UNIVERSITY OF CAPE COAST

# IMPACT OF SOCIO-ECONOMIC BACKGROUND OF PARENTS ON MENU COMPONENTS OF CHILDREN IN UPPER WEST AKIM DISTRICT


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BY

MABEL EYIAH INKUM

Thesis submitted to the Department of Vocational and Technical Education of the Faculty of Science and Technology Education of the College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for award of Master of Philosophy Degree in Home Economics.

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# DECLARATION

## Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …… Date…….....….....

Name: Mabel Eyiah Inkum

## Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature…….....…… Date……

Name: Dr. Augusta Adjei- Frimpong

Co-Supervisor's Signature……..... … Date……...……

Name: Dr. Augustina Araba Amissah

## ABSTRACT

Malnutrition is a leading cause of deaths in children below age five in the developing countries. For MDG goal to be met, malnutrition is to be reduced to the barest minimum if not eradicated. For this the study sought to assess the menu components among children below five years and explored the background characteristics of parents affecting child's menu component and nutritional status in the Upper West Akim District. The study adopted the descriptive cross-sectional design, and used the multi-stage cluster sampling method. A total of n=120 parents from four communities were used. A self-developed interview schedule was used for the data collection exercise. Data collected were analysed using descriptive statistics (frequencies and percentages, means and standard deviation) and inferential statistics (Pearson correlation, chi-square test for association). The findings revealed that mostly, the background characteristics of parents tend to influence the dietary intake of their children. Exclusive breastfeeding of children had direct relationship with nutritional status of their children. The results further highlighted that parents in the Upper West Akim District do not provide good menu component for their children. The anthropometric characteristics of the children showed a direct impact on the dietary intake of the children in the District. It is therefore recommended that training should be organized for parents in the Upper West Akim District to improve upon their nutritional knowledge on the feeding of their children. Additionally, food based recommendations should be developed, promoted and supported through policy initiatives.

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## DEDICATION

To my Father Mr. Frank Inkum Eyiah

# TABLE OF CONTENTS

# LIST OF TABLES

# LISTS OF FIGURES

# CHAPTER ONE

# INTRODUCTION

## Background to the Study

Proper intake of nutrients is a powerful tool, or good catalyst for growth and proper development, especially in children (Alshammari, 2017). This is important because people who are well nourished are more likely to be healthy, and productive with capabilities to learn well (World Health Organisation, (WHO) 1998; Rural Agency for Community Development and Assistance, 2017). The consumption of adequate nutrients benefit families, and their communities at both local and global levels (Otoo, 2008); and prevent the incidence of malnutrition which results from eating unbalanced meals (Rural Agency for Community Development and Assistance 2017).

Malnutrition has been acknowledged as a major health and social challenge which affects about 800 million people, out of which 20% can be traced to the developing countries particularly among children (Lim, 2012). Malnutrition contributes significantly to the high under-five year mortality diseases in the world, as an underlying factor with an estimate of over one third of all child deaths recorded (Kumar, Goel, Mittal & Misra 2002; Lim, 2012). This diet related challenge has been found as a major leading cause of deaths estimated at one third of children below age five in the developing countries including those in sub-Saharan Africa, Asia and Latin America (de Onis Blössner, Borghi, Morris, & Frongillo, 2004; Maia, Fausto, Vieira,

Benetton, & Carneiro 2008; Awatef, Zienab, Asmaa, & Amal, 2011). The implication is that majority of children in the developing world are undernourished, and more likely to have impaired immune systems, poorer cognitive development, and lower productivity at adulthood and greater susceptibility to other diet-related chronic diseases such as hypertension and coronary heart disease later in life where malnutrition becomes over nutrition.

Malnutrition is known to be one of the most devastating illness which affect children especially those under five years of age. The issue of malnutrition is a serious burden on public health in reducing the mortality of children under five years (de Onis, et al., 2004; WHO Multicentre Growth Reference Study Group, 2006). Malnutrition or micronutrient deficiencies continue to be a major health burden in developing countries. It is globally the most important risk factor for morbidity and mortality, with hundreds millions of pregnant women and young children particularly affected (Saloojee, Maayer, Michel, Garenne & Kahn., 2007). Apart from underweight, wasting, stunting, marasmus and kwashiorkor, deficiencies in iron, iodine, vitamin A and zinc are also manifestations of malnutrition in developing countries (Caulfield, Monaghan, & DeLahunt, 2004). Interventions to prevent malnutrition range from promoting breast- feeding to food supplementation schemes, whereas micronutrient deficiencies would best be addressed through food–based strategies.

This is because good nutrition is the fundamental basic right for the maintenance of positive health (Food and Agricultural Organization, 2006) that has the potential to offset certain nutritional challenges like protein energy malnutrition, anaemia, vitamin A deficiency, iodine deficiency and obesity

that continues to plague large proportions of children who are below five years of age (FAO, 2006).

**Statement of the Problem**

Malnutrition is currently the leading cause of global burden of disease (Ezzati, Lopez, Rodgers, Vander Hoorn & Murray 2002) and has been identified as the underlying factor in about 50% of deaths of children under 5 years of age in developing countries (Black, Morris & Bryce, 2003). It is estimated that, in developing countries, more than one-quarter of all children younger than 5 years of age are malnourished (United Native American Cultural Centre, 2000). Nearly two out of every ten babies born die before their 5$^{th}$ day born according to Ministry of Health (Asenso-Okyere, Asante, & Nube, 1997). There are about 7.6 million children under the age of five years who die every year, and nearly 900 of them every hour (de Onis, et al., 2004; Awatef, Zienab, Asmaa & Amal, 2011)

Poverty is considered the main underlying cause of malnutrition and its determinant in children. Malnutrition develops in children whose consumption of protein and energy are insufficient to satisfy their body's nutritional needs. Children born to parents in the low socio-economic group coupled with insufficient education and lack of foods essential for health are largely malnourished as compared with children of the same age group born to parents in the high socio-economic bracket (Muller & Krawinkel, 2005; Odunayo & Oyewole, 2006).

Malnutrition may also occur in children who are unable to absorb vital nutrients or convert them to energy essential for healthy tissue formation and organ function (Awatef, et al., 2011). Available research indicates that factors

such as family size, parental educational level and occupation, infants and young feeding practices, age and gender of the child grossly affect childhood nutrition (Van de Poel, Hosseinpoor, Jehu-Appiah, Vega, & Speybroeck, 2007: Maia, Fausto, Vieira, Benetton & Carneiro, 2008). Statistics also indicate that globally, nearly 53.0% of all deaths in young children in 2003 were attributable to undernutrition. The malnutrition condition, especially among children under age five, affects their physical growth, mental development and capacity (Caulfield, Monaghan, & Delahunt, 2004). In developing countries, efforts are being made to reduce malnutrition prevalence to 17.6%, and a decline from 1.6% to as low as 0.9% in the developed nations (de Onis, et al., 2004). By this it will help meet the Millennium Development Goal four (4) which targets child survival and a reduction in malnutrition among children under five years of age. Therefore, it is imperative to assess the menu components among children under five years in the Upper West Akim District and to explore the socio economic background of parents affecting child's nutritional status in the age bracket.

**Purpose of the Study**

The purpose of the study was to determine the menu components of children less than five years and background characteristics of parents which influence children's nutritional status in the Upper West Akim District. Therefore, this study seeks to determine the prevalence of malnutrition among children less than five years in the Upper West Akim District. Also, this study aims at exploring all the possible socio-economic background factors affecting the nutritional status of children.

**Objectives of the Study**

The following specific objectives were formulated to help guide the research.

1. Examine the association between socio economic background of parents and dietary intake of children in the District.
2. Assess the relationship between exclusive breastfeeding and nutritional status of children.
3. Assess the menu component of children in Upper West Akim District?
4. Investigate the association between anthropometric characteristics of the children and dietary intake of the children in the District?
5. Assess the knowledge level of parents about eating habits of their children in the District?

**Research Questions**

To address the problems of the study, a number of research questions were formulated in order to guide the research towards achieving the stated objectives. These research questions were delineated as follows:

1. What is the association between background characteristics of parents and dietary intake of children in the District?
2. What is the relationship between exclusive breastfeeding and nutritional status of children?
3. What are the menu components of children in Upper West Akim District?
4. To what extent does the anthropometric characteristics of the children associate with the dietary intake of the children in the District?

5. What is the knowledge level of parents about eating habits of their children in the District?

**Significance of the Study**

The findings of the study will help to provide information on nutritional status and socio economic background of parents in the Upper West Akim District of Ghana. It will help in identifying factors that are barriers to good nutrition practices, and translate each guideline into specific messages that health care providers, mothers, Nongovernmental Organizations (NGOs) and agencies can use to come up with the right measures of improving and eradicating malnutrition in Upper West Akim District.

Also this study will inform the Health Ministry specifically about the current menu components and nutritional status of children together with the socio economic background of parents that may account for malnutrition in children located in the Upper West Akim District. This information will assist the ministries of health to formulate appropriate educational and health promotion programme that will help address the problem.

It is hoped that Ghana Health Service and its Allied Agencies and Health related NGOs especially those into child health and poverty alleviation will by this study and its findings, also provide appropriate and adequate nutritional interventions such as supply of fortified food based on the nutritional needs of the children in the area. The data could also be used in planning interventions concerning malnutrition. The outcome of this study could also inform parents on diet related diseases such as stroke, hypertension and diabetes. Teachers can also use the information from this study to offer counselling and advice to children on diet related problems.

**Delimitations**

The study was centered on finding out how the background characteristics of parents influence the menu components and nutritional status of children in the Upper West Akim District. It does not mean the observed characteristics on nutritional status of children are as a result of the socio economic background of parents only. Other factors could contribute to the changes in children's nutritional status but such factors would not be accounted for in this study. Again, the study did not give reasons to differences which may be observed with statuses of children using the anthropometric indices.

The district consists of two types of communities. That is, the urban areas and the rural areas (Which form the majority of communities that make up the District). Although this study was conducted at the Upper West Akim District, it was limited to only rural communities in the District. This presupposes that, the urban communities in the District were excluded from the study. The target population was restricted to all parents who reside in the rural areas of the District. Also the study comprised parents with children less than five years of age regardless of occupation, educational levels among other socio-economic indicators.

**Limitations**

A key limitation that the researcher faced was the unwillingness of some respondents to share their background characteristics. Some parents by their nature were reluctant to give out information. The researcher however, used all means possible to encourage respondents with such behavior to volunteer the information needed to make the research a success. Adequate

measures were taken to ensure that the research objectives were achieved and the research questions were properly answered.

Another limitation is that the result cannot be widely used. This is because the research is specific to a particular area hence the findings of the research can only be described about the geographical area where the study was conducted (rural Upper West Akim District).

**Definition of Terms**

For the purpose of this study the following terms were used to mean the definitions provided for them in the study.

**Socio-economic background**: the position or status of an individual on a social and economic scale which can affect nutritional status of children.

**Malnutrition**: the deficiency of nutrition in under five children.

**Anthropometric indices**: the use of human body measurement for the purpose of obtaining information about nutritional status.

**Nutrition**: the intake of food which is considered in relation to the body's dietary need and a cornerstone of health.

**Parent**: the person who cares and is responsible for the upbringing of the child in providing the basic needs of the child less than five years.

**Children**: infants aged below five years.

**Menu component**: type of food commodities which constitute a child's meal.

**Organization of the Study**

The study was organised into five chapters. Chapter One consisted of the background of the study, statement of the problem, the purpose of the study and the research questions. The chapter also included delimitation of the study, limitation of the study, definition of terms as well as the organisation of the study.

In Chapter Two, the main aims and objectives of the thesis were elaborated further. Here, the research questions being investigated were discussed by placing the study within its broader content of the study variables. The latter part of this chapter discussed relevant, empirical literatures that have informed the design and execution of the study.

Chapter Three described the methodology that was employed for the study. The chapter described the research design, population, sample and sampling procedure, research instrument, validity and reliability of the instrument, pretesting of instrument for data collection as well as procedure data analysis. Chapter Four of the study concentrated on the analyses and discussion of findings. The chapter included the background characteristics of respondents. The analyses were done in line with the research questions.

Chapter Five presented the summary, conclusion and recommendations of the study. An area of further research was also suggested in this chapter.

# CHAPTER TWO

# LITERATURE REVIEW

## Introduction

This chapter reviews available literature on issues relating to malnutrition and the health of children in rural communities and families. This chapter covers a review on the concept of malnutrition, Nutrition of children and their habits, measurement of malnutrition status in children under age five, food choice, meal pattern, the prevalence of malnutrition among children, factors associated with malnutrition, method of nutritional assessment and conceptual framework.

## The Concept of Malnutrition

Although the term malnutrition generally refers to both under nutrition and over nutrition, in this study, it will be used solely to a deficiency of nutrition. Many factors have been outlined as the causes of malnutrition, however, majority of the incidence are related to poor diet or severe and repeated infections, particularly in underprivileged populations (WHO, 2004). Additionally, inadequacies which often come from diet and disease tend to be 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 (WHO). Malnutrition is acceptably a health outcome as well as a risk factor for disease and exacerbated malnutrition which can increase the risk of morbidity and mortality (WHO). Although it is rarely the direct cause of death (except in extreme situations, such as famine), child malnutrition was

associated with 54% of child deaths (10.8 million children) in developing countries in 2001 (WHO). Malnutrition as a direct cause of death has been noticed as "protein-energy malnutrition" (WHO).

Nutritional status has also been highlighted clearly to be compromised by diseases with an environmental component, such as those carried by insect or protozoan vectors, or those caused by an environment deficiency in micronutrients (WHO, 2003). The effects of adverse environmental conditions on nutritional status are even more pervasive. Environmental contamination, such as, the destruction of ecosystems, loss of biodiversity, climate change, and the effects of globalization have contributed to an increasing number of health hazards, which tend to affect the nutritional status of individuals (Johns & Eyzaguirre, 2000).

Additionally, overpopulation as a breakdown of the ecological balance in which the population may exceed the carrying capacity of the environment could be an impinging factor. This often undermines food production, leading to inadequate food intake and/or the consumption of non-nutritious food that encourages malnutrition (Johns & Eyzaguirre, 2000).

Alternatively, malnutrition can have far-reaching impacts on the environment, which in turn induces a cycle leading to additional health problems and deprivation (Johns & Eyzaguirre, 2000). For example, malnutrition can create and perpetuate poverty, which triggers a cycle that hampers economic and social development, and contributes to unsustainable resource use and environmental degradation (Water, Energy, Health, Agricultural and Biodiversity, WEHAB 2002). Breaking the cycle of

continuous poverty and environmental deterioration, therefore, becomes a prerequisite for sustainable development and survival.

**Malnutrition in Women and Children**

The nutritional status of women and children is particularly important, because it is through women and their off-spring that the pernicious effects of malnutrition are propagated to future generations (WHO, 2003). A malnourished mother is likely to give birth to a low birth-weight (LBW) baby susceptible to disease and premature death. The long term effect of supporting such babies, tends to be on the economic development of both families and the society at large which could replicate the cycle of poverty and malnutrition (WHO, 2003). Although child malnutrition declined globally during the 1990s, with the prevalence of underweight children falling from 27% to 22% (de Onis et al., 2004), national levels of malnutrition still vary considerably: 0% in Australia; 49% in Afghanistan (WHO, 2003).

The largest decline in the level of child malnutrition was in eastern Asia where underweight levels decreased by one half between 1990 and 2000 (WHO, 2003). Underweight rates also declined in certain parts of the world: south-eastern Asia, from 35% to 27%; Latin America and the Caribbean from 9% to 6% over the last 10 years (WHO, 2003). In contrast, south-central Asia continues to obtain high levels of child malnutrition, even though the rate of underweight children declined from 50% to 41% during the 1990s (WHO, 2003). In Africa, the number of underweight children actually increased between 1990 and 2000 (from 26 million to 32 million), and 25% of all children under five years old are still underweight, which signals that little has changed from a decade earlier. The projection for 2005 stands that the

prevalence of child malnutrition will continue to decline in all regions except in Africa, and particularly in sub-Saharan Africa which seems to be dominating in the incidence of malnutrition (de Onis et al., 2004).

