RELATION OF DIETARY AND SOCIOECONOMIC CHARACTERISTICS OF MOTHERS TO CHILD GROWTH IN SABON GARI LOCAL GOVERNMENT AREA, ZARIA, NIGERIA

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DEDICATION

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ABBREVIATIONS

Protein-Energy Malnutrition	PEM
Sub-Saharan Africa	SSA
World Health Organization	WHO
United Nations International Children's Fund	UNICEF
Packed Cell Volume	PCV
Food and Agricultural Organization	FAO
Local Government Area	LGA
Federal Government of Nigeria	FGN

CHAPTER I

INTRODUCTION

Background Study of Zaria Local Government Area in Kaduna State of Nigeria

Nigeria has the largest population of any country in Africa (about 140 million), the greatest diversity of cultures, ways of life, cities and terrain, and a total land area of 923,768 sq. km (356,668 sq. miles). Its coastline, on the Gulf of Guinea, stretches 774 km (480 miles). Nigeria shares its international border of 4,470 km (2513 miles) with four neighbors: Chad, Cameroon, Benin, and Niger. The capital of Nigeria is Abuja. Nigeria lies within the tropics but still has climate variations. In general, there are two seasons, dry and wet, throughout Nigeria. The wet season lasts from April to October and the dry season from November to March (NDHS, 2000).

Zaria in Kaduna state is rich in cultures and is also respected in the northern states of Nigeria as a center of learning. The people of Zaria are predominantly Muslim and their culture and ways of life are based mainly on Islamic law. Farming is the major occupation and the climate favors the planting or cultivation of cereals like maize, sorghum, wheat, and rice, and roots and tubers like cassava, sweet potatoes and yams. Hausa is the major language of the people of Zaria and it is spoken by almost 90% of the population. Most of the

women are housewives who, even though they are mostly in seclusion, are involved in petty trading like selling of cooked or raw foods through their children (NDHS 2000).

For any country to thrive and be productive, it must have a healthy population as malnutrition leads to reduced productivity which hampers economic growth and the effectiveness of investments in health and education (Black 2003). Women in developing countries suffer from malnutrition during pregnancy and lactation due to inadequate food intake, and also because culture and tradition give a woman the provider role .Thus women frequently have to deny themselves food in order to meet the families' needs first (NDHS 1990). About a third of women in sub-Saharan Africa have an inadequate daily calorie intake and 60-70% of pregnant women are anemic due to improper nutrition (Cosminsky, 1993).

Women also are malnourished due to superstition, ignorance or illiteracy. They may have limited knowledge of food combinations for themselves and their children. For instance, during pregnancy certain foods are avoided so that they will not affect the health of the mother and baby. It is claimed that if women eat yams or bread, the children will be fat and that if mothers drink a lot of milk their babies will behave like cows. Some even say that eating too many vegetables will make the child behave like a goat. It is believed that a suckling child will become a thief if the mother or the child is allowed to eat eggs.

Nigeria has a high rate of maternal mortality, with 800 annual deaths from pregnancy complications per 100,000 live births. (UNICEF, 2002). In industrialized countries the average maternal mortality is 13 per 100, 000. Nearly 600 000 women die every year from pregnancy related conditions and the maternal mortality rates (MMR = deaths per 100 000 live births) in developing countries may be as high as 1000 compared with less than ten in industrialized countries. (Tomkins 2001, Black 2003). The nutritional status of a woman before pregnancy can determine the survival of her future children particularly for women who have experienced protein-energy malnutrition at some time in their lives (Wynn et al, 1991). This is because women who had suffered one form of malnutrition or the other are likely to have malnourished children.

Statement of the problem

Each year thousands of Nigerian women die from pregnancy-related problems. While some of these deaths result from unsafe abortions, in the rural areas and urban slums, it is inadequate nutrition that sends many mothers and children to their early graves (FOS, 1999). Due to heavy dependence on carbohydrates which subsequently leads to malnutrition, coupled with inadequate dietary combinations, many mothers suffer from complications that lead to their death. If the mothers are lucky enough to survive, their children still may be deficient in essential nutrients leading to a high infant mortality. However, this problem is preventable if available foods (nutritionally balanced) can be obtained locally at little or no cost. The crisis is that women in the vulnerable areas lack effective knowledge of the nutrient composition of foods available to them and

how these can be combined to provide the essential amino acids, minerals and vitamins that would reduce maternal and infant mortality.

Research objectives

In order to determine a locally based nutrition package, the following objectives were developed for the study:

- To assess the relation between socioeconomic factors affecting maternal nutrition and the health status of children in Sabon Gari Local Government Area, Zaria.
- To develop baseline data that will serve as a nutritional guide for use in order to educate women on locally available food sources.
- To provide data which could form the basis of regional policy change and which could spur further research work in the area of using local resources to solve pressing nutritional problems among women.

Justification of the study

Apart from achieving the objectives of the study, there is also no reported work on locally available food sources for safe motherhood and optimal child health that has been done in Sabon Gari Local Government Area. What exists is a national nutritional guide for children and lactating mothers. There are a lot of taboos, superstitions and misconceptions about nutrition related problems within the Local Government Area. For example, chronic cases of malnutrition which occur amongst children in the months of June to August are referred to as the 'rainy season' disease. Similarly, most children are also introduced to complementary foods before the recommended age of six months, which will

also have some adverse effect on them. Lastly studying the nutrition of this underserved segment of the population with their full participation is important in policy formulation as policies not derived from the shared understanding of all stakeholders are bound to fail.

Research questions:

1. What factors contribute to malnutrition amongst children and to the social economic status of women in Sabon Gari Local Government Area, Zaria?
2. Are there relations between maternal occupation, income and literacy, and child health status?
3. Is unavailability of foods that are affordable and accessible related to the incidence of child malnutrition?
4. Are there taboos and superstitions that affect feeding?

