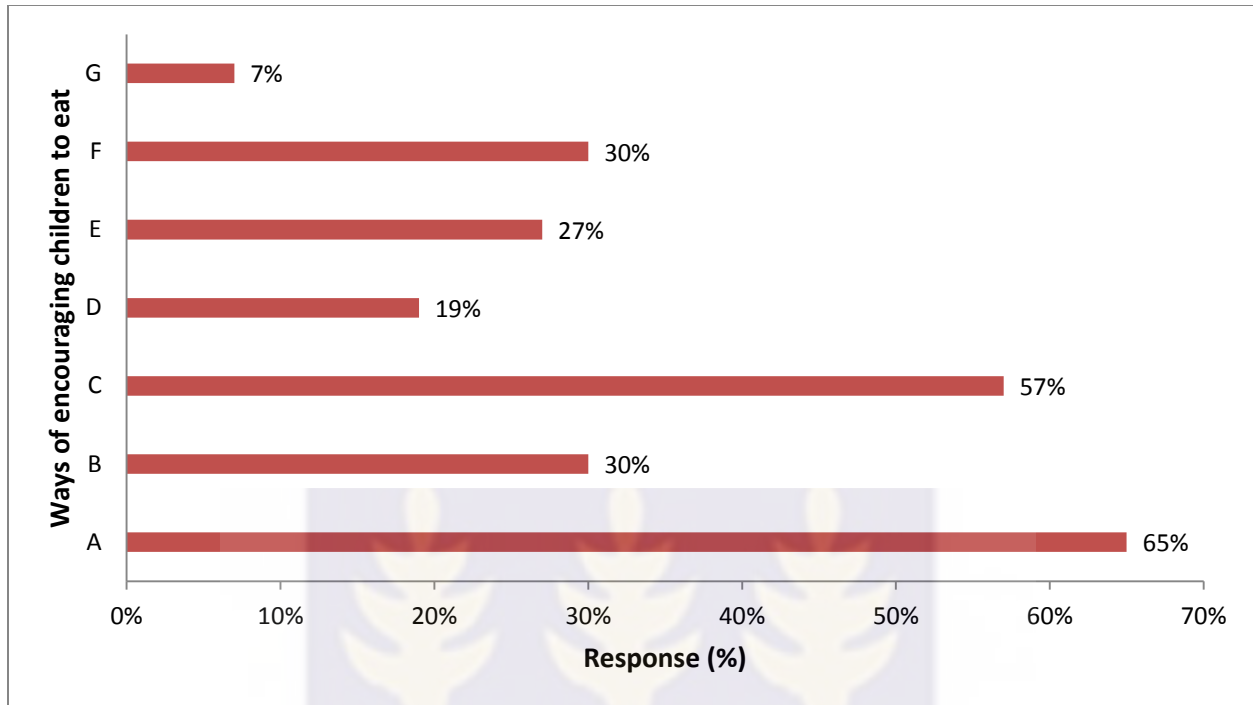


Figure 1: Food ingredients used to fortify maize porridge.

Also, fig 2 shows the ways mothers employed to encourage their children to eat. Most of the mothers said more attention and making of funny faces were usually what they used, giving a percentage of 65% and 57%, respectively. The rest of them used ways like clapping of hands, demonstrating how to eat, saying encouraging words and drawing child’s attention to the food.



A: Giving them attention; B: Clap hands; C: Make funny faces; D: Demonstrate by opening mouth; E: Say encouraging words; F: Draw child's attention; G: Others.

Figure 2: Responses on ways of encouraging young children to eat

4.7 DURATION AND BENEFITS OF ATTENDING GROWTH MONITORING PROGRAMME

Table 9 shows the duration and benefits of attending growth monitoring programme to mothers in the study. Out of 100 mothers, 44% of them attended the programme for 6-12 months, 46% attended up to 13-24 months and only 10% attended for more than 24 months.

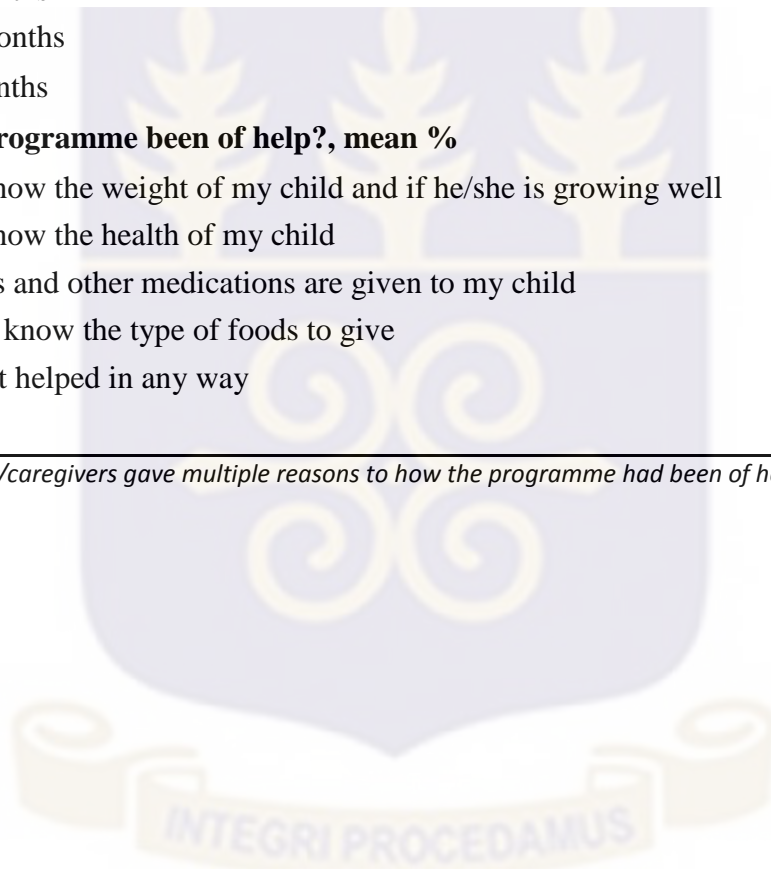
For the benefits of the programme, 80% of mothers said it helped them to know the weight of their children and whether the child was growing well as per their weight. 46% said the programme allowed them to know how healthy their children were. Also 16% of the mothers said, they attended the programme because vaccines and other medications were made available for their children there.

28% of the mothers said through the programme, they were able to know the kind of foods to feed their children with, however, 4% out of the 100 mothers said the programme had not helped them in any way.

Table 9: Duration and Benefits of attending growth monitoring programme

	Frequency (N = 100)
How long have you been attending this programme?, mean %	
6-12 months	44
13-24 months	46
> 24 months	10
How has this programme been of help?, mean %	
Get to know the weight of my child and if he/she is growing well	80
Get to know the health of my child	46
Vaccines and other medications are given to my child	16
Helps to know the type of foods to give	28
It has not helped in any way	4
Others	3

Note: some mothers/caregivers gave multiple reasons to how the programme had been of help to them



4.8: Nutritional Knowledge of Mothers

Figure 3 shows the level of nutritional knowledge among mothers. From the chart, 76% of mothers had very good nutrition knowledge, 13% had good knowledge, 7% had excellent nutrition knowledge and only 4% has fair knowledge.

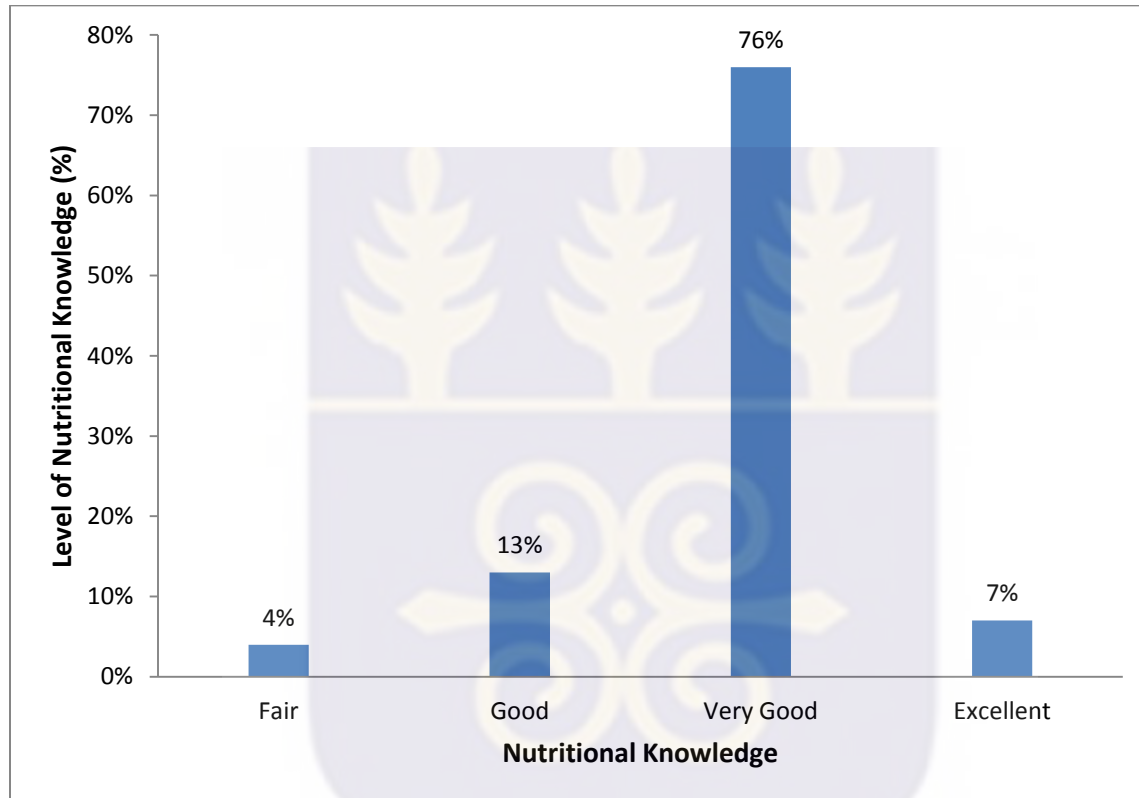


Figure 3: Nutritional knowledge of mothers/caregivers

4.9: Nutritional Status of the Children

Table 10 shows the distribution of stunting, wasting and underweight of the children. The study revealed that 17% of the children were moderately stunted (below $\leq -2SD$) and 12% were severely stunted (below $\leq -3SD$). 5% of the children within the study were moderately wasted and 10% severely wasted. Also 2% were moderately underweight and 1% severely underweight. From table 11, it can be seen that stunting was highest among children (10%) within the age group of 12-23 months, also stunting was highest among males (9%) than females.