Many factors can contribute to high rates of child malnutrition, ranging from those as fundamental as political instability and slow economic growth, to highly specific ones such as the frequency of infectious diseases and the lack of education. It is, however, noteworthy that the factors can vary across countries as revealed in a cross-country analysis where the determinants of stunting in preschool children varied considerably between nations, and among provinces within nations (Frongillo, de Onis, & Hanson, 1997). Important determinants of child malnutrition, such as the prevalence of intrauterine growth retardation (IUGR), have also differed considerably across geographical regions (de Onis, Blössner & Villar, 1998). Whether or not children are undernourished, therefore, seems to be as much a consequence of national and provincial factors, as of individual and household circumstances.

**Malnutrition and Child Growth**

Malnutrition commonly affects all groups in a community, although infants and young children are the most vulnerable because of their high nutritional requirements for growth and development (Kramer, 1987). Malnourished girls, in particular, risk becoming yet another malnourished mother, thus contributing to the intergenerational cycle of malnutrition (Kramer, 1987). In developing countries, poor perinatal conditions are responsible for approximately 23% of all deaths among children younger than five years old. These deaths are concentrated in the neonatal period (that is, the first 28 days after birth), and most are attributable to LBW (Kramer, 1987).

LBW can be a consequence of IUGR, preterm birth, or both, but in developing countries most LBW births are due to IUGR (defined as below the tenth percentile of the Williams sex-specific weight-for-gestational age reference data). Although the etiology of IUGR is complex, a major determinant of IUGR in developing countries is found to be maternal under nutrition (Kramer, 1987).

Evidence has shown that there is a greater incidence of IUGR births among women who are underweight or stunted prior to conception, or who fail to gain sufficient weight during pregnancy as compared to women with normal weight and weight gain (Kramer, 1987; King & Weininger, 1989; WHO, 1995). Growth assessment is the single measurement that best defines the health and nutritional status of a child, because disturbances in health and nutrition, regardless of their etiology, invariably affect child growth (Kramer, 1987; King & Weininger, 1989; WHO, 1995). There is ample evidence that the growth (height and weight) of well-fed, healthy children from different ethnic backgrounds and different continents could be remarkably similar, at least up to six years of age (Habicht, Martorell, Yarbrough, Malina & Klein 1974). Based on this finding, WHO has been recommending that a single international reference population be used worldwide, with common indicators and cut-offs, that use standard methods to analyse child growth data (WHO, 1995). The importance of this is that, the procedure is inexpensive and non-invasive as the growth assessment is universally applicable, does not pose any cultural problems, the measuring equipment is easy to transport, with the tools simple and robust, which can be set up in any environment, making users require little training (WHO, 1995).

Malnutrition develops in children whose consumption of protein and energy are insufficient to satisfy their body's nutritional needs. Malnutrition may also occur in children who are unable to absorb vital nutrients or convert them to essential energy for healthy tissue formation and organ function (Awatef, et al., 2011). Available research indicates that factors such as family size, parental educational level and occupation, infants and young feeding practices, age and gender of the child grossly affect childhood nutrition (Van de Poel et al., 2007; Maia et al., 2008). Statistics also indicate that, globally, nearly 53.0% of all deaths in young children in 2003 were attributable to under nutrition (Van de Poel et al., 2007; Maia et al., 2008). The malnutrition condition, especially among children under age five, affects their physical growth, mental development and capacity (Caulfield, et al., 2004). In developing countries, efforts are being made to reduce the prevalence of malnutrition to 17.6%, and a decline from 1.6% to as low as 0.9% in the developed nations (de Onis, et al., 2004). By this it will help meet the MDG4 which targeted child survival and a reduction in malnutrition among children less than five years of age.

**Nutrition of children, and their habits**

Nutrition is a food intake in accordance with the dietary needs of the organism (Martinchik, 2005). The food should contain all the necessary nutrients such as proteins, fats, carbohydrates, vitamins and minerals, and water in the required quantities to maintain the normal functioning and development of the organism (Martinchik, 2005). At the same time the needs of the individual, and depending on the age, type of employment, living

conditions and others. Proper nutrition with a well-balanced diet combined and regular physical activity, is the basis of good health (Martinchik, 2005).

Habit is a behaviour or course of action which becomes constant and repeated regularly in ordinary life, as determined by Ozhegov's dictionary (2008). Habit occurs after multiple repetitions of the same actions, when it ceases to require volitional and cognitive effort, and the process of action becomes as important as the result, when people start having positive experiences (Martinchik, 2005). The behaviour of parents invariably affects the formation of habits or behaviour in children as many habits begin to form in early childhood by imitation (Martinchik, 2005). This is because, habits are acquired in all spheres of human activity, covering various parts and aspects of human behaviour (Druzhinina, 2009). According to Belton and Belton (2003), the food consumption in childhood can create states for eating behaviour in adult life. Thus, what children consume during the first years of life may have a lifelong effect on well-being and health of a person.

Children often develop their knowledge of food by observing the eating behaviours modelled by others, as shown in a research conducted by Young EM at the Department of Nutrition, University of Tennes-see, USA, that children begin to consume fruits, vegetables, and milk more after they see adults consuming these foods (Young, Fors, & Hayes, 2004).

According to Birch (1980), children's preferences of vegetables depend on preferences of their peers. Their choices increase in favour of vegetables if they see their peers make that choice. Earlier, children who did not select any vegetables during school lunches, after observing a peer model consumption of it began to select more vegetables, even where there was an

alternative of highly preferred food. Children who were not influenced by a peer model had no change in their behaviour (Birch, 1980). Food preferences develop during the period of early childhood and it is at this time that eating habits developed are saved towards adulthood. Promoting healthy food habits in the childhood therefore can prevent health conditions at the stage of adulthood which can support the reduction of future healthcare costs. In order to achieve proper healthcare status, some guidance are in place to make food choices easier for children (Birch, 1980).

There are different internal and external factors, which have an influence on the formation of individual's food habits. It is, however, noteworthy that these habits cultivated over a period of time are not the same with food preferences, that is, people do not always eat only what they like. This is because, for instance, children will eat whatever they prefer, and consequently tend to refuse foods they do not like. (Birch, 1998).

**Nutrient Needs of Children**

'We are what we eat' is a statement frequently used to express the view that the composition of our bodies is dependent to some extent on what is eaten. Latham (1997) states that, "many factors determine an individual's need for nutrient, including body size, rate of growth, physical activity, basal energy and expenditure". Whitner and Rolfes (2002) note that, childhood is the opportune period to shape good nutritional habits, which are often acquired primarily from parents and other care givers.

Children need dozens of nutrients that function collectively to encourage growth and development (Whitner & Rolfes, 2002). The nutrients needed by children can be grouped under two broad headings: macro and

micro nutrients (Whitner & Rolfes, 2002). Macronutrients constitute the majority of an individual's diet, which supplies energy, essential nutrients that are needed for growth, maintenance and activity. Macronutrients such as protein, carbohydrates, fats and oils are used interchangeably as sources of energy with fats and oils often yielding nine calories per gram, with protein and carbohydrate each yielding four calories per gram (Whitner & Rolfes, 2002). Merch (1999), notes that vitamins and trace minerals are labelled as micronutrients because the body only requires them in very small amounts.

**Types of Nutrients (Macronutrients)**

Nutrients constitute the majority of an individual's diet which supplies energy, and the essential nutrients that are needed for growth, maintenance and activity. These nutrients include protein, carbohydrate, fats and oils, and water.

**Proteins**

Protein, as noted by Schucler (1982), is chiefly composed of large combination of amino acids containing the elements carbon, hydrogen, nitrogen and oxygen and is the major source of building materials for muscles, bones, hair, nails and internal organs. Once ingested, protein is broken down into amino acids. Currently, there are 22 amino acids that have been identified as vital for growth, development and maintenance of health. Of the 22 amino acids, nine are essential and therefore must be derived from food sources, while the remaining 13 are non-essential and can be synthesized by the body and are therefore referred to as non-essential amino acids.

In Burton and Foster's (2000) submissions, protein can also be further classified as either complete or incomplete. Complete protein sources such as

meat, poultry, fish, eggs, milk and cheese contain all of the nine essential amino acids, while sources such as nuts and legumes do not have all the essential amino acids and are therefore considered incomplete. According to Salen and Ore (1990), proteins provide calories but also serve a more important and complex function, therefore an adequate intake of protein is essential if normal growth is to occur. Bonnie and Sue (1996), also add that protein needs of children include those for maintenance of tissue, changes in body composition and synthesis of new tissues. Bonnie and Sue estimate that protein needs for growth range from 1-4g/kg of tissue to be gained. Toddlers (one and two years old) still have a lower growth rate, averaging from 1-2kg each year. As a result of this significant slowdown in growth, their protein needs for growth decreases as the rate of growth declines. According to Burton and Foster (2000), as children grow older and accept table food, they receive additional foods that provide high quality protein.

**Carbohydrates**

Carbohydrates are composed of carbon, hydrogen and oxygen and constitute the main source of energy for all body functions, particularly brain functions (Eppright, 1997). In Davies' (1999) opinion, carbohydrates are the easiest form of food for the body to be converted into energy. Once ingested, carbohydrates are turned into glucose in the bloodstream and later into glycogen which is stored in the liver and muscle for later use.

Carbohydrates are chiefly divided into three different chemical classes, monosaccharides, disaccharides and polysaccharides. Monosaccharides are the single sugars, otherwise referred to as simple carbohydrates. Disaccharides are double sugars and are also referred to as simple carbohydrates.

Polysaccharides are multiple sugars, otherwise referred to as complex carbohydrates. Simple carbohydrates (monosaccharide and disaccharides), like those found in fruits, break down very rapidly in the body, making them a good sources of quick energy. Complex carbohydrates (polysaccharides) like those found in rice, potatoes and pasta, take longer to break down in the body, and provide a more even distribution of energy over a longer period of time.

According to Martin and Kern (1992), carbohydrates are the principal sources of dietary energy and act as protein "sparers", so that protein can be used for its primary functions. Pipes and Trahms (1993), also assert that carbohydrates supply between 40 % to 50% of the energy consumed by most infants, which makes complex carbohydrates the most important dietary carbohydrate sources.

Davies (2002) argues that foods such as candies, cookies and potato chips, for example, provide primarily calories, whereas cereals and grains are important sources of the B vitamins as well as carbohydrates. Careful attention to the nutrients carried by the carbohydrate containing foods is, therefore, important in planning diets of children. Indiscriminate consumption of candies, cookies, carbonated beverages and other sweetened drinks dulls the appetite for nutrient-rich foods, contributes to overweight, dental caries and general poor nourishment in infants and young children and should be discouraged.

**Fats and Oils**

Fats and oils, like carbohydrates, are composed of carbon, hydrogen and oxygen. However, in fats, the elements are connected together differently than in carbohydrates. Fats can be found in both plants and animals, and are

insoluble in water (Engle & Ricciuti, 1995). Fats provide three primary functions: as the major source of stored energy for the body, a cushion to protect the major internal organs and an insulator, for preserving body heat, and protecting against excessive cold. Wardlaw (2000), explains that once ingested, fats are broken down into fatty acids and glycerol and are divided into different categories. These are simple fats (triglycerides), compound fats (phospholipids, glucolipids and lipoproteins) and derived fats (cholesterol).

According to Burton and Foster (2000), fats are used by the liver to manufacture cholesterol. Cholesterol is a member of lipids called sterols and is found only in animal tissues. Cholesterol is important in that it acts as a precursor for the synthesis of various steroid hormones in the body. However, King and Burges (1995), substantiate that polyunsaturated fats can lower both low density lipoprotein cholesterol (LDL, bad cholesterol), as well as lowering high density lipoprotein cholesterol (HDL, good cholesterol). Burton and Foster (2000), further state that polyunsaturated fats can be found in foods like almonds, peanut, sunflower oil, corn oil, fish, mayonnaise, soybean, oil, walnuts and most margarine.

Unsaturated fats, on the other hand, can lower LDL without affecting ones HDL making them the healthiest of possible fat sources in the diet. Unsaturated fats can also be found in foods such as pear, cashew, olive oil, and groundnut oil. According to Worthington-Robert and Williams (1996), fats supply between 40 and 50% of the energy consumed in infancy and approximately 40% of the energy consumed after infancy. Fats are calorically concentrated and, therefore, may be very important in the diet of children who are lean and physically active and have small appetites, or in the diet of

children with oral motor problems who can consume only a limited volume of food. Worthington-Robert and Williams (996), also state that chunky passive children should limit the quantity of fat consumed to keep away from gaining weight too rapidly.

**Water**

Even more essential to the body than food is water. Water functions as an essential component of body structure and as a solvent for minerals and other physiologically important compound. It transports nutrients to and from the cell and helps to regulate body temperature (Barnes, 1992). Wardlaw, Insel and Slyer (1994), state that fluid in liquids and foods consumed are the primary sources of water. In addition, metabolic water is created from the metabolism of proteins, fats and carbohydrates.

**Micronutrients (Minerals and Vitamins)**

Micronutrients according to UNICEF (2006), are nutrients/minerals that are required by humans and other living organisms throughout life in small quantities to orchestrate a whole range of physiological functions, but which the organism itself cannot produce. Although minerals contribute only 3-4 % of the body's weight, they play important roles in the regulation of body fluids, acid-base balance and metabolic processes (Pipes & Trahms, 1993). Williams (1999), states that minerals are grouped into macro (major) and micro (trace) minerals. He explains that minerals are classified as macro minerals if the CDA is greater than 100mg per day. Examples include calcium, phosphorus, magnesium, sodium chloride, potassium and sulphur. On the other hand micro minerals are those needed in quantities less than 100mg per

day. Examples are iron, iodine, copper, manganese, fluoride, cobalt, nickle, zinc, chromium and selenium.

**Vitamins**

King and Burges (1995), describe vitamins as chemical compounds that the body needs in small amounts to help it function properly. Because vitamins functions in metabolic processes, the amounts required are determined by intakes of energy, proteins and fats. Vitamins are essential for our bodies to function properly, for growth, energy and for general well-being. Vitamins may be grouped under two broad headings: fat soluble vitamins and water soluble vitamins.

Fat-soluble vitamins**:** According to Taylor (2000), the four fat-soluble vitamins are A, D, E, and K. In his view, because fat-soluble vitamins are soluble in fat and not in water, dietary sources should include foods that have some fat content. The body may contain appreciable stores of each fat-soluble vitamin and may also manufacture several of them so deficiencies are relatively rare in industrialized societies. Taylor (2000) also ascertains that excessive intake may be toxic with the exception of vitamin E.

According to Williams (1999), the human body is capable of forming retinol (vitamin A) from provitamins known as carotenoids, primarily, beta-carotene. Williams (1999) goes on to say that, vitamin A is essential for the maintenance of the epithelial cells, covering the outside of the body. It is also essential for proper visual function, such as night vision and peripheral vision. Beta-carotene may function as an antioxidant and has been theorized to confer some health benefits.

Preformed retinol is most abundant in fish and fish liver oils, whole and fortified milk and in eggs. Active carotenoids are present in dark leafy green vegetables and yellow-orange as well as fruits such as oranges, limes, pineapples. Foods fortified with vitamin A, such as milk and margarine, are also reasonable sources. Williams (1999), notes that inadequate intake of vitamin A could have serious health implications if prolonged. The gradual loss of night vision tends to be one of the first symptoms of mild deficiencies, and include increases susceptibility to infection and skin lesions (Williams, 1999). Vitamin A supplementation may decrease these deficiencies, possibly by strengthening the immune system.

According to Williams (1999), the physiologically active form of vitamin D is calcitriol, which is the hormone of this vitamin. The ultraviolet rays from sunshine converts a compound found in the skin into cholecalciferol (vitamin D3), a pro-hormone, which is released into the blood and is eventually converted by the liver and kidneys into the active hormone, calcitriol. King and Burges (1995), state that vitamin D plays a central role in bone metabolism through its effects on calcium and phosphorus. It is also involved in the development of the skin and has been used in the treatment of psoriasis, a chronic skin disorder. Children can meet their vitamin D requirement from skin exposure to sunlight. However, they can obtain some amount of the vitamin from eggs, butter, and fortified margarine, fish liver oils, tuna, and salmon. Deficiencies may occur in individuals who have little exposure to sunshine and may lead to inadequate calcium metabolism and bone deformities known as rickets especially in children (Townsend, 1998).

Vitamin E is a fat-soluble vitamin. Vitamin E physiological activity is derived from a number of different tecopherols and tocotricnols found in the diet, alpha-tocopherol being the most active (Williams, 1999). Though the total function of vitamin E in human nutrition is unclear, its principal role is to serve as an antioxidant. It also helps to prevent the oxidation of unsaturated fatty acids in cell membrane phospholipids and thereby protects the cell from damage.