Assumptions

This study is undertaken on the assumption that all the questions raised were answered truthfully and also that the proper questions to identify socioeconomic and health problems among mothers and infants were asked. The study also assumed that the measurements were accurate and that the sample size is an adequate reflection of the situation of dietary and socio-economic characteristics of the Local Government Area. It is therefore assumed that the study will help women and children and the entire household eventually, because there is a popular adage in Nigeria that says if you educate a woman, you educate a family and a nation.

CHAPTER II

REVIEW OF LITERATURE

This chapter reviews literature and theories related to the issues of diet and malnutrition. Malnutrition is usually a result of a combination of inadequate dietary intake and infection. In children, malnutrition is related to growth failure; malnourished children are shorter and lighter in weight than they should be for their age, and this comes as a result of improper feeding (Anonymous, 1999). Many infants in Sub-Saharan Africa (SSA) begin to receive cereal-based supplemental foods well before the recommended age of 6 months (UNICEF, 1995). The foods offered are monotonous and bulky, and rarely cover the shortfall left by breast milk in providing the energy and nutrients required to support rapid growth, build nutrient stores and assure resistance to infection (Adelheid, 2003).

Malnutrition is a condition that develops when the body does not get the proper amount of protein, energy (calories), vitamins, minierals and other nutrients it needs to maintain healthy tissue and organ function. It occurs in children who are either undernourished or overnourished. In this study, undernourishment is the issue.

Under nutrition is a consequence of consuming too little of essential nutrients, or using or excreting nutrients more rapidly than they can be replaced. Malnutrition is often associated with infections and diseases and may intensify the effects of every disease. Severe malnutrition is most often found in developing countries, and a child suffering from malnutrition is usually deficient in a variety of nutrients (Kleinman et al, 2003). It has been estimated that 50% of the children in some developing countries may be suffering from malnutrition. A number of women in developing countries also suffer from malnutrition (WHO, 1989, UNICEF, 1995).

Eating well is not difficult in principle; all that is needed is to eat a variety of foods that supplies appropriate amounts of important or essential nutrients to the body. The difficulty is how to get used to this principle and put it into constant use or practice. The task is not an easy one considering all the people who are malnourished or the tens of thousands of women and children in Nigeria who have nutritional deficiencies (Hamilton, 1993).

As Hamilton notes of the case in the USA which is also applicable to where there is availability of foods, even when there is greater variety and freedom of choice in the local stores and farms than ever before, such freedom comes with both risk and responsibility. In most cases some of the foods needed for a balanced diet are locally available within the Local Government Area in Nigeria, but other factors such as ignorance and socioeconomic considerations make it difficult for mothers to make the right dietary decisions. A mother will

have to make the right choices to avoid the problem of malnutrition for herself and her child.

The role of good nutrition in maternal and child health

Good nutrition is the foundation for healthy development. Furthermore, nutrition and poor health are part of a cycle: poor nutrition leads to poor health and poor health causes deterioration of nutritional status. There are three mechanisms by which maternal nutrition and metabolism affect the health of offspring; first, early exposure could have effects on the developing embryo. Secondly, during organogenesis, these environmental effects might alter the number and function of cell types in the heart and other vital organs in the body, predisposing children to diseases. Thirdly, even when fetal organs have been formed, maternal nutrition and metabolism could still impact the regulatory set points by which they function (Kunz & King, 2007).

Maternal nutrition and metabolism are linked with long term health of children because the quality of food determines the extent of nourishing material for the body. Maternal nutrition and metabolism could also determine the breakdown of food or drink into nutrients and influence how nutrients travel through the bloodstream to different parts of the body where they are then used as “fuel” and for many other purposes. This underscores the necessity to provide the body with proper nutrition which ensures that for a child, there is rapid growth in all the cells of the body while for a mother tissues are constantly repaired and

maintained. The right nutrients or foods are important for all these changes in the cells (Grigsby, 2006, Rickets, 1986).

The health and nutritional status of mothers and children are intimately linked. Improved child feeding begins with ensuring the health and nutritional status of women, in their own right, throughout all stages of life and continues with women as providers for their children and families. Mothers and children form a biological and social unit; they also share problems of malnutrition and ill health. Whatever is done to solve this problem concerns both mothers and children together. (Ottesen, 1998)

Women's Advocate (the Nigerian based newspaper) in 2006 reported 800 deaths per 100,000 maternal deaths indicating the severity of the condition of women. As the report observed, maternal deaths in the country result from preventable causes including ignorance, myths, cultural barriers, poor road networks, lack of access to both health services and skilled birth attendants, mismanagement of pregnancy, illiteracy and poverty. Other contributing factors are inadequate functional utilities, especially electricity, drinking water and transportation systems. (WHO, 1995)

Prevalence of protein energy malnutrition (PEM)

Malnutrition is defined by the World Health Organization (WHO) as the cellular imbalance between supply of nutrients and energy and the body's

demand for them to ensure normal growth, maintenance, and specific tissue functions. Each year, it is estimated that around 12 million children die before their 5th birthday in resource poor countries and that 70% of these deaths are due to diseases and or malnutrition (Lambrechts et al, 1999, WHO, 1998).

Malnutrition affects all age groups, but has been implicated in more than 50% of all child deaths in developing countries. According to a new World Bank report, malnutrition is costing poor countries up to 3% of their yearly GDP, while malnourished children are at risk of losing more than 10% of their life time earnings potential (FAO ,1996). The most common form of malnutrition is protein energy malnutrition. There are two types or forms of protein energy malnutrition (PEM): kwashiorkor and marasmus.

Marasmus involves inadequate intake of protein and calories, but a child with kwashiorkor has a fair calorie intake but inadequate protein intake. Marasmus affects children and adults, kwashiorkor affects or is commonly found in children and has been reported mainly in developing countries (Bender et al, 2003).