Mothers with tertiary education had the highest number of stunted children (10%) and those who were employed equally had a higher number. Also, high prevalence of severe wasting was found in children (6%) within the age group 12-23 months. Children within the age groups 12-23 months and 24-35 months also had the highest percentage of moderate wasting (below $\leq -2SD$).

Table 10: Distribution of anthropometric indices of infants

Measure of Nutritional status	Frequency (N = 100)
WHZ, n %	
None	85 %
$\leq -2SD$	5 %
$\leq -3SD$	10 %
HAZ, n %	
None	71 %
$\leq -2SD$	17 %
$\leq -3SD$	12 %
WAZ, n %	
None	97 %
$\leq -2SD$	2 %
$\leq -3SD$	1 %
MUACZ, n %	
None	99 %
$\leq -2SD$	1 %

WHZ: Weight-for- height Z-score, HAZ: Height-for-age Z-score, WAZ: Weight-for-age Z-score, MUACZ; MUAC-for-age Z-score



Table 11: Percentage of children under age 5 classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height and weight-for-age.

Parameter	Height-for-age		Weight-for-height		Weight-for-age		Number of children
	Percentage below -3SD	Percentage below -2SD	Percentage below -3SD	Percentage below -2SD	Percentage below -3SD	Percentage below -2SD	
Age in months							
6-11	5.0	6.0	0.0	1.0	0.0	0.0	37
12-23	4.0	10.0	6.0	2.0	0.0	0.0	43
24-35	3.0	1.0	3.0	2.0	0.0	2.0	18
36-47	0.0	0.0	1.0	0.0	1.0	0.0	2
Sex							
Male	7.0	9.0	6.0	2.0	1.0	1.0	45
Female	5.0	8.0	4.0	3.0	0.0	1.0	55
Mother's education							
None	1.0	3.0	3.0	0.0	1.0	0.0	13
Primary	1.0	2.0	0.0	0.0	0.0	1.0	7
Junior	2.0	2.0	1.0	0.0	0.0	1.0	12
Secondary	3.0	0.0	2.0	0.0	0.0	0.0	18
Tertiary	5.0	10.0	5.0	5.0	0.0	0.0	50
Employment status							
Yes	8	11	8	5	0.0	2.0	71
No	4	6	3	0	1.0	0.0	29

WHZ : Weight-for-height Z-score, HAZ: Height-for-age Z-score, WAZ: Weight-for-age Z-score, MUACZ: MUAC-for-age Z-score

4.10 Influence of Nutritional Knowledge of Mothers on the Nutritional Status of Their Children

4.10.1: Weight-for-Height

With reference to table 12, mothers who had excellent knowledge in nutrition had 28.6% of their children being moderately wasted ($\leq -2SD$), no child belonging to these mothers fell under severely wasted ($\leq -3SD$) with a p-value of 0.103. Mothers with very good knowledge had only 3.9% of their children being moderately wasted and 11.8% being severely wasted. Mothers with good nutrition knowledge had no child being moderately wasted but had 7.7% of their children being severely wasted. However mothers with fair knowledge had no child being too small for their height. The p-value of 0.103 showed there was no significance difference between mothers/caregivers' nutrition knowledge and wasting in their children.

4.10.2: Height- for- Age

From table 12, mothers with fair knowledge in nutrition had 25% of their children being moderately stunted ($\leq -2SD$) and no child being severely stunted ($\leq -3SD$). Those with good knowledge had 23.1% of their children being moderately stunted and 7.7% being severely stunted ($\leq -3SD$). Seventeen percent of children from mothers with very good nutrition knowledge were moderately stunted while 10.5% of these children were severely stunted. However 14.3% each of children from mothers with excellent knowledge were both severely and moderately stunted. A p-value of 0.985 indicated no significant difference between knowledge and stunting.

4.10.3: Weight-for-Age

Women with fair, good and excellent nutrition knowledge had no malnourished child but 1% of children from mothers of very good knowledge were malnourished.

4.10.4: MUAC- for-Age

Children belonging to women with good, very good and excellent nutrition knowledge recorded no case of their MUAC being small for their age. However, one case of -2SD was recorded, a child belonging to a mother with fair nutrition knowledge (table 12).

Table 12: Influence of nutritional knowledge by mothers/caregiver on the nutritional status of their children

Measure of Nutritional status	Level of Nutritional knowledge				P-value
	Fair (n = 4)	Good (n = 13)	Very Good (n = 76)	Excellent (n = 7)	
<i>WHZ</i>					
None	4 (100)	12 (92.3)	64 (84.2)	5 (71.4)	0.103
≤ -2SD	0 (0.0)	0 (0.0)	3 (3.9)	2 (28.6)	
≤ -3SD	0 (0.0)	1 (7.7)	9 (11.8)	0 (0.0)	
<i>HAZ</i>					
None	3 (75.0)	9 (69.2)	55 (72.4)	5 (71.4)	0.985
≤ -2SD	1 (25.0)	3 (23.1)	13 (17.1)	1 (14.3)	
≤ -3SD	0 (0.0)	1 (7.7)	8 (10.5)	1 (14.3)	
<i>WAZ</i>					
None	4 (100)	13 (100)	74 (97.4)	7 (100.)	0.996
≤ -2SD	0 (0.0)	0 (0.0)	1 (1.3)	0 (0.0)	
≤ -3SD	0 (0.0)	0 (0.0)	1 (1.3)	0 (0.0)	
<i>MUACZ</i>					
None	3 (75.0)	13 (100)	76 (100)	7 (100)	<0.0001
≤ -2SD	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	
≤ -3SD	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	

WHZ: Weight-for-height Z-score, HAZ: Height-for-age Z-score, WAZ: Weight-for-age Z-score, MUACZ: MUACZ-for-age Z-score, P-value < 0.05 is significant

4.11 Use of Complementary Foods and Its Effects on the Nutritional Status of their Children

4.11.1: Weight-for Height

With the use of complementary foods, mothers who answered 'yes' to the start of complementary feeding had 5.4% of their children being moderately wasted ($\leq -2SD$) and 10.9% being severely wasted ($\leq -3SD$), table 13. However, there was no significant effects with the use of complementary foods on the nutritional status of their children (P-value = 0.464).

4.11.2: Height-for Age

Mothers who had started complementary feeding, had 17.4% of their children's height being too short for their age. Those who answered 'no' to the introduction of complementary foods had only 3% of their children being too short for their age. Also table 13, a p-value of 0.819 for height for age (stunting) showed that timely introduction of complementary foods had no significant influence on the height-for-age of a child.

4.11.3: Weight- for- Age

Also from table 13, 1.1% of children introduced to complementary foods at the time of the study weighed too small for their age. With a p-value of 0.915, it can be said that the time of introduction of complementary foods had no significant effect on the weight for age of the children (P-value of 0.915).

4.11.4: MUAC-for-Age

With the MUAC for age, only 1.1% of children in the study had small MUAC reading. However, introduction of complementary foods had no significant influence on the nutritional status of the children during the time of my study (P-value of 0.767).

Table 13: Use of complementary foods by mothers/caregivers and its effect on the nutritional status of their children.

