ENSIGN COLLEGE OF PUBLIC HEALTH, KPONG
EASTERN REGION, GHANA

NUTRITIONAL STATUS ASSESSMENT OF CHILDREN UNDER FIVE YEARS IN HARD-TO-REACH AND PERI-URBAN COMMUNITIES OF LOWER MANYA KROBO MUNICIPALITY (LMKM), EASTERN REGION, GHANA

BY

YVETTE EYRAM AVORGBEDOR

(157100028)

A thesis submitted to the department of Community Health in the faculty of Public Health in partial fulfillment of the requirements for the degree of

MASTER OF PUBLIC HEALTH

JUNE, 2017

DECLARATION

I hereby certify that except for reference to the work of others', which I have duly cited, this Project submitted to the Department of Community Health, Ensign College of Public Health, Kpong is the results of my own investigation, and has not been presented for any other degree elsewhere.

YVETTE EYRAM AVORGBEDOR   ……………... ……………….
(157100028)   Signature   Date

DR. MOSES KLEVOR………………… ………………..
Supervisor   Signature   Date

DR. STEPHEN MANORTEY   ……………….. ………………
Ag. Head of Academic Programme   Signature   Date

DEDICATION

I dedicate this work to God Almighty for his immeasurable grace and favor throughout my studies. This work is also dedicated to my entire family, friends and loved ones for their prayers and unflinching support.

ACKNOWLEDGEMENT

DEFINITION OF TERMS

Malnutrition: It refers to over or under nutrition, nutrient imbalances or deficiencies (Chen et. al, 2001). This study will focus on under nutrition.

Stunting: Height-for-age Z- scores (HAZ) reflect linear growth retardation and are used to describe long term nutritional status; stunting is defined as HAZ < - Z-score.

Wasting: Weight-for-height Z- scores (WHZ) reflect more current nutritional status and measure the degree of thinness in a child; wasting is defined as WHZ < -2 Z-scores

Underweight: Weight- for- age below Z- scores (WAZ) represents a global measure of malnutrition; and underweight is defined as WAZ< -2 Z- scores.

Z-score: A Z- score (or standard deviation score) is defined as the deviation of the value of an individual child from the median value of the reference population, expressed in standard values.

ABBREVIATION/ACRONYMS

UNICEF- United Nations International Children's Emergency Fund

WHO- World Health Organisation

FAO- Food and Agricultural Organisation

GDHS – Ghana Demographic and Health Survey

GMP- Growth Monitoring and Promotion

CHPS- Community - based Health Planning Services

CMAM- Community-based Management of Acute Malnutrition

USAID - United States Agency for International Development

LMKM- Lower Manya Krobo Municipality

LMKMA- Lower Manya Krobo Municipal Assembly

MGRS- Multicentre Growth Reference Study

MUAC- Mid Upper Arm Circumference

NCHS- National Centre for Health Statistics

UN- United Nations

SAM- Severe Acute Malnutrition

SD- Standard Deviation

SHEP- School Health and Environmental Programme

TBA- Traditional Birth Attendant

DHS- Demographic Health Survey

WAZ- Weight-for-age z- score

WHZ-Weight-for-height z- score

WIFA- Women in fertility age

HAZ-Height-for-age z- score

JHS- Junior High School

SHS- Senior High School

O' Level-Ordinary Level

ABSTRACT

Malnutrition in children adversely impacts their growth and development, educational attainment, and the incidence of chronic diseases and economic productivity later in life. This study aimed to assess the nutritional status of children under 5 years of age in rural communities in the Lower Manya Krobo Municipality (LMKM) of the Eastern Region of Ghana.

A cross sectional study design employing quantitative methods was chosen for this study. The study population comprised children between the ages of 6 and 59 months and their caregivers. The study sample was chosen from among eligible caregivers and their children from 4 hard-to-reach communities and (2) peri-urban communities within 3 sub-municipalities, who lived in and accessed child welfare services in the LMKM during the study period.

A sample of 285 caregivers and their children were enrolled. Face-to-face interviews were used to collect the data from the respondents, and anthropometric measurements were carried out. Data entry was done using Excel 2010 and analyzed using WHO Anthro version 3.2.2 and STATA version 14.

The average age of the children under 5 years and their mothers were 32 months and 29 years respectively. Findings from the study indicate that, 40% of the children were malnourished (either stunted, wasted or underweight). Among severely malnourished children, about 5% were stunted, a similar percentage were wasted and 7% were underweight. Results of Chi square and Fisher's exact tests for association carried out indicated that, mother's age ($p<0.001$), family structure ($p=0.010$) and access to media information ($p<0.001$) were significantly associated with mother's nutritional knowledge. To ascertain the predictors of mothers' nutritional knowledge, a multiple logistic regression analysis showed that, caregivers with a lower education level (primary/junior high school) were more likely to have higher nutritional knowledge.

Ultimately, the study identified that, majority of children under 5 years of age surveyed from hard-to-reach and peri-urban communities in the LMKM had good nutritional status. More than a third of the children were however stunted, a tenth wasted, and less than a fifth underweight. There is therefore

the need for a more integrative effort of parents, community leaders, municipal health directorate and other stakeholders to improve the nutritional status of children under 5 years.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1

1.0 INTRODUCTION

1.1 Introduction and background of study

Malnutrition is a condition where there is a deficiency of certain vital nutrients in a person's diet or an excess of the aforementioned. This body of work will focus on nutrient deficiency among children under 5 years of age in selected hard-to-reach and peri-urban communities in the Lower Manya Krobo Municipality (LMKM) of Ghana. When there is deficiency, there is failure to meet requirements of the body in several respects *viz.* growth, physical condition, mood, demeanor and cognitive abilities (Barasi, 1997). Malnutrition commonly affects all groups in a community; however, infants and young children are the most vulnerable, owing to their high nutritional requirements for growth and development (Akorede and Abiola, 2013). Another group of concern is pregnant women, given that malnourished mothers are at higher risk of giving birth to low birth weight babies who are susceptible to growth failure during infancy and early childhood, and ultimately face the perils of morbidity and early death (Akorede and Abiola, 2013). Malnourished adolescent girls in particular risk becoming malnourished mothers, thus contributing to the intergenerational cycle of malnutrition (Akorede and Abiola, 2013).

Globally, the prevalence of stunting, underweight and wasting in children under-five years are 26, 16 and 8%, respectively (United Nations Children's Fund [UNICEF], World Health Organisation [WHO] and World Bank, 2012). About 20 million children suffer from severe acute malnutrition, which is a life threatening condition requiring urgent treatment (WHO et al., 2007). Malnutrition is one of the biggest public health problems globally, and it is associated with more than 41% of deaths among children 6 to 24 months of age in developing

countries (approximately 2.3 million deaths annually) (Sandoval-Priego *et al.,* 2002). Several studies conducted in Iran in recent years, have reported rates of stunting, underweight and wasting in Iranian children under 5 years to be 13, 8 and 5% respectively in 2000–2002 (Houshiar Rad *et al.*, 2009). An estimated 230 million children under the age of 5 are believed to be chronically malnourished in developing countries (Van De Poel *et al.,* 2008). Similarly, about 54% of deaths among children of this age group are believed to be associated with malnutrition in developing countries (FAO, 2008).

In Sub-Saharan Africa, 41% of children under 5 are malnourished, and deaths from malnutrition are increasing on a daily basis in the region (FAO 2008). According to a recent Ghana Demographic and Health Survey (GDHS) report, more than one-quarter (28%) of children under age 5 in Ghana are stunted, 1 in 10 are severely stunted, and almost 1 in 10 are wasted (GDHS, 2014). Overall, 14% of children under age 5 are underweight (GDHS, 2014). Children living in rural areas are more likely to be stunted than children living in urban areas (32% vs. 21%) (GDHS, 2014).

The incidence of malnutrition among children under 5 in Ghana has been assessed through the GDHS, conducted every 5 years, since 1988. Between 1993 to 2008, Ghana made steady progress in reducing rates of underweight and wasting among children less than 5 years, from 27% to 14%, and 11.4% to 8.5%, respectively; however, there has been little progress in reducing stunting within the same period (Abdul-Rahman and Agble, 2012). Regional level data on stunting among children less than 5 years show mixed trends; Greater Accra Region had the lowest prevalence of stunting (14%), with the Eastern Region having the highest prevalence (37.9%) (Abdul-Rahman and Agble, 2012). A study on determinants of under 5 mortality in the Builsa District of the Upper East Region of Ghana identified non-exclusive breastfeeding and non-vitamin A supplementation as major causes of under 5 mortality (Osei-

Kwakye *et al.,* 2010). Another study on the socio-economic determinants of dietary diversity among women of child-bearing age in Northern Ghana reported that marital status, household membership structure, ethnicity and literacy were significant socio-economic determinants of dietary diversity of mothers in Northern Ghana; mothers' participation in household decision making regarding livestock production, food purchase, use of household income, access to credit and control over income were also found to be significant predictors of women's dietary diversity (Zakaria 2014). Caregiver perceptions and practices as well as child health were all independent predictors of child feeding adequacy in a study on the duration of exclusive breastfeeding and subsequent child feeding adequacy in Ghana (Aryeetey and Goh, 2013).

Consequences of childhood under-nutrition include growth failure, impaired intellectual and physical development, lower resistance to infection, and high incidence of some chronic diseases (Demissie and Worku, 2013). Under-nutrition further affects human performance and decreases population survival, and it may also enhance the economic burden (Jesmin *et al.,* 2011).

Reducing under-nutrition among children under 5 years of age remains a huge challenge in developing countries. However, the Community-based Management of Acute Malnutrition (CMAM) program, funded by the United States Agency for International Development (USAID) under the auspices of the World Health Organization (WHO) supports countries with high levels of severe acute malnutrition (SAM) to scale up coverage for treatment(USAID, 2015).

1.2 Problem statement

Despite the fact that the right to adequate food is recognized globally, half of the almost 10 million children under the age of 5 who die annually do so from a combination of

malnutrition and easily preventable diseases (Tobergte and Curtis, 2013). Malnutrition is the underlying cause in more than 50% of these deaths (Tobergte and Curtis, 2013). The WHO estimates that approximately 150 million children younger than 5 years in developing countries are underweight and an additional 200 million children are stunted (Akorede and Abiola, 2013).

Under-nutrition remains a devastating problem in many developing countries, affecting over 815 million people, causing more than one-half of child deaths (Saaka *et al.,* 2015). Malnutrition contributes to Ghana's current health problems (morbidity and mortality) in several ways.

Effective nutrition is one of the most important health determinants among citizens of any country, including Ghana. However, malnutrition remains a big threat to almost all regions in Ghana, and in rural communities of LMKM of the Eastern Region. A review in 2012 on school health and nutrition interventions and mapping of existing programs in Ghana revealed that, whilst the prevalence of stunting decreased in 6 regions (Western, Greater Accra, Ashanti, Volta, Upper East and Northern) between 1993 and 2008, the other four regions, of which the Eastern Region is a part, recorded increases higher than the national average (Abdul-Rahman and Agble 2012). A study on young child feeding practices and nutritional status in some rural communities of LMKM of the Eastern Region of Ghana revealed that although breastfeeding rates were high (97%), complementary feeding practices were less than ideal, with as many as 14% of the children being introduced to complementary foods below the age of 3 months; the nutritional quality of complementary foods were poor, and the prevalence of stunting among the children was high (20%) (Nti and Lartey, 2007). A similar study in the LMKM revealed signs of stunted growth and distension of body parts amongst other signs of malnutrition in children under 5 years of age; such children do not gain corresponding body weight and become prone to infections (Nti and Lartey, 2008).

Malnourished children have lowered resistance to infections and are therefore more likely to die from ailments like diarrhea and acute respiratory infections (Hien and Kam, 2008).

1.3   Justification of the study

The Eastern Region of Ghana has majority of its population in rural areas (Ghana Statistical Service 2014); there is the need to carry out studies to establish the current nutritional situation among the vulnerable and to inform policies and programs. With regards to nutrition, few studies have been done in rural and peri-urban areas in the Eastern Region, and the nutritional status of children under 5 years of age in rural communities of the LMKM has not been well documented. A study in 2008 on the influence of care practices on the nutritional status of Ghanaian children reported that only one study had assessed the quality of care giving and child nutritional status in Lower Manya Krobo (Nti and Lartey, 2008). There is a need to continually monitor the nutritional status of children in poor settings to continuously inform policy makers and various stakeholders (Tobergte and Curtis, 2013).

A study on the nutritional status of children under 5 years of age will further serve as a tool to assess the Community-based Management of Acute Malnutrition (CMAM) program, which seeks to address malnutrition amongst young children in the LMKM. Reports reveal that less than 1 in 10,000 children have enrolled in the program (Lower Manya Krobo Municipal Assembly [LMKMA], 2014). This study will further assess the extent to which the CMAM program has helped manage acute malnutrition in children since its implementation.

1.4 Research hypothesis and conceptual framework

1.4.1 Research hypothesis

The number of living children a mother has is associated with child nutritional status.

1.4.2 Conceptual framework

Malnutrition in children results from several factors, most of which are interlinked. The conceptual framework below (figure 1) shows the most significant of these factors, and categorizes them as immediate, contributing and basic causes(UNICEF,1990).

The immediate causes directly contribute to the presence of malnutrition; these include the presence of infectious disease agents and their source and most importantly, inadequate dietary intake (UNICEF,1990). Both food intake and infectious diseases reflect underlying social and economic conditions at the household, community, and national levels that are supported by political, economic, and social structures within a country (UNICEF, 1990).