The primary origin of protein energy malnutrition is inadequate food intake while a secondary cause is as a result of diseases that lead to low food ingestion, reduced nutrient absorption or utilization, increased nutritional requirements and/or increased nutrient losses (WHO, 2006) The World Health Organization (WHO) estimates that around 300 million children have growth retardation related

to malnutrition. In many developing countries 20 to 75% of all children between 0-5 years of age suffer from protein energy malnutrition.

Protein-energy malnutrition, especially among young children, remains one of the principal health problems in the developing countries including Nigeria. It is estimated that in Nigeria 40% of the children who die under the age of five were severely malnourished. This is as a result of faulty weaning practice, poverty, low food availability, poor sanitary conditions, minimal medical attention and endemic childhood infection (Ebrahim, 1981, Nnakwe, 1995, Rice et al, 2000). Protein calorie malnutrition is also rampant among the adult population.

Muller et al (2005) have reported that 17-25% of Nigerian pregnant women are anemic. Low iron intake and /or infestation by intestinal parasites have been blamed as the major causes for the high prevalence of anemia. Iron, iodine, vitamin A, and protein energy malnutrition are the leading nutritional problems in the developing world today (Muller et al, 2003, Buyckx, 1993).

Determinants of nutritional status

Nutritional status of mothers and children is determined by a number of factors. The major determinants of nutritional status are nutrient intakes, infections and socioeconomic factors.

Determinants of a child's nutritional status are the child's dietary intake and health status. The role of the former is to provide the essential nutrients for child growth and development. The status of a child's health affects her or his

appetite and the absorption of nutrients in food eaten, which strongly affect nutritional status. In addition, factors such as a country's natural resource base, income and food availability are among the underlying determinants of child nutrition. Other determinants include: the quality of a household's health environment and the quality of care for children and their mothers e.g. feeding, immunization, prenatal and birthing care. (Haddad et al, 1997, 2003, Ottesen 2000)

Increases in food availability will lead to higher food intake for young children in households and, consequently, improved nutritional status (Haddad et al., 1997). As Smith and Haddad point out, it is also true that the developing countries with the highest per capita dietary energy supplies (DES), the standard measure of national food availability, tend to have the lowest child malnutrition rates (Smith & Haddad, 2000). Further, looking from1970-1995 the developing country per-capital DES increased by 22% (from 2092 to 2559 kcal), while the percent of malnourished children declined considerably, from 46.5 to 31%.

Smith et al (1999) also observed that at the extreme are those who have little faith in the ability of increases in aggregate food availability to improve child nutrition. These peoples' arguments are bolstered by the fact that over two-thirds of malnourished children live in countries with adequate food supplies to meet their population's dietary energy requirements. They point to problems of poverty and food access and to non-food factors, such as children's health and the quality of their care, as more crucial constraints to improved child nutrition.

In this group of scholars are Bouis and Haddad, (1990) and von Braun et al (1989) who argue that increased income and nutrient intake are the most important determinants of nutritional status. The body is built, controlled and maintained by the interaction of nutrients and because of this a healthy and varied diet is important at all times in life, particularly in the life of a mother and a growing child (Williamson, 2006). Since a regular and adequate supply of nutrients is essential to health, if there is shortage of nutrient supply to meet the body's requirements, development is delayed, and maintenance is slowed which in turn affects physiology and anatomy, and can lead to disease and even death.

Infection and malnutrition

Dallman et al (1984) confirmed that inadequate iron intakes lead to anemia with packed cell volume (PCV) and hemoglobin concentration. Donald (1991) also reports that (protein energy malnutrition) is particularly serious in the post-weaning stage and is often associated with infections. The most common diseases associated with severe protein energy malnutrition are respiratory infections, diarrhea and vomiting. The report also suggests that protein energy malnutrition has lasting effects on growth and development of children.

In the year 2000, 10.8 million children under five years of age died, over half of them due to communicable diseases compounded by malnutrition. Malnutrition has been responsible, directly or indirectly, for 60% of the 10.9 million deaths annually among children under five (Black 2003). Over two thirds of these deaths are also associated with inappropriate feeding practices and

occur within the first year of life. Malnourished children who survive are more frequently sick and suffer the life long consequences of impaired development (Hatloy, 2000). For instance, in some communities, colostrum, the initial breast milk rich in protein and antibodies, is traditionally discarded because of its color, while this is actually an important food for infant's health

Infection also hinders the body's effective utilization of nutrients in a number of ways, including increased rates of catabolism and diversion. Susceptibility to infection is linked to poor living conditions and sanitation. Malnutrition complicated by infection interferes with the growth and development of the child and can lead to growth retardation. It can also account for low productivity since malnourished children may grow into adults who do not have full energy capacity as adults thereby creating a vicious cycle (UNICEF, 1998, FAO, 1997).

A poor diet, frequent acute and chronic infections, repeated pregnancies, prolonged lactation and a heavy burden of work also contribute to the mother's depletion. Infection affects the nutritional status of mother and child in such a way that bacterial and other infections could lead to an increased loss of nitrogen from the body (King, 2003).

A profile analysis reveals that in Nigeria 52% of child deaths are attributed to protein energy-malnutrition (Muller et al, 2003). Protein energy malnutrition weakens the immune system of children and reduces their ability to fight infection and disease which therefore makes them more vulnerable to infections (NDHS,

1990). For example, when excess nitrogen is excreted in the urine beyond the normal balance required, it can be an evidence of depletion of body protein from muscles as well as from the diet.

Other impediments to health include malaria parasites which affect the red blood cells reducing their number and thereby causing anemia. If allowed to fester, malaria causes fever and uses up nutrient stores which causing loss of potential energy (WHO, 1993) and appetite.