Vitamin E is found primarily in small fat content in various vegetables, margarine, and fortified ready-to-eat cereals, whole grain products, wheat germ oil and eggs. Moderate to small amounts are found in meat, dairy products, fruits, vegetables and particularly sweet potatoes and dark-green leafy vegetables (Townsend, 1998). If adequate supply is not provided, a deficiency characterized by haemolytic anaemia will occur (Williams, 1999).

According to Williams (1999), vitamin K is a fat-soluble vitamin. It is often called the blood coagulation vitamin or anti-hemorrhage vitamin. Williams adds that, vitamin K is needed for the formation of four compounds that are essential in two steps of the blood-clotting process. In addition, vitamin K appears to enhance the function of osteocalcin, a protein that plays an important role in strengthening bones in children. Townsend (1998), indicates that vitamin K is found in a variety of plants and animal foods. Good plant sources include green leafy vegetables, such as peas, broccoli, and spinach, while meats and milk contain lower amounts. Vitamin K (menoquinone) is also formed in the intestine by bacteria, so a deficiency is unlikely.

Water-soluble vitamins: Water soluble vitamins are vitamins that are able to dissolve in water and are not stored in the body. Because they are not stored in the body, they must be replenished on daily basis. Once water soluble vitamins are ingested, they are first absorbed by the intestinal tract which promptly passes them directly to the blood, which then takes them to the cellular tissues and other areas where they are needed. The body rids off any excess through urine every day.

Pipes and Trahms (1993) and Kings and Burges (1995), are of the view that thiamin requirement of infants are sparse, although it is known to support the body to burn nutrients in order to release energy. Thiamin is abundant in whole-grain, pork, lean meat, liver, legumes and nuts. Enriched bread and cereal products are also reasonable source of this nutrient. Inadequate intake of these food sources may result in beriberi.

Signs of riboflavin deficiency are unusual, however very low riboflavin intake may interfere with growth (Pipes and Trahms,1993). Like thiamin, riboflavin also helps the body to burn nutrients to release energy and children who lack this may have cracked lips, sores at the corners of their mouth and a rough skin. Riboflavin is found abundantly in dairy products, meats, poultry, fish, enriched green products, green-leafy vegetables and beans (Townsend, 1998).

The fact that tryptophan is converted to niacin makes basic requirement for niacin to be determined. Little is known about the Nutritional Equipment requirement of infants and children. Meat contains both niacin and tryptophan and it is a good source of the nutrient. In general, protein is about

one percent tryptophan. Lack of niacin in children will result in pellagra (Townsend, 1998).

For older children, folate needs are extrapolated from those of infants as it helps the body to grow and to make healthy red blood cells. The body stores only a little folate in the liver. Unlike iron, folate cannot be reused when a red cell dies. So a person needs to eat folates nearly every day (King & Burges, 1995). According to Williams (1999), almost all foods contain some folate, but the foods which contain most are liver and kidney, fresh vegetables particularly dark green leaves, fish, beans, groundnuts, maize and other cereals. Much folate is destroyed when foods are stored or cooked for a long time.

According to Williams (1999), an intake of 10 mg/day of vitamin C is adequate to prevent and cure scurvy in children. It does not, however, provide for acceptable reserves. In relation to body weight, the vitamin C requirement of older children is higher than that of adults, thus, the recommendation increases over time. King and Burges (1995), contend that vitamin C helps the body to use calcium and other nutrients to build bones and blood vessels. Vitamin C helps the body to absorb non-haem iron and finally helps to destroy free radicals. Fruits and vegetables are the primary sources of vitamin C.

**Magnesium**

To Martin and Kern (1992), approximately 50% of the body's magnesium is deposited with calcium and phosphorus in bones, 25% is in muscles, and the remainder is found in soft tissues. Williams (1999), points out that magnesium is generally needed to help in bone metabolism to prevent bone fragility; this helps to regulate the synthesis of protein and other

compounds which may be essential for optimal oxygen metabolism; and helps to block some of the actions of calcium in the body, such as contraction in both the skeletal and smooth muscles. Williams (1999), listed the food sources of magnesium as nuts, seafood, green leafy vegetables, fruits and vegetables, whole grain-products, and human and cow's milk.

**Calcium/Phosphorus**

Calcium is the most abundant mineral in the body representing about two percent of the body weight whereas phosphorus is the second most abundant mineral element in the body after calcium (Martin & Kern, 1992). Children may need two to four times as much calcium or phosphorus than adults since they are growing; thus 600 mg/day is recommended for the last half of the first year and 800 mg/day for one to ten years of age. Davies (1999) and Argon (2006), argued that children need calcium and phosphorus for growth of bones and teeth.

Milk and dairy products, cheese, yoghurt, ice cream, egg yolk, dried beans and peas, dark green leafy vegetables and cauliflower are the richest sources of calcium. Other good sources are fish with small bones such as sardines and canned salmon (Williams, 1999). Phosphorus is found in combination with calcium in dairy products but also occur most in protein rich foods such as meat, eggs, nuts, legumes grains. Lack of calcium and phosphorus could result in poor formation of teeth and bones, osteoporosis and rickets in children (Williams, 1999).

**Trace Minerals**

According to Martin and Kern (1992), trace minerals such as sodium chloride, potassium, iron, copper, zinc, iodine, fluoride, manganese and sulphur are also essential mineral elements needed in the diet of children. Trace minerals are needed for the following functions: haemoglobin and myoglobin formation, building new tissues especially red blood cells, protein synthesis and immune function and sensation of taste and smell. Trace minerals also help in the formation of thyroid hormones, development and functions of the brain and nervous system, bone formation and for fat synthesis. Martin and Kern state the following foods as rich sources of trace elements: liver, meat, fish, shell fish, poultry, eggs, oysters, dried beans and peas, whole grain product, green leafy vegetables, nuts, iodized salt and drinking water.

**Measurement of Malnutrition Status in Children under age five**

Globally, malnutrition plays a role in the deaths of about 16,000 young children every day, with almost all of them in the developing world; that is a yearly death toll of about six million children (de Onis et al., 2004; Awatef et al., 2011). This often happens as a result of weak resistance to infections and diseases that make malnutrition a contributor to more than half of the deaths of children under five worldwide (de Onis et al., 2004; Awatef et al., 2011). Malnutrition has, therefore, been argued as a persistent problem for young children in sub-Sahara Africa, with a high percentage of children not able to reach the normal international standard height-for-age; in other words known as being stunted (Nti, & Lartey, 2008).

Malnutrition is among the major public health problems affecting children, especially those below age five in third world nations (Singh, Ranjana, Laksgminarayana, & Anand, 2006; WHO Multicentre Growth Reference Study Group, 2006). Malnutrition can be described as over nutrition or under nutrition (Blössner, & de Onis, 2005). Under nutrition is defined as the outcome of insufficient food intake (hunger) and repeated infectious diseases UNICEF (2006). Undernutrition includes being underweight for one's age, too short for one's age (stunted), dangerously thin (wasted), and deficient in vitamins and minerals (micronutrient malnutrition). When individuals are undernourished, they can no longer maintain natural body capacities, such as growth, resisting infections and recovering from disease, learning and physical work, and pregnancy and lactation in women. Poor feeding of infants and young children, especially the lack of optimal breastfeeding and responsive complementary feeding, along with such illnesses as diarrhoea, pneumonia, malaria and HIV/AIDS, often exacerbated by helminths, are major causes of under nutrition UNICEF (2006).

Over nutrition is frequent or habitual overconsumption of nutrients by eating too much food to the point that it becomes dangerous to an individual's health. Nutrients are all compounds necessary for bodily function, including minerals, vitamins, fats, carbohydrates and proteins. Although most nutrients can be harmful in excess, the danger of over nutrition relates mostly to carbohydrates and fats. Overeating differs conceptually from over nutrition, although they are essentially the same thing in action; whereas overeating is a compulsion considered a psychological disorder, over nutrition is volitionally

choosing to eat more food than you need, even if you do not realize it (Parks, 2017).

Under nutrition is the opposite of over nutrition, meaning that it is a nutrient deficiency from not eating enough food. The term malnutrition refers to both under nutrition and over nutrition. Under nutrition usually affects the balance of all the nutrients in your body. Nonetheless, problems relating to a deficiency in carbohydrates and fats will manifest first and most acutely. Initially, the body starts using its glycogen or sugar reserves, stored water and body protein. Then the body consumes stored fatty acids and lean muscle, which result in a dramatic decrease in body weight. Short-term under nutrition is often possible if one inexplicably lose at least 10 % of body weight over three to six months.

Under nutrition is a form of malnutrition which is a condition resulting from not consuming enough nutrients. However, it is not synonymous with under eating. It can occur despite overeating. This is because proper nutrition requires a balance of all nutrients not present in all foods; this means that the body requires a balance of many different foods. Even in the case of over nutrition, when you may be eating too much food, you can still develop a deficiency in certain nutrients if you fail to consume the proper variety of foods. In this way, you can be both over nourished and malnourished. Other causes of malnutrition unrelated to the amount of food you eat include digestion or absorption problems and certain medical conditions.

Malnutrition is known to be a state of imbalance in energy or specific nutrients such as protein, iodine, vitamin A or iron but it is also synonymous with protein-energy malnutrition, which signifies an imbalance between the

supply of protein and energy and the body's demand for them to ensure optimal growth and function (WHO, 2004; Blössner, & de Onis, 2005). This imbalance includes both inadequate and excessive energy intake. The inadequate intake of energy normally leads to under nutrition, in the form of wasting, stunting and underweight. The excess energy intake on the other hand, results in overweight and/or obesity (over nutrition) (de Onis, & Blössner, 1997; Singh, et al., 2006).

Wasting, measured as the weight-for-height, and its prevalence is defined as the proportion of under-five falling below minus 2 and/or minus 3 standard deviations from the median weight-for-height of the WHO/National Centre for Health Statistics NCHS (2004). Also, stunting is measured as the height-for-age and its prevalence; is defined as the proportion of children under-five that falls below minus 2 and/or minus 3 standard deviations from the median height-for-age of the WHO/NCHS. Underweight is measured as weight-for-age and its prevalence is defined as the proportion of children under-five years below minus 2 and minus 3 standard deviations from the median weight-for-age of the WHO/NCHS (de Onis et al., 2006; WHO Multicentre Growth Reference Study Group, 2006).

Nutritional deficiency resulting from either inadequate energy (caloric) or protein intake manifests in either marasmus or kwashiorkor, wasting, stunting and underweight (WHO, 2004; Blössner, & de Onis, 2005). Marasmus is characterized by wasting of body tissues, particularly muscles and subcutaneous fat, usually as a result of severe restrictions in energy intake. Kwashiorkor, on the other hand, affects mainly children, and often characterized by oedema, generally as a result of severe restrictions in protein

intake. However, marasmus and kwashiorkor can be present simultaneously, which gives rise to marasmic-kwashiokor that shows in the presence of oedema. Malnutrition is often a synergistic factor underlying deaths in children in many developing countries but can also directly result in death

Most authors (de Onis, & Blössner, 1997; WHO/UNICEF, 2003; WHO, 2004; de Onis, et al., 2006), suggested that the use of anthropometric data (height, weight, fat fold at triceps [FFT], BMI and upper arm circumference) is one of the most appropriate methods of estimating childhood malnutrition. According to WHO (2004), the 'gold standard' in anthropometric assessment of children is weight-for-length/height, with the usual practice being to measure the length of children under 2 years of age and the height of older children (Blössner, & de Onis, 2005).

National estimates of the burden of malnutrition, including estimates for child malnutrition, provide vital information on preventable ill-health, and indicate the health gains possible from interventions to prevent the risk factor. The results also allow policy-makers to direct resources to the most vulnerable segments of the population, and thus make better use of resources. Methods for estimating the burden of malnutrition associated with poverty are outlined in the tenth volume of the Emotional and Behavioural Disorder series (Blakely, Hales & Woodward, 2004). To illustrate how to calculate the national burden of malnutrition, there is a step-by-step numerical example for child malnutrition in Nepal (WHO, 2004). The disease burden is estimated in terms of the mortality and morbidity associated with the principal causes of child death, such as, diarrhoea, acute respiratory infections, measles, malaria,

and perinatal risk factors; and with protein-energy malnutrition as a direct cause of death, and mortality associated with other infectious diseases.

**Food Choice and Meal Patterns**

**Food Choice**

While school-food service personnel attempt to provide healthful meals and food choices, children do not always eat the food they receive. Brigges (1994), states that food pattern in United States show distinctive cultural characteristics that change as life style changes. A study carried out by Plum (1994), on the nutritional needs of preschool children revealed that, a child's food choices are largely determined by the family environment and other community or external factors.

The dietary patterns of children are determined by social, psychological, and economic factors. Plum (1994), further explained that, toddlers and pre-schoolers spend more time eating at home than they do in school. Their food choices and food preferences are, thus, largely dependent on what their parents and caregivers provide. When children are young, their parents and families have greater control over what they eat. As they get older, however, what their friends eat in the school environment and what is available to them in school and elsewhere, will have an impact on what they eat (Brigges, 1994).

To Plum (1994), at the beginning of the twenty-first century, more families were headed by single parents than ever before, and a greater number of two-parent families have both parents in the workforce. As a result, toddlers and pre-schoolers often have to depend on their schools to feed them. If they are eligible for the School Breakfast Programme (SBP) and National School

Lunch Programme (NSLP) at school, they can have free or reduced-priced breakfasts and lunches. Even so, there is no guarantee that they will eat what they are given. Burton and Foster (2000), are also of the view that what children eat at school is dependent on many factors, including the dinning environment, peer pressure, administrative support, teacher participation, cafeteria staff and the quality of food choices offered. According to Brigges (1994), children accept simple unmixed dishes more willingly than casseroles and prefer most of their food at room temperature, neither hot nor cold. This makes food preparation important as children eat more easily those foods which they are familiar with. Some portions of new foods can be introduced with familiar foods in feeding them. According to Eppright (1997), dried foods are especially hard for preschool children to eat. Therefore, in planning menu the following must be considered:

1. Always balance dry food with one or two moist foods.
2. Combine sharp rather than acid flavoured foods.
3. Include colourful foods such as red tomatoes, green pepper and carrot sticks in their meals.

**Meal Pattern**

It has been noted that a generation of nibblers are being raised. Anliker, Cowart and Lawless (1991), state that nearly 60% of three to five year old children eat more than three times a day. They go on to say those young children consume food on an average of five to seven times a day, although from two to 14 times a day have been noted. Brigges (1994), is also of the view that the frequency of food intake was unrelated to nutrient intakes except when children consumed food less than four or more than six times a

day. Children who consumed food less than four times a day consumed fewer calories and less calcium, protein, ascorbic acid, iron, than average intakes of other children. Those who consumed food more than six times a day consumed more energy, calcium and ascorbic acid than the average intake of children. He added that, snacks have been noted to provide one-fourth to one-third of the total calories, over one-third of the total sucrose, one-fifth of the total calcium and ascorbic acid and one-fifth of the protein ingested by children.

Wardlaw, Insel and Syler (1996), also agree to the fact that proper child nutrition should usually include eating three meals a day and two nutritious snacks, limiting high-sugar and high-fat foods, eating fruits, vegetables, lean meats and low-fat dairy products, including three servings of milk, cheese or yogurt to meet preschool children's calcium needs. These healthy practices can also prevent many medical problems, including becoming overweight, developing weak bones and developing diabetes. It also ensures that preschool children physically grow to their full potential.

**The Prevalence of Malnutrition among Children**

The prevalence of underweight was projected to decline from 26.5% in 1990 in 17.6%in 2015, a change of -34% worldwide (de Onis et al., 2006; 2004) In developed countries, the prevalence was estimated to dwindle from 1.6% to 0.9%, with a change of -41%. In developing regions in total, the prevalence of underweight in Africa was forecasted to increase from 24.0% to 26.8% a change of plus 12%.

Meanwhile, the prevalence was estimated to decrease from 35.1% to 18.5%, a change of -47% in Asia. In addition, the number of underweight

children was projected to decline from 163.8 million in 1990 to113.4 million in 2015, resulting in a change of -31% globally (de Onis et al., 2004). Numbers are projected to decrease in all sub-regions of sub-Saharan, Eastern, Middle and Western Africa, which are expected to experience substantial increases in the number of underweight children (de Onis, et al., 2006).