The contributing factors consist of access to food and existing infrastructure such as the health services that provides the means to prevent malnutrition. The basic factors complete the framework; these are the resources and access to resources that promote the utilization of food and the mechanisms to protect the individual's right to access that food. Resources in this context refer to capital, financial and human resources (UNICEF, 1990).

Inadequate diet and disease, in turn, are closely linked to the general standard of living, the environmental conditions, and whether a population is able to meet its basic needs such as food, housing and health care (UNICEF,1998). Adequate incomes, greater food availability and expanded health services are necessary for adequate nutrition (UNICEF, 1990). However, they do not guarantee improvements unless households are able to take advantage of them. In this context, sufficient knowledge and the ability to care for vulnerable individuals are of critical importance (UNICEF,1990). Care consists of the time, attention and support provided in the household and in the community to meet the physical, mental and social needs of growing children and other family members (UNICEF 1990).
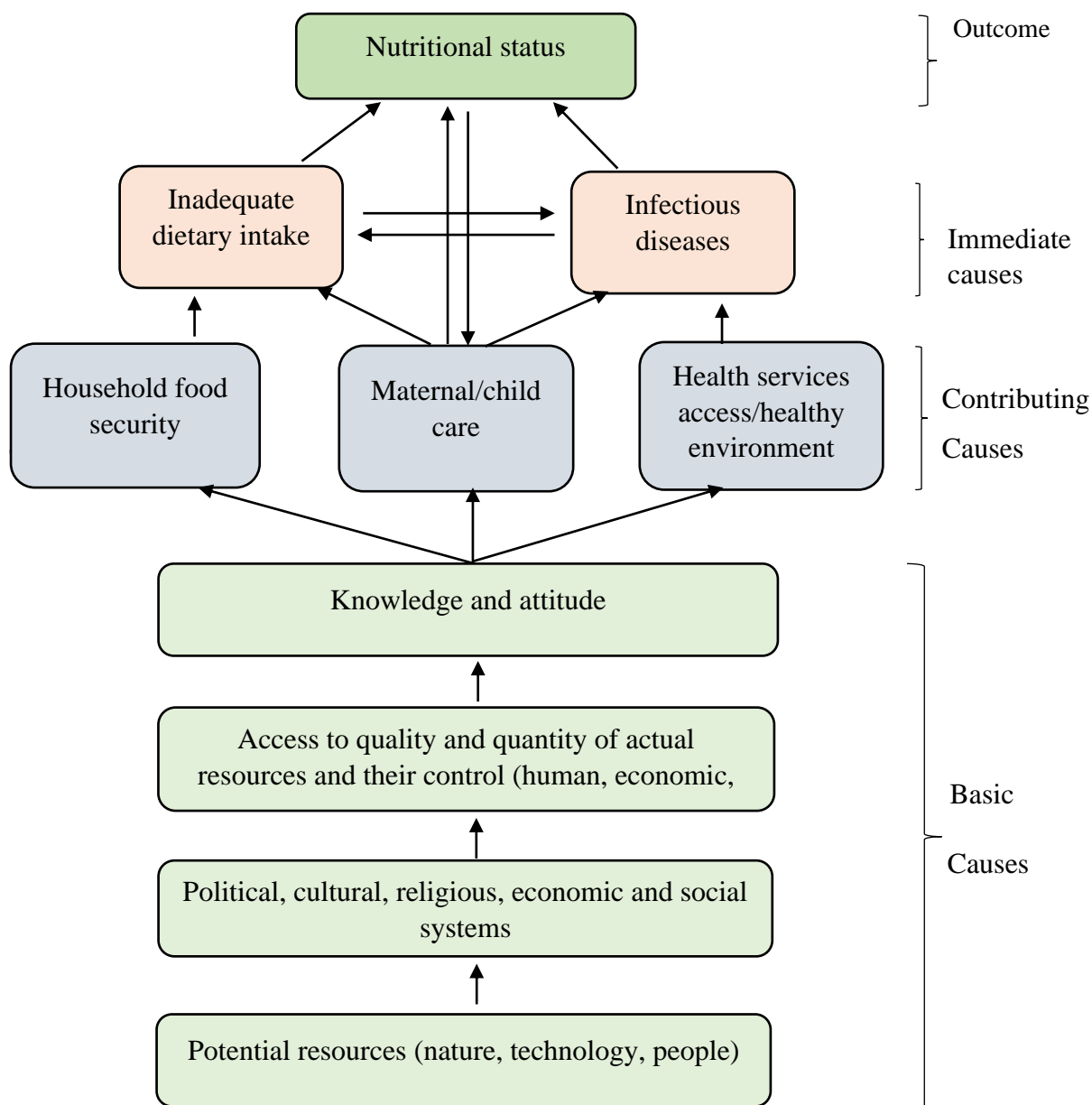
Figure 1.1: Conceptual framework factors contributing to nutritional status of women and children. *Source: Adapted from UNICEF (1990)*

1.5 Research questions

1. What is the nutritional status of children under 5 years of age in hard-to reach and peri-urban communities of the LMKM of the Eastern Region of Ghana?

2. Which factors are associated with the nutritional status of children under 5 years of age in rural and peri-urban communities of the LMKM of the Eastern Region of Ghana?

3. How knowledgeable are caregivers of children under 5years of age in the LMKM of the Eastern Region of Ghana about recommended nutrition practices?

4. What types of foods are fed to children under 5years of age by their caregivers in the LMKM of the Eastern Region of Ghana?

1.6 General objective

To determine the prevalence of malnutrition in children under 5 years of age in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality of the Eastern Region of Ghana.

1.7   Specific objectives

1. To determine the nutritional status of children under 5 years of age in the Lower Manya Krobo Municipality of the Eastern Region of Ghana.

2. To identify factors associated with malnutrition among children under 5 years of age in the Lower Manya Krobo Municipality of the Eastern Region of Ghana.

3. To assess mothers' knowledge on the recommended nutrition practices of children under 5 years of age in the Lower Manya Krobo Municipality of the Eastern Region of Ghana.

4. To document the types of foods fed to children under 5 years of age by caregivers in the Lower Manya Krobo Municipality of the Eastern Region of Ghana.

1.8 Profile of study area

1.8.1   Introduction
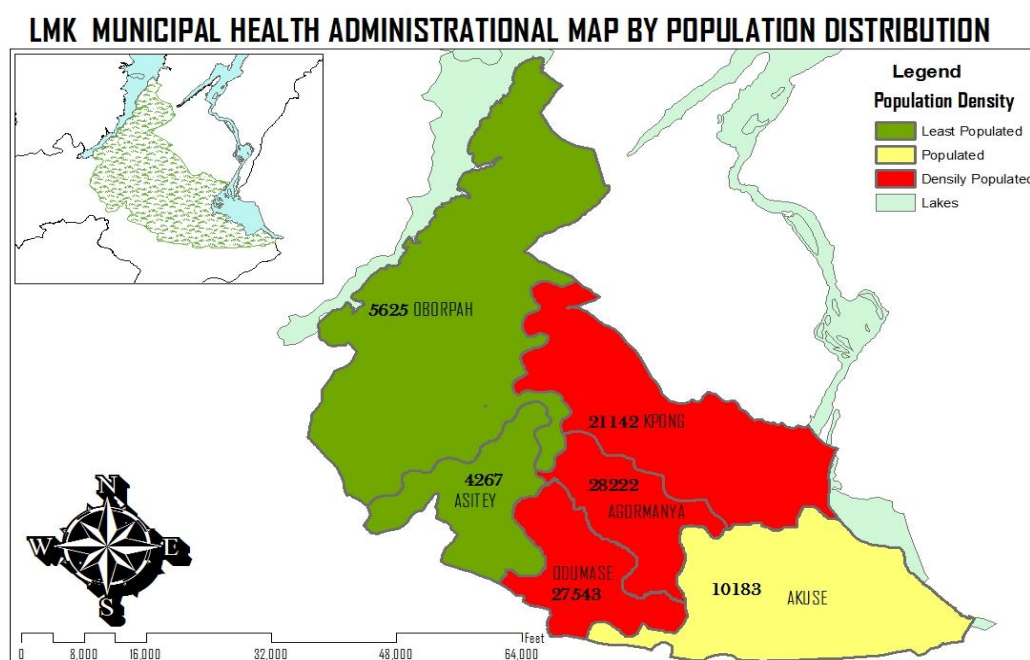
Figure 1.2: Map of the Lower Manya Krobo Municipality Showing the geo-political zones

The LMKM forms part of the 26 Municipalities and Districts in the Eastern Region of Ghana. It lies between latitude 6.05S and 6.30N and longitude 008E and 0.20W.The Municipality covers a total land area of 18.310sq km). The Municipality, with Odumase as its administrative capital, has an estimated total population of 101,098; about 24,264 out of the total population are women in fertility age (WIFA), with 4,044 expected pregnancies and

20,220 children under 5 years of age (LMKM, 2014). There are 6 health sub-municipalities and 32 community-based health planning services (CHPS) zones. The Municipality provides both curative and preventive services to the residents in the communities within the health delivery system LMKMA, 2014).

1.8.2   Economic activities

The main economic activity within the Municipality is agriculture, which employs about 82.5% of the working force (Lower Manya Krobo Municipal Assembly (LMKMA, 2014). The major crops grown in the Municipality are tree crops such as mango and oil palm. Food crops grown include maize, cassava, vegetables, plantain and yam. A significant proportion of the working force engages in fishing on the Volta River, whilst others engage in livestock farming (LMKMA, 2014). Other economic activities that also generate income for the people include: commerce, transport services, various trades such as carpentry, masonry and dressmaking. In spite of these economic activities, incomes are still low and poverty is widespread and pervasive in the Municipality. In the hospitality industry, there are a few hotels, guesthouses and restaurants and a number of beer and chop-bars (LMKMA, 2014).

1.8.3   Health facilities

The Municipality is divided into 6 sub-municipalities and 5 zones. Health facilities in the Municipality include 2 public hospitals and 1 mission hospital, 4 reproductive and child health facilities, 22 CHPS zones, 2 private clinics, 1 public clinic, 1 private maternity home and 9 traditional birth attendants (TBAs) (LMKMA, 2014).

1.9 Scope of report

This study was limited to 6 selected hard-to-reach rural and peri-urban communities from 3 sub-municipalities in the LMKM in the Eastern Region of Ghana. The study focused on examining the nutritional status of children under 5 years of age in the selected communities. Emphasis was placed on the prevalence of malnutrition (stunting, wasting and underweight in children). The socio-demographic and socio-economic factors that were likely to be associated with the nutritional status of the children were explored. Additionally, mothers' knowledge on the recommended nutritional practices of the children was assessed and the types of foods fed to the children were documented.

1.10   Report organization

The research work is organized into 6 chapters. Chapter 1 covers the general introduction and is grouped under the following sub-sections: background to the study, statement of the problem, justification of the study, significance of the study, objectives of the study, research questions, scope of the study and organization of the study.

Chapter 2 encompasses a review of relevant literature on the subject under study. Chapter 3 covers the various methods used for collecting data; these include administration of questionnaires, physical observations, research design, data management and analysis, data presentation and reporting. Chapter 4 presents the results of the study. Chapter 5 entails the discussion of the results obtained from the study. Chapter 6 provides conclusions and recommendations from the study.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

The subsequent review takes a comprehensive look at nutrition in general with a focus on children and explores studies conducted in different countries and in Ghana. The focus of the review is on the nutritional status of people in rural areas with emphasis on children, the predictors of nutritional status, as well as the nutritional practices of people in under-developed areas.

2.2 Definition of nutrition

Nutrition science is the study of food systems, foods and drinks, and their nutrients and other constituents; and of their interactions within and between all relevant biological, social and environmental systems (Beauman *et al.,* 2005). According to UNICEF, nutrition is the intake of food considered in relation to the body's dietary needs; the growth or micronutrient status of an individual is what is referred to as nutritional status (UNICEF, 2012). The purpose of food science and nutrition is to contribute to a world in which present and future generations are able to fulfill their human potential, live in the best of health, and develop, sustain and enjoy an increasingly diverse human, living and physical environment; the fact that nutritional status is one of the most important health indicators of a population cannot be over emphasized (Areekul *et al.,* 2005).

2.3 Recommended nutrition and dietary guidelines for infants and children

Adequate nutrition in the first 2 years of life ensures that a child has the best possible mental and physical growth development (WHO/FAO/UN Expert Consultation, 2007). Children grow very fast and have high nutritional needs, especially for the first 9 months, making this

period critical for a child's future well-being (WHO/FAO/UNU Expert Consultation, 2007). Experts have shown that children who do not receive good nutrition in their first 2 years of life are more likely to suffer from poor health later in life, and their bodies and brains may not grow properly (Boelaert et al., 1995).

According to the WHO (2015), consuming a healthy diet helps prevent malnutrition in all its forms as well as a range of non-communicable diseases and conditions. An overview of dietary guidelines for infants and young children is summarized below:

- Infants should be breastfed exclusively during the first 6 months of life.

- Infants should be breastfed continuously until 2 years of age and beyond.

- From 6 months of age, breast milk should be complemented with a variety of adequate, safe and nutrient dense complementary foods. Salt and sugars should not be added to complementary foods (WHO, 2015).

Good nutrition depends on different conditions. These can be categorized as follows: adequate diet, absence of disease and appropriate caring practices (Boelaert et al. 1995). Below is a list of the 16 key behaviors for the promotion of appropriate feeding of infants and young children.

TABLE 2.1 Key behaviors for the promotion of appropriate feeding of infants and young children.