Children must have optimal growth and physical and intellectual development to learn and achieve their potential in society and so must be cared for nutritionally to avoid ill health. Achieving this requires both preventive and curative interventions at all levels and includes both improved health and education. Recent focus has been on health systems interventions that address averting deaths by cause for the 42 countries (the majority in sub-Saharan Africa) that account for 90% of worldwide under-5 deaths (Nnakwe, 1995) The belief is that improved health and nutrition will lead to enhanced economic development.

Socioeconomic status and nutritional status

Mother and child nutritional status are affected by socioeconomic factors, which in turn affect nutrient intake and the prevalence of infection. People in the higher socioeconomic level have more financial power and can afford whatever kinds of foods that are needed, and they also have access to environmentally better living conditions and therefore are less susceptible to infection and under nutrition (Onyango, 2003). In the lower economic sector, people are financially handicapped and can hardly afford adequate food. Their living conditions are also very poor as many people are crowded in very poor sanitary conditions and foods are handled in an unhygienic environment. Lack of food or food scarcity is a major problem in most parts of West Africa and in other developing countries (Smith, and Haddad 2000). Food is such a high priority for poor households that many may be tenuously "secure" but at a great sacrifice. Ocloo (1993) stated that three quarters of family income of many households goes for food only. Families who have members that are educated are economically buoyant and can afford more nutritionally balanced food compared to poor and rural families.

However Bouis and Haddad (1990) and von Braun et al (1989) state that increased income from raised productivity may improve the household's ability to purchase food but that the requisite health and sanitation inputs are usually not purchased. Haddad et al (2003) also state that malnutrition is associated with an inadequate diet, poor health and sanitation service and inadequate care for young children. Most of the time mothers are so busy on the farm that the child is

left in the care of another child who can barely look after him or herself. Thus the child may not be well cared for in areas of food intake and hygiene.

A combination of income growth and nutrition interventions are therefore suggested to adequately tackle this issue.

Causes of malnutrition

Developing countries that invest in better nutrition for mothers and children get high returns on their spending by having a society that is productive. Eating is one of life's greatest pleasures. For most people, this pleasure is available several times a day, for others, the idea of eating evokes feelings of guilt and anxiety as most people, particularly women, may not have enough to provide for their families (Whitney ,1983).

Elaborating further, Whitney also observes that although Africans love children, the love is not matched by the provision of good feeding. Contrary to popular perceptions, malnutrition is not always result of having too little to eat. There are children living in households with plenty to eat and drink who are still stunted or underweight because of misguided child feeding and care practices, poor access to health services, and poor sanitation. In developing countries where malnutrition is widespread, human factors more than food production may be more responsible for its occurrence.

Pregnant and nursing women eat too few calories and too little protein and have untreated infection and disease that leads to low birth weight. The New

World Bank Report 2006 states that the most damaging effects of under-nutrition occur during pregnancy and in the first two years of life and the effect of this early damage on health, brain development, intelligence, educability and productivity are largely irreversible.

Mothers have little time to take care of their young children or themselves during pregnancy and in many countries mothers are reported to introduce children to other food before the age of six months. As Ojofeitmi (1982) notes, ignorance of the knowledge of nutrients for a balanced diet and inability to purchase the best type of food suitable for mother and child have been major causes of malnutrition.

Insufficient food intake affects the child principally as a result of one of these causes: the child is given little food and she or he is unable to get more. An example is restriction of intake of protein during illness or prolonged exclusive breast feeding. Secondly, sometimes a child is given enough food but the food is of inadequate quality for his or her needs and age resulting in low protein and energy density. For example, in Nigeria, the major staple foods are roots and tubers, which are bulky (not energy dense) and are low in protein. Improper feeding practices by the mother, such as unhygienic preparation or over-diluted formula or starch gruels give rise to early-age severe protein energy malnutrition in children (Fagbule, 1990).

In addition, mothers also feed children under the age of six months foods other than breast milk even though exclusive breastfeeding is the best source of

nutrients and the best protection against many infections and chronic diseases (Kakute et al, 2005). Breast milk is important to the child because it is hygienic, and an excellent source of energy, essential nutrients and water. It contains immune factors that are protective, thereby reducing child morbidity and mortality (WHO 2001, 2006).

Onyango (2003) states that in West African countries exclusive breastfeeding is usually adequate up to three to four months of age, but after this period, it may become increasingly inadequate to support the nutritional demands of the growing child. Thus in the weaning process, there is always the need to introduce soft, easily swallowed foods to supplement the child's feeding early in life.