The Ghana Health Service (GHS) has reported an increasing trend of malnutrition over the past five years. According to the health agency's annual report, 2006, the malnutrition trends in children 0-11, 12–23 and 24–59 months have shown an increase over the period 2003-2006 (Nti, & Lartey, 2007). The trend is high in mostly the three northern regions of Ghana: northern, upper East and upper west. Ashanti region, recorded a low malnutrition rate among the 0-11 and 24–59 months groups. These were 1.8% and 2.3%, respectively. The region recorded 3.3% among the 12–23 months age group. (de Onis, et al., 2006).

According to UNICEF (2008), stunting or low height-for-age is caused by long-term insufficient nutrient intake and frequent infections. This generally occurs before age two and its effects are largely irreversible. These effects include delayed motor development, impaired cognitive function and poor school performance. Nearly one third of children under five in the developing world are stunted yet there are certain countries where the prevalence exceeds this estimation. A study conducted in Malawi revealed that stunting prevalence was 50% (UNICEF, 2008).

In Ghana, the rates of children under five years are moderately and severely stunted to 22.4% and 7.4%, respectively (UNICEF, 2008). Stunting begins at birth and continues through 40 months but after 24 months it cannot

be reversed (WHO, 2006). In Botswana, stunting prevalence was 38.7% (Mahgoub, & Bandeke, 2005). A study conducted in the Manya Krobo a district in the Eastern region, in Ghana, revealed that 20% of the children below 5 years of age were stunted (Nti, & Lartey, 2007).

Wasting or low weight-for-height is another strong predictor of mortality among children under five. It is usually the result of acute significant food shortage and/or diseases. Wasting proportion of under-five falls below minus 2 and minus 3 standard deviations from the median weight-for-height of the WHO/NCHS. There are 24 developing countries with wasting rates of 10 per cent or more, indicating a serious problem urgently requiring a response (UNICEF, 2008).

Underweight or weight-for-age prevalence is usually the proportion of less than five falling below minus 2 standard deviations (This is termed as moderate underweight) and 3 standard deviations (severe underweight) from the median weight-for-age of the WHO/NCHS (UNICEF, 2008). Underweight is reversible and it reflects either acute or chronic malnutrition. This implies that weight gain can be adequate even while the process of stunting continues. Usually weight faltering concentrates between 3 and 12 months. However, after 12 months the child can be stunted and underweight but his/her weight-for-height ratio can improve (WHO, 2006). On the average, children in the rural areas are twice as likely to be underweight as those in the urban areas (UNICEF, 2008). The prevalence of underweight in Ghana:11.5% and 21.4% for rural and urban, respectively is a confirmation. Besides, boys and girls usually have similar prevalence rates. In Ghana, the prevalence is 18.3% and 17.1% for boys and girls, respectively (UNICEF, 2008). However, in

Botswana, malnutrition is significantly higher among boys than girls (Mahgoub, & Pandex 2006).

In Bangladesh and other developing countries such as India, the prevalence of underweight is 48% and 45.5%, respectively (Anon, 2006). Again, severe degree of malnutrition is high in children under two years. This is confirmed by a study done in India where the proportions of underweight (65.5%) and stunting (81.8%) were found maximum among children aged 13-24 months (Ray et al 2001). A study done in Aydin province of Turkey showed that the prevalence of malnutrition in children under five years was found as 10.9% for stunting, 4.8% for underweight and 8.2% for wasted (Ergin, Okyay, Atasoylu, & Beser 2007).

**Factors Associated With Malnutrition in Children under Five**

In exploring the complex web of causes for child under nutrition, the observation that 'not all poor children are malnourished' has led to investigations of other factors such as the level of family income, cost and access to food, mother's educational level, birth interval, breast feeding practices, family size, and immunization of the children (Mason, Barabasi, & Oltvai 2001; Blössner, & de Onis, 2005; WHO, 2005) as factors affecting the nutritional status of children under five years.

According to Lipton and De-Kadt (1998), a World Food Programme (WFP) survey conducted in 1987 in Ghana shows significant correlation among three indicators of malnutrition and a number of variables relating to income, food supply, environment, social and health status. A high socio-economic standing of a house-hold will determine the nutritional status of a child. The level of income is by far the greatest single cause of variability in food intake although

income is not the only measure of poverty. Many other social and environmental factors contribute to malnutrition and are closely linked to the poverty levels of individuals and countries.

A low socio-economic status has adverse effects on the food security, access to health care, environmental sanitation and personal hygiene (Sarmistha, 1998; WHO, 1999). In developing countries income from home-produced food and payment received in kind are generally more important than cash income in the determination of food availability in a household in a rural community, although food availability is determined primarily by cash income. De Boer (2000), also stated that meals in most northern communities (Northern, Upper East and Upper West) are known to be either monotonous with hardly any variety or are low in terms of protein and micronutrient contents. The nutritional status of a person therefore depends largely on the quantity and quality of food available on the market, purchasing power of the household that would determine the accessibility to food and the distribution of food within the household.

Although food intake influences the nutritional status of an individual to a great extent, it is not the only critical factor responsible for malnutrition particularly in the case of children under five years of age. Living standards, birth weight, birth interval, sex of child, weaning practices and mothers certification are also important contributory factors which have been identified from research stages carried out on the subject in the recent past, However, dietary inadequacy is certainly the basic cause of malnutrition among children and many of the above identified factors directly or indirectly contribute to the

incidence of malnutrition (Black, Allen, Bhutta, de Onis, Mathers, & Rivera 2008).

Ramli, Agho, Inder, Bowe, Jacobs, & Debley (2009), found that the odds for stunted children aged 0-23 months was 26% lower in families that provided at least three meals per day relative to families which cannot. In addition, children aged 0-59 and 0-23 months from families in the least poor or middle household wealth indices category have reduced the odd of being stunted and severely stunted compared to those of the poorest families. Moreover, Abuya, Ciera, and Kimani-Murage (2012), observed that, residing in slum is associated with low socio-economic status and can significantly determine a child's nutrition status. Low socio-economic status and slum life are predisposing factors relevant in determining children's nutritional status.

**Level of income and malnutrition status among children under five years.**

The amount of money the father or the mother makes at the end of every month determines the food available for children, access to quality health services and the quality decline environments in which the children live and grow (WHO, 2005; Hayward, Viros, Trunzer, Bollag, Spleiss, & Chapman 2012). Most studies found a significant association between amounts of money a family earns a month and the nutritional status oftheir children particularly, those below age five (Mukherjee, Caturvedi & Bhalwar, 2008; Meshramet, Arlappa, Balakrishna, Laxmaiah. Mallikajum, Reddy, Ravindranath, Kumar, & Brahmam, 2012). Meshramet et al, 2012 found that families belonging to lower and missal household's wealth indexes are relatively 1.4 times higher than children with stunting conditions. Mukherjee, Chaturvedi, Bhalwar (2012), also found that maternal socio economic status

was an important determinant of nutritional status of their children. The authors observed that others of the low socio-economic bracket were 2. -2.6 times more likely to have their under five children under weight than those mothers of the middle and high socio-economic status.

Malnutrition is often seen in children whose parents are poor and thus, are unable to consume enough protein or energy given foods (Van de Poel, Hosseinpoor, Jehu-Appiah, Vega, & Speybroeck, 2007). Poverty is considered the main underlying cause of malnutrition and its determinants in children (Maia et a., 2008). Others also argued that children born to parents in the low socio-economic group are largely malnourished as compared to those with children of the same age group born to parents in the high socio economic background (Muller & Krawinkel, 2005: Odunayo & Oyewole, 2006). The low socio-economic families normally lack the high formal education and food for essential health. Reyes, Perez-Cuevas, Sandovall, Castillo, Santos, Doubova, & Gutierrez (2004), found that, in the rural areas, a greater risk of stunting was associated with father's occupation exampled by peasant farmers. It was contended that children born to male fathers in the rural areas are of higher times more likely to grow stunted than children born to workers of the civil service. The underlying reason is that, fathers are mostly the bread winners of the family in the most situations.

Moreover, such farming activities are on peasant basis with harvest not sufficient enough to feed families with adequate amount of food (Ghana Statistical Service, Noguchi Memorial Institute for Medical Research and ORC macro, 2004)

Addressing problems of household income status is thus suggested to be a means to curbing the problem of stunting and underweight among under five children (Zere, & McIntyre, 2003). Zere and McIntyre found the rate of stunting to be the highest followed by underweight among the children in South Africa. The rate of stunting was significantly higher in male children (26.8 vs. 22.2 percent; $\chi 2 = 10.6$, $p = 0.001$). Their findings also revealed that while stunting and underweight were responsive to improvements in the socio-economic status of the household, wasting did not appear to be sensitive. Additionally, the rates of stunting and low weight-for-age tend to be the highest among the African population group. Wasting which is a manifestation of acute and short-lived malnutrition, however, did not exhibit significant socio-economic differentials.

It is noted that income-related inequalities are the strongest in stunting (an indicator of chronic malnutrition that is often associated with socio-economic deprivation). The poorest bear the heaviest burden of stunting and underweight. It is further observed that although the rates of stunting and underweight are highest among African children, the pro-rich concentration indices are more pronounced for Coloured children. Stunting and underweight concentration indices for White children do not manifest statistically significant socio-economic inequalities.

According to Thomas, Strauss, and Henriques (1990), family income has significant positive correlation on child survival. Their study to investigate the impact of household characteristics on child survival, using household survey data from Brazil concluded that child health status depends on the income status of the family. Increases in income at the household and national

levels imply similar rates of reduction in malnutrition (Haddad, Alderman, Appleton, Song, & Yohannes, 2003). Using a nutrition index based on weight-for-age of children in rural India, they revealed that higher per capita current income improves the nutritional status of both boys and girls. He pointed that the impact is higher for boys than that in girls. However, the effect of income is not independent but in association with other factors such as mother's educational level and food availability (Sarmistha, 1998).

**Mothers' level of education and malnutrition status among children under five years**

According to Biswas, and Bose (2010), stunting (a form of under nutrition) is one of the greatest problems still confronting the third world countries in the 21st century. Their study investigated the prevalence of stunting and its predictor(s) among the children in Bengalee, India with a cross-sectional study and a randomly selected sample of 673 preschool children (323 boys and 350 girls), age 1-5 years. They observed a high stunting 39.2% among the children with age and sex combined. The results showed that father and mother educational status (FES and MES) and birth order (BO) were significantly associated with the prevalence of stunting among the girls. With logistic regression analyses, they found that both FES (Wald =19.97) and MES (Wald=13.95) were strong predictors of stunting among the girls. Similarly, their BO (Wald=13.71) was a strong predictor of stunting among the girls. In addition, girls with ≥ 3rd BO had significantly higher risk (OR=2.49, Cl=1.54-4.03) higher than those with ≤ 2nd BO.

Moreover, girls with FES lower than secondary level had significantly (OR=3.30, Cl=1.96-5.58) high rate of stunting than those with FES ≥

secondary level. Likewise, girls with MES lower than secondary level, concluded that parents' educational status and birth order were strong factors associated with stunting among girls but not in boys, especially in the developing countries.

Education provides the opportunity for girls to become more empowered and self-confident as they acquire knowledge, skill, attitudes and values critical for negotiating an equal place in society. Across the developing world, women play vital roles in maintaining household food security, and in caring for children on daily basis, both of which are important factors influencing a Child's nutritional status. Women are highly involved in food production and acquisition, thus boosting food security (Smith, & Haddad, 2000).

Maternal literacy and level of education impact on the human and economic empowerment of women (WHO, 2005), is also supposed to improve the health seeking and child caring practices of the mother. Maternal education and maternal nutritional knowledge are significantly but independently associated with child nutrition outcomes (Webb & Lapping, 2002).

Women's disempowerment as a result of exclusion from education, therefore, results in their limited access and that of their children to basic health services and information. Women's education relative to men's has been found to be strongly associated with child malnutrition in developing countries (Smith et al., 2000). Improvements in female secondary school enrolment rates are estimated to be responsible for 43% of the total of 15.5% reduction in child underweight rates in developing countries during the 1970–1995 periods (WHO, 1992).

Women are naturally the primary caregivers at the beginning of a child's life, carrying out many functions towards the growth of the child. Women are most often the people who feed and bath children, seek health care for the children when they are sick, protect them from exposure to danger, and support their cognitive and social development. Given these roles, women's knowledge and abilities and their own physical well-being and decision-making powers are crucial to children's health (Smith et al., 2000).

Most mothers in general do not have adequate knowledge of the amounts of food that children should eat or should be eating. When the frequency of feeding is low, the quality and amount of meals also tend to be low, so the diet of most children across the country is inadequate in every respect to maintain health and growth (Smith et al., 2000). This report, therefore, finds women's education and status relative to men's to be strongly associated with child malnutrition in developing countries. It is estimated that improvements in female secondary school enrolment rates are responsible for 43% of the total 15.5% reduction in the child underweight rate of developing countries during the period of 1970 to 1995.

In India, it was discovered that they have the largest population of non-school-going working girls. Women and girls receive far less education than men, due to both social norms and fears of violence (Smith et al., 2000).

**Breastfeeding and malnutrition status among under five children**

It has been established that breastfeeding is one of the main determinants of child malnutrition (Brakohiapa, Bille, Quansah, Kishi Yartey, Harrison & Yamamoto, 1988; Briend, & Bari, 1989). Breastfeeding a child for 19 months was found to be associated with malnourished children who visited

a children's hospital in the city of Accra, Ghana (Brakohiapa et al., 1988). The association between breastfeeding, nutritional status and survival was investigated in a cohort of 1087 children aged 12-35 months from rural Bangladesh followed monthly during 2 years. Mean weight-for-age of breastfed children was 69.6% compared to 70.6% for non-breast fed children. Despite this difference in nutritional status, the risk of dying, after adjusting for age, was six times higher in non-breastfed malnourished children than in similarly malnourished breastfed children. The study revealed that breastfeeding beyond one year has positive impact on children's nutritional status. Therefore, breastfeeding should be encouraged in communities with a high prevalence of malnutrition, despite the frequently observed association between prolonged breastfeeding and malnutrition (Briend & Bari 1989).

Nguyen and Kam (2008), concluded that maternal, socio-economic and environment factors such as weight of the child at birth and duration of exclusive breastfeeding were found to be significant factors for malnutrition among children under five. With a structured questionnaire, they aimed to assess the nutritional status and characteristics related to malnutrition in children below five years of age in Nghean, Vietnam. Anthropometric measurement, underweight (weight-for-age), wasting (weight-for-height) and stunting (height-for-age) of the children was determined based on reference data from the National Centre for Health Statistics (NCHS). Hierarchical Logistic regression analysis indicated that the mean Z-scores for weight-for-age, height-for-age and weight-for-height were -1.46 (95% CI=-1.57, -1.35), -1.44 (95% CI=-1.56, -1.32) and -0.71 (95% CI=-0.82, -0.60), respectively. One hundred and ninety three (31.8%), two hundred and sixty nine (44.3%),

with seventy two (11.9%) were underweight, stunting and wasting respectively. Furthermore, the mother's level of education and occupation, household size, number of children in the family, weight at birth and duration of exclusive breastfeeding were found to be significantly related to malnutrition. Exclusive breastfeeding was independently and positively significant to underweight, stunting and wasting.

A similar study (Kumar et al., 2006), concluded that delayed initiation of breast-feeding, and deprivation from colostrum are significant risk factors for under nutrition among under-five children. Kumar et al., (2006), aimed to determine the prevalence of nutritional status of under-five children and to assess whether infant feeding practices are associated with the under nutrition in Anganwari (AW) areas of urban Allahabad. They revealed that 36.4% were underweight (<2SD weight- for-age), 51.6% were stunted (<2SD height- for-age), and 10.6% were wasted (<2SD weight- for-height). Proportions of underweight (45.5%) and stunting (81.8%) were found maximum among children aged 13-24 months. Wasting was most prevalent (18.2%) among children aged 37-48 months. Initiation of breast-feeding after six hours of birth, and deprivation from colostrum were found significant risk factors for underweight. However, wasting was not significantly associated with any infant feeding practices studied.

**Family size and malnutrition status among under five children**

Research have pointed out household structure, comprising family size, resources and care-giving as having effects on child nutritional status and infant mortality. Family size, for instance, tends to influence the use of family resources. The larger family size dilutes family resources more than

smaller family size if the income levels are the same (Heaton, Forste, Hoffmann, & Flake, 2005). Comparisons of nutritional status of children from monogynous households and those from polygynous households revealed that boys have better nutrition in monogamous households 40.8% stunted and 24.5% underweight compared to 62.5% stunted 42.5% underweight in polygynous households. But female stunting does not differ significantly by household type (40.4% monogamous, 42.3% polygynous). Furthermore, girls have better physical status than boys in polygynous households. Additionally, the study found that children in the monogynous households have better nutritional status than their counterparts in the polygynous households (Gillett-Netting, & Perry, 2005).