<u>**SUMMARY**</u>

Behaviours 1-9; Adequate diet

1-3 Exclusive breast feeding (at birth, few days after birth, up to 6 months).

4-6; Optimal feeding (from birth up to at least 2 years).

6-9; Complementary feeding (at 6 months and beyond).

Behaviours 10-13; Absence of diseases (immediately from birth).

Behaviours 14-16; Appropriate caring practices

<u>**ADEQUATE DIET**</u>

<u>Behaviors/ Activity</u>

1   Place the infant on the breast within one hour of the birth, with skin-to-skin contact.

2   Ensure the infant consumes the thick yellow milk produced directly after birth

3   Give the infant ONLY breast milk for the first 6 months

4   Allow the infant to breastfeed on demand, day and night

5   Ensure correct positioning and attachment of the infant at the breast.

6   Continue breastfeeding even when unwell.

7   Introduce the infant to foods in addition to breast milk at 6 months.

8   Provide sufficient & appropriate complementary foods from 6 months up to at least 2years

9   Ensure the child gets adequate iron, vitamin A and iodine in the diet.

<u>**ABSENCE OF DISEASE**</u>

<u>Behavior/ Activity</u>

10	Prevent and treat malaria simply and effectively
11	Prevent and treat diarrhea simply and effectively
12	Prevent intestinal worms simply and effectively.
13	Prevent and treat pneumonia simply and effectively.

APPROPRIATE CARING PRACTICES

Behavior/ Activity

14   Ensure the child is growing well and gaining weight rapidly (from birth to 2 years at least).

15   Feed the child adequately during and after illness (up to 6 month)

16   Give the child affection, attention and stimulation to help him/her grow and learn quickly.

Source: Boelaert et al. 1995

2.4 Child malnutrition

Child malnutrition continues to be a major public health problem in developing countries around the world. Malnutrition includes both under and over nutrition. This study will focus on under-nutrition (stunting, wasting and underweight).The Demographic and Health Survey (DHS) program continues to find high levels of under-nutrition in all countries surveyed. The South/Southeast Asia region has the highest rates of stunting and under- weight (40% or

more), followed by sub-Saharan Africa (about 30%); the remaining 3 global regions have stunting rates around 20% and underweight rates between 10-15% (Mukuria *et al.,* 2005).

Children younger than 6 months and those aged 24-35 months have lower rates of under-nutrition compared to children aged 6-23 months. Under-nutrition accelerates from 4 to 23 months of age, and is more prevalent in rural than urban areas(Mukuria *et al.,* 2005). This differential may be due to differences in social and economic conditions in urban and rural areas, such as mother's education, work status, and availability of water and sanitation facilities (Mukuria *et al.,* 2005).

2.5 Determination of nutritional status using anthropometric measurements

The status of child nutrition is measured using three indices, namely height-for-age (stunting), weight-for-age (underweight) and weight-for-height (wasting). These indices provide information about development and body composition, and are directly influenced by food intake and the occurrence of infections (Abdul-Rahman and Agble, 2012; Akorede and Abiola, 2013).

Height-for-age is a measure of linear growth retardation and cumulative growth shortfall. Children with a height for age z-score below -2 standard deviations (SD) from the median of the reference population are said to be stunted (UNICEF *et al.,* 2012). Stunting is an indicator of chronic malnutrition and reflects failure to receive adequate nutrition over a long period of time. Repeated and chronic illness can also contribute to stunting (UNICEF *et al.,* 2012). The relationship between body mass and height is described by the weight-for-height index. Children with weight-for-height z-scores below -2SD from the median of the reference population are considered wasted (thin). Wasting is a measure of acute malnutrition and represents failure to receive adequate nutrition in periods immediately preceding the data

collection; it might also be due to a recent illness which led to weight loss or inadequate food intake (Abdul-Rahman and Agble, 2012). Weight-for-age is an indicator which is affected by both chronic and acute malnutrition; it is therefore considered to be a composite index of weight-for-height and height-for-age. Children whose weight-for-age z-scores are below -2SD from the median of the reference population are said to be underweight (WHO Multicenter Growth Reference Study [MGRS] Group, 2006).

2.6 Predictors of nutritional status

Nutrition plays a vital role in the growth and development of individuals. Good nutrition protects children and mothers, strengthens the immune system and reduces the risk of non-communicable diseases related to food during the lifecycle; it also enhances the productivity of the population and can help gradually eliminate the vicious circle of poverty and hunger (Gouado 2014). The nutritional status of an individual can be influenced by various factors such as age, socio-cultural practices, food availability, climatic conditions and geographical location (Wassie *et al.,* 2015).

A study on factors affecting food selection and nutritional status among the elderly Kenya concluded that the physiological factors that affected food selection and intake were dental problems, loss of taste and appetite, and chronic diseases (Makori 2001). The psychological factors that affected food choices were loneliness and bereavement; the socio-economic factors with most influence were income, cost of food, place where the food was bought, cooking and the facilities available, and the means of transport to the market place (Makori, 2001)

With respect to children under 5 years, socio-economic, demographic, health-system and cultural factors were shown to influence child nutrition (Rahman *et al.,* 2008). In particular, better demographic situations such as increasing level of maternal health and child birth size; high socio-economic conditions such as higher parental education, household economic class

17

and media exposure; improved health-system practices such as good immunization and supplementation practices and standard living conditions as well as health facilities, and residency in the more developed divisions were the important factors associated with lower prevalence of malnutrition (Rahman et al. 2008).

2.7 Nutritional status of children in rural and peri-urban areas

There are significant differences between rural and urban populations in terms of socio-economic status, lifestyle and nutritional status (Aziz and Devi, 2012). A study comparing the nutritional status of rural and urban school children in Pakistan reported that rural children perform more physical activity with less food available and hence tend to be more underweight compared to urban children who perform less physical activity (Anwer and Awan, 2003) Among rural populations, most factors affecting physical growth of school children were influenced by environmental factors before puberty, including poor food consumption patterns, illness and poor sanitation; female children in rural areas were found to be grossly stunted, wasted and underweight compared to males (Anwer and Awan, 2003). The difference in treatment of boys and girls was evident in nutritional status; strong preference for sons led to neglect of female children and their mothers (Anwer and Awan, 2003). In a study on the nutritional status of children in two districts in Nepal, underweight, stunting, thinness and wasting were evident in children from the remote mountainous areas (Thapa *et al.,* 2013).

2.8 Nutritional practices and knowledge of nutrition among women

Nutritional practices among women are determined by a number of factors, including level of education, socio-economic status, and socio-cultural practices (Wassie *et al.* 2015). Breastfeeding and weaning are key to achieving better nutritional status for children;

inappropriate breastfeeding and weaning practices among ethnic minority women was associated with high malnutrition rates in a study in Vietnam (Huong *et al.,* 2013). Nutritional practices of individuals in rural and urban areas differ primarily due to development and socio-economic status. A study on nutritional practices among children aged 4-6 years in Malaysia reported that children in urban areas were more likely to consume instant noodles compared to those in urban areas because the mothers of these 'urban children' were mostly busy and hence provided instant noodles for their children (Aziz & Devi 2012). A research on the nutritional status of Ghanaian women observed that less educated, married and women with salaried jobs were at risk of being overweight, obese and hypertensive, which was arose from an unbalanced or inadequate diet (Nyansanga, 2011). In Bangang rural community of China, high prevalence of malnutrition was observed among young children, and obesity was also high among mothers, with the practice of exclusive breastfeeding being scarce, and inappropriate complementary feeding in very poor hygiene environments; nutritional problems observed were due to poor knowledge on feeding practices, low education and low socio-economic levels of mothers (Gouado 2014). Nutrition education on healthy eating before, during and after pregnancy should be more effectively taken into account in nutrition policy planning and implementation (Nyansanga, 2011).

2.9 Child nutrition in Ghana

The incidence of malnutrition among children under 5 years of age in Ghana has been assessed through the Ghana Demographic and Health Surveys (GDHS) conducted every 5 years since 1988. From 1993 to 2008, the country made steady progress in reducing the rates of underweight and wasting among children less than 5 years from 27% to 14% and from 11% to 9%, respectively. However, there has been little progress in reducing stunting within the same period (Abdul-rahman and Agble, 2012).The regional level data on stunting among children less than 5 years shows a mixed trend; Greater Accra Region had the lowest

prevalence of stunting (14%) with Eastern region having the highest (38%) (Abdul-rahman and Agble, 2012).

In a study on the determinants of under 5 mortality in the Builsa District of the Upper East Region of Ghana, non-exclusive breastfeeding and non-vitamin A supplementation were identified as major causes of under 5 mortality (Osei-Kwakye *et al.,* 2010). Another study on the socio-economic determinants of dietary diversity among women of child bearing age in Northern Ghana reported that marital status, household membership structure, ethnicity and literacy were significant socio-economic determinants of dietary diversity of mothers in Northern Ghana; mothers' participation in household decision making regarding livestock production, food purchase, use of household income, access to credit and control over income were also found to be significant predictors of women's dietary diversity among mothers (Zakaria 2014). Caregiver perceptions and practices, as well as child health were independent predictors of child feeding adequacy in a study on the duration of exclusive breastfeeding and subsequent child feeding adequacy in Ghana (Aryeetey and Goh, 2013). A study on the nutritional status of upper primary school pupils in rural settings in Ghana revealed high incidence of stunting and underweight, even though most pupils ate more than three times daily; more boys were stunted or underweight than girls, and more girls were overweight/obese than boys (Danquah, 2013). A similar study on the nutritional status of school going children in the Nkwanta South District of Ghana reported stunting prevalence of 50%, thinness prevalence of 19% and overweight prevalence of 6.9%,; malnutrition is a major nutritional problem among school children in Nkwanta South, despite the presence of several intervention programmes including the School Health and Environmental Programme (SHEP), School Health Services and School Feeding Programme (Prince and Laar, 2014).

2.10 Improving the situation of malnutrition in Ghana

To improve the prevailing situation of child malnutrition, it is recommended that media professionals use research findings on nutrition to reach out to key stakeholders including policymakers, health and nutrition experts, farmers, mothers, and caregivers; government opportunities should be provided for nutrition and health experts to educate members of the public on malnutrition in Ghana (Saaka *et al.,* 2015). The introduction of infant-food certification in Ghana has been a bold new step towards transforming the landscape of child nutrition at population scale (Master *et al.,* 2011). To improve this, rolling out certification services in a randomized fashion would allow the impact of those services to be rigorously measured under a wide range of conditions, so as to adjust implementation procedures over time in Ghana, and then guide the possible replication of the most successful approach in other countries (Master *et al.,* 2011). District Health Services and District Education Services should educate parents and guardians of children in schools on the current school feeding programme in Ghana in that the school feeding was not a replacement feeding but rather a supplementary feeding programme to improve children's nutritional status. Teachers can also adopt nutrition education for parents during Parent Teachers Association and School Management Committee meetings in order to educate parents on their roles in the nutrition of their child (Prince and Laar, 2014).

CHAPTER 3

3.0 METHODOLOGY

3.1 Introduction

This chapter discusses the approach and methodology used for the study. The chapter describes the research design employed for the study, details of the research process, data collection techniques and tools, and the study population. The chapter ends by presenting the statistical tests used to analyze the data.

3.2 Research design

A cross sectional study design which employed quantitative data collection methods was chosen for this study. A cross sectional study is an observational study that involves data collected from a population, or a representative subset of a population at a defined time (Schmidt and Kohlmann, 2008). Advantages of cross sectional studies are that they can be used to generate hypothesis, and exposures (risk factors) and outcomes can be assessed at the same time (Schmidt and Kohlmann, 2008)

3.3 Study population

The study population comprised children between the ages of 6 and 59 months and their caregivers living in selected hard-to-reach and peri-urban communities in the LMKM who accessed child welfare services during the study period. The study sample was chosen from 6 communities from 3 sub-municipalities.

3.4 Sample size

The sample size was calculated using the total population of children 5 years and under in the

Municipality as at 2016 (20,220), an expected frequency of malnutrition of 25%, a

confidence level of 95%, design effect of 1.0 and 3 clusters, using Epi Info (version 7)

sample size calculator. This generated a sample size of 285.

Table 3. 1 : Distribution of sample size from study sites in the Lower Manya Krobo Municipality

Sub Municipal	Selected rural and peri-urban communities	Total population of children under 5	Sample size calculation	Sample size generated
Oborpa	Yonguase	283	(283/2104)*285	38
Asitey	Ayermesu	263	(263/2104)*285	36
Kpong	Tsledorm	162	(162/2104)*285	22
Kpong	Wawase	243	(243/2104)* 285	33
Kpong	Ayikpala	607	(607/2104)* 285	82
Kpong	Nuaso Old Town	546	(546/2104)* 285	74
		TOTAL = 2104		**TOTAL = 285**

3.5 Sampling techniques

A multi-stage sampling approach was adopted in this study. Three of the 6 sub-municipalities

were randomly selected. Four hard-to-reach and 2 peri-urban communities were randomly

chosen from the selected sub-municipalities. Households with children under 5 years were

selected to take part in the study, forming the second stage sampling unit. In each of the

selected communities (clusters), a central point was identified and from there, a directional

compass was used to select the first household. All houses/compounds along that direction

were visited to recruit potential respondents for the study. In cases where there were more

23

than 1 eligible child per household or compound, 1 child was randomly selected to participate in the study. At the end of the first randomly selected direction, the sampling team returned to the central point and moved in the opposite direction looking to recruit respondents. The process was repeated until the end of each community was reached.