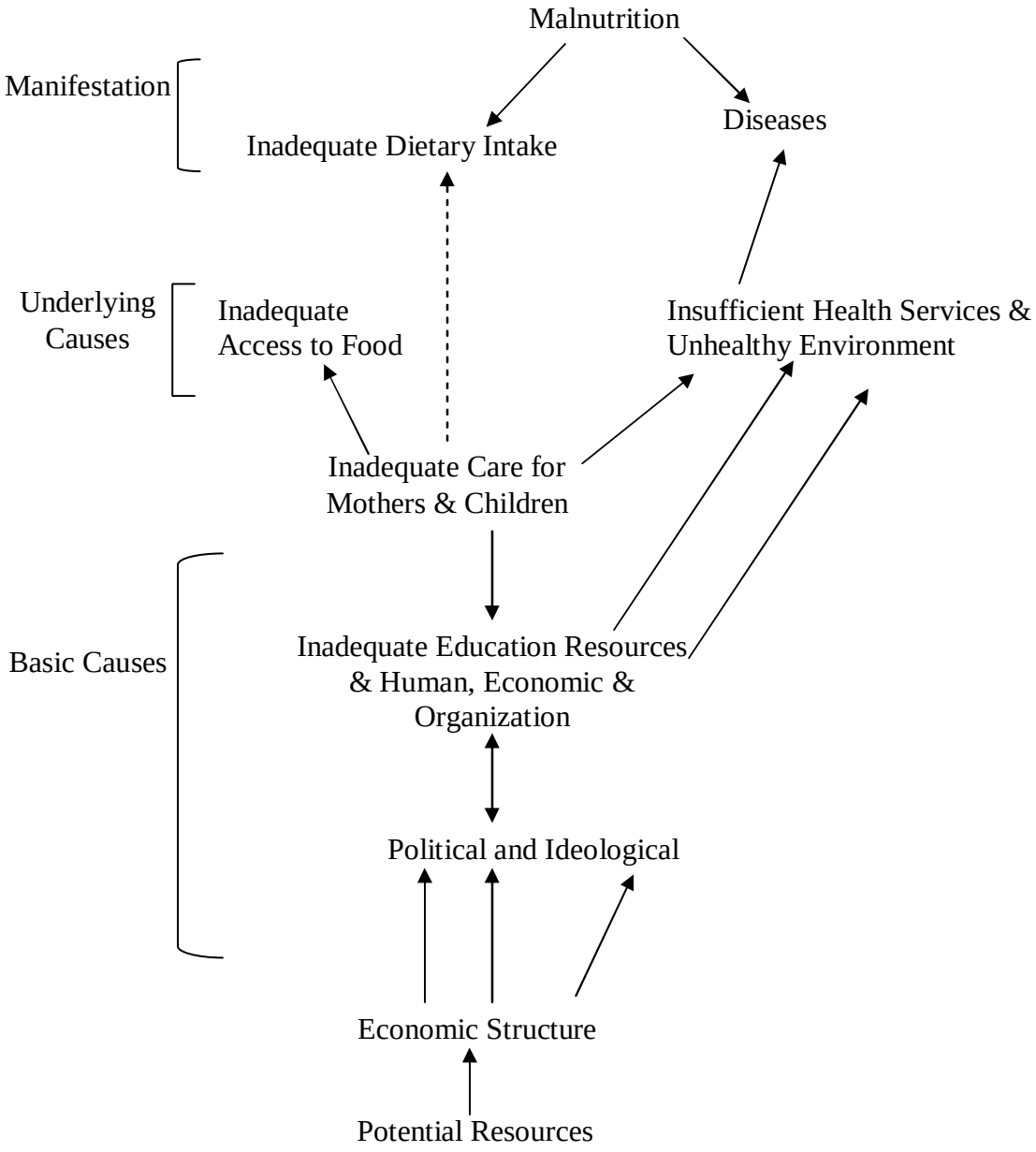
While the above is desirable, the low economic level of the country (poverty and size of the family) can also force mothers to purchase staple foods for the household at the expense of other specialty foods for infants. This has some nutritional effects or implications for the health of the weaned child and the household.

Another factor that compounds malnutrition is non-literacy and ignorance. Some women have no knowledge of the nutrient value of foods while some eat nutritious food occasionally and not as a matter of necessity. Ignorance means that even when nutrient-dense foods are accessible, they may not be eaten. Complementing ignorance is poor communication, poor transport and poor

distribution of food. All these contribute to malnutrition and determine the state of health of mother and child (Eide, 1984).

Added to the above is the fact that some countries grow enough food but do not have adequate storage conditions thereby leading to shortages of foods at some periods of the year. In other countries or even within the same country starvation could be occasioned due to natural disasters such as drought (Aguayo et al, 2005, Craufurd et al, 2006). Under such conditions nutrition for the mother and child is compromised.

Figure 1.1: CAUSES OF MALNUTRITION



Sources: FGN / UNICEF (1994)

Food fortification

Food fortification has been used to reduce some of the micronutrient deficiencies in Nigeria. An example is the fortification of table salt with iodine. In Nigeria, 90% of table salt sold is iodized (UNICEF/ NPC, 1995, Rao, 1994).

Fortification of sugar with vitamin A is been looked into by UNICEF and the federal government of Nigeria (UNICEF, 1995) Food fortification and supplementations are important ways of preventing malnutrition.

Nutrition education

Nutrition education is an important way of improving the health of mothers and children in Nigeria. Studies have shown that teaching with practical demonstrations is as important as providing food supplements (Adedoyin et al, 1991). Teaching with practical demonstration is also important because it will lead to better utilization of available food material through better selections of food items and better cooking practices and hygiene.

Diet diversity

All people need a variety of foods to meet requirements for essential nutrients and the value of a diverse diet has been long recognized. Lack of diversity is a particularly severe problem among poor populations in the developing world, where food or diet are based predominantly on starchy staples and often include few or no animal products and only seasonal fruits and vegetables. Individuals consuming more diverse diets are more likely to meet

their nutrients needs compared to individuals with little or no diversity (Ruel et al, 2004).

Diet diversification is important as most of the rural communities or families practice animal husbandry, plant or cultivate legumes and vegetable gardens and fish, but they sell almost all nutrient dense food, leaving children and women to suffer from micronutrient deficiencies and protein energy malnutrition.

For vulnerable young children, the problem is worse because they need energy and nutrient dense foods to grow and develop both physically and mentally and to live a healthy life. Because of this, food diversification is very important.

Malnutrition is common in developing countries because food or diet are frequently deficient in macronutrients (protein, carbohydrates and fat) causing protein-energy malnutrition and micronutrients (minerals and vitamins) causing specific micronutrient deficiencies or both (WHO, 2001, 2006, FAO, 2004, Henderson et al, 2003).