**Immunization and nutritional status among children under five years**

Immunization or vaccination is known to significantly protect a child from many childhood killer diseases such as measles, respiratory tract infections, whopping cough, poliomyelitis, and cholera among others (Abedi, & Srivastava, 2012; Santosh, Sunil, Ashok & Ragavendraswamy, 2013). According to Abedi and Srivastava, childhood vaccination may protect children's nutritional status and lead to improved child growth in developing countries where most child killer diseases are preventable with vaccination.

Abedi, and Srivastava (2012), observed that of 402 studied children, 176 (43.8%) were fully immunized, 168 (41.8%) and 58 (14.4%) were partially immunized and unimmunized, respectively. The authors observed that fully immunized children had better nutrition status. A typical example was that, immunization status of the children was significantly associated with underweight children. The study indicated that majority of children were

malnourished and most of them were unimmunized. Abedi and Srivastava again discovered that immunization status of children in the urban area was better than those from rural children.

Das and Hossain (2008), in Bangladesh, studied 6005 children aged 12-59 months and noted that those children who did not receive any vaccines, over one-fifth and two-fifths were found severely and moderately undernourished. Furthermore, the proportion of underweight was found significantly higher among partially immunized children (60.0%) than that of fully immunized children (52.0%). Similarly, Ray, Biswas, Gupta, Mukherjee, Kumar Biswas, & Joardar (2000), in Siliguri, India, found a significantly higher prevalence of malnourished children amongst partially immunized and non-immunized children (81.3% and 88.2%) in comparison to fully immunized children (62.1%). This implies that partially and non-immunized children were at higher risk of malnutrition as they were not protected against the vaccine preventable diseases. Sengupta, Nina & Benjamin (2010), observed that underweight, stunting and wasting were significantly higher in the incomplete immunized children than the completely immunized under five children. The implication is that, the protective potentials of immunization cannot be under estimated and must be implemented to the benefits of the children (Sengupta, et al., 2010; Bhavsar, et al., 2012).

Santosh et al. (2013), conducted a study of 600 under five children and it was revealed that 560 (93.3%) had received primary immunization, while 40 (6.7%) children were partially immunized. Accordingly, the prevalence of malnutrition was significantly higher in children who were partially immunized compared to fully immunized ones. With the high prevalence of

underweight (119; 53.6%), stunting (120; 54.1%) and wasting (38; 17.1%), Santosh, et al. (2013), revealed that stunting, wasting and acute respiratory infections were significantly lower in fully vaccinated children than in partially vaccinated ones. Thus, frequent vaccination tends to protect children against infections. Invariably, incomplete vaccination leads to worm infestation, which is also an important predisposing factor for childhood malnutrition

The current study focuses on exploring parent's background characteristics and malnutrition status among children of under five years. It is been anticipated that there will be high degree of malnutrition among the children. And that the condition will be severe as the children grow. More girls are also envisaged to be more malnourished as compared to their counterpart boys. Parents or the caregivers' education, age, level of income, and child breastfeeding and immunization status are also expected to be significant determinants of the children's nutritional status.

**Method of Nutritional Assessment**

Nutritional assessment, according to Baxter (1999), is a structured way to establish nutritional status and energy requirements by objective measurements and completed with objective parameters in relation to specific disease indications where an adequate nutritional treatment can be developed for the patient. Davidson, Passmore, Brocks and Trussewell (1975), observed that nutritional assessment is difficult because there are so many ill-defined grades between the obvious well-nourished and the ill-nourished. In the development of an appropriate design for the Health Nutrition Examination Survey in America, Miller (1973), concludes that the nutritional status is

reflected in a complex of interrelationships of clinical observation, biochemical assessment, and anthropometric measurement, sociological and psychological evaluations of dietary intake pattern.

All dietary assessment must fulfil the specific purpose of the study. Shils and Young (1986), in their submission state that one should make sure that intakes are representative of typical diet over the time period being investigated, provided a reliable, repeatable and representative data are capable of validation and conform to the constraints imposed by respondents, interviewer characteristics and cost. Considering these factors before the beginning of dietary studies saves a great deal of time. There are two possible ways to assess the adequacy of food and nutrition and to detect the presence of inadequacy in food intake among individuals or population. The first measures nutritional intake and the second assess nutritional status.

**Nutritional Intake Assessment**

Measures of nutritional intake estimates the amount of food a person is eating and can be used to assess adequacy of the quantity of dietary supply. In simple terms, one can categorize people as being well-nourished or undernourished based on whether their intake of food matches their food energy needs or nutrient requirements. According to Svedberg (2001), the methodologies that provide such information are those based on national sample surveys or dietary surveys that attempt to measure the food consumption or intake levels of representative individuals within a population. These methods often tend to provide an estimate of the risk of the population or individual to inadequacy of food but do not help to identify actual

individuals in the population who are deficient; nor do they help define the degree of severity of the food inadequacy.

**Nutritional Status Assessment**

The second option assesses the nutritional status of the individual or a representative sample of individuals within a population by measuring anthropometric, biochemical or physiological (functional) characteristics to determine whether the individuals are well nourished or under nourished. This method makes use of objective, measurable criteria that reflect the changes in anthropometric, biochemical or functional characteristics of the individual as a consequence of inadequate intake of food for long periods of time or as a result of seasonal fluctuation in intakes of food or poor absorption and utilization of ingested food. Anthropometry is the most frequently used method to assess the nutritional status of individuals or population groups. Measurements of nutritional anthropometry are based on growth in children and body weight changes in adults.

**Nutritional Anthropometry**

Nutritional anthropometry as defined by Jelliffe (1997), are measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition. Though, as old as the definition may seem to be, it still has relevance to the subject under consideration. Further to his submissions, he intimates that anthropometric measurements are of two types. They are growth and body composition. They have been widely used for the assessment of the nutritional status of both children and adults. The selection of the ideal single or a combined use of anthropometric indicators depends upon the sensitivity and

specificity of the indicator chosen. Sensitivity indices are ideally suited for nutritional status assessment in screening or surveillance activities as they are capable of detecting even small changes that occur in nutritional status during conditions of food inadequacy. Gibson (1990), posits that nutritional anthropometry has several advantages. These are:

1. Methods are precise, accurate and provide standardization
2. Procedures used are simple, safe and non-invasive
3. Equipment required is inexpensive, portable, durable and can be made or purchased locally
4. Relatively unskilled personnel can perform measurement procedures
5. Information is generated on past nutrition
6. Methods can be used to quantify the degree of under nutrition or over nutrition and provide a continuum of assessment from under to over nutrition
7. Methods are suitable for large sample sizes such as representative population samples
8. Methods can be used to monitor and evaluate changes in nutritional status over time.
9. Methods can be adopted to develop screening test in situations such as nutrition emergencies to identify those at high risk.

Notwithstanding these advantages, there are also, however, several limitations. Nutritional anthropometric techniques are prone to measurement and other types of errors, both systematic and random. These errors, according to Gibson (1990), arise out of inadequate and improper training of personnel, difficulties in measurement of certain anthropometric characteristics such as

skin folds and instrumental or technical errors. Researchers in nutrition explain that these errors can be minimized by properly training personnel to use standardized, validated techniques and by frequent calibration of instruments, thus improving the accuracy and precision of the measurement.

In infants and children under five years of age, assessment of growth has been the single most important measurement that best defines their nutritional status (De Onis, Monteiro, Akre & Clugston, 2002). Nube (2001), argue that the disturbances in nutrition as a result of inadequacy of food intake, severe and repeated infections or a combination of both, operating very often as a viscous spiral, invariably affect the growth of a child. These adverse conditions Nube (2001), explains are closely linked to the general standard of living and the population's ability to meet its basic needs for nutritious food, safe water, good housing, acceptable levels of environmental sanitation and ready and easy access to health care.

Assessment of the nutritional status of the child by the use of nutritional anthropometric indicators of growth has been used not only to provide information on the nutritional and health status of children but also as an indicator of the nutritional status and adequacy of food for all members of that community. Food and Agriculture Organization (1994), reports that there are growing doubts whether estimates of under nutrition based on nutritional anthropometry in children alone without any information about the adults in the community necessarily reflect the overall nutritional status and the adequacy of food availability within the entire community. Height and weight are the most commonly used indicators of the nutritional status of a child.

According to a World Health Organization Working Group (1986), appropriate weight-for-age of a child reflects linear growth and can measure long term growth faltering or stunting. On the other hand, they also agree that appropriate weight for height is particularly sensitive to acute growth disturbances and is useful to detect the presence of wasting. According to Kramer (1992), weight-for-age represents a convenient synthesis of both linear growth and body proportion and can, therefore, be used for the diagnosis of underweight children. The presence of under nutrition in children is assessed using these three anthropometric parameters (weight-for-age, height-for-age and weight-for-height) and by comparing them with internationally accepted reference standards (WHO, 1983).

World Health Organisation (1995), indicated that if a child has a low height-for-age, that is a z score below two standard deviation of the reference population mean (-2 z–score), such a child is categorized as stunted. Similarly, a low weight-for-age is a diagnostic of an underweight child, while a low weight-for-height is indicative of wasting. They further argue that, the growth retardation prevalence for the under five year old preschool child is estimated by the proportion of weight-for-age, height-for-age and weight-for-height below -2 z score, the accepted cut off for the diagnostic of under nutrition. Hence it is indicative of an increase in risk of morbidity and mortality.

Grantham-McGregor, Powel, Walker and Himes (1991), also argue that there is sufficiently good evidence to show that poor growth and smaller size in preschool children is associated with impaired development. There are a number of studies that have demonstrated a relationship between growth status and school performance or intelligence. However, this cannot be

regarded as a simple causal relationship between inadequacy of food, physical growth status and intellectual development. Complex environmental, socio cultural and economic factors also affect both growth and development

**Conceptual Framework**

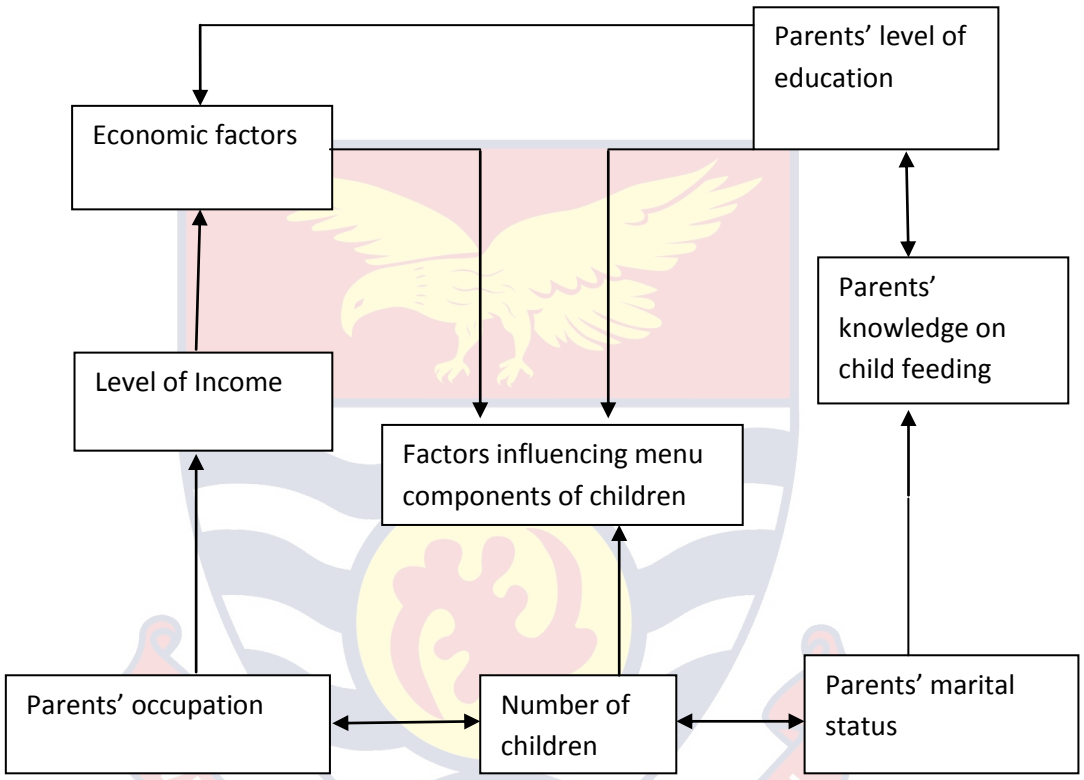


*Figure 1*: Conceptual framework of factors influencing menu component of children.
Source: Author's own Construct, (2018)

The conceptual framework depicts that children's menu components can mainly be influenced by factors such as the parent's level of education, economic status and number of children. A factor such as parents' occupation also has the tendency to influence their level of income which could affect their economic status. It could be said that, parents' marital status influences their knowledge on child feeding. This is because, when individuals are properly married, they tend to have greater concern about their children's

welfare. There are instances where couples go to the extent of acquiring knowledge on nutritious foods to ensure that their children grow well and are free from childhood ailments such as kwashiorkor and marasmus. The level of education promotes in-depth knowledge or understanding into childhood feeding requirement and the education given at ante-natal clinics could easily be adhered to by parents who are well educated. The ability to read and understand component on cans and boxes containing children's foods makes it possible for them to select best food for their children.

With this, when parents level of education increase, it impact on their economic status as well. Parents' occupation can also influence the number of children they may have. In the same way, parents' marital status can equally influence the number of children they may have. All these play a major role in influencing children's menu components.

**Chapter Summary**

From the literature, it suggests that the degree of every child's nutritional status depends on the degree of parent's commitment and nutritional knowledge. The stakeholders are parents and care givers such as what pertains in homes. Consequently, the literature review focused on major areas such as nutrient needs of children, composition of macro and micro nutrients, diet and improved health. Other areas included group feeding, funding school meals and conditions under which meals should be prepared and served. From the review, there is an indication that there are a number of core factors that come together to help achieve good nutritional status. These core factors focus on aspects such as good nutritional knowledge, hygiene and sanitation practice and adequate source of finance.

# CHAPTER THREE

# RESEARCH METHODS

## Introduction

This section deals with the methodology used in conducting the study. It involves the research design, population of the study, sampling and sample size, the instrument to be used for data collection, data collection procedure and how data collected were analyzed.

## Study Area

The Upper West Akim District is a new District which was extracted from the West Akim Municipality after the 2010f population and housing census. The population of the district was attained through scientific extrapolation from the 2010 national population and housing census of the Municipality through which the district was created. The district covers an area of about 1,018 square km with a population of about 87,051 people. This district shares boundaries with the Ayensuano District to the east, West Akim Municipality to the north, Nsawam Adoagyiri Municipality to the south eastern part, Ga South municipality to the south and Awutu-Afutu Senya District in the Central Region to the west. The main occupation of the economically active population is agriculture, forestry, crafting (artisan) and related trade (vocations like hairdressing and dressmaking). Other forms of employment for the people are in petty trading and fishery (Ghana Statistical Service, 2010).