3.6 Data collection techniques and tools

Respondents were interviewed with a semi-structured questionnaire and their responses were ticked accordingly. Child weight and height measurements were carried out under standard procedures using the UNICEF electronic scale (SECA) and SECA stadiometer respectively. Other tools for data collection included: a list of communities within the study area, field books, and stationery. Ages of the children were determined using documented evidence of the birth date from child health books/cards (contained essential information on health status and household demographic characteristics) and birth certificates.

To ensure the accuracy of the dates of birth of the children, the anthropometric team filled in each child's date of birth a second time, during the anthropometric measurements. Mothers/caregivers and their children convened at a central point with the children's essential documents for cross-checking, filling in and anthropometric measurements. Child age was calculated in months using WHO Anthro, (version 3.2.2).

The study's informed consent was explained to the respondents and oral approval was obtained prior to the interviews. Data collection was among randomly selected households rather than at health clinics, which allowed for a more representative sample and inclusion of families without access to health care facilities.

3.7   Study procedures

3.7.1 Semi-structured questionnaire

Semi-structured questionnaires were administered to caregivers of children under the age of 5 years. Data collected included child age (recorded from child health cards, birth certificates, or with the help of local calendar of events), gender, educational level, ethnicity, religion, marital status, occupation of mother, occupation of spouse, birth parity and household size.

3.7.2 Anthropometric measurements

Anthropometric measurements of the children were as well taken. Data included the following:

- Weight: Targeted children were weighed using UNICEF electronic scale (SECA) calibrated using standard weights. Mothers of children below 24 months of age were weighed first, after which the scale was tarred before their children were handed to them to enable the children's weights to be recorded. Children 24 months of age and above stood on the scale independently, with their feet positioned slightly apart and their weight readings were recorded. To ensure the accuracy of the measurements weight measurements were taken twice.

- Height: Children's heights were measured on a measuring board (precision of 0.1 cm). Children less than 2 years of age were measured lying down in a supine position, whilst children greater than or equal to 2 years of age were measured standing with a SECA stadiometer. The children were made to stand on the footboard with their back against the back board to ensure that the back of their head, shoulder blade, back, buttocks calf and their heels touched the back board of the stadiometer. The head was positioned in the Frankfurt horizontal plane. Their tummies were pushed in gently to

help each child stand straight and the head board was pressed firmly on the top of the head and their height readings recorded.

- Mid-upper arm circumference (MUAC) was measured at the mid-point of the left upper arm (precision of 0.1cm). ACF MUAC tapes were used.
- Bilateral oedema: This was assessed by the application of normal thumb pressure for at least 3 seconds to both feet (WHO, 2009).

3.7.3 Measurement of indicators of malnutrition

Stunting

The height-for-age index was calculated from measurements of the child's height and age. This is an indicator of linear growth retardation and cumulative growth deficits. Children whose height-for-age Z-score was below -2 z scores were considered short for their age (stunted), and children below -3 z scores were considered severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time and is affected by recurrent and chronic illness (WHO, 2009).

Wasting

The weight-for-height index was calculated from measurements of the child's weight and height. This index identifies wasted children. It is very useful when exact ages of children are difficult to determine. Acute malnutrition rates were estimated from the weight-for-height index values as well as presence of bilateral oedema. Findings were then compared to WHO standards (2006) and National Center for Health Statistics (NCHS) references. The result was then expressed in both Z-scores and percentages of the median. Expression in z- scores convey malnutrition rates more precisely and

allows for inter-study comparison (WHO, 2009). The percentage of the median on the other hand estimates weight deficits more accurately and has been used in determining eligible children for targeted feeding programmes (WHO , 2009).

Underweight

The weight-for-age index was calculated from measurements of the child's weight and age. Children whose weight-for-age were below -2 z scores were classified as underweight and children whose weight-for-age was below -3 z scores were considered severely underweight (WHO, 2009).

Malnutrition

MUAC measurements are a good predictor of mortality. It is an indicator of malnutrition in children taller than 65 cm in some protocols, and children taller than 75cm in others (WHO, 2009). MUAC measurements of the assessed children were presented in various height groups of < 75cm, ≥ 75cm to < 90cm, and ≥ 90 cm (WHO, 2009).

Table 3. 2: MUAC guidelines

Anthropometric Measurement	Indication
MUAC < 115mm and/or oedema	Severe malnutrition and high risk of mortality
MUAC ≥ 115 mm and <125 mm	Moderate malnutrition and risk of mortality
MUAC ≥ 125 mm and <135mm	At risk of malnutrition
MUAC ≥ 135 mm	Adequate nutritional status

Source: WHO, 2009

Mothers' knowledge on standard nutritional practices was assessed using a structured questionnaire. The caregivers responded to the following categories of questions:

- exclusive breastfeeding and its duration

- types of complementary foods introduced to children and at what age

- knowledge of recommended nutrition practices for children under 5 years of age, and

- number of times children are fed in a day.

3.8   Training of enumerators and supervisors

Training of enumerators and supervisors in the use of the anthropometric equipment and the recording of data was conducted over a period of 3 days. This included a discussion on the purpose of the study, ethical issues, questionnaire administration and anthropometric equipment use demonstrations using the WHO Multicentre Growth Reference Study (MGRS) training videos. This was followed by practical exercises in the measurement of height, length, weight and MUAC of infants and children. Seven tertiary level students were trained as field enumerators and three as supervisors for the study.

3.9 Pre-testing

The data collection tools were pre-tested in Djekiti and Agormanya, a hard-to-reach and peri-urban community respectively with similar characteristics to the selected study communities. Necessary corrections were effected to the questionnaire before the actual study was conducted.

3.10   Data handling plan

The field enumerators reviewed each questionnaire before leaving the households/communities. At the end of each day of fieldwork, supervisors reviewed each questionnaire for accuracy, logical patterns, and legible writing. Field enumerators were asked to return to survey households in cases where missing data or other problems were observed.

3.11 Data processing and analysis

Data was entered in Microsoft Excel 2010 and exported to WHO Anthro version 3.2.2 and STATA version 14 for further analyses.

Analysis was based on the set aims and objectives. All univariate, bivariate and multivariate analyses were done using STATA version 14. Odds ratio and 95% confidence intervals (CI), and p values were determined. Chi square or Fisher's exact tests for association were carried out between selected variables (mother's age, level of education, marital status, occupation, ethnicity, residence, number of children, family structure, history of malnutrition and access to media information) that may be associated with the mother's nutritional knowledge. Multiple logistic regression analysis was carried out to ascertain the predictors of mother's nutritional knowledge. The following were used as explanatory variables: mother's age, level

of education, family structure, access to media information. Factors found to be associated with nutritional status of the children at the bivariate stage were put in a multivariate model to adjust for confounders and assess the strength of association. The multiple logistic regression analysis to determine predictors of malnutrition amongst children indicated that the sex of the child and access to media information were both significant predictors of child malnutrition. Results were considered to be statistically significant at p-values less than 0.05.

WHO Anthro Version 3.2.2 was used to analyze the anthropometric data using the following indices: weight-for-age (WAZ) z-scores, weight-for-height (WHZ) z-scores and height-for-age (HAZ) z-scores.

3.12 Ethical considerations

Ethical clearance was obtained from the Institutional Review Board of the Ensign College of Public Health. Letters of notification were sent to the Lower Manya Krobo Municipal Health Directorate and the Ghana Educational Service. Permission was sought from the community leaders and public announcements were made in the various communities.

Field enumerators explained the purpose of the study to the mothers/caregivers and both verbal and written consent were obtained before proceeding with the interviews. The weighing scales and measuring boards were regularly calibrated to ensure accuracy and reliability of measurements. Mothers/caregivers were given the opportunity to ask questions for clarity and decision making with regards to the survey. The informed consent form was read out to respondents, since majority of them were illiterate. Suitable atmosphere for private interactions between the field enumerators and mothers/caregivers were created, and respondents were assured of confidentiality. Additionally, respondents' identity were hidden with subject codes, and data collection personnel were trained to ensure confidentiality

throughout the study. The informed consent form administered to the respondents explained the confidentiality, voluntary participation and withdrawal, risk and benefits of the study.

3.13 Study Assumptions

The following assumptions were made:

1. Respondents will be objective with their answers.

2. The sample will be a true representation of the study population.

3. Responses from participants will represent the true situation in the Municipality.

4. Selected participants will fully participate for a correct assessment to be made.

3.14 Fieldwork constraints/limitations

One challenge of the study was bias due to difficulty of recall, which is a methodological problem in studies of this type. Fieldwork took a longer time than expected due to a number of difficulties, including the remoteness of some selected communities and households, extremely poor road conditions due to the heavy rains, and the absence of the mothers in their homes on market days.

3.15 Dissemination of findings

During one of the regular meetings of the Municipal Health Directorate, findings from the study were presented by the research team to the staff of the Directorate. Findings will further be published in a peer-reviewed journal.

3.16 Potential policy impact

The results obtained from the study is intended to inform stakeholders, particularly in the LMKM to adopt strategies and programmes to control malnutrition.

CHAPTER 4

4.0 RESULTS

4.1 Demographic characteristics of respondents (caregivers)

Table 4. 1: Socio-demographic characteristics of the caregivers and their children in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality

Characteristics	Frequency (%) N=285
Age of caregiver (years)	
17-25	93 (32.6)
26-35	145 (50.9)
36-55yrs	47 (16.5)
Marital status	
Single	54 (19.0)
Married	169 (59.3)
Cohabiting	62 (21.8)
Level of education	
No formal education	40 (14.0)
Primary	108 (37.9)
JHS/Middle/JSS	113 (39.7)
SHS/O Level/Vocational	18 (6.3)
Tertiary	6 (2.1)
Primary Occupation	
Farmer	124(43.5)
Petty Trader	134(47.0)
Salary worker	8(2.8)
Other	19(6.7)
Mother's Monthly Income	
No Income	46(16.1)
Below Gh¢150	116(40.7)
Gh¢150 - ¢450	115(40.4)
Above Ghc 450	8 (2.8)
Ethnicity	

Krobo	216(75.8)
Ewe	52(18.3)
Others*	17(6.0)

Children's Ages (months)

6-12	46 (16.1)
13-18	28 (9.8)
19-31	74 (26.0)
32-43	54 (19.0)
44-59	83 (29.0)

Place of residence

Peri-urban	111(39.0)
Rural	174(61.1)

Number of children

3 or less	41(14.4)
4-6	167(58.6)
7 and above	77(27.0)

Number of persons above five (5) years of age in the household

1-3	91(31.9)
4-7	155(54.4)
7 and above	39(13.7)

Household Size

1-3	10(3.5)
4-6	183(64.2)
7 and above	92(32.3)

Number of children under five years

1 child	119(41.8)
2 children	135(47.4)
3 or more children	31(10.9)

Data presented are frequencies and proportions
* Other ethnic groups : Ga,Guan and Northerners

The study sampled a total of 285 caregivers (mothers) ranging from age 17-55 years. Over 50% of the caregivers were within age group 26-35 years (table 4.1). Close to 60% of the caregivers were married and majority had either primary or junior basic school education (table 4.1). The predominant occupations among the respondents were trading and farming (> 90%), with most of them (> 80%) earning between 150-450 Ghana cedis a month. The

predominant ethnic group was the Krobo (76%). Majority of households had a size ranging between 4-6 members, and about 89% of respondents had at most 2 children under the age of 5 years (table 4.1).

4.2 Description of factors associated with malnutrition among children under five

Table 4. 2: Frequency distribution of factors associated with malnutrition among children under 5 years in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Characteristics	Frequency (%) (N=285)
Child's welfare major decision taker	
Both Parent	14 (4.9)
Father	160 (56.1)
Mother	91 (31.9)
Other	20 (7.0)
Family Structure	
Extended	76 (26.7)
Nuclear	209 (73.3)
Children's food influenced by overall family menu	274 (96.1)
Regular media information on child nutrition	213 (74.7)
History of malnutrition	271 (95.1)
Postnatal clinic attendance	227 (79.7)
Frequency of postnatal clinic attendance	
Less than 3	133 (57.8)
3-5	83 (36.1)
6 and above	14 (6.1)

Data presented are frequencies and proportions

The nuclear family system was the most practiced amongst respondents. Majority (56%) of respondents mentioned that major decisions regarding child welfare were made by fathers. The overall menu of the family was the main determinant of the child's food for 96% of

respondents. Seventy five percent of caregivers asserted that there was regular media information on child nutrition. About 95% of respondents admitted that they had a history of malnutrition. Postnatal clinic attendance was high amongst respondents, with an 80% attendance rate; about 58% of the respondents had attended less than 3 sessions.
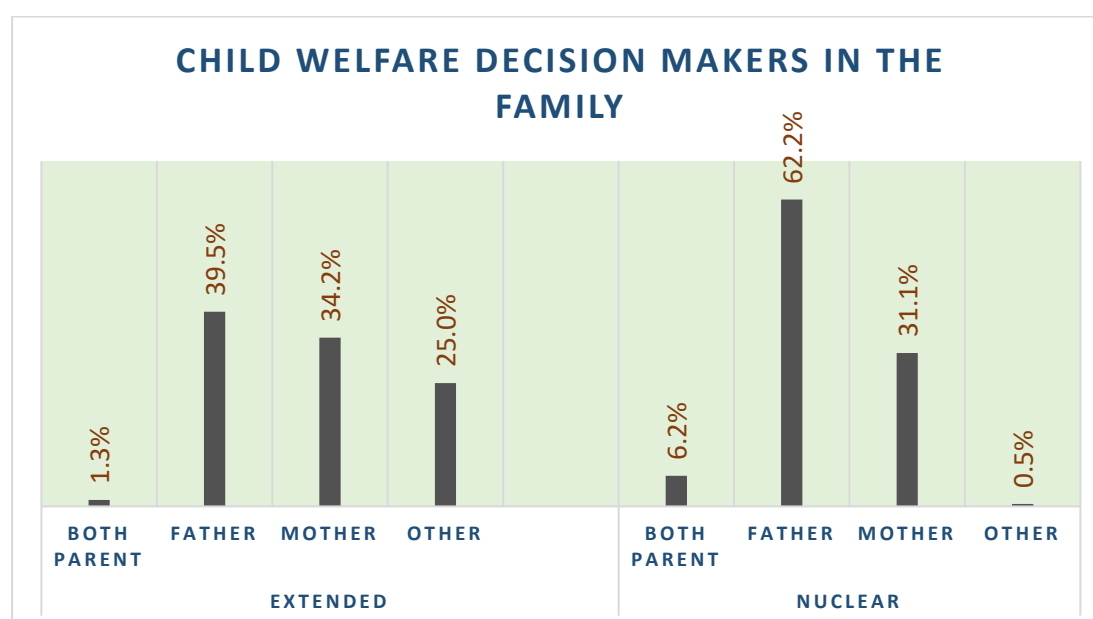
Figure 4.1: The distribution of child's welfare decision maker in both nuclear and extended family structure.