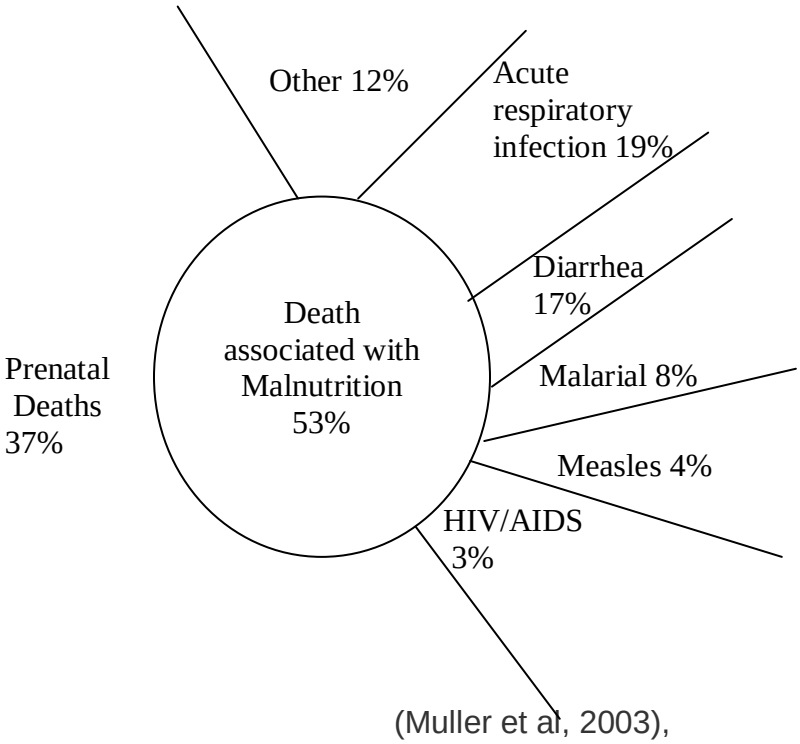
One of the major causes of malnutrition is poverty and so ways or methods to tackle malnutrition have to be very simple to be sustained in developing countries. Food diversification should be targeted towards home gardening and leaf protein extraction (Find your feet 1994). And again, introducing a change in the food habits of the people may not be an easy task

because of economic constraints, but the people can be educated on ways to solve their nutritional problems by using resources available within their means and localities.

Malnutrition and disease as a major cause of death.

Protein-energy malnutrition and micronutrient deficiencies continue to be major health burdens in developing countries. Micronutrient deficiencies and malnutrition remain globally the most important risk factor for illness and death with hundreds of millions of pregnant women and young children particularly affected (WHO, 1999). Apart from marasmus and kwashiorkor, deficiencies in iron, iodine, vitamin A and zinc are the main manifestations of malnutrition in developing countries, where prevalence of poor diet and infectious diseases form a vicious circle as people in the rural areas have little or no access to formal health services (Muller et al, 2005). The high prevalence of bacterial and parasitic disease in developing countries also contributes to malnutrition and in the same way malnutrition increases women and children's susceptibility to and severity of infections and is thus a major component of illness and death from disease. Malnutrition is therefore the most important risk factor for the burden of disease in developing countries. It is the direct cause of about 300,000 deaths per year and is indirectly responsible for about half of all deaths in young children (Black 2000, Black 2001, Muller et al. 2003).

Figure 1.2 Malnutrition and diseases



(Muller et al, 2003),

Other deficiency diseases common in the developing countries are rickets and endemic goiter which are clear sign of deficiencies or malnutrition on the health of mother and children and micronutrient deficiency which is also on the increase. Globally, 740 million people are deficient in iodine, including up to 300 million with goiter and 20 million with brain damage from maternal iodine deficiency during their fetal development (WHO 1995, Adelekan 2003, Muller et al, 2003).

It is estimated that two billion people are deficient in zinc, one billion have iron–deficiency anemia, and vitamin A deficiency affects some 250 million, mainly young children and pregnant women in developing countries (Black, 2003, Cook et al, 1998, Shali, et al 2004, WHO, 1995, UNICEF, 2003).

To reduce malnutrition and infection a variety of actions are needed including provision of safe drinking water and sanitation, education about and support for better diets, micronutrient interventions and special attention to the growth of the vulnerable such as women and young children including access to quality health services. Nutrition education should be about locally available protein foods and micronutrient-rich plants which are effective and sustainable. Also education on breast feeding practices and possible deficiency as a result of malnutrition on the health of mother and child may help reverse the culture of malnutrition (Aguayo, 2005).

An adequate and nutritionally well balanced diet is essential for a healthy and vigorous life of mother and child. The recommended daily allowances and other standards for daily intakes of nutrients are based on determinations of the women and child's needs and these needs are discovered by seeing what happens when they lack enough of the nutrient that is needed (Henderson et al, 2003).

A woman needs extra energy and protein to build up her body while awaiting pregnancy, for growing demands of the fetus and eventually for breast feeding. Women are also expected to take folic acid to reduce birth-defects in children or choose diets that can supply adequate amounts of folate. Her needs will depend on activity level and her nutritional state. A well nourished woman with light activity level will aim to increase intake by about 6 to 7 grams of protein per day during pregnancy for example. During lactation, if a mother‘s diet is

good, the child will thrive and grow well on her supply of breast milk. Therefore, both mother and child need a variety of foods to meet requirements for essential nutrients but not having a variety of diet or diversity especially within the poor segments of the population is a serious problem in the developing world, where most staple foods are roots and tubers and include little or no animal products and seasonal fruits and vegetables. Young children and mothers are more vulnerable because the child needs energy and nutrient dense foods to grow and develop both physically and mentally and the mother for pregnancy, lactation and healthy life (PAHO/WHO 2003, Hatloy et al 1998).

There are also major nutritional requirements at all ages in life. Infants between the ages of 0- 6 months of age need exclusive breastfeeding because it contains all the nutrients required at this period, which is a period of rapid growth and development. The breast milk initially contains enough iron for the child but as the child grows between six and twelve months milk becomes inadequate in iron. The need for protein, thiamin, niacin, vitamin B6, B12, zinc, sodium and chloride increase, as they play important roles in metabolic function. (Henderson et al, 2003)

At the age of one to three years, children become very active and their rate of growth is very rapid too (first year of life). At this time, energy–dense diets, like whole milk are needed and also care must be taken concerning the amount of fiber eaten. If there is too much fiber, the danger is that the child will not eat enough food to meet energy needs for proper growth. There is also the

need for protein, vitamins and calcium, phosphorous and iron and other needed minerals. At the age of four to five years, energy needs or requirements will increase and a higher need of protein, vitamins and minerals as this contributed to children growing well. (Henderson et al, 2003).