**DISTRICT MAP OF UPPER WEST AKIM**

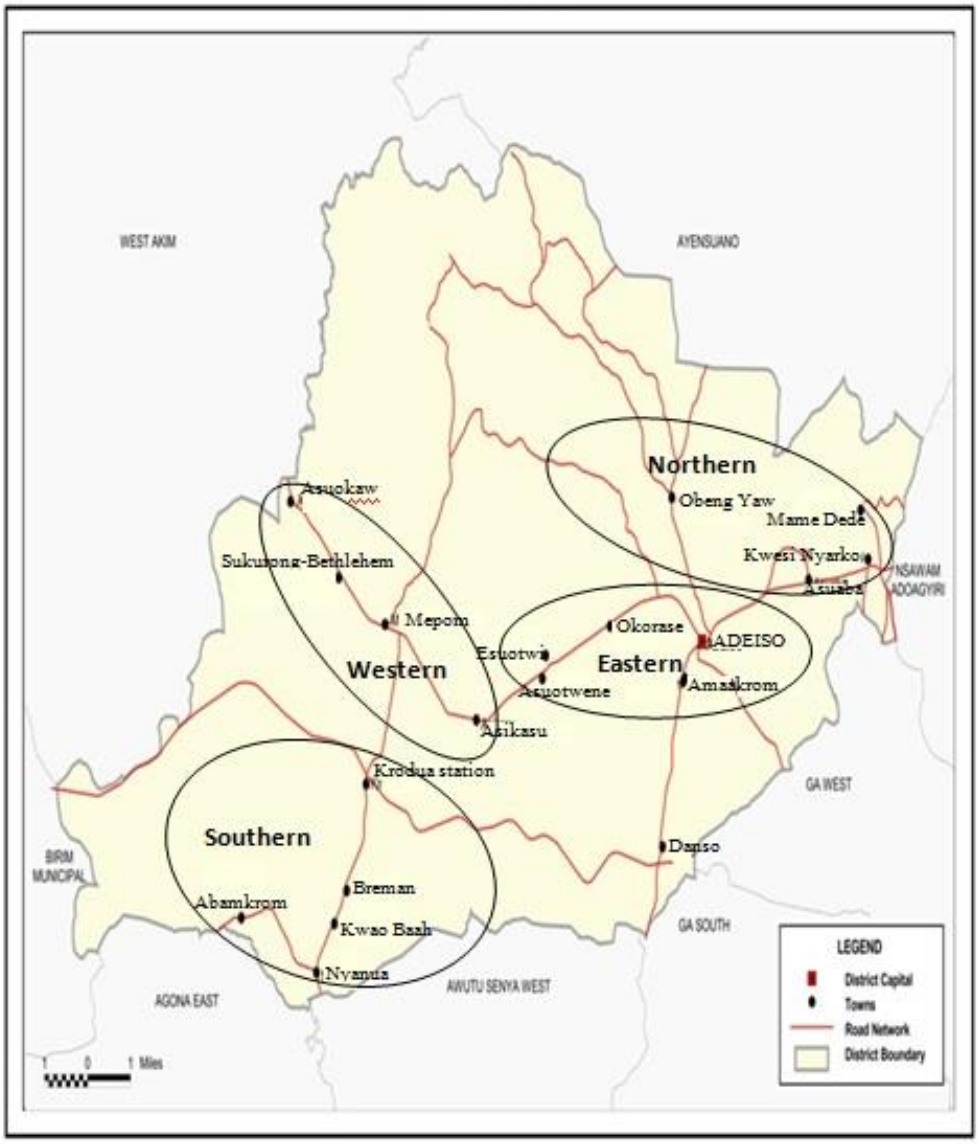


*Figure 2*: Map of Upper West Akim

Source: Ghana Statistical Service (2010)

**Population**

The total population of Upper West Akim District is estimated as 87,051 with 44,212 women of child bearing age and 12,636 of children under age five (Ghana Statistic Service 2010). The study population comprised all children under age five with their parents who resides with them in the Upper West Akim District.

**Research Design**

The research design considered most appropriate for this study was the descriptive cross-sectional design which covered households of parents with children below five years. According to Babbie (2007), surveys are useful in describing a large population with accurate representative sample. Also, surveys make measurement of opinions, beliefs and attitudes standardized (Nwadinigwe, 2002). In addition, surveys are flexible where many variables and questions can be asked on a topic, making analysis more flexible.

A descriptive survey design describes phenomena and is usually used as a pre-cursor to quantitative research designs (De Vos, Strydom, Fouchè & Delport, 2012). Descriptive survey design is designed to get pertinent and precise information concerning the current status of a problem with respect to one or more variables and where possible draw valid general conclusions from the facts discovered (Mugenda & Mugenda, 1999). The purpose of most descriptive research is limited to characterizing something as it is (McMillan & Schumacher 2006). Based on this, the researcher deems it appropriate to use descriptive cross-sectional design for the study.

This design was appropriate per this study because it is recommended by Amin (2005) for studies which involve a cross section of respondents or subjects with almost similar characteristics. The researcher collected information from a cross-section of respondents (parents) at one time without repetitively visiting them. That is to say, the cross-sectional design was most appropriate on big population as it saved time and finances (Creswell, 2003). McMillan and Schumacher (2006), indicate that apart from being the most commonly used method in educational research; the descriptive design is

preferred, because it is objective in data collection at a point in time, it quantifies variables, and it describes the phenomena using numbers to characterize them.

The study therefore adopted a descriptive cross-sectional survey design based on the relatively short period that the survey covered. However, descriptive studies have some limitations. Descriptive research also provides the likelihood for error and subjectivity. For example, when a researcher designs an interview schedule, questions are pre-arranged, fixed and strict. Again, the researcher cannot control events to isolate cause and effect. Despite these limitations, a descriptive design was adopted because the study's aim was to examine the nutritional status of children less than five years and background characteristics of parents which influence children's nutritional status in the Upper West Akim District.

**Sampling Procedure**

In view of the broad nature of the population for the study, multi-stage cluster sampling method was used in selecting the sample for the study. This technique is considered the most appropriate sampling method because of the comparatively wide coverage of the study area. In ensuring that sample selected is a true representation of the total population of rural parent in the district, the district was divided into four zones. The division was named Southern, Northern, Eastern, and the Western zones of the rural district. This helped to achieve greater precision and accuracy.

Compton and Hall (1972), assert that in a cluster sampling of this nature where the population is homogeneous, precision will be achieved with fewer cases than will be possible within a random sample. Within each cluster,

a list of communities were prepared and a simple random sampling method specifically the lottery method was used to select one rural community from each of the four clusters where samples were obtained for the study. The names of all rural communities in each cluster were written on pieces of paper and mixed together in a bowl. Any field assistant can be called to pick one of the papers. The selected communities were used as another cluster within which parents were used for the study. This procedure was adopted for the four zonal clusters.

The next stage was on the selection of parents from households in the four randomly selected communities to serve as the study units. Disproportional method was adopted to choose 120 parents from the four communities to be selected for the study due to lack of data on all the individual rural community in the district to help warrant the use of proportional method in choosing parents from the communities. For each community selected, the researcher used simple random technique to select thirty (30) parents for the study. All households with parents were numbered by the researcher separately in each of the four communities; the researcher then used the numbers assigned to the families to prepare a sampling frame for each community and randomly select the thirty (30) parents to be studied in each community. Observational study and measurement check list of meals were conducted with on sub-sample from each selected town to ascertain the nutritional content of children's meal which was analysed qualitatively

**Sample size**

A vital decision in conducting research has to do with the researcher's ability to decide on the sample size that is representative of the targeted population. According to Nwana (1992), certain practices among social researchers when it deals with the relationship between the population of a study and the sample that was representative of that population can be adopted. Hence, Nwana suggested that if the population is a few hundred, probably between one hundred and five hundred (100-500), a 40% or more sample size can be representative enough; if many hundreds (over five hundreds but less than a thousand), 20% sample was enough; if the population is a few thousands (in tens of thousands), a 10% sample is recommended and if the population is several thousand (as is the case in this research), 5% or less will do.

Others also looked at it in terms of the type of research in determining the representativeness of a population with it sample size for a research. Fraenkel and Wallen (2000), suggested that for a descriptive study, a sample with a minimum number of 100 elements is essential; for correlational studies, a sample size of at least 50 was necessary to establish the existence of relationships; for experimental and causal comparative studies, they recommended a minimum of 30 elements. Hence for the nature of this study as being descriptive, Wallen's suggestion was adopted to justify the choice of 120 as the sample size in view of the above observation. The sample size for the research was 120 participants.

**Data Collection Instruments**

The research instrument used was interview schedule. The reason for the use of interview according to Awoyemi (2002), is that, it is known to be quite valid, reliable and economical in terms of money and time spent in it usage. The interview schedule was developed by the researcher and it was grouped into sections made up of bother close and open ended items. Section A covered the anthropometric measurement details of children below five years for assessment. Section B found out the demographic characteristics of parents, the eating habits of children considering the type of food that most parents feed children with especially when weaning. Section C elicited the menu components of children. Observational study was also conducted to assess the nutritional components and weight of children's meals eaten in a day. An MCP digital infant weighing scale and a stadiometer were used for the anthropometric data collection on children under five years.

**Validity and reliability of the instrument**

The idea of validity hinges on the extent to which research data and the methods of obtaining data are deemed accurate, honest and on target. Practically, the validity of an instrument is assessed in relation to the extent to which evidence can be generated in support of the claim that the instrument measures the attributes targeted in the proposed research (Dambudzo, 2009).

Validity of the instruments was ensured by matching the objectives with the questions that were in the interview schedule to be administered to respondents. To ensure face and content validity, the interview schedule was given to supervisors and other experts at the Department of Vocational and Technical Education in the University of Cape Coast (UCC) for expert

judgement and assessment. These persons found that the interview schedule appeared to measure the appropriate constructs and the items were related to the research questions and also broadly covered the details of the study.

Also, the reliability of the study was ensured by performing a pre-test study to ensure that results produced by the respondents were the same when administered under different circumstances. The Crobach's alpha was deemed the best method to estimate the reliability of the instrument. The Crobach's alpha has a correlation coefficient ranging in value from 0 to 1. The closer a reliability coefficient value is to 1, the more reliable the test, while the closer the reliability coefficient value is to 0, the less reliable the test (Gay, Bajko & Gaudet, 2009). The reliability obtained was .781 indicated that the instrument was reliable.

**Pre-testing of the instrument**

The success of any research study depends, to a large extent, on the validity and reliability of the survey instrument. In order to ensure the validity and reliability of the instrument, it is vital that the researcher pre-tests the survey instrument. A pre-test study was carried out to test the research instruments in order to assess and improve their validity and reliability. One community (Danso) also within the district which was not selected as part of the research was used for the pre test because parents in both Districts have the same characteristics. The pre test used a simple random sampling technique

A sample size of 30 parents was randomly selected to partake in the study. The parents were informed about the purpose of the study, after which their consents were sought and also the necessary ethical issues such as confidentiality was explained to them before the interview schedule were

distributed. This exercise was essential to help the researcher ascertain how valid and reliable the contents and constructs of the survey instrument were, identify problematic areas that needed reviewing and also determine the length of time it took for the questionnaires to be answered. This study was used to check the language used in the research instruments to ensure that it was simple and clear enough. The pre test study also helped to identify any vague and ambiguous questions in order to make necessary adjustments before the actual study was carried out. For example, the item 23 was altered from the raw meal pattern of the child to the food commodities that constitute their meals patterns. Also, the option with 'above four hours' was added as a result of the outcome on parents who could not breastfeed after four hours.

**Ethical consideration**

Researchers should be mindful of ethical issues especially in social research because it is concerned with data about people. Consideration for moral issues and respect for participants is essential in social research (Punch, 2009). In this research several ethical issues were taken into consideration. This includes informed consent, confidentiality and anonymity. One of the issues that were involved in this research was informed consent. According to Seidman (2006), informed consent affords prospective participants the opportunity to accept or decline to engage in the research. It describes the need for participants to understand the aims, objectives and potential harm that such involvement may have on them. It also spells out that they have the right to withdraw even after consent has been given; this is in line with Cohen et al. (2000); and Mertens, (2010), who also stated that informed consent arises

from the participant's right to freedom. The purpose of the study was carefully reviewed with each participant before they were involved in the research.

With confidentiality, however, efforts were made to maintain confidentiality of the responses of the participants. Participants were told that their responses would be kept confidential and that no one known to them would have access to the information provided and none of the respondents names were recorded in the study.

Anonymity of study respondents were also highly taken into consideration in the present study. Oliver (2010), pointed out that anonymity is a vital issue in research ethics because it gives the participants the opportunity to have their identity concealed. In this research, fictitious names were used for identification purposes which cannot be traced to the participants. Codes were also adopted where necessary to ensure anonymity of information and harm. In order not to unnecessarily invade the privacy of participants, prior visit was made to selected district before the data collection commenced. Neither names nor any identifiable information from respondents were taken as a way of ensuring the ethical principle of anonymity in social research. This is to prevent possible victimization of respondents where certain responses may be viewed as unpalatable to other stakeholders.

**Data Collection Procedure**

In ensuring that data to be collected are accurate and as quick as possible, the researcher recruited two research/field assistants to help in the data collection. The recruitment of the research assistants was based on the educational level with a minimum of a University degree, how fluent they are in the native language of the residents (Twi) and also in English to be able to

translate the items to the respondents as and when the need be. The researcher also considered field assistance who had experience on the field. The assistants were trained to be familiar with the items in the interview schedule and how to interpret them into the local language of the respondents when the need be. They were also involved in the pre-testing as part of their training.

The researcher and her team contacted the assembly member and the chiefs of the communities that were selected to brief them about their mission and also sought their approval to conduct the study in the community. This was done through written information and a verbal follow-up before data was collected. The research team introduced themselves to each selected respondent and explained the purpose of the visit and requested to administer the interview schedule. Also, since the area is predominantly farming communities, the data was mostly conducted early in the mornings and late evenings during the entire data collection period since the farmers may be at farm during the day. The data collection took place from 15th to 29th December 2017. A period of two weeks was used in administering the interview schedules. Data collection was assisted by two field assistants. The obtained data was by way of ticking the responses of the respondents on the interview schedule. During the data collection, the researchers waited on parents for the interview schedule administration hence, there was a 100% return rate.

**Data Processing and Analysis**

After the data was collected, the information was edited to remove inconsistencies in responses. That is, the data cleaning process, editing, coding and tabulation was undertaken. The data analysis involves reducing accumulated data to a manageable size, developing summaries, looking for

pattern and applying statistical techniques (Morse, 1991; Cooper & Schidler, 2001).

Data collected were coded and statistically analyzed using the latest version of Statistical Package for Service Solution (SPSS) (V.23). Numerical summary was drawn in a form of tables showing frequencies and percentages for the eating habit of children. The analysis was based on sections of the items on the structured interview. The data were analyzed using simple statistical instruments for easy understanding by all. Therefore, data collected were analyzed using percentages, frequency distributions, cross tabulations, and measures of central tendencies such as mean scores and standard deviations. The observational study conducted was analyzed qualitatively.

**Chapter Summary**

The research used a quantitative approach. The design employed for the study was descriptive cross-sectional design. The researcher adopted Wallen's suggestion to justify the choice of 120 participants.

The respondents were randomly selected from the rural Upper West Akim District. The quantitative data was processed using the latest version of SPSS and with both descriptive and inferential statistical tool such as frequencies, percentages, mean, standard deviation, z-scores, pearson product moment correlation, and Chi square were used in analyzing the research questions. Data collected through observational study was also analyzed qualitatively.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## Introduction

This chapter presents the analysis and interpretation of the findings of the study. The analysis and interpretation of data were carried out based on the results of the research questions formulated for the study. The analysis was based on the 100% return rate data obtained from 120 respondents (parents) selected for the study.

The analysis of the main data is organised in line with the research question that guided the study. The data were analysed using inferential statistics (Chi square test for association and Pearson product moment correlation co-efficient) and descriptive statistics (means, standard deviations, frequencies and percentages). The results are presented below.

## Demographic Characteristics of Respondents

This section relates to the background information of the respondents. The demographic data includes sex, age (in months), weight (in Kilograms) and height (in centimetres) of the children. The results are presented in Table 1.

With respect to the gender, the male children were the majority (n=64, 53.3%) whilst the female children were the least (n=56, 46.7%). In relation to the ages of the children (in months), the results give evidence that children from 31 months and above were the majority (n=43, 35.8%), followed by 21

to 30 months (n=36, 30%), and below 10 months (n=25, 20.8%), with those within 11 to 20 months recording 13.3% (n=16). By implication, the results on the ages show that most of the children were cluttered around the preferable age and therefore fit for the purpose of the study.

**Table 1: Anthropometric Measurement of the Children**

| Variables | Subscale | Freq. | Percent % |
|---|---|---|---|
| Sex | Male | 64 | 53.3 |
| | Female | 56 | 46.7 |
| Age (in months) | Below 10 months | 25 | 20.8 |
| | 11 to 20 months | 16 | 13.3 |
| | 21 to 30 months | 36 | 30 |
| | 31 months and above | 43 | 35.8 |
| Weight (in Kg) | Below 5kg | 21 | 17.5 |
| | 6 to 10kg | 47 | 39.1 |
| | 11kg and above | 52 | 43.3 |
| Height (in cm) | Below 50cm | 31 | 25.8 |
| | 51-100cm | 61 | 50.8 |
| | Above 110cm | 28 | 23.3 |

Source: Field Data Inkum (2018) (n=120)

Another vital area of the anthropometric measurement of the children which could have practical implication on the study was the weight (in Kg) of the children. The results indicate that most of the children were 11kg and above (n=52, 43.3%), with 6 to 10kg being 39.1% (n=47). and below 5kg were 17.5% (n=21), respectively.