4.3 Mothers' knowledge on recommended nutrition practices of children under 5 years

Table 4. 3: Mothers' knowledge on recommended nutrition practices of children under 5 years in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Characteristics	Frequency (%) (N=285)
Exclusive breastfeeding should be less than six month	41 (14.4)
Babies can be fed water alongside breast milk within the first six months	51 (17.9)

Complementary food should be introduced within the first six months	37 (13.0)
Consumption of fish and, or meat should be more in children than adults	260 (91.2)
Fruit consumption should be more in adults than children	52 (18.3)
Food consumption should be more in adults than children	121 (42.5)
Inadequate food causes malnutrition	267 (93.7)
Breast feeding should begin three days after birth	19 (6.67)
Children need cow's milk as a drink in the first 12 months	145 (50.9)
Babies should be exposed to sunlight occasionally for vitamin D	130 (45.6)
Sugar, salt and honey should be added to babies' food	143 (50.2)
Breast feeding should begin three days after birth	19 (6.7)
Breast feeding should be thrice daily	8 (2.8)

Data are presented in frequency (N) and proportions (%)

Knowledge of caregivers on recommended nutritional practices for children under 5 years was subsequently assessed. About 85% of respondents believed exclusive breast feeding should not be less than 6 months. About 17% mentioned that babies can be fed water alongside breast milk within the first 6 months. Majority of respondents reported that complementary foods should not be introduced within the first 6 months, and consumption of fish and or meat should be more among children than adults. Over 50% of caregivers were of the view that sugar, salt and honey should be added to babies' food; fruit consumption should be more in children than in adults; children need cow's milk as a drink in their first 12 months; malnutrition may be caused by refusal of child to eat; inadequate food causes malnutrition, and lack of time to feed child can lead to malnutrition. About 41% did not know

whether babies should be exposed to sunlight occasionally for vitamin D. Majority of respondents (97%) did not agree with the assertion that breast feeding should be thrice daily.

4.4 Factors associated with mothers' nutritional knowledge

Table 4. 4: Factors associated with mothers' nutritional knowledge in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Variables	Knowledge Level, N (%)		X^2 (df)	p
	Low	High		
Mother's Age(Years)				
17-25	9 (9.68)	84 (90.32)		
26-35	18 (12.41)	127 (87.59)	21.7638 (2)	*<0.001
36-55	18 (38.30)	29 (61.70)		
Level of Education				
Higher Education	1 (4.17)	23 (95.83)		0.020
Lower Education	42 (19.00)	179 (81.00)		
No Education	2 (5.00)	38 (95.00)		
Marital Status				
Cohabiting	13 (20.97)	49 (79.03)	0.449	
Married	25 (14.79)	144 (85.21)		
Single	7 (12.96)	47 (87.04)		
Occupation				
Farmer	16(12.90)	108(87.10)		0.264
Petty Trader	27(20.15)	107(79.85)		
Salary Worker	0(0.00)	8(100.00)		
Other	2(10.53)	17(89.47)		

Ethnicity

Ewe	10(19.23)	42(80.77)		0.695
Krobo	32(14.81)	184(85.19)		
Other	3(17.65)	14(82.35)		
Area of Residence				
Peri-urban	14(12.61)	97(87.39)	1.3800(1)	0.240
Rural	31(17.82)	143(82.18)		
Number of Children				
3 or less	4(9.76)	37(90.24)		0.305
4-6	25(14.97)	142(85.83)		
7 and above	16(20.78)	61(79.22)		
Family Structure				
Extended	5(6.58)	71(93.42)	6.6122(1)	*0.010
Nuclear	40(19.14)	169(80.86)		
History of Malnutrition				
Yes	3(21.43)	11(78.57)	0.3521(1)	0.553
Access to Media Information				
Yes	18(8.45)	195(91.55)	34.1511(1)	*<0.001

Results are based on Chi squared and Fisher's exact tests *Statistically significant at p<0.05

Mothers' nutritional knowledge was assessed using a set of 13 standard questions. Those who scored above average were considered as having a high nutritional knowledge. Nutritional knowledge was high amongst study participants (84%). Mother's age, family structure and access to media information were significantly associated with mother's nutritional knowledge (p <0.05).

Table 4. 5: Crude or unadjusted odds of factors associated with mothers' knowledge on child's nutrition in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Variable	Unadjusted OR (95%CI)	p
Mother's age (years)		
17-25 (Reference)	1	
26-35	0.76 (0.32 - 1.76)	0.52
36-55	0.17 (0.70 - 0.43)	0.00
Educational level		
No Education (Reference)	1	
Higher Education	1.21 (0.10 - 14.11)	0.88
Lower Education	0.22 (0.05 - 0.97)	0.05
Family structure		
Extended (Reference)	1	
Nuclear	0.30 (0.11 - 0.78)	0.014
Access to media information		
No (Reference)	1	
Yes	6.5 (3.30 – 12.81)	0.036

Results are based on a multiple logistic regression. Data are odds ratios (ORs) and 95% confidence intervals.

Table 4. 6: Adjusted odds of factors associated with mothers' knowledge in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Variable	Adjusted OR (95%CI)	Adjusted p
Mother's age (years)		
17-25 (Reference)	1	
26-35	0.74 (0.29 - 1.87)	0.53
36-55	0.26 (0.09 - 0.73)	0.01

Educational level

No Education (Reference)	1	
Higher Education	0.36 (0.03 - 4.76)	0.44
Lower Education	0.14 (0.03 - 0.67))	0.01

Family structure

Extended (Reference)	1	
Nuclear	0.55 (0.19 - 1.64)	0.29

Access to media information

No (Reference)	1	
Yes	5.12 (2.46 - 10.69)	0.00

Results are based on a multiple logistic regression. Data are odds ratios (ORs) and 95% confidence intervals. Data adjusted for confounders such as age.

Older caregivers, caregivers with a lower education level (primary/junior high school) and caregivers with access to media information were more likely to have higher nutritional knowledge (table 4.5).

4.**5   Food consumption by children under 5 in selected communities in the Lower Manya Krobo Municipality**

Table 4. 7: Food groups and frequency of consumption by children under 5 years of age in selected communities in the Lower Manya Krobo Municipality in the past week

Food Group	Consumption Over The Past Seven Days (%)	
	Less than four times n (%)	**More than four times n (%)**
Food from cereals, roots tubers and plantain	67 (23.51)	218 (76.49)
Vitamin A rich foods	217 (76.14)	68 (23.86)
Other fruits or vegetables	105 (36.84)	180 (63.16)
Meat	246 (86.32)	39 (13.68)
Fresh or dried fish or shellfish	57 (20.00)	228 (80.00)
Eggs	154 (54.23)	130 (45.77)
Foods from beans,peas, or nuts	228 (80.00)	57 (20.00)

Milk products	261 (91.90)	23 (8.10)
Foods made with oil, fats	112 (39.30)	173 (60.70)
Sweets, pastries, drinks	244 (85.61)	41 (14.39)

Data presented are frequencies and proportions

 Data on the kinds of food consumed by children under five in the past week was collected. The various kinds of food consumesd by children include foods rich in protein (milk, egg) carbohydrates (root tubers,cereals) and vitamins (table 4.5). Classification was based on consumption of food groups either less than or more than four times within the past week. The most consumed food group, in the past seven days was fresh or dried fish or shellfish followed by foods from cereals, root tubers and plantain. The least consumed food group was milk products.

4.6 Nutritional status of children under 5 years in hard-to-reach and peri-urban communities of Lower Manya Krobo Municipality.

Table 4. 8: Prevalence of malnutrition among children under 5 years in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

	Anthropometric indices			Overall nutritional Status
	Height-for-age (%) (Stunting)	**Weight-for-height (%) (wasting)**	**Weight-for-age (%) (underweight)**	
Low (below -2 SD)	96 (33.68%)	29(10.18%)	41 (14.39%)	114 (40%)
Normal (Above -2 SD)	189 (66.32%)	256 (89.82%)	244 (85.61%)	171 (60%)

*Prevalence of malnutrition:
Undernourished: A child with a z-score of less the -2SD for any of the anthropometric indices
Normal: A child with z-scores for all three indices above -2SD

Regarding malnutrition, a total of 40% of the children sampled were malnourished (either stunted, wasted or underweight (table 4.9).

Table 4. 9: Categorization of under-nutrition among children under 5 in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Anthropometric Indices	Moderate Frequency (%)	Severe Frequency (%)	Normal Frequency (%)
Height-for-age	80(28.07%)	16(5.61%)	189 (66.32%)
Weight-for-height	14(4.91%)	15(5.26%)	256 (89.82%)
Weight-for-age	21 (7.37%)	20 (7.02%)	244 (85.61%)

Data presented are frequencies and proportions.

About 5% of children who were under nourished were severely stunted or wasted, and 7% severely underweight, with 28%, 5% and 7% being moderately stunted, wasted and underweight, respectively.

4.7 Age group, residence and sex distribution of under nourished children

Table 4. 10: Categorization of under-nutrition among children under 5 in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Variable	Height-for-Age (Stunting) N=285 Frequency (%)			Weight-for-Height (Wasting) N=285			Weight-for-Age (Underweight) N=285			Overall Nutritional status N=285	
	Below -3SD	Below -2SD	Normal	Below -3SD	Below -2SD	Normal	Below -3SD	Below -2SD	Normal	Undernourished	Normal
Age of Child											
6-12	3(6.52)	25(54.35)	18(39.13)	3(6.52)	2(4.35)	41(89.13)	6(13.0)	3(6.52)	37(80.43)	29(25.44)	17(9.94)
13-18	2(7.14)	13(46.43)	13(46.43)	1(3.57)	5(17.9)	22(78.57)	0(0.00)	3(10.71)	25(89.29)	19(16.67)	9(5.26)
19-31	2(2.70)	11(14.86)	61(82.43)	2(2.70)	1(1.35)	71(95.95)	2(2.70)	1(1.35)	71(95.95)	15(13.16)	59(34.50)
32-43	4(7.41)	14(25.93)	36(66.67)	1(1.85)	2(3.70)	51(94.44)	4(7.41)	6(11.11)	44(81.48)	22(19.30)	32(18.71)
44-59	5(6.02)	17(20.48)	61(73.49)	8(9.64)	4(4.82)	71(85.54)	8(9.64)	8(9.64)	67(80.72)	29(25.44)	54(31.54)

Sex

Male	6(4.65)	43(33.3)	80(62.02)	12(9.3)	7(5.43)	110(85.3)	12(9.3)	13(10.1)	104(80.6)	61(47.29)	68(52.71)
Female	10(6.4)	37(23.7)	109(69.9)	3(1.92)	7(4.49)	146(93.6)	8(5.13)	8(5.13)	140(89.7)	53(33.97)	103(60.03

Resident

Peri-Urban	3(2.70)	29(26.13)	79(71.17)	2(1.80)	6(5.41)	103(92.8)	4(3.60)	5(4.50)	102(91.9)	40(36.04)	71(63.96)
Rural	13(7.4)	51(29.31)	110(63.2)	13(7.4)	8(4.60)	153(87.9)	16(9.2)	16(9.20)	142(81.6)	74(42.53)	100(57.47)

* Data, presented as frequencies and proportions categorized by age, sex and residence

Malnourished children were classified by age group, sex and residence. Children in age groups 6-12 months and 44-59 months comprised about 50% of all undernourished children (table 4.10). Sex distribution of child under-nutrition stood at 47% and 33% of males and females, respectively. Fewer children in peri-urban areas (36%) were under nourished compared to those in rural areas (42%).

4.8 Socio-demographic factors associated with under-nutrition among children under-fives years old in hard-to-reach and peri-urban communities of Lower Manya Krobo Municipality.