Taboos and food habits

There may be a variety of cultural factors compounding the dietary deficit experienced by rural women. For example, men may have the opportunity to eat a wider variety or better quality of foods outside the home, such as in cafes or local restaurants, or there may be an unequal distribution of food within households. Women may be trained to show restraint in eating, to give the best foods to men, or to allow others in the family to eat first (Ottesen et al, 1999, lado, 1992, Aunger, 1994).

Some rural women are also obligated to follow cultural practices, such as food taboos that curtail their access to calories and specific nutrients. Many of these taboos are more stringent for pregnant and lactating women, just at a time when their nutritional requirements are greater. Such cultural norms have obvious repercussions for the health of reproductive-aged women and their children because they have lasting implications for the total number of children women can conceive and bear, as well as those that can survive to adulthood. (King, 2003, Lockitch et al, 1996).

Knowledge of food value should be a guide to wise food selection decisions. We select food stuff in terms of quality and nutritive value instead of selecting for quantity or size. However, some foods have taboos associated or attached to them, which prevents their selection, though most people have their likes and dislikes and their beliefs about food taboos. Women in some parts of Nigeria have more food taboos during pregnancy and lactation like snails and meat from wild animals. Animal milk is commonly consumed and liked by many people in Asia, Africa, Europe and America but rarely taken in China. Lobsters, crabs and shrimps are considered delicacies and prized foods by many people in Europe and North America but revolting to many people in Africa despite the nutritive value or content of these foods (FAO 1997, Lado, 1992, Laughlin 1974, Maher, 1981).

Religion also plays an important role in the consumption or eating of some food. Rejecting one type of food or the other not minding the health benefits or nutritive value of it has negative effects on maternal and child health e.g. forbidding adherents from eating cat fish because it has no scales by Jehovah's Witness or from eating meat not slaughtered or killed in accordance with religious rites as practiced in Islam. Religious restrictions therefore prevent mothers and children from having a balanced diet which may eventually lead to malnutrition or deficiency in certain nutrients.

A study by King shows clearly that malnutrition in many social groups could be as a result of cultural practices rather than lack of food or unavailability

of food and that taboos prevent pregnant women and children from getting sufficient protein in many parts of Africa (King, 2003). Some foods have such emotional significance or attachment that they are eaten in large quantities to the exclusion of other needed foods. Another study by Udoh, demonstrates that there are instances among all people where customs and beliefs regarding foods prevent the consumption of adequate diets and thus lead to malnutrition. In most cases, the beliefs lead to the avoidance of protein foods by the vulnerable groups such as mothers and children (Udoh, 1982). The reasons behind taboos are faulty and the resulting habits may also lead to serious undernutrition or malnutrition.

Household income, maternal education, family size and malnutrition

Household income is defined as a flow of commodities and services available for the satisfaction of human wants and needs over a given period of time, while family size is the number of people within the household (Gesler, 1996). The improvement of living standard of the poor through the accumulation of human capital is often regarded to be the objective as well as a means to economic development. Incidentally, Nigeria like many sub-Saharan Africa countries has been experiencing a decline in standard of living (FOS, 1999).

Wise food selection is indispensable to economical spending of the allowance of a household. Increase in income is important for reducing malnutrition. Bigger incomes at the household level allow families to spend more

on food, clean water, hygiene and preventive and curative health care. It helps them have a diversified diet, better child care arrangements and at the community level, more income means better quality health care as well as improved water and sanitation systems (Fotso et al, 2005).

Household income is one of the factors that has a great effect on the choice of food. What people or some families eat is not necessarily what they want to eat. Factors determining income use of families, especially for mother and child, include: the number of people in a household (family size), the man's life style, storage facilities such as grain bins, cooking utensils, tax and house rent, the mother's ability and interest in meals, medical bills, electrical bills, cost of food and mother's education (Fotso, 2006). Education may increase total family resources, cost of time, and also residually affect preference for family size. Given the total resource cost and technology, parental education has income effects on the household and hence the resources available for rearing the children (Stratus, 2001; Handa 1999, 2000).

As many studies attest, increased education of any women in the household can have a positive impact on child nutrition. A study by the World Bank (1975) shows that children from larger households in Nigeria are more vulnerable to malnutrition. The role of education, especially girls' education, in improved health and nutrition status of children and birth spacing is now clear. Increases in female status and education have been estimated to account for half of the reduction in child malnutrition rates during the past 25 years (Darnton-Hill,

2006). Women's education offers leverage for improving child health through the provision of more effective parental care in the home and ensuring the use of treatment services from the health care system. It may also contribute to delayed child bearing, longer birth interval and fewer children as well as improved opportunities to pursue work outside the home and to generate additional household income (Alderman et al, 2006).

Mother's education plays a facilitating role of ensuring that women make maximum impact (Engle et al, 1999). For example, educated mothers may have better paid jobs and are thus able to earn a higher income and take better care of their children. They can also reside in areas where there are functioning social infrastructures, have a commendable culture of hygiene to protect children from diseases, and possibly participate in child health enhancing programs like immunization.

Women produce 60-80% of all foods grown in sub Saharan Africa (FAO, 1996) yet they suffer disproportionately from hunger and malnutrition. Women grow a large share of the world's food for domestic consumption. Also when they have income, they spend it more on food for the household than men. So a woman's direct access to income or production, or lack of it, has bearing on how much the family will have to eat. Household income and education of the mother or both parents are important in a household, as household income determines the level of expenditure on purchases of nutritional foods as well as other goods and services and the welfare of the household in general. While

education of parents influences children's nutritional status, it enables the mother or other caregivers to provide more informed nutritional care to children and other household members.