Furthermore, the anthropometric measurement of the children, for the heights (in cm) of the children show majority of the children were within the

range of 51-100cm (n=61, 50.8%), whilst below 50cm were 25.8% (n=31) and above 110cm height were 23.3% (n=28).

The z-scores values of the anthropometric indices of the children were recorded as indicated in table 2.

**Table 2: Z-scores of the Anthropometric Measurement of the Children**

| Variables | SD/Median | z-score values (cm/kg) | WHO Standards (Current values, 2007) | Remarks/Interpretation |
|---|---|---|---|---|
| Height -for age (cm) | -3 SD | 63.33<WHO | 95.2 | Stunted |
| | +3 SD | 66.33<WHO | 123.7 | Stunted |
| | Median | 73.93<WHO | 109.4 | Stunted |
| Weight -for age (kg) | -3 SD | 2.96<WHO | 12.1 | Underweight |
| | +3 SD | 5.96<WHO | 29.5 | Underweight |
| | Median | 9.33<WHO | 18.2 | Underweight |
| Weight for Height (kg/cm) | -3 SD | 3.62<WHO | 11.6 | Wasted |
| | +3 SD | 6.62<WHO | 21.1 | Wasted |
| | Median | 9.52<WHO | 15.3 | Wasted |
| Nutritional Status | -3 SD | 12.96<WHO | 25.1 | Malnourish |
| | +3 SD | 15.96<WHO | 25.1 | Malnourish |
| | Median | 15.33<WHO | 28.5 | Malnourish |

Source: Field Data Inkum (2018) (n=120)

In determining the nutritional status of the children, z-score values were obtained for weight for age, height for age and weight for height as well as the nutritional status of the children from the anthropometric data. The results from the Z-scores gives evidence to believe that generally most children in the Upper West Akim District were malnourish. This was evident after the Z-scores for the children in Height, Weight and Nutritional Status falls below the WHO (2007) Current values.

**Research Question One: What is the association between background characteristics of parents and dietary intake of children in the District?**

The main purpose of this research question was to assess the association between background characteristics of parents and dietary intake of children in the District. To achieve this, Chi square test for association was conducted. The results are presented in Table 3.

The chi-square test of association shows that most of the background characteristics of parents do have significant association with the dietary intake of their children. For example mothers education produced a significant association to indicate that it influence dietary intake of their children ($\chi^2$ = 3.006, df=112, p=.010). In relation to the fathers' education, the results were not different from that of the mothers. The results reveal that fathers' in the Upper West Akim District level of education have direct impact and significant association to the dietary intake of their children ($\chi^2$ = 4.924, df =112, p=.007).

**Table 3: Results of Chi Square Test for Association between Background Characteristics of Parents and Dietary Intake of Children**

| Demographic Variables | Chi-square ($\chi^2$) | Degree of Freedom (df) | Significance (p-value) |
|---|---|---|---|
| Mother's Age | 3.863 | 112 | .080 |
| Mothers' Education | 3.006 | 112 | .010* |
| Fathers' Education | 4.924 | 112 | .007* |
| Marital Status | 2.637 | 112 | .023* |
| Parents Religion | 1.737 | 112 | .566 |
| Parents Occupation | 3.237 | 112 | .001* |
| Parents Income | 3.590 | 112 | .000* |
| Number of Children | 2.280 | 112 | .004* |

Source: Field data Inkum (2018) ** Significant at p<0.05 (2-tailed), n=120

In assessing the marital status of the parents as one of the important background characteristics, the results highlighted that marital status of the parents is related of the dietary intake of their children and as such could influence the children's diet ($\chi^2$ = 2.637, df =112, p=.023).

Determining the respondents occupation in relation to dietary intake of children was also deemed appropriate based on the fact that Awatef, et al., (2011) suggested that elsewhere, parents' occupation could affect the dietary intake of their children. In the case of Upper West Akim District, the results was consistent in that parents in the Upper West Akim District occupation had direct influence on the dietary intake of their children ($\chi^2$ = 3.237, df =112, p=.001).

In view of the fact that the parents occupation could influence their income, the researcher found it necessary to check on whether the parents income range could also have an association with the dietary intake of their children and the results did not proof otherwise ($\chi^2$ = 3.590, df =112, p=.000).

The last variable that had significant association was the number of children the parents had. The results gave vivid evidence that number of children (family size) that the parents in the Upper West Akim District had strong impact on the dietary intake of their children ($\chi^2$ = 2.280, df =112, p=.004).

On the contrary, two of the variables did not show any relationship. The results on the mother's age did not have significant association with the dietary intake of their children ($\chi^2$ = 3.863, df =112, p=.080). The results could mean that the health of the children could not be as a result of the mother's age and as such, age of the mother could not serve as a determinant of the dietary

intake of their children. The results further indicate that the religion of parents in the Upper West Akim District did not also have structural effects on the dietary intake of their children ($\chi^2$ = 1.737, df =112, p=.566).

These results confirm previous studies by Lipton and De-Kadt (1998), where a World Food Programme (WFP) survey conducted in 1987 in Ghana showed significant correlation among three indicators of malnutrition and a number of variables relating to income, food supply, environment, social and health status. This gives an implication that a high socio-economic standing of a house-hold can determine the nutritional status of a child, with levels of income standing out as one cause of variability in food intake although income is not the only measure of poverty.

The results further support the assertion that a low socio-economic status has adverse effects on the food security, access to health care, environmental sanitation and personal hygiene of children (Sarmistha, 1998: WHO, 1999).

Additionally, Hayward et al. (2012) and WHO (2005), highlighted the amount of money the parents make at the end of every month as a determinant to the food availability for children, and their access to quality health services and the quality environments in which the children live and grow. Most studies (Meshramet et al., 2012; Mukherjee, Caturvedi & Bhalwar. 2008) have agreed that there is a significant association between amounts of money a family earns a month and the nutritional status to their children in particular, those under five, as found in this study.

Moreover, the results of the present study support the findings of Thomas, Strauss, and Henriques (1990), that family income has significant

positive correlation on child survival. Increases in income at the household and national levels imply similar rates of reduction in malnutrition as found by Haddad, Alderman, Appleton, Song, & Yohannes, (2003). Using a nutrition index based on weight-for-age of children in rural India, they revealed that higher per capita current income improves the nutritional status of both boys and girls. Furthermore, a study pointed out that the impact is higher for boys than that in girls, although, the effect of income is not independent but in association with other factors such as mothers educational level and food availability (Sarmistha, 1998).

In relation to the education of the parents, the findings of this study agrees with that of WHO (2005) and Webb and Lapping (2002) that indicated that parents literacy and level of education impact on the human and economic empowerment of parents. According to the findings, parental education tends to improve the health seeking and child caring practices of the mother. Parental education and maternal nutritional knowledge are significantly but independently associated with child nutrition outcomes.

In connection with the family size, previous research point out household structure, comprising family size, resources and care-giving which as having effects on child nutritional status and infant mortality(Heaton, Forste, Hoffmann, & Flake, 2005). The authors argue that the size of the family influences the use of family resources. The larger family size dilutes family resources more than smaller family size if the income levels are the same (Heaton, Forste, Hoffmann, & Flake, 2005).

**Research Question 2: What is the relationship between exclusive breastfeeding and nutritional status of children?**

This research question was to explore whether exclusive breastfeeding will have relationship with nutritional status of children. To achieve this, Pearson product moment correlation was used. In the analysis, correlation (r) was used to determine the degree and the direction of a relationship between the variables (exclusive breastfeeding and nutritional status of children). The deceptive results are presented in Table 4 which presents results of the correlation variables. The results show that Exclusive Breastfeeding recorded a descriptive results showing that it has high descriptive values (M= 50.54, SD=5.58, SEM=3.61).

**Table 4: Descriptive Results of the Correlation Variables**

| Variables | Mean | Std. D | SEM | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| Exclusive Breastfeeding | 50.54 | 5.58 | 3.61 | 8.5858 | 6.1615 |
| Nutritional Status of Children | 40.59 | 6.64 | 2.81 | 4.3369 | 6.4104 |
| Total (N=120) | AM =45.5 | ASD =6.1 | ASEM=3.21 | | |

Source: Field Data Inkum (2018)

The description of Nutritional Status of Children was also recorded (M= 40.59, SD=5.64, SEM=3.61). Per the descriptive results, Correlation Matrix (Pearson Product Moment Correlation) was performed.

Table 5 shows the results of the Pearson Product Moment Correlation Coefficient (PPMCC) of the exclusive breastfeeding and nutritional status of the children.

**Table 5: Correlation Matrix (Pearson) for Exclusive Breastfeeding and Nutritional Status of Children**

| Variables | | 1 | 2 |
|---|---|---|---|
| Exclusive | Pearson Correlation | 1 | .901* |
| Breastfeeding | Sig. (2-tailed) | | .000 |
| | N | 120 | |
| Nutritional | Pearson Correlation | .901* | 1 |
| Status of | Sig. (2-tailed) | .000 | |
| Children | N | 120 | 120 |

Source: Field Data Inkum (2018) ** P< 0.05 level (2-tailed), n=120

It is evident from the table that there was a high statistically significant positive relationship between exclusive breastfeeding and nutritional status of the children (r=.901, p<0.05, p=0.000). This gives the implication that exclusive breastfeeding from mothers have a direct relationship with the nutritional status of their children. The results from the present study confirm that of Brakohiapa et al., (1988) and Briend and Bari (1989), who averred that breastfeeding is one of the main determinants of child malnutrition. Breastfeeding a child for 19 months was found to be associated with malnourished children who visited a children's hospital in the city of Accra, Ghana (Brakohiapa et al., 1988). A similar study by Kumar et al. (2006) also concluded that delayed initiation of breast-feeding, and deprivation from colostrum are significant risk factors for under nutrition among children below age 5.

**Research Question 3: What is menu component of children in Upper West Akim District?**

To accomplish the purpose of the study, the researcher explores the menu component of children in Upper West Akim District. To achieve this, descriptive statistics (frequencies and percentages) were used for the analysis. The results are as illustrated in Table 6.

**Table 6: Analysis of Menu Component of Children in Upper West Akim District**

| Statements | Freq.(f) | Percent (%) |
|---|---|---|
| 1. Children ever breastfed. | | |
| Yes | 89 | 74.2 |
| No | 31 | 25.8 |
| 2. Children still breastfeeding | | |
| Yes | 112 | 93.3 |
| No | 8 | 6.7 |
| 3. The time parents start breastfeeding the child after birth. | | |
| Less than 30 Minutes | 19 | 15.8 |
| One Hour | 20 | 16.6 |
| Two Hours | 17 | 14.1 |
| Three Hours | 23 | 19.1 |
| Above Four Hours | 41 | 34.1 |
| 4. Practices of parents among these | | |
| Exclusive breastfeeding? (6 months) | 62 | 51.6 |
| Breastfeed the child for 18 months | 29 | 24.1 |
| Breastfeed the child for 24 months | 20 | 16.6 |
| Breastfeed the child beyond 24 months | 9 | 7.65 |
| 5. the food commodity mostly given to the child | | |
| Cereals and Grains | 74 | 61.6 |
| Fruits and Vegetables | 18 | 15.0 |
| Animal and Animal Product | 16 | 13.3 |
| Roots and Tubers | 7 | 5.8 |
| Legumes and Nuts | 5 | 4.2 |

Source: Field Data Inkum (2018) (n=120)

The result shows that majority of mothers of the children agreed they breastfed their children (n= 89, 74.2%) whilst few of them agreed to have challenges in breastfeeding their children (n=31, 25.8%). Some of the mothers further indicated that they still breastfeed their children (n=112, 93.3%) and few of them responded that currently, they do not breastfeed their children (n=8, 6.7%).

To find out the time frame of breastfeeding the children after birth, the results show that most mother's breastfed their children after four hours and above (n=41, 34.1%) while those who confirmed three hours followed (n=23, 19.1%). Some agreed that depending on the condition, they breastfed their children within one hour (n=20, 16.6%). Less than 30 minutes was also indicated by some of the mothers (n=19, 15.8%). Two hours recorded the least count (n=17, 14.1%)

In relation to the breastfeeding practices, majority of the mothers indicated that they practice exclusive breastfeeding (n=62, 51.6%) while breastfeeding the child for 18 months followed (n=29, 24.1%). Some of the parents also indicated that they practise the habit of breastfeeding their children for 24 months. Few of them agreed that they breastfed their children beyond 24 months.

With respect to the type or groups of food given to the children, the results highlighted that majority gave cereals and grains (corn, rice wheat, millet, oats) to their children (n=74, 61.6%). The use of fruits and vegetables (cabbage, orange, mango, banana, okro) followed (n=18, 15.0%). The use of animal and animal product (meat, fish, egg) in feeding the children followed

(n=16, 13.3%), and roots and tubers recorded few of them (n=7, 5.8%), while legumes and nuts recorded the least (n=5, 4.2%).

**Results of Observation**

To complement the results with more evidences, observational check list was conducted on the mothers of the children in the cause of feeding their children. In some cases, the results on the observational check list contradicted that of the interview schedule. My observation indicates that even though the children are fed with the cereals and grains (corn, rice wheat, millet, oats) than all the other types of the food stuffs, the supplements were not given in their right proportions. In some instances, the children were given little fish with small soup indicating a lack of protein in the diet which could lead to the malnutrition of the children.

The result of the observation revealed that even though most of the parents claimed to be feeding their wards with the cereals and grains (corn, cassava, rice wheat, millet, oats) they were in most cases not prepared properly. For example, observations gave indications that the children were not given the right quantity of sauce which suggests that a lack in the required vitamins could happen.

On the issue of breastfeeding of the children, most of the mothers claimed to be giving exclusive breastfeeding for some number of months. However, my observational results gave vivid evidence that most of the children lacked the necessary nutrients found in foods such as, bread, and milk which could affect the health of the children.

The results from the study supports the assertion of UNICEF (2008), that stunting or low height-for-age is caused by long-term insufficient nutrient

intake of right proportion of meal for children and this could lead to frequent infections. According to UNICEF (2008), this generally occurs before age two and its effects are largely irreversible. These effects may include delayed motor development, impaired cognitive function and poor school performance.

**Research Question 4: What is the association between anthropometric characteristics of the children and dietary intake of the children in the District?**

The research question four, sought to determine the association between anthropometric characteristics of the children and their dietary intake in the District. To assess this, Chi-square ($\chi^2$) test for association was performed. The results are presented in Table 7.

**Table 7: Results of Chi Square Test for Association between Anthropometric Measurements of the Children and Dietary Intake of Children.**

| Demographic Variables | Chi-square ($\chi^2$) | Degree of Freedom (df) | Significance (p-value) |
|---|---|---|---|
| Sex | 1.263 | 116 | .762 |
| Age (in months) | 3.990 | 116 | .006* |
| Weight (in Kg) | 2.009 | 116 | .017* |
| Height (in cm) | 2.893 | 116 | .011* |

Source: Field Data Inkum (2018) (n=120)

The results indicate that most of the measured anthropometric (age, weight and height) of the children have significant association with their dietary intake. For instant, the Age (in months) of the children was observed to influence the dietary intake of children ($\chi^2$ = 2.009, df =116, p=.017). Height (in cm) of the children also had significant impact on the dietary intake of children ($\chi^2$ = 2.893, df =116, p=.011).

Statistically, the results of the weight (in kg) were in line with the age of the children. The weight (in kg) was observed have strong relationship with the dietary intake of children ($\chi^2$ = 3.990, df =116, p=.004). However, after the measurement of the sex of the children, the results was different as compared to other anthropometric characteristics ($\chi^2$ = 1.263, df =116,p=.762).

The results give evidence to accept the findings of Nguyen, and Kam (2008), who concluded that maternal, socio-economic and environment factors such as weight of the child at birth and duration of exclusive breastfeeding were found to be significant factors for malnutrition among children under five. With a structured questionnaire, they aimed to assess the nutritional status and characteristics related to malnutrition in children less than five years of age in Nghean, Vietnam. Anthropometric measurement, underweight (weight-for-age), wasting (weight-for-height) and stunting (height-for-age) of the children was determined based on reference data from the National Centre for Health Statistics (NCHS).