Measure of Nutritional status	Use of complimentary foods		P-value
	Yes (n = 92)	No (n = 8)	
WHZ			0.464
None	77 (83.7)	8 (100)	
≤ -2SD	5 (5.4)	0 (0.0)	
≤ -3SD	10 (10.9)	0 (0.0)	
HAZ			0.819
None	67 (72.8)	5 (62.5)	
≤ -2SD	16 (17.4)	2 (25.0)	
≤ -3SD	9 (9.8)	1 (12.5)	
WAZ			0.915
None	90 (97.8)	8 (100)	
≤ -2SD	1 (1.1)	0 (0.0)	
≤ -3SD	1 (1.1)	0 (0.0)	
MUACZ			0.767
None	91 (98.9)	8 (100)	
≤ -2SD	1 (1.1)	0 (0.0)	
≤ -3SD	0 (0.0)	0 (0.0)	

WHZ: Weight-for-height Z-score, HAZ: Height-for-age Z-score, WAZ: Weight-for-age Z-score, MUACZ: MUACZ-for-age Z-score, P-value < 0.05 is significant

CHAPTER FIVE

5.0 DISCUSSION

5.1 SOCIO-DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

Demographic and socio-economic factors has been shown to be among of the under-lying causes of malnutrition in children below five years (Adeladza, 2009). In this study, majority of the mothers fell within the ages of 29-39 years (56%). More than half of the mothers had some form of formal education, 87% and 13% of the mothers were illiterates. A similar study by Amanuel, Gerezgiher, Hailemariam, & Kalayou, (2013) revealed that 39.2% of mothers were between the ages of 25-29, 36.4% were within the ages of 15-25 and 24.4% were also within the age range of 30-34. They also found that 84.5% of the mothers had some form formal education and only 15.5% had no form of formal education. Unlike this study where 71% of the mothers were currently working and 29% not employed, 32.9% of mothers were employed but in the above study 67.1% of the mothers were unemployed. This result of high employment could be due to the fact that majority of the mothers had some form of formal education. Also the age group of 29-39 is the working age group of people in the region, hence the high level of employment.

Studies have shown that stunting in children decreases as household wealth increases, unemployed mothers would need to rely solely on their spouses to provide money for essential basic needs like food, shelter and clothing. However this was the opposite in this current study since most of the mothers were employed and stunting was high in the children. This could be attributed to early introduction of complementary foods since working mothers would have to resume work after four (4) months of delivery.

5.2 MATERNAL NUTRITION KNOWLEDGE

Maternal nutrition knowledge affects a mother's food choices and preparation. This knowledge and skills help fight against malnutrition since it empowers the mothers/caregivers to make the right choices for foods which are highly nutritious and safe (Ongosi, 2010).

In this study, majority of the mothers, 76%, had very good nutrition knowledge, which is similar to a study conducted by Akeredolu, Osisanya, Mosadolorun-Seriki, & Okorafor, (2014) in Lagos, Nigeria where majority of the mothers (73.3%) scored above average. This could have been attributed to their high level of education. According to Imdad, Yakoub, & Bhutta, (2011), education has a positive effect on the nutrition knowledge and practices of mothers. Another study by Gichana (2013) also showed that majority of mothers interviewed had adequate knowledge in nutrition. This current study also revealed that the mothers aside having high nutrition knowledge, they equally had optimal breastfeeding and complementary feeding practices. This followed a report by Sule et al., (2009) on nutritional status of under-five children in two-rural communities of South-west Nigeria, which concluded that nutrition education of mothers had a positive impact on the feeding practices of their children.

The present study has demonstrated that the high level of education of mothers is not a forecaster of malnutrition since 10% of children belonging to mothers with tertiary education were stunted and 5% wasted as compare there percentage of children belonging to mother with no form of education, which was 3%. Also research work by Nekesa, (2012) in Kenya showed that educational level was not the only factor influencing nutritional knowledge of mothers but other factors like age, marital status and source of family foods equally influence nutrition knowledge.

This was supported by a report from WHO, (2006) which states that nutritional status of children is not only affected by nutritional knowledge but also feeding practices of mothers. Inappropriate feeding practices were equally responsible for one-third of cases of malnutrition.

Previous studies suggested that mothers' education level has an influence on the nutritional status of children (Mahgoub, Nnyeipi, & Bandeke, 2006). Similar works by Appoh & Krekling (2005) and Fransesco (2010) revealed that nutrition knowledge of mothers was associated with nutritional status. However, reports from Waihenya, Kogi-Makau, & Muita (1996), on maternal nutrition states that there was no significant relationship between nutritional status of children and the overall nutrition knowledge of mothers. They further explained that nutrition knowledge alone was inadequate in children's nutritional status. Also it is reported in this study that majority of mothers (92%) initiated breast feeding the very first day of delivery and 82% of mothers fed within an hour after delivery. This conforms with WHO and UNICEF recommendation on breast feeding which states that breast feeding be initiated within an hour of delivery since early initiation stimulates production of breast milk, increases breast feeding period of the mother and promote mother-child relationship(WHO, 1998). Early breast feeding recorded in this study could be attributed to the fact that most of the mothers delivered at the hospital and also because of the high level of education of mothers.

5.3 EFFECTS OF KNOWLEDGE ON BREASTFEEDING AND COMPLEMENTARY FEEDING PRACTICES

Aside demographic, socio-cultural and economic factors, infant feeding practices also plays a major role in child care. Other works have shown the relationship between malnutrition and child feeding practices (Kapur, Sharma, & Agarwal, 2005). Therefore, the need for educating mothers on proper infant feeding practices.

Initiation of breastfeeding within the first and second day after delivery were found to be 92% and 3% respectively. According to this study, 52% of mothers initiated breastfeeding within 30 minutes after delivery and 30% within an hour after birth. Majority of mothers stopped breastfeeding their children after 18 months. At the period of the study, most mothers should have introduced complementary foods because of the age range. Ninety-two percent of the mothers had already started giving complementary foods, 76% of mothers introduced these foods between the ages of 3-6 months and 14% introduced the foods between 6-9 months.

It was detected that occurrence of stunting was low in the first year (6-11 months) which had only 6.0% being stunted. This is similar to an assessment which took place in Mbeere District (Kenya National Bureau of Statistics, 2009). However, the prevalence of stunting was highest among children 12-23 months, this results follow the same path in a study by Macharia, Kogi-Makau, & Muroki (2005), where stunting was equally highest among children 12-35 months. This prevalence of stunting could be accredited to bad weaning and complementary feeding practices. Poor feeding practices could be as a result of either lack of knowledge by mothers or lack of sufficient food but in this study it was seen that majority of the mothers had adequate nutrition knowledge hence it could be as a result of the latter.

The effect observed between children aged 12-23 months and nutritional status based on stunting could be explained by the fact that as children grow older, they become less dependent on their mothers. At this age, they tend to access different foods and from this study it was realised that majority of the children within the age range of 12-23 months had already been introduced to complementary foods (Meme, 1996). Also underweight increased among children 24-35 months, this could probably be explained by the high physical activity level of children within this age group which may require more nutrient consumption to support growth (Badake, et al., 2014).

In addition, it was found that the predominance of stunting and wasting was greater in males than females, this results are similar to findings by Kenya National Bureau of Statistics (KNBS) and ICF Macro (2010). Moreover, from this study, it was realised that children consumed mainly maize products. This confirms that the diet was based in starchy staples. Hence, it is possible that the foods were not sufficient enough to meet the macronutrient requirements of the children. It is known that complementary feeding has an effect on the nutritional status of children as well as the frequency of feeding. The higher the frequency of feeding the more likely the child will get adequate nutrient supply. The feeding frequency for children attending the growth monitoring programme at the regional hospital of the Upper West Region ranged from one to five meals; with majority of children (41%) in the study being given three (3) meals per day.

5.4 NUTRITIONAL STATUS

The result of this study revealed that there was high occurrences of stunting (height-for-age) among the children. Also, stunting was highest among males compared to females.

Previous studies by Gichana (2013) and Olack (2011) showed similar results where males children were more stunted. This does not differ much from a study conducted by Wamani, Nordrehang, Peterson, Tumwineand, & Tglleskar (2007) in Sub-Saharan African countries, where male children under five years were likely too be stunted than females. Futhermore, this study shows no significant difference between prevalence of stunting and nutritional knowledge.

According to Mahgoub, Nnyeipi, & Bandeke (2006), stunting was higher among children under three(3) years in Botswana. Research by Akeredolu, Osisanya, Mosadolorun-Seriki, & Okorafor (2014) also showed a high prevalence of stunting, 16.3% in children between 0-24 months. Reports from GDHS (2014) also revealed a higher prevalence of stunting in children under five years with Upper West recording one of the highest percentages (22.2%). In this report, the higher the stunting in male children could be attributed to the fact that male children turn to be more active than females so their nutrient requirements might be higher and also maybe due to the reason that they are usually not with their mothers since they go out to play hence frequency of consumption is low. Stunting is a condition showing the increasing effect of chronic malnutrition and it is affected by habitual and chronic illness (KNBS and ICF Macro, 2010).

Among the types of malnutrition, stunting has the highest prevalence and 90% of the world's stunted children are found in Africa and Asia, where 36% and 27% of children are affected respectively (Nigeria Demographic and Health Survey, National Population Commission and ICF Macro, 2008). This study showed that the prevalence of underweight (weight-for-age) was different from the national statistics. According to GDHS (2014), 13.5% of children were underweight as compared to the 2% recorded in this study. There was no significant difference in the prevalence of underweight between males and females.