Table 4. 11: Maternal and household factors associated with the nutritional status of children under 5 in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Factors	Nutritional Status of Child		X^2	p
	Undernourished	Normal		
Educational Level				
JHS/Middle/JSS				
No Formal	43 (38.05%)	70 (61.95%)		
Education	12 (30.00%)	28 (70.00%)		Fisher's Exact
Primary	45 (41.67%)	63 (58.33%)		0.027
SHS/O	13 (72.22%)	5 (27.78%)		

Level/Vocational	1 (16.67%)	5 (83.33%)		
Age				
17-25 years	38 (40.86%)	55 (59.14%)		
26-35 years	54 (37.24%)	91 (62.76%)	1.3962	0.498
36-55 years	22 (46.81%)	25 (53.19%)		
Marital status				
Cohabiting	34 (54.84%)	28 (45.16%)		
Married	56 (33.14%)	113 (66.86%)	9.4502	*0.009
Single	24 (44.44%)	30 (55.56%)		
Occupation				
Farmer	50 (40.32%)	74 (59.68%)		Fisher's Exact
Petty Trader	51 (38.06%)	83 (61.94%)		0.321
Salary Worker	2 (25.00%)	6 (75.00%)		
Other	11 (57.89%)	8 (42.11%)		
Ethnicity				
Ewe	16 (30.77%)	36 (69.23%)	3.1628	0.206
Krobo	89 (41.20%)	127 (58.80%)		
Other	9 (52.94%)	8 (47.06%)		
Residence				
Peri-urban	40 (36.04%)	71 (63.96%)	1.1903	0.275
Rural	74 (42.53%)	100 (57.47%)		
Family income				
GHC 300-600	29 (34.94%)	54 (65.06%)		
GHC 50-300	59 (55.66%)	47 (44.34%)	18.8125	<0.001
GHC 600-800	17 (25.00%)	51 (75.00%)		
Above GHC800	9 (32.14%)	19 (67.86%)		
Family structure				
Extended	36 (47.37%)	40 (52.63%)	2.3445	0.126
Nuclear	78 (37.32%)	131 (62.68%)		
Media Information				
Yes	78 (36.62%)	135 (63.38%)	4.0141	0.045
History of Malnutrition				
Yes	4 (28.57%)	10 (71.43%)	0.8013	0.371
Number of Children	24 (58.54%)	17 (41.46%)		
3 or less	63 (37.72%)	104 (62.28%)	7.0116	*0.030
4-6	27 (35.06%)	50 (64.94%)		
7 and above				
People above 5 years in the household	31 (34.07%)	60 (65.93%)		
1-3	60 (38.71%)	95 (61.29%)	7.2931	*0.026
4-7	23 (58.97%)	16 (41.03%)		
7 or more				
Mothers' Nutritional				

Knowledge				
Low Knowledge	22(48.89%)	23(51.11%)	1.7593	0.185
High Knowledge	92(38.33%)	148(61.67%)		
Number of people **in the household**				Fisher's Exact
1-3	5(50.00%)	5(50.00%)		0.384
4-6	68(37.16%)	115(62.84%)		
7 and above	41(44.57%)	51(55.43%)		

*Significant association; p<0.05: Results are based on Chi-square tests performed.

Data are presented in tables as frequency (N) and proportions (%);

Table 4. 12: Child factors associated with malnutrition among children under 5 in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Factors	Nutritional Status of Child			p
	Undernourished	**Normal**	X^2	
Children's Age(Months)				
6-12	29(63.04%)	17(36.96%)		
13-18	19(67.86%)	9(32.14%)		
19-31	15(20.27%)	59(79.73%)	32.1312	<0.001
32-43	22(40.74%)	32(59.26%)		
44-59	29(34.94%)	54(65.06%)		
Sex of child				
Male	61(47.29%)	68(52.71%)		
Female	53(33.97%)	103(66.03%)	5.2140	0.022
Postnatal Attendance				
Yes	86(37.89%)	141(62.11%)	2.0781	0.149

*Significant association; p<0.05: Results are based on Chi-square tests performed.

Data are presented in frequency (N) and proportions (%);

Marital status (p=0.009), family income (p <0.001), total number of children (p=0.030) and the number of children above 5 years old in the household (p=0.026) were significantly associated with the nutritional status of children. Factors not associated with child nutritional status included mother's age, occupation, ethnicity, and place of residence. An analysis between nutritional status of children and child factors established that the sex (p=0.022) and age (p<0.001) were significantly associated with nutritional status.

4.9 Predictors of malnutrition in children

Table 4. 13: Multivariate logistic regression of socio-demographic factors and overall nutritional status of children under 5 in hard-to-reach and peri-urban communities of the Lower Manya Krobo Municipality.

Variables	Categories	OR (95%)	p-value	AOR (95%)	p-value
Marital Status	Cohabiting (Ref)	1		1	
	Married	2.38(1.29-4.37)	0.0040	1.05(0.50-2.23)	0.893
	Single	1.47(0.70-3.10)	0.3035	2.19(0.84-5.76)	0.111
Sex of child	Male(Ref)	1		1	
	Female	1.71	0.0274	2.20(1.24-3.90)	0.007
Children's age in months	6-12(Ref)	1		1	
	13-18	0.81(0.30-2.20)	0.6761	0.65(0.22-1.92)	0.435
	19-31	6.71(2.68-16.80)	0.0000	3.66(1.40-9.61)	0.008
	32-43	2.48(1.08-5.71)	0.0269	0.96(0.35-2.65)	0.933
	44-59	3.18(1.45-6.94)	0.0022	0.78(0.24-2.51)	0.672
Educational level	JHS/Middle (Ref)	1		1	
	No formal Educaton	1.40(0.64-3.06)	0.3965	1.82(0.71-4.67)	0.215
	Primary	0.84(0.49-1.45)	0.5284	1.10(0.58-2.08)	0.781
	SHS/O Level	0.23(0.07-0.72)	0.0058	0.34(0.08-1.47)	0.148
	Tertiary	3.00(0.33-27.08)	0.3036	2.48(0.20-30.77)	0.479

Access to media information	No(Ref)	1		1	
	Yes	1.68(0.97-2.91)	0.0592	1.91(1.00-3.66)	0.050
Family Income	GHC300-600(Ref)	1		1	
	GHC50-300	0.43(0.23-0.78)	0.0047	0.73(0.34-1.55)	0.410
	GHC600-800	1.71(0.83-3.55)	0.1431	1.53(0.65-3.62)	0.335
	Above GHC800	1.13(0.45-2.84)	0.7883	1.68(0.56-5.08)	0.356
People above age 5 years in the household	1-3(Ref)	1		1	
	4-7	0.83(0.48-1.43)	0.5062	0.70(0.37-1.33)	0.274
	7 or more	0.36(0.16-0.80)	0.0085	0.32(0.12-0.84)	0.021
Commencement of School	No(Ref)	1		1	
	Yes	2.80(1.63-4.79)	0.0001	3.48(1.45-8.34)	0.005
Number of children	1-3(Ref)	1		1	
	4-6	2.33	0.0157	0.85(0.32-2.45)	0.744
	7 and above	2.61	0.0147	1.14(0.39-3.31)	0.810

Results presented in crude and adjusted odds ratios are based on regression analysis carried. *Significant association; $p<0.05$

KEY; OR- Odds Ratio, AOR-Adjusted Odds Ratio, Ref-Reference group

Older children were less likely to experience malnutrition than younger ones and families with greater numbers of individuals older than 5 were at a greater risk of having undernourished children (table 4.12).

CHAPTER 5

5.0 DISCUSSION

5.1 Demographic characteristics of respondents (caregivers)

The demographic features of every community are important determinants of the nutrition and health status of community members. Factors such as place of residence, occupation, socio-economic status and age have significant associations with nutritional status of individuals (Islam *et al.*, 2016). The age group for majority of caregivers in our study is similar to those reported in other studies on child nutritional status carried out in rural areas in Ghana (Nyansanga, 2011; Aryeetey and Goh 2013; Nti and Lartey 2008; Nti and Lartey 2007). . The dominantly rural nature of communities sampled is a likely reason behind the low levels of education recorded amongst caregivers, a direct contrast to other studies conducted in slightly urban areas which found out that majority of women had at least tertiary education (Nyansanga, 2011).Trading in most cases has been the predominant occupation reported by caregivers in various studies conducted in nutrition assessment (Akorede & Abiola 2013); majority of our study participants were traders or involved in farming.

5.2 Caregiver factors associated with malnutrition

In Ghana, very few studies have explored the association between family system and nutritional status. The nuclear family system was the most practiced amongst our study respondents. The number of competing siblings impacts child malnutrition as large numbers of children is associated with an increased risk of malnutrition (Gurmu and Etana, 2012). Caregivers who had a larger family size or practiced the extended family system were more likely to face problems of malnutrition amongst their children. Most caregivers asserted that, they receive regular media information on child nutrition; however most respondents

admitted a history of malnutrition, a development which questions how caregivers handle the information they obtain from the media regarding nutrition. Caregivers in this respect may not necessarily abide by nutritional recommendations promoted by the various media platforms. Even though postnatal attendance was impressive amongst respondents, majority who attended postnatal care sessions mentioned they had attended less than three sessions at the time of this study, indicating the reluctance of caregivers to utilize postnatal services. Women who do not attend postnatal care are likely to have limited information regarding essential issues such as child nutrition.

5.3 Mothers' knowledge on recommended nutrition practices of children under 5 years

Malnutrition and poor feeding practices remain a huge problem in Ghana. The Growth Monitoring and Promotion (GMP) programme seeks to empower mothers to provide appropriate child care. Although the programme has been implemented in Ghana for over 4 decades, little is known about its impact on child feeding outcomes. In this study, majority of caregivers believed exclusive breast feeding should not be less than 6 months. Even though the study found out that mother's nutritional knowledge was high, feeding practices among children might be suboptimal as close to half of respondents were of the view that food consumption should be more in adults. Another study in Ghana reported that although most mothers participating in the GMP programme in the Accra Metropolis were knowledgeable about child feeding recommendations, feeding practices were suboptimal, especially among children receiving complementary feeding (Gyampoh *et al.*, 2014). It is important to provide adequate nutrition counselling and support to mothers of growing children.

5.4 Determinants of the mother's nutritional knowledge

The study established that the mother's age, family structure and access to media information were associated with their nutritional knowledge. Studies on the nutritional knowledge of women regarding family size have rarely been conducted in Ghana. In this study, women with a larger family size were more likely to have low educational standards and may be deficient when it comes to nutritional knowledge. Older women in our study were more likely to have a higher nutritional knowledge. Younger mothers are likely to have little or no experience when it comes to weaning and especially child nutrition (Saaka *et al.*, 2015; Babatunde *et al.,* 2011; Demissie and Worku 2013); they are likely to have children who suffer from malnutrition. Also, caregivers with a lower education level were more likely to have higher nutritional knowledge. Mothers with low education levels are more likely to live in rural areas where health care access is an issue, and they are also likely to belong to the low socio-economic class. The results of this study in this regard buttresses results from other studies conducted on the correlates of mother's nutritional knowledge and subsequently child malnutrition (Demissie and Worku 2013; Babatunde *et al.,* 2011; Lartey 2008). Caregivers with access to media information in this study were more likely to have higher nutritional knowledge. Caregivers who have access to information are likely to have some minimum level of education, are again likely to dwell in urban areas and are able to have access to healthcare, hence their ability to improve their nutritional knowledge over time (Nti and Lartey 2008).

5.5   Food consumption by children

A study by Saaka *et al.* (2014) on child malnutrition in rural areas in northern Ghana revealed that, children did not eat protein-rich foods often enough for good health as most (91%) were

fed on cereal-based foods. The findings from Saaka's study do not differ much from this study as it was observed that majority of the children consumed meat and beans less than 4 times in a week. Also according to Saaka's findings, the intake of foods known to have a good content of micronutrients and protein was less than satisfactory, only 14% of children were fed on vitamin A-rich fruits and vegetables (Saaka *et al.,* 2015). In our study most of the children consumed vitamin A rich foods less than 4 times in the past week. A few children (24%) happened to feed less than 4 times per week on food rich in carbohydrates (root tubers,cereals). The high consumption of carbohydrates could be attributed to the fact that the rural folks especially, have access to and have to pay little or nothing for such foods. Majority of the children were fed more than 4 times within the past week with fresh, dried or shell fish. According to Kawarazuka, this is a good practice since fish is more nutritious than staple foods providing proteins, essential fatty acids and micronutrients which aid in the growth and development of the child (Karawazuka, 2010). Most children consumed sweets less than 4 times in a week. This practice of low sweet consumption is commendable.Studies have shown that, too much sweet consumption in young children may lead to dental caries (Duijster *et al.,* 2013); it may also lead to increased risk of non-communicable diseases such as diabetes in later stages of the child's life (Naidoo, 2013).

5.6 Nutritional status of children under 5 years of age

The prevalence of malnutrition among children under 5 remains persistently high in Ghana, especially in the 3 northern regions. For example, in the Northern Region of Ghana, 33% of children below five years are stunted, 13% wasted, and 22% underweight (Saaka, 2014). In this study, the prevalence of stunting, wasting and underweight among children under 5 were similar. This study in effect highlights the dire situation of nutritional needs of children in Ghana especially in very deprived rural and under developed areas and hence the need to put in place constructive measures to address the situation.

5.7 Age group, residence and sex distribution of under nourished children

The prevalence of malnutrition differs across various age groups in Ghana (Prince and Laar, 2014). In a study on the nutritional status of upper primary students in a rural setting in Ghana, the prevalence of stunting and underweight were 57% and 46%, respectively, among the respondents (Danquah 2013). Children in age groups 6-12 months and 44-59 months formed about half of all children who were undernourished in our study. Sex distribution of child under-nutrition indicated that more males than females were malnourished. Studies have established that there is a certain level of gender inequality when it comes to nutritional needs of children especially in rural areas; females are more likely to be severely malnourished than their male counterparts mainly due to discrimination against girls in intra-family food distribution (Choudhury *et al.* 2000).This study reports opposite results but buttresses the issue of variation in child nutritional status on the issue of gender. With regards to place of residence a number of studies have been able to establish that children in rural areas are more likely to be under nourished (Van De Poel *et al.*, 2008; Lartey 2008; Babatunde *et al.* 2011) mainly due to low socio economic status of parents of children in rural dwellings.