In another study, Kumar et al. (2006), revealed that 36.4% were underweight (<2SD weight- for-age), 51.6% were stunted (<2SD height- for-age), and 10.6% were wasted (<2SD weight-for-height) and these had significant effects on the dietary intake of children.

**Research Question 5: What is the Knowledge level of parents about eating habits of their children in the District?**

To assess the knowledge level of parents about eating habits of their children in the District, means and standard deviations were used for the analysis. In the analysis, means provided the summary of the responses from respondents and the standard deviations indicated whether results were clustered to the mean score or dispersed. Where the standard deviation is relatively small (within 0), the results were believed to be homogeneous (similar responses). On the other hand, where the standard deviation is relatively large (within 1), the results were believed to be heterogeneous (dissimilar responses). On a five point Likert Scale (Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree), a criterion value of 2.50 was obtained. A mean of 2.50 and above indicates that results give positive results while a mean of 2.49 and below indicated negative results. The results are presented in Table 8.

**Table 8: Knowledge Level of Parents about Eating Habits of Their Children**

| Statements | Test Value=2.50 | |
|---|---|---|
| | Mean | SD |
| Exclusive breastfeeding should be less than six months | 2.11 | .441 |
| Babies can be fed with water alongside breast milk within the first six months. | 1.36 | .363 |
| Complementary foods should be given within the first six months | 3.05 | .260 |
| Children need to consume more protein foods (fish and, or meat) than adult | 2.36 | .120 |
| Adults need to eat more fruits and vegetables than children | 3.75 | .120 |
| Children do not need to eat more food than adult | 2.36 | .012 |
| Parent's Knowledge on child's immunization | 1.98 | .252 |

Source: Field Data (2018) (n=120)

Generally, the results means that, most of the participated parents do not have much knowledge about the eating habits of their children and by implication, it could affects the dietary intake of the children. For example, in relation to the item "Exclusive breastfeeding should be less than six months" the results show that most of the parents did not have knowledge to this effect (mean=2.11, SD=.441). On the items "Babies can be fed with water alongside breast milk within the first six months", the results was consistent as majority of the parents shared little knowledge about that (mean= 1.36, SD=.363).

The parents further shared that Children do not need to consume more protein foods (fish and, or meat) than adult (mean=2.36, SD=.120). Thus on the issue that "Children do not need to eat more food than adult" most of the parents disagreed to that fact (mean=2.36, SD=.012).

With respect to the item "Complementary foods should be given within the first six months", most of the parents agreed to that fact (mean=3.05, SD=.260). Again, on the item "Adults need to eat more fruits and vegetables than children" majority of the parents agreed to that evidence (mean=3.75, SD=.120).

Concerning the immunization status of the children, the results show that most parents do not have much in-depth knowledge about the immunization process and as such do not participate in it fully (mean=1.98, SD=.252). This agrees with previous studies that the practice of most parents affects their wards health. For example Sengupta, Nina and Benjamin (2010), and Bhavsar et al. (2012), observed that underweight, stunting and wasting were significantly higher in the incomplete immunized under five children than the completely immunized under five children. The protective potentials

of immunization can, therefore, not be under estimated and must be implemented to the benefits of the children. According to their study, most parents do not frequently engage their wards through the immunization process and these affects the weight of their children.

The present study further contradict Santosh et al. (2013), study, which used 600 under five children and highlighted that 560 (93.3%) had received primary immunization, while 40 (6.7%) children were partially immunized. Accordingly, the prevalence of malnutrition was significantly higher in children who were partially immunized compared to fully immunized ones. With the high prevalence of underweight (119; 53.6%), stunting (120; 54.1%) and wasting (38; 17.1%), Santosh et al. (2013), revealed that stunting, wasting and acute respiratory infections were significantly lower in fully vaccinated children than in partially vaccinated ones. Thus, frequent vaccination protects the child against infections, whilst incomplete vaccination may lead to worm infestation, an important predisposing factor for childhood malnutrition.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## Introduction

This chapter presents a summary of the study which sort to assess the impacts of socio-economic background of parents on menu components of children in the Upper West Akim District. It also presents the key findings of the study as well as the conclusions, recommendations and suggestions for further research on the study and the area.

## Summary

The purpose of the study was to assess the menu components among children under five years in the Upper West Akim District. The study adopted descriptive cross-sectional design which was deemed appropriate for this study. The multi-stage cluster sampling method was used in selecting the sample for the study. A total of 120 parents from the four communities in the Upper West Akim District were used for the study. An observation with an interview schedule was use for the data collection. Pre-testing of the instrument was done and reliability and validity were ensured. Ethical consideration was also ensured before the actual data collection. The data collected was analysed using descriptive statistics (frequencies and percentages, means and standard deviation) and inferential statistics (Pearson correlation, chi-square test for association). The study was guided by specific objectives which included examination of the association between background

characteristics of parents and dietary intake of children in the District; assessment of the relationship between exclusive breastfeeding and nutritional status of children; explored the menu component of children in Upper West Akim District; investigated the association between anthropometric characteristics of the children and dietary intake of the children in the District and finally assessed the knowledge level of parents about eating habits of their children in the District.

**Key Findings**

The results from the study revealed that most of the background characteristics of parents influenced the dietary intake of their children. Some of these characteristics included mothers' education, fathers' education, marital status, parent's occupation, parent's income and number of children. Only two variables of the parents' characteristics (Mother's age and parents' religion) did not indicate an influence on the dietary intake of the children.

It is apparent from the study that there was a high statistically significant positive relationship between exclusive breastfeeding and nutritional status of the children. This therefore, means that exclusive breastfeeding from mothers have a direct relationship with nutritional status of their children.

The results gave evidence to argue that parents in the Upper West Akim District do not really provide good menu component for their children and the observation results gave additional evidence to this fact.

The results also revealed that some of the anthropometric characteristics of the children had direct impact on the dietary intake of the

children in the District, specifically, the Age (in months), the Weight (in Kg) and the Height (in cm) of the children.

The results showed that largely, most of the participated parents lacked enough knowledge about eating habits of their children and this could affects the dietary intake of the children.

**Conclusions**

Based on the findings from the study, it can be concluded that, in the quest of establishing the dietary intake of children in the District, the background characteristics of parents served a significant role. Again, it could be said that the major menu component which forms the meals of the children in the District were generally known to be cereal based and the other major nutrients from other food groups were limited in the children's meal which could have contributed to the malnutrition status of the children. With respect to the anthropometric characteristics of the children and their dietary intake in the District, it could be inferred that most anthropometric characteristics of the children were influenced by their dietary intake. The lack of knowledge, of parents in the Upper West Akim District about eating habits, could also influence or affect the nutritional status of their children.

**Recommendations**

Based on the findings and conclusions of the study, the following recommendations are made:

1. Regular parental training by Ghana Health Service should be organized for parents in the Upper West Akim District to improve their nutritional knowledge on the feeding of the children.

2. Regular assessment of nutritional status of children in the District should be done by the District Health Directorates to keep the Parents updated on their children's health.
3. Food based programmes must be developed, promoted and supported through policy initiatives, state licensing and/or national accreditation standards and resources and training for parents in the Upper West Akim District.
4. More specific education by the Health Ministry should also be geared towards enhancing good dietary patterns and nutritional status among children to prevent them from adverse nutritional deficits and complications in later life
5. The Ministry of Health should frequently organize immunization exercises for children in the Upper West Akim District to help fight some diseases.

**Suggestions for Further Research**

The researcher suggests the following for further studies:

1. The current study is limited in scope because it was based on only one District (Upper West Akim). To make the study more representative and the results generalizable for the whole country, there is the need to replicate this study among population groups using larger geographic areas.
2. The study employed interview schedule and observations as the instrument for data collection, therefore further studies could include interviews to give more practical and realistic evidence.

3. Further studies should include more anthropometric measurements of the children in relation to their food intake to give more holistic results. Example, BMI with the percentage of body fat of children to compare with reference standards to assess the child's status.

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# APPENDICES

## APPENDIX A

## STRUCTURED INTERVIEW FOR PARENTS

**Dear parent,**

I am a student of UCC pursuing Mphil in Home Economics (Food and Nutrition). I am conducting a research on menu components of under five year children and the socio-economic background of their parents as part of my academic work. I would be grateful to you if you could participate by answering the following questions for the research. Your privacy is protected, and every information you provide will be used sorely for the research. Thank you. Signature: ..... Thumb print: .....

**SECTION A: ANTHROPOMETRIC MEASUREMENT OF CHILDREN**

1. Sex of the child. Male [ ] Female [ ]

2. Age of the child (months) ……..…….

3. Weight of the child (kg) ……

4. Height of the child (cm) ……

**SECTION B: BACKGROUND CHARACTERISTICS OF PARENTS**

***Instruction: Mark [ √] or state where needed the box corresponding to your choice concerning each statement below:***

5. Mother's age? .....……

6. Mothers highest level of education attained

a. No formal education [ ] b. basic education [ ] c. Secondary Education[ ]

d. Vocational Training [ ] e. post secondary [ ] f. Tertiary Education [ ]

7. Father's highest level of education attained

a. No formal education [ ] b. Secondary Education [ ]

c. Post Secondary [ ]

d. Vocational Training [ ] e. Secondary Education [ ]

f. Tertiary Education [ ]

8. Marital Status

a. Single [ ] b. Married and living together [ ]

c. married but not staying together [ ] d. Divorced [ ]

d. Widow [ ] e. Cohabitation [ ]

9. Religion

a. Christian [ ] b. Muslim [ ] c. Traditional [ ]

d. Others (specify) ……

10. Mother`s occupation

a. unemployed [ ] b. apprentice [ ] c. trader [ ]

d. farmer [ ] e. self-employed [ ]

f. government worker [ ]

g. others (specify) ……

11. Father's occupation

a. unemployed [ ] b. apprentice [ ] c. trader [ ]

d. farmer [ ] e. self- employed [ ]

f. government worker [ ]

g. others (specify) ……..…..

12. Mother's monthly income

a. less than ¢50 [ ] b. above ¢50 - ¢300 [ ]

c. above ¢300 - ¢600 [ ]

d. above ¢600 - ¢800 [ ] e. above ¢800 [ ]

13. Father's monthly income

a. less than ¢50 [ ] b. above ¢50 - ¢300 [ ] c. above ¢300 - ¢600 [ ] d. above ¢600 - ¢800 [ ] e. above ¢800 [ ]

14. How many children do you have? ……..

15. How many of them are less than five years? …….

16. How many people do you feed in your household? .....

**SECTION C: MENU COMPONENTS OF CHILDREN.**

17. Did you ever breastfeed this child/children?

a. Yes [ ] b. No [ ]

18. Is the child still breastfeeding?

a. Yes [ ] b. No [ ]

19. When did you start breastfeeding your child after birth?

a. less than 30 minutes [ ] b. one hour [ ] c. two hours [ ] d. three hours [ ] e. above four hours [ ]

20. Which of the following do you practice? Please *Tick (√) as many as applicable*

a. Exclusive breastfeeding? (6 months) [ ] b. Breastfeed the child for 18 month [ ] c. Breastfeed the child for 24 months [ ] d. Breastfeed the child beyond 24 months [ ]

21. When did you start weaning the child?

a. Before 6 months [ ] b. At 6 months [ ]

c. 7 – 12 months [ ] d. After 12 months [ ]

22. When did you start giving the child complementary diet?

a. Before 6 months [ ]

b. 6 months [ ]

c.7 – 12 months [ ]

d. After 12 months [ ]

23. What type or groups of food do you give to your child? *Please tick as many as applicable*

a. cereals and grains (eg: corn, rice wheat, millet, oats) [ ]

b. fruits and vegetables (eg: cabbage, orange, mango, banana, okro) [ ]

c. animal and animal product (eg: meat, fish, egg etc) [ ]

d. roots and tubers (eg: yam, cassava, cocoyam, potato) [ ]

e. legumes and nuts(eg.agushie, neri, groundnut, beans) [ ]

Others (specify)…….....

24. From question 23, which of the selected foods dominate in the child's diet? *tick as applicable*

a. cereals and grains (eg: corn, rice wheat, millet, oats) [ ]

b. fruits and vegetables (eg: cabbage, orange, mango, banana, okro) [ ]

c. animal and animal product (eg: meat, fish, egg etc) [ ]

d. roots and tubers (eg: yam, cassava, cocoyam, potato) [ ]

e. legumes and nuts(eg.agushie, neri, groundnut, beans) [ ]

others(specify)…….

25. Have you received any education on the following?

Breastfeeding

Yes [ ]

No [ ]

Inclusion of fruits and vegetables in the diet.

Yes [ ]

No [ ]

Complementary feeding.

Yes [ ]

No [ ]

26. What is the immunization status of your child?

a. No routine immunization [ ]

b. Partially immunized [ ]

c. Fully immunized [ ]

27. Did your child experience diarrhoea in the last 2 weeks?

a. Yes [ ]

b. No [ ]

Respond to the following statements by ticking [√ ] the column that best represent your view on the extent to which you **Strongly Agree (SA), Agree (A), Neutral/ (N) Disagree (D), Strongly Disagree (SD)** to the questions**.**

| **Read And Answer as Applicable** | **SA** | **A** | **N** | **D** | **SD** |
|---|---|---|---|---|---|
| 28. Exclusive breastfeeding should be less than six months | | | | | |
| 29. Babies can be fed with water alongside breast milk within the first six months. | | | | | |
| 30. Complementary foods should be given within the first six months | | | | | |
| 31. children need to consume more protein foods (fish and, or meat) than adult | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 32. Adults need to eat more fruits and vegetables than children | | | | | |
| 33. Children do not need to eat more food than adult | | | | | |

## APPENDIX B
## WHO GROWTH REFERENCE FOR CHILDREN.

Reference values for height-for-age, weight-for-age and body mass index-for-age at 5 years by sex for the 1977 and 2007 references, and the WHO Child Growth Standards

| | 1977 reference | 2007 reference | WHO standards* | 1977 reference | 2007 reference | WHO standards* |
|---|---|---|---|---|---|---|
| Z-scores | Boys | | | Girls | | |
| Height-for-age (cm) | | | | | | |
| -3 SD | 96.1 | 96.0 | 96.1 | 95.1 | 94.9 | 95.2 |
| -2 SD | 100.7 | 100.6 | 100.7 | 99.5 | 99.6 | 99.9 |
| -1 SD | 105.3 | 105.2 | 105.3 | 104.0 | 104.3 | 104.7 |
| Median | 109.9 | 109.7 | 110.0 | 108.4 | 109.1 | 109.4 |
| +1 SD | 114.5 | 114.3 | 114.6 | 112.8 | 113.8 | 114.2 |
| +2 SD | 119.1 | 118.8 | 119.2 | 117.2 | 118.6 | 118.9 |
| +3 SD | 123.7 | 123.4 | 123.9 | 121.6 | 123.3 | 123.7 |
| Weight-for-age (kg) | | | | | | |
| -3 SD | 12.3 | 12.6 | 12.4 | 11.9 | 12.2 | 12.1 |
| -2 SD | 14.4 | 14.2 | 14.1 | 13.8 | 13.8 | 13.7 |
| -1 SD | 16.6 | 16.1 | 16.0 | 15.7 | 15.8 | 15.8 |
| Median | 18.7 | 18.3 | 18.3 | 17.7 | 18.1 | 18.2 |
| +1 SD | 21.1 | 20.9 | 21.0 | 20.4 | 21.0 | 21.2 |
| +2 SD | 23.5 | 23.9 | 24.2 | 23.2 | 24.5 | 24.9 |
| +3 SD | 25.9 | 27.5 | 27.9 | 26.0 | 29.1 | 29.5 |
| Body mass index-for-age (kg/m2)** | | | | | | |
| -3 SD | - | 12.1 | 12.0 | - | 11.8 | 11.6 |
| -2 SD | - | 13.0 | 12.9 | - | 12.8 | 12.7 |
| -1 SD | - | 14.1 | 14.0 | - | 13.9 | 13.9 |
| Median | - | 15.3 | 15.2 | - | 15.2 | 15.3 |
| +1 SD | - | 16.6 | 16.6 | - | 16.9 | 16.9 |
| +2 SD | - | 18.2 | 18.3 | - | 18.8 | 18.8 |
| +3 SD | - | 20.1 | 20.3 | - | 21.3 | 21.1 |

WHO Child Growth Standards for 0-5 years of age.
Source: World Health Organization (2007)

## APENDIX C

## KEY WORDS

Children

Dietary

Menu Components

Parents

Socio-Economic Background

Upper West Akim