A previous study by Badake, et al., (2014) in Kenya showed that underweight of children under five is lower than stunting. It reported 18.1% of children being underweight against 39% being stunted. Also, reports by Kenya Demographic Healthy Survey recorded 16% and 35% for underweight and stunting respectively (KNBS and ICF Macro, 2010). Underweight (weight-for-age) does not differentiate between wasting and stunting thus children can be underweight because they are stunted, wasted or both (GDHS, 2014). Another study conducted by Akeredolu *et al*, (2014) showed that 13% of children were underweight which might have resulted from insufficient intake of food nutrients. Results from this study also showed that 5% of the children were moderately wasted (weight-for-height) and 10% severely wasted. However, they were lower than the number of children stunted. In previous studies by GDHS, (2014) the prevalence of children wasted in the Upper West Region was lower than what was recorded in this study. Prevalence of severe wasting was higher in male than female children. In other studies, the prevalence of wasting among children in the study were 10%. Wasting reflects a recent period of sickness and short period food scarcity that leads to considerable weight loss (WHO, 2000). It may be caused by lots of factors such as incorrect feeding practices, insufficient food intake, seasonal food insecurities and diseases (malaria and diarrhea) (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, 2005). From the study it was observed that the main complementary food in this study area was maize porridge. Hence, one can say that complementary foods given to children were of low nutritional value even though most of the mothers knew what to fortify the maize porridge, they still give only the porridge without any fortification. This may result in children eating but still losing weight or there is no weight gain. Also, children who fall ill frequently may not have time to gain the weight they lost during the illness and from the study, more children feel ill more than once in a month.

Diarrhoea which is known to be one of the illnesses likely to result in wasting was seen to affect more than half the children in the study and majority of them had it for close to three (3) days. In addition, children are noted to possess low gastric capacity therefore the need to give small frequent meals to meet their nutrient requirement however, it was noted that majority of the children were being fed three (3) times in a day. Report by WHO on complementary feeding of infants and young children stated that infants between the ages of 6-8 months should be given 2-3 meals a day and those between the ages of 9- 23 months should be fed 3-4 meals a day with the inclusion of 1-2 nutritional snacks. This goes to explain why children around that age group were malnourished and also from the study it was shown that 66% of mothers did not offer snacks (WHO, 2009b). Moreover, this current study showed no significant difference in the prevalence of wasting between children whose mothers had good nutrition knowledge.

A report by UNICEF (2013) showed that in Sub-Saharan Africa, 1 in 10 children under the age of five years were wasted. Lastly, results from MUAC readings for children aged between 6-59 months showed no serious problem even though the weight-for-height indicator revealed otherwise. This could probably be explained by the low sensitivity of the MUAC measurements to identifying malnourished children.

CHAPTER SIX

6.0: CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 CONCLUSION

Most of the mothers/caregivers (76%) had very good nutritional knowledge and there was maximal breastfeeding and complementary feeding practices among the mothers. The study revealed no significant association ($P > 0.05$) between mothers' nutrition knowledge and the nutrition status of the children. Even though, majority of the mothers appeared to have good nutrition knowledge, it did not seem to transform into appropriate infant feeding practices since prevalence of stunting, wasting and under-weight were of concern. The prevalence rates of stunting, wasting and underweight were 17%, 5% and 2% respectively. Also from the study it was found that male children (9%) were more stunted than female children. Malnutrition (stunting, underweight and wasting) can be said to be high in children attending the growth monitoring programme in the Wa Regional Hospital. Thus, there was no effect of the mothers/caregiver's nutrition knowledge on the nutritional status of their children.

6.2 LIMITATION

There may be under-reporting or exaggeration of feeding practices by mothers.

6.3 RECOMMENDATION

It is recommended that;

There is the need for studies to establish the reasons why stunting is more prevalent than wasting and under-weight in the Upper West Region.

REFERENCES

- Adeba, A., Garoma, S., Fekadu, H., & Garoma, W. (2014). Prevalence of wasting and its associated factors of children among 6-59 months in Guto Gida district, Oromia regional state, Ethiopia. *Journal of Food Processing Technology*, 289.
- Adeladza, T. A. (2009). The influence of Socio-economical Nutritional Characteristics on Child Growth in Kwale District of Kenya. *African Agriculture Nutrition and Development*, 1584-5374.
- Akeredolu, I., Osisanya, J., Seriki-Mosadolorun, J., & Okorafor, U. (2014). Mothers' Nutritional knowledge, Infant feeding Practices and Nutritional status of children (8-24 months) in Lagos state, Nigeria. *European Journal of Nutrition and Food Safety*, 364-374.
- Aidam B.A., Perez-Escamilla R., Lartey A. (2005). Lactation counselling increases exclusive breast-feeding rates in Ghana". *Journal of Nutrition*, 135:1691-1695.
- Amanuel, B., Gerezgiher, A. B., Hailemariam, B., & Kalayou, K. (2013). Mothers Knowledge on Nutritional Requirement of Infant and Young Child Feeding in Mekelle, Ethiopia, Cross Sectional Study. *Global Journal of Medical Research*, 2249-4618.
- Amosu, A. M., Degun, A. M., Atuolomah, N. O., & Olarenwaju, M. F. (2011). A study of the nutritional status of under-five children of low-income earners in South-Western Nigerian community. *Current Research Journal of Biological Sciences*, 578-585.
- Amsalu, S., & Tigabu, Z. (2008). Risk factors for severe acute malnutrition in children under the age of 5: A case control study. *Ethiopian Journal of Developmental Health*, 22:21-25.
- Appoh, L., & Krekling, S. (2005). Maternal nutritional knowledge and child nutritional status in the Volta Region of Ghana. *Maternal and Child Nutrition*, 100-110.
- Ashworth, A., Shrimpton, R., & Jamil, K. (2008). Growth monitoring and promotion: review of evidence impact. *Journal of Maternal and Nutrition*, 86-117.
- Babatunde, R., Olagunju, F., Fakayade, S., & Sola-Oja, F. (2011). Prevalence and Determinants of Malnutrition among Under-five Children of farming Households in Kwara State, Nigeria. *Agricultural Science*, 173-174.
- Badake, Q., Maina, I., Mboganie, M., Muchemi, G., Kihora, E., Chelimo, E., et al. (2014). Nutritional status of children under five years and associated factors in Mbeere South District, Kenya. *African Crop Science*, 799-806.
- Basavanthappa, B. T. (2008). *Essentials of Community Health Nursing*. In B. T. Basavanthappa, *Essentials of Community Health Nursing* (pp. 400-480). New Delhi: Jaypee Ltd.
- Beavers, I., Margaret, K., & Jan, F. (1992). Nutrition knowledge, attitudes and food purchasing practices of parents. *American Journal of Epidemiology*, 904-914.

- Beka, T., Wambui, K., Zewditu, G., & Girum, T. (2009). Magnitude and determinants of stunting in children under five years of age in food surplus region of Ethiopia: The case of West Gojam zone. *Ethiopian Journal of Health Development* , 98-106.
- Benson, T. (2005). Improving nutrition as a development priority: Addressing under nutrition within national policy processes in Sub-Saharan Africa. Washington DC: International Food Policy Research Institute.
- Bevan, A., & Reilly, S. (2011). Mother's effects to promote healthy nutrition and physical activity for their preschool children. *Journal OF Pediatric Nursing* , 315-403.
- Bhandari, P., Shrestha, S., & Ghimire, D. (2007). Socio-cultural and geographical disparities in child immunization in Nepal. *Asia-Pacific Population* , 43-64.
- Black, R., Allen, L., Bhutta, Z., Caulfield, L., de Onis, M., & Ezzati, M. (2008). Maternal and Child Undernutrition Study Group. Maternal and Undernutrition: global and regional exposures and health consequences. *Lancet* , 371:243-60.
- Black, R., Morris, S., & Bryce, J. (2003). Where and why are 10 million children dying every year. *Lancet* , 2226-2234.
- Bloss, E., Wainaina, F., & Bailey, R. (2004). Prevalence and Predictors of underweight, stunting and wasting among children aged 5 and under in Western Kenya. *Journal of Tropical Pediatrics* , 260-270.
- Blossner, M., deOnis, M., & Pruss-Ustun, A. (2005). Malnutrition: quantifying the health impact at national and local levels. Geneva: WHO.
- Bondy, J., Thind, A., Koval, J., & Speechley, K. (2009). Identifying the determinants of childhood immunization in the Philippines. *Vaccines* , 169-175.
- Bronte-Tinkew, J., & DeJong, G. (2004). Children's nutrition in Jamaica: Do household structure and household economic resources matter? *Social science and medicine* , 499-514.
- Dabone, C., Delisle, H. F., & Receveur, O. (2011). Poor nutritional status of school children in urban and peri urban areas of Ouagadougou (Burkina Faso). *Nutrition Journal* , 34.
- David, A. B. (2002). Introduction to nutrition and metabolism. In A. B. David, Introduction to nutrition and metabolism (p. 740). London: Taylor and Francis.
- Deconinck, Bahwere, P., Diene, S., Bernardo, D., & Adou, P. (2011). Summary report;community-based management of acute malnutrition implementation in West Africa. West Africa: Hedwig.
- Dietitians of Canada and Canadian Pediatric Society. (2010). The Executive Summary: Promoting Optimal Monitoring of Child Growth in Canada. *Pediatric Child Health* , 77-79.
- Dinesh, K., Goel, N., & Poonam, C. (2006). Influence of Infant feeding practice on the nutritional status of under-five children. Department of Community Medicine,GMCH , sector 32a.