5.8 Maternal and household factors associated with under-nutrition

Studies on the determinants and factors associated with malnutrition report factors such as geographic location, household size, occupation and education level of mothers, sex, religion and occupation of household heads, and irrigation as strongly associated with malnutrition in children (Adeladza, 2010; Nti *et al.,* 2014; Otoo, 2008; Prince and Laar, 2014).This study revealed that factors including marital status, family income, total number of children were significantly associated with the nutritional status of children. Single mothers are more likely to have a financial challenge fending for their wards compared to married women *(Sandoval-*

Priego *et al.,* 2002) and families with low income have a greater risk of having malnourished children that families with higher income (Van De Poel *et al.,* 2008). A greater family size also implies increased competition for food which is likely to result in malnutrition of children (Gurmu and Etana, 2012). Contrary to other studies, this study did not find any association with the mother's age with child malnutrition. The study also established that the sex of a child and child's age were significantly associated with malnutrition; females are likely to be severely malnourished due to gender discrimination in terms of nutritional needs (Prince and Laar, 2014; Choudhury *et al.,* 2000).

5.9. Predictors of malnutrition in children

A study on the prevalence and determinants of malnutrition among children under 5 in farming households in Kwara State, Nigeria, established that the significant determinants of malnutrition were gender and age of child, education and body mass index of mother, calorie intake of the households, access to clean water and presence of toilet in the households (Babatunde *et al.,* 2011). This study revealed that the sex of the child and access to media information were both predictors of child malnutrition: Females were twice more likely to be undernourished than their male counterparts, due to gender discrimination when it comes to nutritional needs (Choudhury *et al.,* 2000). According to the study, older children were less likely to experience malnutrition than younger ones; a likely reason for this development is such that, increase in the number of children under 5 in the household as a result of poor birth spacing (Davanzo *et al.,* 2004; Nti *et al.*, 2014; Sahu *et al.,* 2015) usually results in biological depletion of mothers and inadequate capacity of caring for children which in turn affects the nutritional status of children (Gurmu and Etana, 2012). The number of people above 5 years of age in the household was a predictor of under nutrition in our study. A greater family size implies increased competition for food which is likely to result in malnutrition of children (Gurmu and Etana, 2012).

CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusions

Majority of children under 5 years of age surveyed from hard-to reach and peri-urban communities of the Lower Manya Krobo Municipality had good nutritional status. However, more than a third of the children were stunted, a tenth wasted, and less than a fifth underweight. Additionally, maternal and household factors associated with the nutritional status of the children under 5 years in the municipality included marital status, family income, total number of living children and number of people above 5 years of age in the household.

6.2 Recommendations

Based on the findings of this study, the following recommendations are made to improve the nutritional status and overall health of the child.

More intense monitoring and evaluation structures need to be developed by the Municipal and Regional Health Directorates for effective surveillance of nutrition and health status of children under 5 years. This will aid the government and other stakeholders in identifying priority areas for intervention.

Furthermore, awareness needs to be created by the Municipal Health Directorate and other stakeholders about affordable but nutritious foods through regular educational programmes in the various communities within the Municipality. Parents should also be encouraged to cultivate nutritious food crops in their backyards.

The capacity of community volunteers in hard-to-reach areas within the Municipality should be strengthened to enable them embark on regular child health promotion home visits.

Parents need to be enlightened about the relevance of family planning, and these services should be taken to the doorstep of caregivers to help reduce the number of births per mother. This will help ensure that good care is given to children under 5 years of age, even when food and financial resources are scarce.

It should also be reiterated to mothers that exclusive breastfeeding has a protective effect against malnutrition and childhood diseases.

There is a need to provide a closer well equipped health center with well trained personnel for the under privileged population.

REFERENCES

Abdul-rahman, L. & Agble, R., 2012. Review of School Health and Nutrition Interventions and Mapping of Existing Programmes in Ghana. , (August), pp.21–27.

Adeladza, 2010. The influence of socio-economic and nutritional characteristics on child growth in Kwale District of Kenya. *African Journal of Food, Agriculture, Nutrition and Development*, 9(7), pp.1570–1590.

Akorede, Q.J. & Abiola, O.M., 2013. 15-Assessment of Nutritional Status of Under Five Children in Akure South Local Government ,Ondo State. *Ijrras*, 14(3), pp.671–681. Available at: http://www.arpapress.com/Volumes/Vol14Issue3/IJRRAS_14_3_24.pdf.

Anwer, I. & Awan, J.A., 2003. Nutritional status comparison of rural with urban school children in Faisalabad District, Pakistan. *Rural and Remote Health*, 3(1), p.130. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22070419.

Areekul, W., 2005. Dietary behaviors and nutritional status of adolescents in a remote rural area of Thailand. *Journal of the Medical Association of Thailand = Chotmaihet thangphaet.*, 88 Suppl 3, pp.240–246.

Aryeetey, R.N.O. & Goh, Y.E., 2013. Duration of Exclusive Breastfeeding and Subsequent Child Feeding Adequacy. *Ghana Medical Journal*, 47(1), pp.24–29.

Aziz, M.F.A. & Devi, M.N., 2012. Nutritional status and eating practices among children aged 4-6 years old in selected urban and rural kindergarten in Selangor, Malaysia. *Asian Journal of Clinical Nutrition*, 4(4), pp.116–131.

Babatunde, R.O., 2011. 11-Prevalence and Determinants of Malnutrition among Under-five Children of Farming Households in Kwara State, Nigeria. *Journal of Agricultural Science*, 3(3), pp.173–181. Available at:

http://www.ccsenet.org/journal/index.php/jas/article/view/12058.

Beauman, C., 2005. The principles, definition and dimensions of the new nutrition science. *Public health nutrition*, 8(6A), pp.695–698.

Boelaert, M., 1995. Nutrition guidelines. , 1.

Choudhury, K.K. et al., 2000. Gender inequality and severe malnutrition among children in a remote rural area of Bangladesh. *J Health Popul Nutr*, 18(3), pp.123–130. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11262764.

Danquah, A.O., 2013. Nutritional Status of Upper Primary School Pupils in a Rural Setting in Ghana. *International Journal of Nutrition and Food Sciences*, 2(6), p.320. Available at: http://www.sciencepublishinggroup.com/journal/paperinfo.aspx?journalid=153&doi=10.11648/j.ijnfs.20130206.19.

Davanzo, J., 2004. The Effects of Birth Spacing on Infant and Child Mortality , Pregnancy Outcomes , and Maternal Morbidity and Mortality in Matlab , Bangladesh. , (October).

Demissie, S. & Worku, A., 2013. Magnitude and factors associated with malnutrition in children 6-59 months of age in pastoral community of Dollo Ado district , Somali region , Ethiopia. *science Journal of Public Health*, 1(4), pp.175–183.

FAO, 2008. The State of Food Insecurity in the World 2008. *Fao*, p.56.

GDHS, 2014. Ghana Demographic Health Survey. *Ghana Statistical Service*, p.530.

Ghana Statistical Service, 2014. 2010 Population & Housing Census: Nadowli-Kaleo District Analytical Report.

Gouado, I., 2014. Feeding Practices, Food and Nutrition Insecurity of infants and their Mothers in Bangang Rural Community, Cameroon. *Journal of Nutrition & Food Sciences*, 04(03), pp.2–7. Available at: http://www.omicsonline.org/open-

access/feeding-practices-food-and-nutrition-insecurity-of-infants-and-their-mothers-in-bangang-rural-community-cameroon-2155-9600.1000264.php?aid=24500.

Gurmu and Etana, 2012. Household structure and children ' s nutritional status in Ethiopia. , (2), pp.113–130.

Gyampoh, S., Otoo, G.E. & Aryeetey, R.N.O., 2014. Child feeding knowledge and practices among women participating in growth monitoring and promotion in Accra, Ghana. *BMC pregnancy and childbirth*, 14(1), p.180.

Hien, N.N. & Kam, S., 2008. Nutritional status and the characteristics related to malnutrition in children under five years of age in Nghean, Vietnam. *Journal of Preventive Medicine and Public Health*, 41(4), pp.232–240.

Houshiar Rad, A., 2009. Prevalence of stunting, underweight, wasting and overweight among Iranian under-five-year-old children (2000-2002). *Iranian Journal of Nutrition Sciences &amp; Food Technology*, 3(4), pp.49–56.

Huong, L.T., Thi, V. & Nga, T., 2013. Nutritional Practices among Ethnic Minorities and Child Malnutrition in Mountainous Areas of Central Vietnam *. *Food and Nutrition Sciences*, 4(January), pp.82–89.

Islam, A., 2016. Socio-economic and demographic factors influencing nutritional status among early childbearing young mothers in Bangladesh. *BMC Women's Health*, pp.1–9. Available at: http://dx.doi.org/10.1186/s12905-016-0338-y.

Jesmin, A., 2011. Prevalence and determinants of chronic malnutrition among preschool children: A cross-sectional study in Dhaka City, Bangladesh. *Journal of Health, Population and Nutrition*, 29(5), pp.494–499.

Lartey, A., 2008. Maternal and child nutrition in Sub-Saharan Africa: challenges and

interventions. *The Proceedings of the Nutrition Society*, 67(1), pp.105–108.

Lower Manya Krobo Municipal Assembly, 2014. Lower manya krobo municipality. , p.189.

Makori, E., 2001. Factors affecting food selection , intake and nutritional status of the elderly in Mathare slums of Nairobi Kenya. , p.31.

Masters, W. A., Kuwornu, J. & Sarpong, D., 2011. Improving child nutrition through quality certification of infant foods: scoping study from a randomized trial in Ghana. Available at: http://www.theigc.org/node/1264.

Mukuria, A., Cushing, J. & Sangha, J., 2005. Nutritional Status of Children: Results from the Demographic and Health Surveys 1994-2001. , pp.1–155.

Nti, C.A. et al., 2014. Knowledge , Attitude and Practice of Birth Spacing among Ghanaian Mothers : Implications for Maternal and Child Nutritional Status. , 31(11), pp.1971–1978.

Nti, C.A. & Lartey, A., 2008. Influence of care practices on nutritional status of Ghanaian children. *Nutrition research and practice*, 2(2), pp.93–9.

Nti, C.A. & Lartey, A., 2007. Young child feeding practices and child nutritional status in rural Ghana. *International Journal of Consumer Studies*, 31(4), pp.326–332.

Nyansanga M. A., 2011. Nutrition Status of Ghanaian Women with Young Children-dietary Intake , Anthropometric and Life Style Data Maria Adam Nyangasa.

Osei-Kwakye, K., 2010. Determinants ofunder-five mortality in Builsa district, Upper East Region, Ghana. *Journal of Science and Technology*, 30(1), pp.45–53.

Otoo, 2008. Nutritional status of children in Ghana: WISHH Annual Conference.

Van De Poel, E., 2008. Socioeconomic inequality in malnutrition in developing countries.

Bulletin of the World Health Organization, 86(4), pp.282–291.

Prince, A.K. & Laar, A., 2014. Nutritional status of school-aged children in the Nkwanta south district-Volta region of Ghana. *European Scientific Journal*, 10(30), pp.310–327.

Rahman, A., 2008. Factors Associated with Nutritional Status of Children in Bangladesh: A Multivariate Analysis. , 37(1).

Saaka, M. et al., 2015. *Child malnutrition in northern Ghana : evidence , factors and recommendations from a new study*,

Saaka, M., 2014. Relationship between mothers' nutritional knowledge in childcare practices and the growth of children living in impoverished rural communities. *Journal of Health, Population and Nutrition*, 32(2), pp.237–248.

Sahu, D.., 2015. Levels, trends & predictors of infant & child mortality among Scheduled Tribes in rural India. *The Indian journal of medical research*, 141(5), pp.709–19.

Sandoval-Priego, A., 2002. Family strategies of life associated with malnutrition in children less than 2 years of age. *Salud Pública de México*, pp.44(1):41–49.

Schmidt, C.O. & Kohlmann, T., 2008. Polygons, Diagonals,. *Int J Public Health*, 9(August), pp.321–326.

Strategy, U.M.N., 2015. Community-based Management of Acute Malnutrition. , pp.1–6.

Thapa, M., Neopan A., Singh U. &Shrestha B., 2013. Nutritional Status of Children in Two Districts of the Mountain Region of Nepal. *Jnhrc*, 11(3), pp.235–239.

Tobergte, D.R. & Curtis, S., 2013. *Journal of Chemical Information and Modeling*, 53(9), pp.1689–1699.

Unicef, World Health Organization & The World Bank, 2012. UNICEF-WHO- World Bank.

Joint Child Malnutrition Estimates: Levels & trends in child malnutrition. *Africa*, p.35. Available at: http://www.who.int/nutgrowthdb/estimates2011/en/.

Wassie, M.M., 2015. Predictors of nutritional status of Ethiopian adolescent girls : a community based cross sectional study. *BMC Nutrition*, pp.1–7.

World Health Organisation & United Nations International Chidren Fund, 2009. Child growth standards and the identification of severe acute malnutrition in infants and children. *WHO Library*, pp.1–12.