- Echoka, E. (2007). Barriers to child nutrition security in food secure households. A study of Mjini village in Bungoma. Thesis, Kenyatta University .
- Edmond, K. M., Zandoh, C., Quigley, M. A., Amenga-Etego, S., Owusu-Agyei, S., & Kirkwood, B. R. (2006). Delayed breastfeeding initiation increases the risk of neonatal mortality. *Pediatrics Journal* , 380-6.
- Ergo, A., Gwatkin, D., & Shekar, M. (2009). What difference do the new WHO child growth standards make for the prevalence and socio-economic distribution of undernutrition. *Food and Nutrition Bulletin* , 3-15.
- Eskezyiaw, A. G., Desta, H. H., & Genet, G. K. (2017). Exclusive breastfeeding practice and associated factors in Kemba Woreda, Southern Ethiopia, a community based cross-sectional study. *International Journal of Science, Technology and Society* , 55-61.
- Ezzati, M., Lopez, A., Rodgers, A., Vander Hoorn, S., & Murray, C. (2002). Comparative risk assessment collaborating group; Selected major risk factors and global and regional burden of disease. *Lancet* , 1347-1360.
- Faber, M., & Bernade, S. (2007). Breast feeding, complementary feeding and nutrition status of 6-12 months old infants in rural Kwazulu-Natal .
- FAO. (2014). Guidelines for assessing nutrition related knowledge, attitudes and practices. Rome: FAO of the United Nations.
- FAO. (2011). Eating well for good health; lessons on nutrition and healthy diets. Rome: FAO.
- FAO. (2008). The state of food insecurity in the world: High food prices and food security-threats and opportunities . Rome: Food and Agriculture Organisation.
- FAO. (2005). Nutrition country profile; Sudan nutrition profile. Sudan: Food and Agriculture Organisation of the United Nation.
- Fransesco, B. (2010). Child Nutrition in Mozambique in 2003: The Role of Mother's Education and Nutrition Knowledge. *Economic and Human Biology* , 331-45.
- Fischer Walker, C., Friberg, I., Binkin, N., Young, M., & Walker, N. (2011). Scaling up diarrhoea prevention and treatment interventions: A lives save tool analysis. *PLoS Med* , 1-8.
- GDHS. (2014). Demographic Health Survey. Accra: Ghana Statistical Service.
- Geissler, C. A., & Powers, H. J. (2005). Human Nutrition. In C. A. Geissler, & H. J. Powers, *Human Nutrition 11th Ed* (pp. 236-243). Churchill Livingstone: Elsevier.
- Gibson, R. (2005). Anthropometric Assessment. In: *Principles of Nutrition Assessment*. Amazon: Oxford University Press.
- GDHS. (2014). Demographic Health Survey. Accra: Ghana Statistical Service.

- Geissler, C. A., & Powers, H. J. (2005). Human Nutrition. In C. A. Geissler, & H. J. Powers, Human Nutrition 11th Ed (pp. 236-243). Churchill Livingstone: Elsevier.
- Gibson, R. (2005). Anthropometric Assessment. In: Principles of Nutrition Assessment. Amazon: Oxford University Press.
- Gichana, M. B. (2013). Nutritional knowledge of mothers and Nutritional Status of Their Children 6-59 months under Malezi Bora Programme in Kawangware Sublocation, Dagoretti, Nairobi County. Thesis for Masters Programme from University of Nairobi, 1-51.
- Griffiths, M., & Rosso, J. D. (2007). Growth monitoring and the promotion of healthy young child growth: Evidence of effectiveness and potential to prevent malnutrition. The Manoff Group, 134-7.
- GHS. (2005). Imagine Ghana free of malnutrition. Accra: Ghana Health Service.
- GSS. (2008). Ghana Demographic and Health Survey. Accra: Ghana Health Service.
- GSS. (2009). Demographic Health Survey. Accra: GSS.
- GSS. (2011). Ghana Multiple Indicator Cluster Survey with an Enhanced malaria and Biomarker. Accra: GSS.
- GSS, GHS, & Macro, I. (2008). Ghana Demographic and Health SURVEY. Accra: GSS, GHS, ICF Macro
- Health, A. C. (2009). Community-based sub-component of Ethiopian National Nutrition Program Baseline Survey. Ethiopia: Addis Continental Institute of Public Health.
- Imdad, A., Yakoub, M. Y., & Bhutta, Z. A. (2011). Impact of Maternal Education on Complementary Feeding and Provision of Complementary Foods on Child Growth in Developing Countries. BMC Public Health, 525.
- Iram, U., & Butt, M. (2006). Understanding the health and nutrition status of children in Pakistan: A study of the interactions of socioeconomic and environmental factors. International Journal of Social Economics, 111-131.
- Jesmin, A., Yamamoto, S., Malik, A., & Haque, M. (2011). Prevalence and Determinants of Chronic Malnutrition among Preschool Children. A cross-sectional study in Dhaba city, Bangladesh. Journal of Health Population Nutrition, 494-499.
- John, G., Safari, S., Kimambo, C., James, E., & Welaimiara, L. (2015). Feeding practices and nutritional status of infants in Morogoro Municipality, Tanzania. Tanzania Journal of Health Research, 15-31.
- Johnson, A., Knight, E., Edwards, C., Oyemade, U., Cole, O., Westney, O., et al. (1994). Dietary intakes, anthropometric measurements and pregnancy outcomes. Journal of Nutrition, 936S-942S.

- Kapur, D., Sharma, S., & Agarwal, K. N. (2005). Dietary Intake and Growth Pattern of Children 9-36 months of Age in An Urban Slum in Delhi. *Indian Pediatrics* , 351-356.
- Katona, P., & Katona-Apte, J. (2008). The interaction between nutrition and infection. *Clin Infect Dis* , 1502-1588.
- Kenya National Bureau of Statistics (KNBS) and ICF Macro. (2010). Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.
- Kenya National Bureau of Statistics. (2009). Mbeere District Multiple Indicator Cluster Survey 2008, Kenya. Kenya National Bureau of Statistics .
- Khadilkar, V., Khadilkar, A., Choudhury, P., Agarwal, V., Deepak, U., & Shah, N. (2007). Growth monitoring guideliness for children from birth to 18 years. *Indian Pediatrics* , 187-197.
- Khor, G. (2003). Update on the prevalence of malnutrition among children in Asia. . *Nepal Med Col* , 113-122.
- Kimani-Murage, E., Madise, N., Fotso, J., Kyobutungi, C., Mutua, M., Gitau, T., et al. (2011). Patterns and determinants of breastfeeding and complementary feeding practice in Urban informal settlements, Nairobi, Kenya. *BMC Public Health* , 369.
- Lagua, R. T., & Claudio, V. S. (2004). *Nutrition and Diet therapy Reference Dictionary*, 4th ed. New York: Chapman and Hall.
- Lartey, A. (2008). Maternal and child nutrition in Sub-Saharan Africa: Challenges and interventions. *Prac.Nutr Soc* , 105-108.
- Latham, M. (1979). *Hman Nutrition in Tropical Africa*. Rome: FAO.
- Leenstra, T., Petersen, L., Kariuki, S., Oloo, A., Kager, P., & terKuile, F. (2005). Prevalence and severity of malnutrition and age at menarche; cross-sectional studies in adolescent school girls in Western Kenya. *Eur.J. Clin Nutr* , 41-48.
- Lindsay, A., Machads, M., Sussner, K., Hardwick, C., & Peterson, K. (2008). Infant feeding practices and beliefs about complementary feeding among low-income Brazilian mothers, a qualitative study. *Food Nutrition Bull* , 15-24.
- Lofti, M. (1988). Growth monitoring: A brief literature review of current knowledge. *Food and Nutrition Bullet* , 10.
- Macharia, C. W., Kogi-Makau, W., & Muroki, N. M. (2005). A comparative study on the nutritional status of shildren (6-59 months) in a World Vision Project and Non-Project Area in Kathonzwenii Division, Makueni District, Kenya. *African Journal of Food Agriculture and Nutrition Development* , 7-8.
- Mahgoub, S. E., Nnyeipi, M., & Bandeke, T. (2006). Factors affecting prevalence of malnutrition among children under 3 years of age in Botswana. *African Journal of Food Agriculture Nutrition and Development* .

- Magnani, R. (1997). Sampling guide. Food and Nutrition Technical Assistance Project. Arlington.
- McKinnon, L., Giskes, K., & Turrell, G. (2014). The contribution of three components of nutrition knowledge to socio-economic differences in food purchasing choices. *Public Health Nutrition* , 1814-24.
- Meme, M. M. (1996). Nutrient intake and nutritional status of primary school children in a school with and without a feeding programme in Nyambene District, Kenya . Thesis for University of Nairobi, Kenya , 48-71.
- Mohieldin, A., Ibrahim, M., & Alshiek, M. (2010). The impact of feeding practices on the prevalence of under nutrition among 6-59 months aged children in Khartoum. *Sudaness Journal of Public Health* , 1-2.
- MPHS. (2010). Health indicators in Ijara Districts. Ijara: Ministry of Public Health and Sanitation.
- National Bureau of Statistics (NBS) [Tanzania] and ORC Macro. (2005). Tanzania Demographic and Health Survey 2004-05. Dar Es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
- Nekesa, M. (2012). Nutritional knowledge, attitudes and practices of primary caregivers of home grown school feeding programme of pupils at Sauri Millennium village, Siaya-Kenya. Published MPH thesis, University of Kenyatta , 50-52.
- Nel, E. (2010). Diarrhoea and malnutrition. *South African Journal of Clinical Nutrition* , S15-S18.
- Nguyen, N. (2009). Nutritional status and determinants of malnutrition in children under 3 years of age in Nghe, Vietnam Pakistan. *Journal of Nutrition* , 958-964.
- Nicklas, T. A., & Hayes, D. (2008). Position of the American dietetics association: nutrition guidance for healthy children ages 2 to 11 years. *Journal of the American Dietetics Association* , 1038-1047.
- Nigeria Demographic and Health Survey, National Population Commission and ICF Macro. (2008). Nigeria Demographic and Health Survey. Calverton, Maryland: NPC and ICF Macro.
- Nutrition, S. u. (2008, January). A framework for action; Maternal and child undernutrition . *The Lancet* , pp. 2-10.
- Nyirandutiye, D., Ag Ikane, A., & Fofana, A. (2011). Screening for acute childhood malnutrition during the national nutrition week in Mali increase treatment referrals. *PLoS ONE* , 14818.
- Olack, B., Burke, H., Cosmas, L., Bamrah, S., Dooling, K., Feikin, D., et al. (2011). Nutritional status of under five children living in an informal Urban Settlement in Nairobi, Kenya. *J Health Popul Nutr* , 357-363.

- Ongosi, A. N. (2010). Nutrient intake and nutrition knowledge of lactating women (0-6) months postpartum in Low Socio-economic Area in Nairobi, Kenya, Pretoria. University of Pretoria .
- Otgonjargal, D., Woodruff, B., Batjargal, J., Gereljaral, B., & Davaalkham, D. (2012). Nutritional status of under-five children in Mongolia. *Journal of Medicine and Medical Sciences* , 341-349.
- Ozdogan, Y., Ucar, A., Akan, L. S., Yilmaz, M. V., Surucvoglul, M. S., Cakuroglu, F. P., et al. (2012). Nutritional knowledge of mothers with children aged between 0-24 months. *Journal of Food, Agriculture and Environment*, 173-175.
- Pelto, G., Santos, I., Goncalves, H., Victora, C., Martines, J., & Habicht, J. (2004). Nutrition counselling training changes physician behaviour and improves caregiver's knowledge acquisition. *Journal of Nutrition* , 357-362.
- Phengaxy, M., Ali, M., Yagyu, F., Soulivanh, P., Kuroiwa, C., & Ushijima, H. (2007). Risk factors for protein energy malnutrition in children under five years, study from Laos. *Pediatric Intentional Journal* , 49-260.
- Poh, B., Kathyran Tham, B., Wong, S., Winnie Chee, S., & Tee, E. (2012). Nutritional status, dietary intake patterns and nutrition knowledge of children aged 5-6 years attending kindergarten in the Klang Valley, Malaysia. *Malasian Journal of Nutrition* , 231-242.
- Prost, M., Jahn, A., Floyd, S., Mvula, H., Mwaiyeghele, E., Mwinuka, V., et al. (2008). Implication of new WHO Growth standards on identification of risk factors and estimated prevalence of malnutrition in rural Malawian infants. *PLoS ONE* , 1-8.
- Rajaratnam, J., Marcus, J., Flaxman, A., Wang, H., Levin-Rector, A., Dwyer, L., et al. (2010). Neonatal, postneonatal childhood and under-5 mortality for 187 countries, 1970-2010: a systematic analysis of progress towards Millennium Development Goal 4. *Lancet* , 1988-2008.
- Rao, V., Yadav, R., Dolla, C., Kumar, S., Bhondeley, M., & Ukey, M. (2005). Under nutrition and childhood morbidities among tribal pre-school children. *Indian Journal of Medical Resources* , 43-47.
- Regional Hospital Health Administration. (2014). Wa regional hospital annual report. Wa, Ghana: Regional Hospital Health Administration.
- Schofield, L. (2009). Report of baseline nutrition assessment in the slums of Nairobi East and North Districts, Nairobi Kenya. 572.
- SCN. (2006). Meeting the challenge to improve complementary feeding. Geneva: UN.
- Seligman, H., Laraia, B., & Kushel, M. (2010). Food insecurity is associated with chronic disease among low-income NHANES participants. *Journal of Nutrition* , 304-310.

- Shettigar, D., Anisla, M., Maryes, G., Chaeko, J., Thomas, R. J., & Shukoor, S. (2013). Assessment of knowledge of mothers of under five children on nutritional problems: A rural community based study. *National Journal of Community Medicine* , 4.
- Shi, L., Zhang, J., Wang, Y., Caulfield, L., & Guyer, B. (2010). Effectiveness of an educational intervention on complementary feeding practices and growth in rural China: a cluster randomised controlled trial. *Public Health Nutrition* , 556-565.
- Sendeku, & Agegnehu, G. (2007). Perception and practice of mothers/caregivers on child nutrition (0-56) in Arba Minch Zuria. 2nd Annual Conference of Food and Nutrition Society (FoNSE). *Health and Nutrition Research* , 64-86.
- Siddiqi, M., Haque, M., & Goni, M. (2011). Malnutrition of under-five children: Evidence from Bangladesh. *Asian Journal of Medical Sciences* , 113-9.
- Sule, S.S., Onayade, A., Abiona, T., Fatusi, A., Ojofeitimi, E., Esimai, O., et al. (2009). Impact of nutritional education on nutritional status of under-five children in two-rural communities of South-West Nigeria.
- Sultan, A., & Zuberi, R. (2003). Late weaning: the most significant risk factor in the development of iron deficiency anemia at 1-2 years of age. *J. Ayub Med Coll Abbottabad* , 3-7.
- Sumit, M. (2012). Assessing vulnerability to chronic under nutrition among under-five children in Egypt. *Academic Editor: Abbas Bhuiya* , 10-12.
- Survey, N. D. (2008). National Population Commission and ICF Macro. Calverton, Maryland: NPO AND ICF Macro.
- SunWoong, L., ChungJa, S., AeJung, K., & MiHyun, K. (2000). A study on nutritional attitude, food behaviour and nutritional status according to nutrition knowledge of Korean middle school students. *Korean Journal of Community Nutrition* , 419-431.
- Surabi, S. M. (2004). Malnutrition among children. *Times of India* , 92-7.
- Suresh, B. S., Ravishankar, T. L., Chaitra, T. R., Mohapatra, A. K., & Gupta, V. (2010). Mother's knowledge about pre-school oral health. *Journal of Indian Soc Pedod Prev* , 282-7.
- Takanashi, K., Chonan, Y., Quyen, D., Khan, N., Poudel, K., & Jimba, M. (2009). Survey of food-hygiene practices at home and childhood diarrhoea in Hanoi, Viet Nam. *Journal of Health Population* , 602-11.
- Tumwine, J. (2005). Clean drinking water for homes in Africa and other less developed countries. *Biomedical Journal* , 448-469.
- UN. (1992). Second report on world nutrition situation. Geneva: United Nations.
- UN. (2009). The state of the world's children 2009. Special edition: celebrating 20 years of the convention on the rights of the child. New York: United Nations.

- UNICEF. (1987). Analysis of children and women in Sri Lanka. Sri Lanka: UNICEF.
- UNICEF. (2013). Improving Child Nutrition. The achievable imperative for progress. New York.
- UNICEF. (2012). Millennium development goals, goal 4: reduce child mortality. Washington DC: UNICEF.
- UNICEF. (2004). Report of the review of accelerated child survival and development (ASCD) programme in the Upper East Region of Ghana. Upper East Region.
- UNICEF. (2009). State of the World's Children 2008. Washington DC: UNICEF.
- Unicef, WHO, & Bank, W. (2012). Unicef WHO-World Bank Joint child malnutrition estimates. New York, Geneva, Washington DC.
- UNICEF. (2014). The state of the world's children 2014 in numbers. Every child counts: revealing disparities, advancing children's right. New York: UNICEF.
- USAID. (2007). Nutrition status and its determinants in Southern Sudan. Summary of Available Data. Washington DC: USAID.
- Van de Poel, E., O'Donnell, O., & Van Doorslaer, E. (2007). Are urban children really healthier? Evidence from 47 developing countries. *Social science and medicine*, 1986-2003.
- Van den Broeck, J., Willie, D., & Younger, N. (2009). The world health organisation child growth standards. Expected implications for clinical and epidemiological research. *European Journal of Pediatrics*, 247-251.
- Vereecken, C., & Maes, L. (2010). Young children's dietary habits and association with mothers' nutritional knowledge and attitudes. 44-51.
- Victora, C., Adair, L., Fall, C., Hallal, P., Martorell, R., Richter, L., et al. (2008). Maternal and child under nutrition: consequences for adult health and human capital. *Lancet*, 340-357.
- Vitolo, M., Rauber, F., Campagnolo, P., Feldens, C., & Hoffman, D. (2010). Maternal dietary counselling in the first year of life is associated with a higher healthy eating index in childhood. *Journal of Nutrition*, 2002-2007.
- Waihenya, E., Kogi-Makau, W., & Muita, J. (1996). Maternal nutritional knowledge and the nutritional status of preschool children in a Nairobi Slum. *East Africa Medical*, 419-23.
- Wamani, H., Nordrehang, A. A., Peterson, S., Tumwineand, J. K., & Tgleskar, T. (2007). Boys are more stunted than girls in Sub-Saharan Africa: A meta-analysis of 16 demographic and health surveys.
- Waswa, L. M. (2005). Factors influencing nutritional status of preschool children in Kimili Division, Bungoma District, Kenya. MSc Thesis, Kenyatta University .
- Wells, J. (2000). Natural selection and sex differences in morbidity and mortality in early life. *Health Population Nutrition Biology*, 65-76.