WHO/FAO/UNU Expert Consultation, 2007. Protein and amino acid requirements in human nutrition. *World Health Organization technical report series*, (935), pp.1–265.

World Health Organization, 2015. Fact Sheet No. 394: Healthy Diet. , (September), pp.1–6.

Zakaria, H. and D.B.L., 2014. Socio-Economic Determinants of Dietary Diversity among Women of Child Bearing Ages in Northern Ghana. *Food Science and Quality Management of IISTE www.iiste.org*, 34, pp.12–26.

APPENDICES

APPENDIX 1: INTRODUCTORY NOTE AND INFORMED CONSENT

Part 1: PARTICIPANT INFORMATION

INTRODUCTION

I am Yvette Eyram Avorgbedor from Ensign College of Public Health in Kpong. I am conducting a study that involves research on the nutritional status of children 0-5 years in some randomly selected rural sub municipals in the Lower Manya Krobo municipality in the Eastern Region of Ghana. I will be explaining all about the study to you, and you will also receive a copy of the leaflet that explains all about this research study that you are being asked to partake in. Please take all the time you need to read it carefully. You may ask me any questions about anything you do not understand at any time. You are a volunteer. You can choose not to take part and if you join, you may quit at any time. There will be no penalty if you decide to quit the study.

Why you are being asked to participate

You have being asked to take part in this study because your community is among the selected sub-municipals in the Lower Manya Krobo municipality in the Eastern Region of Ghana. Specifically, I am interested in taking information from mothers with children between ages 0-5 years, in selected rural communities, and in all I plan to ask such people to participate in the study.

Procedures

If you agree to be part of the study, a trained project staff, will ask you to fill a questionnaire alone for approximately 10 - 30 minutes. As a participant, if you agree to participate in this study, data from your responses may be used as part of my assessment of the nutritional status of children 0-5 years in the rural communities of Lower Manya Krobo Municipality in the Eastern Region of Ghana.

Risk and Benefits

I anticipate minimal or no risk to you. There is no direct benefit to you for being in the study; however, the study outcomes may lead to better understanding of the nutritional status of children 0-5 years in the rural communities of the Lower Manya Krobo municipality, which may help in health policy development and programs planning to improve the health status of such children.

Confidentiality

All data will be de-identified and will be kept private. Your identifiable data such as name or date of birth will not be used in documents, reports, or publications related to this research. I will keep all documents secured and under lock

When typing your survey responses into the computer, all data will be entered without any information that will make it possible for your identity to be known. The information you provide will be kept strictly confidential and will be available only to persons related to the study. (Myself and my supervisors) The Office of Ethical Review Board of Ensign College may also have access to study records upon their request.

Your responses will not be shown to other participants or community members. The original paper survey forms will be destroyed once data entry is complete.

Voluntariness and Withdrawal
Your participation in the study is completely voluntary and you reserve the right not to participate, even after you have taken part, to withdraw. This is your right and the decision you take will not be disclosed to anyone. It will not affect the care that will be offered to you at the health facility now or in future. If you join the study, you can change your mind later. You can choose not to take part and you can quit at any time. There will be no negative consequences if you choose not to participate in the study. Please note however, that some of the information that may have been obtained from you without identifiers, before you chose to withdraw, may be used in analysis reports and publications.

Cost/Compensation
Your participation in this study will not lead to you incurring any monetary cost during or after   the   study.

Who to contact

This study has been approved by the Institutional Review Board of Ensign College. If you have any concern about the conduct of this study, your welfare or your rights as a research participant or if you wish to ask questions, or need further explanations later, you may contact me Yvette Eyram Avorgbedor (+233248658497) of Ensign College of Public Health, or my supervisor Dr. Moses Klevor (+233244611096) You may also contact the Administrator of the Institutional Ethics Committee of the Ensign College of Public Health at (+233245762229).

Thank   you!

Do you have any questions?

.

"I have read the information given above, or the information above has been read to me.

I have been given a chance to ask questions concerning this study; questions have been

answered to my satisfaction. I now voluntarily agree to participate in this study knowing

that I have the right to withdraw at any time without affecting future health care services"

Name of **participant**   _____

Signature of **Participant** _____

Date: /   /   /

Name of **witness**   _____

Signature of **witness** _____

Date: /   /   /

Name of **investigator**   _____

Signature of **investigator** _____

Date: /   /   /

INSTRUMENT 1: STRUCTURED QUESTIONNAIRE

TITLE: NUTRITIONAL STATUS OF CHILDREN UNDER 5 YEARS OF AGE IN RURAL COMMUNITIES OF LOWER MANYA KROBO MUNICIPALITY, EASTERN REGION, GHANA.

ALL QUESTIONS ARE TO BE ADDRESSED TO MOTHERS AND CAREGIVERS OF CHILDREN UNDER 5 YEARS OF AGE

Respondent ID ………….   Questionnaire Number……………

District Name:————————   Sub Municipal's Name: ————————

Interview Result:
1=Completed   [ ]
2=Partially Done   [ ]
3=Not done   [ ]

Enumerator's Name: …………………………………………   Date of Interview: …. /…./……..

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1.   Age of respondent in years ………………
2. Marital status of respondent   1. Single [ ]   2. Married [ ]   3. Divorced [ ]   4. Widowed   [ ]   5. Cohabiting [ ]
3. What religious affiliation?   1. Christian [ ]   2. Muslim [ ]   3. Traditional [ ]   4. Others (Specify) ………
4. What is ethnicity of respondent?   1. Krobo   [ ]   2. Ewe [ ]   3. Ga Adagme [ ]   4. Akan [ ]   5. Other [ ]   Specify…………………
5. What is the highest level of education attained?   1. Primary [ ]   2. JHS/Middle   [ ]   3. SHS/O Level/Vocational Training   [ ]   4. Tertiary [ ]   5. No formal education   [ ]
6.   What is the occupation of mother/caregiver?   1. Salary worker [ ]   2. Farmer [ ]   3. Petty Trader [ ]   4. Others (specify)……………
7.   What is the mother's monthly income?   1. Below Gh¢150 [ ]   2. Gh¢150 - ¢450 [ ]   3. Above Ghc 450 [ ]
8.   How many children do you have? ……………… *(if there is only one child, skip to Q15)*
9.   How many of them are under 5 years of age? ....
10. What is the age of your youngest child?   …………….
11. What is the Sex of your youngest child?   1. Female [ ]   2. Male [ ]
12. What is the age of the child before the youngest child? ………………
13.   How many people are in the household?....................

SECTION B: TYPES OF FOOD FED TO CHILDREN (6-59 MONTHS)

Now I would like to ask you about the types of liquids your child drank yesterday during the past seven (7) days.

14. Did your child drink any of the following liquids more than four (4) times within the past seven days?
READ THE LIST OF LIQUIDS (A THROUGH I, STARTING WITH "BREASTMILK").
PLACE A CHECK MARK IN THE BOX IF CHILD DRANK LIQUID IN QUESTION

A). Breast milk?	1. Yes [ ] 2. No [ ]
B). Plain water?	1. Yes [ ] 2. No [ ]
C). Commercially produced infant formula eg Lactogen?	1. Yes [ ] 2. No [ ]
D). Any fortified, commercially available infant and young child food [e.g. Cerelac]?	1. Yes [ ] 2. No [ ]
E). Any (other) porridge e.g. koko, tom brown?	1. Yes [ ] 2. No [ ]
F). Any other milk such as tinned, powdered, or fresh animal milk?	1. Yes [ ] 2. No[ ]
G). Sweetened fruit juice?	1. Yes [ ] 2. No [ ]
H). Milo or Richoco?	1. Yes [ ] 2. No [ ]
I). Any other liquids such as sugar water, carbonated drinks?	1. Yes [ ] 2. No [ ]

Q28. Did your child eat any of the following foods yesterday during the day or at night? *(24 Hour recall)*

READ THE LIST OF FOODS. Tick the appropriate answer

A). Any foods made from grain (for example, made with millet, sorghum, maize, rice, wheat, or other local grains, porridge, bread)?	1. Yes [ ] 2. No [ ]
B). Carrots, or yellow sweet potatoes?	1. Yes [ ] 2. No [ ]
C). Any other food made from roots or tubers (for example, white potatoes, yams, cassava, or other local roots/tubers)?	1. Yes [ ] 2. No [ ]
D). Any dark green leafy vegetables (for example, cassava leaves, or other dark green leaves e.g kontomire,)?	1. Yes [ ] 2. No [ ]
*E). **Ripe** mango, **ripe** pawpaw (or other local vitamin A-rich fruits)?*	1. Yes [ ] 2. No [ ]

66

F). Any other fruits and vegetables (for example, bananas, avocadoes, tomatoes, onions, apples, oranges, others)?	1. Yes [ ] 2. No [ ]
G). Any beef, pork, lamb, goat, rabbit (or wild game meat)?	1. Yes [ ] 2. No [ ]
H). Any chicken, duck, or other birds?	1. Yes [ ] 2. No [ ]
I). Any fish?	1. Yes [ ] 2. No [ ]
J). Any eggs?	1. Yes [ ] 2. No [ ]
K). Any foods made from beans (for example, made with cowpeas, soybeans or others)?	1. Yes [ ] 2. No [ ]
L). Any groundnuts/peanuts, or any other nuts?	1. Yes [ ] 2. No [ ]
M). Any cheese or yogurt?	1. Yes [ ] 2. No [ ]
N). Any food made with oil, fat, or butter?	1. Yes [ ] 2. No [ ]
O). Organ meats (for example, liver, kidney, others)	1. Yes [ ] 2. No [ ]
P). Foods made with red palm oil, palm nut, palm nut pulp sauce	1. Yes [ ] 2. No [ ]

 Please respond to the following statements by marking [√] the column that most accurately represents your knowledge on nutritional practices

SECTION C: MOTHERS' KNOWLEDGE ON RECOMMENDED NUTRITIONAL PRACTICES

Questions	True	False	Don't Know
15. Exclusive breastfeeding should be less than six months			
16. Babies can be fed with water alongside breast milk within the first six months			
17. Complementary food should be given within the first six months			
18. Children need to consume more fish and, or meat than adults			
19. Adults need to eat more fruits and, or vegetables than children.			
20. Children do not need to eat more food than adults.			
21. Lack/inadequate food causes malnutrition			

22. Lack of time to feed children causes malnutrition			
23. Refusal by children to eat causes malnutrition.			
24. Fruit juice is recommended for babies under the age of six months			
25. Children need cow's milk as a drink in the first 12 months			
26. Babies should be occasionally exposed to sunlight for vitamin D			
27. Sugar, salt or honey should be added to babies' food			
28. Breast-feeding should begin three days after birth			
29. Breast-feeding should be thrice daily			

30. When should complementary feeding be introduced?   1. < 6 months [ ]   2. On 6th month [   ]   3. Soon after 6th month [   ]   4. ≥ 7 months [ ]   5. Anytime [   ]

SECTION D: FACTORS ASSOCIATED WITH MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE

31. How much is your family's annual income?   1. less than ¢ 50 [ ]   2. ¢50 - ¢300 [ ]   3. ¢300 - ¢600 [ ]   4. ¢600 - ¢800 [ ]   5. above ¢800 [ ]   6. other (specify)…………………

32. Who takes the major decision about the child's welfare?   1. Mother [ ]   2. Father [ ]   3. In-laws [ ]   4. Others (specify) ………………….

33. How is your family structure?   1. Nuclear [ ]   2. Extended [ ]

34. How many people are in the immediate family? 1. < 3 [ ]   2. 3 – 5 [ ]   3. 5 – 7 [ ]   4. Others (specify) ………………….

35. Are children fed the same foods as adults?   1. Yes [ ]   2. No [ ]

36. Do you get regular information from the media on child nutrition? 1. Yes [ ]   2. No [ ]

37. Do you have any history of malnutrition among family members?   1. Yes [ ]   2. No [ ]

38. Do (or did) you attend postnatal care?1. Yes [ ]   4. No [ ]

39. If yes, how many times? 1. < 3 [   ]   2. 3 – 5 [ ]   3. 5 – 7 [ ]   4. Others (specify) ……………

40. What are some of the foods that children are allowed to eat in your household? You may choose as many as applicable.

1. Porridge[ ] 2. Rice [   ] 3. Eggs, meat, fish [   ]   4. Yam, potatoes [   ] 5. Others (Specify) ……………….

41. Which foods are children not allowed to eat?   1. Ice kenkey [   ] 2. Mixed food [ ] 3. Yam [   ]   4. Eggs, meat, fish [   ]   5. Others (Specify) ………… 6. Not Applicable [ ]

42. Are you fully aware of all the nutritional requirement for your child? 1. Yes [ ]   2. No [ ]

SECTION E: ANTHROPOMETRIC ASSESSMENT OF THE CHILD

Date of interview: (DD/MM/YYYY) …/…/……/

43. Date of birth of the child (DD/MM/YYYY) ...…/...…/……/

44. Age the of child in years or months …………….

45. Has your child started school?   1. Yes [ ]   2. No [ ]

46. Weight of child in kilograms……. ☐☐·☐

47. Length or height of child in centimeters…….. ☐☐☐ *(children 2 years and under only)*

48. Height of child in centimeters………………. *(children above 2 years only)*

49. Weight-for-Age……………………………………

50. Weight-for-Height (Length)…………………………….

51. Height (Length)-for-Age…………………………………

52. Bilateral Oedema…………………………………………

53. Is your child on the Community Management of Acute Malnutrition (CMAM) programme? a. Yes [ ]   b. No [ ]