- Whati, L. H. (2005). Knowledge questionnaire and performance-rating scale for Urban South African adolescents participating in the birth-to-twenty study. Thesis for the University of Stellenbosch , 1-106.
- WHO. (1995). Physical status: the use and interpretation of anthropometry. A report of WHO Expert Committee. Geneva: WHO Technical Report series 854.
- WHO. (1998). Evidence for the ten steps to successful breast feeding. Geneva: WHO.
- WHO. (1999). Management of severe malnutrition: a manual for physicians and other senior health workers. Geneva: World Health Organization.
- WHO. (2000a). Infant and Young child nutrition. Technical consultation on infant and young child feeding. Geneva: WHO.
- WHO. (2000b). Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet* , 451-455.
- WHO. (2003). Global Strategy for Infant and Young Child Feeding. Geneva: WHO library cataloguing-in-publication data.
- WHO. (2006). Infant and Young Child Nutrition. Geneva: WHO.
- WHO. (2007). Reproductive Health Library; Pregnancy and Childbirth and Breastfeeding. New York.
- WHO. (2009a). World Development indicators. Washington DC: World Bank.
- WHO. (2009b). Infant and Young child feeding: Model chapter for textbooks for medical students and Allied health professionals. Session 3, Complementary feeding. Geneva: WHO.
- WHO. (2010). Data Bank on infant and young child feeding in Nigeria. Nigeria.
- WHO. (2011). World Health Statistics. Geneva, Switzerland: World Health Organization.
- WHO. (2012). World Health Statistics. Geneva: WHO.
- WHO, UNICEF, World Bank. (2009a). Immunization: putting vaccines to good use. In: state of the world's vaccines and immunization. Geneva: WHO.
- WHO/UNICEF. (2009b). Diarrhoea: Why children are still dying and what can be done. Geneva: WHO/UNICEF.
- Wiejesingh, D. (2010). Nutritional status of under 5 year old children and its relationship with maternal nutrition knowledge in Weeraketiya DS division of Sri Lanka. *Tropical Agricultural Research* , 330-339.
- Wilson, A., Forsyth, J., Greene, S., Irvine, L., Hau, C., & Howie, P. (1998). Relation of infant diet to childhood health: seven year follow up of cohort children in Dundee infant feeding study. *BMJ* , 21-25.

APPENDICES

APPENDIX I: Research Participant Information Sheet

Dear respondent,

My name is Abu-Naa Zahari Aminbo, a postgraduate student of the department of Dietetics, University of Ghana, pursuing MSC Dietetics.

I seek your cooperation to partake in a research titled: “Effect of nutritional knowledge of mothers/caregivers on the nutritional status of their children under-five years old in Wa Municipal, Ghana”, as part of my academic work. Could you please spare me few minutes of your time and respond to the items below as honestly as possible.

Explanation of Procedure - You are kindly requested to complete the attached questionnaire. Please take your time to respond and be sincere to the best of your knowledge. All information provided will be treated as private and confidential, your answers and name will never be revealed. Also, you are not obliged to answer any question you do not want to, and you may stop the interview at any time.

The objective of this study is to assess the relationship between nutritional knowledge of mothers/caregivers and nutritional status among children aged 6-59 month(s). This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question.

Possible risks and benefits - The research will not pose any risk to you or your child whatsoever. The only discomfort is the time you take to respond to the questions.

Cost and compensation for participation – the research is purely voluntary participation required by you and no monetary compensation is awarded for your participation and you are not also required to make any payment to partake in the study.

Confidentiality – Your withdrawal and refusal to participate will involve no penalty. You are free to withdraw consent and discontinue participation at any time without prejudice from the research team. Information provided by you in this research will be used only for the intended purpose.

APPENDIX II: INFORMED CONSENT FORM

I hereby agree to take part in this research. I have read the attached participant's information sheet and I fully understand my role in this research. All my questions will be answered to the best of my knowledge and satisfaction. I do agree that my participation will be totally voluntary. I have been informed about the confidentiality of any information I will provide and that my privacy and anonymity will be assured in the collection, storage and publication of the research material.

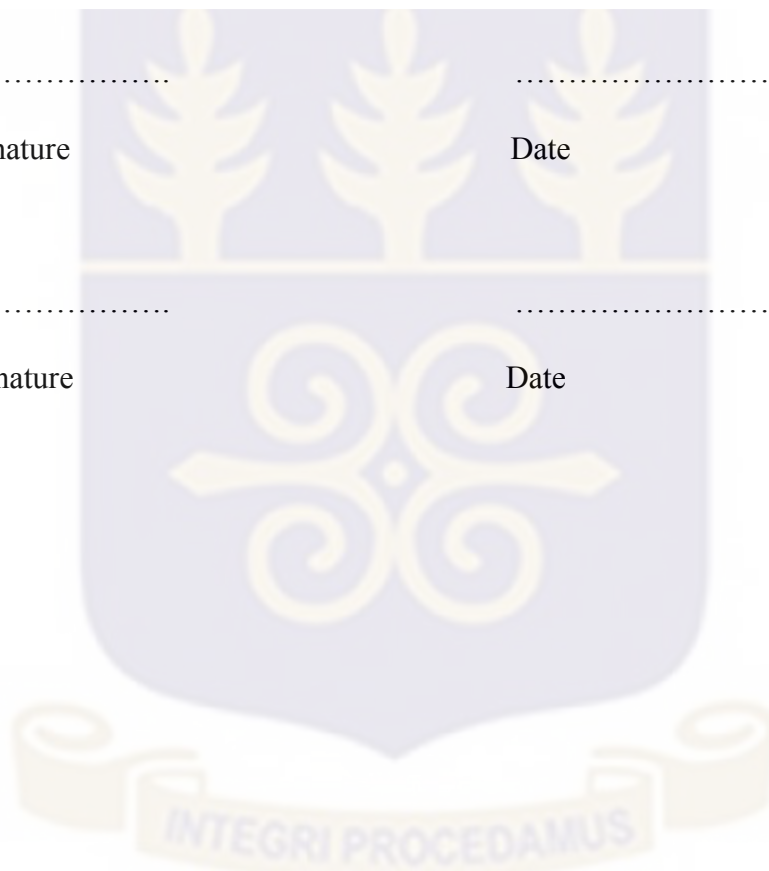
I have fully understood the aims, methods and conditions of participation in this study.

.....
Participant's Signature

.....
Date

.....
Researcher's Signature

.....
Date



SOCIO DEMOGRAPHIC QUESTIONNAIRE FOR MOTHERS/CAREGIVERS AND INFANT/YOUNG CHILDREN: ADAPTED FROM WWW.FAO.ORG/DOCREP/019/I3545E/I3545E00.HTM.		
No	Question	Responses
SOCIO DEMOGRAPHIC DATA		
1	Age	18-28 .....1 29-39.....2 40-50 .....3 51 and above .....4
2	Gender	Male .....1 Female.....2
3	Marital status	Single.....1 Married .....2 Widowed/Separate/Divorce.....3
4	Place of residence	....................
5	Highest education level	No education.....1 Primary education .....2 Junior high school .....3 Senior high school .....4 Tertiary education.....5
6	Ethnicity (Tribe)	Waalu.....1

		Dagaao.....2 Sissalu.....3 Others .....4
7	Religious Denomination	Christianity.....1 Moslem .....2 Traditionalist .....3 Others .....4
SOCIO-ECONOMIC DATA		
8	Occupation, Are you employed?	Yes.....1 No.....2
9	If yes, what type of job do you do?	Farming.....1 Trading.....2 Tradesman.....3 Public/ Civil Servant.....4 Others.....5
10	If Farmer, state	Subsistent.....1 Semi-Commercial.....2 Commercial.....3
11	If Trader/ Tradesman/Public/Civil Servant, do you have a regular cash income/ are you a salaried worker	Yes.....1 No.....2
12	Do you receive any form of financial subvention?	Yes.....1 No .....2
13	If yes, in what form?	Regular .....1 Casual .....2

14	What is the Occupation of the father?	Farmer.....1 Trader.....2 Tradesman .....3 Public/Civil Servant .....4 Others.....5
15	Does he earn enough to buy food and essentials for all the family?	Yes.....1 No.....2
ADEQUATE FOOD SECURITY AND FOOD INTAKE		
16	Do you have any land on which you grow food?	Yes.....1 No.....2
17	Are you able to provide food for the family throughout the year?	Yes.....1 No .....2
18	How many children do you have?	1- 4.....1 5-8 .....2 9-12 .....3 13 and above .....4
19	How many people do you feed in your household?	1-4 -----1 5-8 -----2 9-12 -----3 13 and above -----4
INCIDENCE OF DISEASE		
20	Has your child been falling sick?	Yes .....1 No .....2
21	How often does your child fall sick	Once in a week .....1

		Twice in a week .....2 Never fallen sick .....3 Once in a month .....4 Other .....5
22	Has your child had diarrhoea before?	Yes .....1 No .....2
23	How long did it last?	1 day.....1 2 days .....2 3 days.....3 4 days.....4 5 days .....5 Other .....6
24	How recent was it?	1 week ago .....1 2 weeks ago .....2 3 weeks ago .....3 1 month ago .....4 Other .....5
INFANT/ YOUNG CHILDREN		
25	Gender of child	Male .....1 Female .....2
26	Date of birth/age (month)	.....
27	Birth weight	.....

KNOWLEDGE AND PRACTICES: ADAPTED FROM WHO'S INFANT AND YOUNG CHILD FEEDING MODULE (WHO, 2010)		
Breastfeeding Practices		
28	When did you start breastfeeding this child?	The very first day after delivery.....1 The second day .....2 The third day .....3 The fourth day.....4 Others (specify) .....5
29	If breastfeeding began on day one, please indicate the hours after delivery breastfeeding commenced?	Within 30 minutes after birth.....1 Within one hour after birth .....2 Within two hours after birth.....3 Others.....4
30	. Are you still breastfeeding your child?	Yes .....1 No.....2
31	If the answer of 31 is no , what age did you stop breastfeeding the child	.....
32	Do you give water to your child?	Yes .....1 No .....2
33	If 33 is yes, at what age of the child did you start?	.....
34	Do you give the child breast milk anytime the child asks for?	Yes .....1

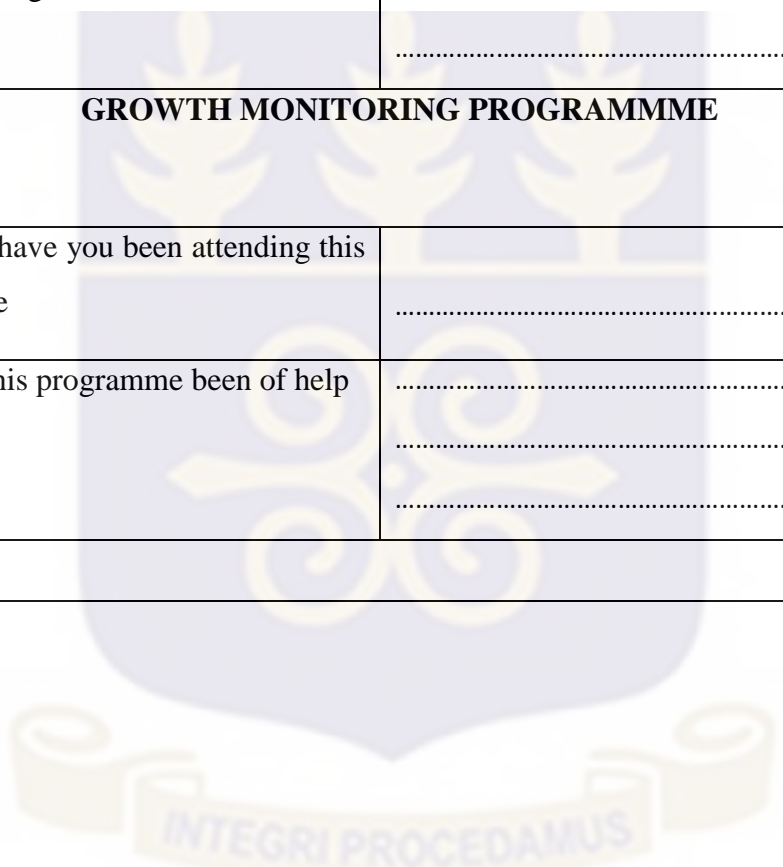
		No .....2
35	On the average how many times do you breastfeed your child in a day	Two times .....1 Three times .....2 Four times .....3 Five times .....4 Six times .....5 Others (specify).....6
36	How many times do you breastfeed during the night?	Two times .....1 Three times .....2 Four times .....3 Five times .....4 Six times .....5 Others .....6
Complementary Feeding Practices		
37	Have you started giving complementary foods to the child?	Yes .....1 No .....2
38	If you answered yes to 38 at what age of the child did you start?	.....

39	What type of weaning food do you give to your child?	Porridge .....1 Weani mix .....2 T.Z. ....3 Rice (cooked) .....4 Others .....5
40	How many times do you give the child complementary foods?	2 times .....1 3 times .....2 4 times .....3 Others.....4
41	Do you normally give the child snack in between the main meals?	Yes .....1 No .....2
42	Do you give your child any infant formula?	Yes .....1 No .....2
43	. If yes , what type of formula do you give your child?	SMA .....1 Lactogen .....2 Cerelac .....3 Others (specify) .....4
44	Do you feed the child with a feeding bottle which has nipple?	Yes .....1 No .....2
Knowledge on Breastfeeding and Complementary Feeding		

45	How long is it recommended that a woman breastfeeds her child?	6 months or less .....1 6–11 months .....2 12–23 months .....3 24 months and more .....4 Other .....5 Don't know .....6
46	At what age should babies start eating foods in addition to breastmilk?	At 4 months .....1 At 6 months .....2 Other .....3 Don't know .....4
47	Why is it important to give foods in addition to breast milk to babies from the age of six months?	Breast milk alone is not sufficient (enough)/cannot supply all the nutrients needed for growth from six months.....1 Food is readily available 2 Other .....3 Don't know .....4
48	Which foods or type food can be added to maize porridge to make it more nutritious?	..... ..... .....

49	Do you know any ways to encourage young children to eat?	Giving them attention during meals, talk to them, make meal times happy times .....1 Clap hands .....2 Make funny faces/play/laugh .....3 Demonstrate opening your own mouth very wide .....4 Say encouraging words .....5 Draw the child's attention .....6 Other .....7 Don't know .....8
50	How good do you think it is to give different types of food to your child each day?	Not good .....1 Not sure .....2 Good .....3
51	If not good, can you give reasons why?	..... ..... .....
52	How difficult is it for you to give different types of food to your child each day?	Not difficult .....1 So-so .....2 Difficult .....3
53	If Difficult: Can you tell me the reasons why it is difficult	..... ..... .....

54	How good do you think it is to feed your child several times each day?	Not good .....1 Not sure .....2 Good .....3
55	If Not good: Can you tell me the reasons why it is not good?	..... ..... .....
GROWTH MONITORING PROGRAMMME		
56	How long have you been attending this programme	.....
57	How has this programme been of help	...............



APPENDIX IV: ETHICAL CLEARANCE LETTER



UNIVERSITY OF GHANA
SCHOOL OF BIOMEDICAL AND ALLIED HEALTH SCIENCES

9th August, 2016.

Ms. Abu-Naa Zahari Aminbo,
Dept. of Nutrition and Dietetics,
SBAHS,
Korle Bu.

Dear Ms. Abu-Naa,

ETHICS CLEARANCE

Ethics Identification Number: SBAHS/10507247/AA/ND/2015-2016.

Following a meeting of the Ethics and Protocol Review Committee of the School of Biomedical and Allied Health Sciences held on Wednesday, 13th January 2016, I write on behalf of the Committee to approve your research proposal as follows:

TITLE OF RESEARCH PROPOSAL: "ASSESSING THE NUTRITIONAL KNOWLEDGE OF MOTHERS/CAREGIVERS AND ITS IMPACT ON THE NUTRITIONAL STATUS OF THEIR CHILDREN UNDER FIVE YEARS"

This approval requires that you submit six-monthly review reports of the protocol to the Committee and a final full review to the Committee on completion of the research. The Committee may observe the procedures and records of the research during and after implementation.

Please note that any significant modification of the research must be submitted to the Committee for review and approval before its implementation.

You are required to report all serious adverse events related to this research to the Committee within seven (7) days verbally and fourteen (14) days in writing.

As part of the review process, it is the Committee's duty to review the ethical aspects of any manuscript that may be produced from this research. You will therefore, be required to furnish the Committee with any manuscript for publication.

Please always quote the ethical identification number in all future correspondence in relation to this protocol.

Thank you.

Yours sincerely,

Dr. E. Olayemi.
(Chairman, Ethics and Protocol Review Committee)


Cc: Dean
Head, Dept. of Nutrition and Dietetics
School Officer
COLLEGE OF HEALTH SCIENCES

• Telephone: +233 (0) 302 687 975

P. O. Box KB 143, Korle Bu, Accra, Ghana.
• Email: sbahs@chs.ug.edu.gh

• Website: www.chs.ug.edu.gh

APPENDIX V: DEPARTMENT OF NUTRITION AND DIETETICS INTRODUCTORY LETTER



UNIVERSITY OF GHANA
DEPARTMENT OF NUTRITION AND DIETETICS
SCHOOL OF BIOMEDICAL AND ALLIED HEALTH SCIENCES

February 22, 2016

THE DOCTOR IN-CHARGE
WA REGIONAL HOSPITAL
WA

Dear Sir/ Madam,

LETTER OF INTRODUCTION-ABU-NAA ZAHARI AMINBO

The above named person is an MSc student of the Department of Nutrition and Dietetics the School of Biomedical and Allied Health Sciences, University of Ghana.

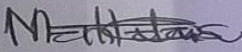
As part of academic requirement of a Master's of Science degree in dietetics, she is required to carry out a research project in nutritional status of children under five years and above. The area of research is on **'ASSESSING THE NUTRITIONAL KNOWLEDGE OF MOTHERS/CAERGIVERS AND ITS IMPACT ON THE NUTRITIONAL STATUS OF THEIR CHILDREN UNDER FIVE YEARS OLD**

We hereby write to request permission and assistance for the researcher to work with your facility (Wa Regional Hospital).

Please do not hesitate to contact me for any further information.

Thank you.

Yours faithfully,



Dr. Matilda Asante
Head of Department

COLLEGE OF HEALTH SCIENCES

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