Food affordability, consumption patterns and malnutrition

The Rome Declaration on World Food Security (1996), defines food availability as "food that is available at all times, to which all persons have means of access, that is nutritionally adequate in terms of quantity, quality and variety and is acceptable within the given culture". Food availability, affordability and consumption patterns are related because sometimes drought and weather may cause food not to be available, and if food is not available, purchasing and consumption and hence malnutrition prevalence are affected. Environmental factors such as deforestation, rainfall and salinization impact heavily on food production in Africa. A Food and Agricultural Organization (FAO) study has predicted that climate change will cause severe drought in African. The right to an adequate standard of living including food is recognized in the universal declaration of human rights (Eide, 1989, FAO, 2004).

Food security is a basic need in any development policy but achieving this is a problem in most households in Nigeria because it has different dimensions. Common staple foods in most Nigeria homes are insufficient and do not contain the basic nutrients to provide a balanced diet. Because of this there is malnutrition in most households (Abdullah, 1999).

Another aspect is that the results of unavailability of basic needs of life, such as sub-standard health care facilities, absence of good drinking water poor sanitation level, illiteracy and disease, reduce the level of productivity of most households and their ability to utilize food to the fullest benefits. The after effects of this problem lead to reduced purchasing power and consumption patterns and hence are manifested in malnutrition and poverty all year round especially when most of the population practices subsistence farming.

Fighting or preventing malnutrition

Malnutrition, be it in the form of protein energy malnutrition or micronutrient deficiencies, affects the life of individuals and eventually the larger society. Because of this, various methods have been used to reduce or fight the problem of malnutrition. Methods to reduce malnutrition include government polices, specific agricultural programmes, nutrition surveillance, food fortification, population education, public health programs and nutrition education. Most of these areas are best handled by the national government and international agencies like WHO and UNICEF (Clausen et al, 2005, Handa 2000)

CHAPTER III

METHODOLOGY

Introduction

This study assesses the relation between socioeconomic factors affecting mother's nutrition and the health status of children in the Sabon Gari local Government Area Zaria. The study involved several visits to the communities and meeting and interacting with the women in those communities over a period of time. In order to have unrestrained access, the researcher linked with the community leaders in the communities .The participants/volunteers were drawn from five communities in Zaria.

Data were collected from women using a structured questionnaire (Appendix C). The study sample was made up of 100 mothers and 100 of their children from 0-5 years of age, using a convenience sample of women from the five villages. Data were compiled in an Excel spread sheet and analyzed using the SAS statistical package.

Table 1.3 Percentage of respondents from each village

Villages	Percentage	Number
Gabas	19	19
Sabon Gari	20	20
Kamachi	20	20
Kakuyayi	21	21
Makada	20	20
Total	100	100

The table shows that the 100 respondents were proportionately taken from each of the five villages. Each of the 100 respondents involved in the study had a child between 0-5 years whose nutritional status was evaluated using height and weight for age.

Research design

A survey was adopted for this study. It is a convenience sample and data were collected using a structured questionnaire.

Population

Both literate and illiterate women and their children formed the sample population of this study. The 1995 population estimate for Zaria local government area (LGA) of Kaduna state was 369,800 less than half of which are females. Out of this figure, 100 women and their children from ages 0-5 volunteered for this study.

Research team:

The team included the researcher and four trained nurses as research assistants from the Ahmadu Bello University Teaching Hospital, Zaria (ABUTH). The team reviewed the survey questions before administering.

Anthropometric measurements

Anthropometric measurements included age, height and weight of children from 0-5 years .The children were weighed by the four trained nurses from

ABUTH without clothing (See appendix D). Each child was weighed twice. The children's height was also measured to 0.1 cm using a measuring tape. The sex of the children was collected later by the research assistant using a code which was used to match up the names and sex of a child.

Structured Questionnaire:

The questionnaire contained a series of questions that solicited information from the respondents (women). The researcher visited the women in their homes for a closer observation on how they ate and their environment. The research assistants also read the questionnaire in the local language to the respondents and marked the response. The questionnaire contained 37 items relating to diet diversity, socio-economic status of mothers and health status of children.

Administration of instrument

Approval was sought from the communities' Chiefs and the Local Government Chairman and from the Oklahoma State University Institutional Review Board (IRB). A script describing the study and consent forms were also prepared and read to the respondents. They were made to understand that they could withdraw anytime they were not comfortable with the research. After this discussion, they were given the consent forms to sign if they wanted to participate in the research. The questionnaire was administered by the researcher with assistance from four staff nurses from Ahmadu Bello University Teaching Hospital, Shika, Zaria.

Procedure for data analysis

Data from the questionnaires were compiled using Excel software. The Statistical Analysis System (SAS) and the World Health Organization's (WHO) latest software for anthropometric measurements (2006) was used to calculate standardized z-scores for weight for height (WHZ), height for age (HAZ) and weight for age (WAZ) of the children. The information obtained from the respondents was organized and presented as percentages in frequency tables.

CHAPTER IV

RESULTS

Introduction

Data collected for this study were statistically analyzed and are presented in this chapter. The relationship between socio-economic factors and the health status of children in the selected villages within Sabon Gari Local Government Area of Kaduna State, in Nigeria has been investigated. In this chapter, the demographic characteristics of the respondents are presented in tables as frequencies.

Demographic characteristics of participants

Each of the 100 respondents involved in the study had a child whose nutritional status was evaluated. Among the demographic variables of the respondents selected for study were: age of the mother, weight and height of the children, age of meal introduction, immunization and the socio-economic characteristics of mothers.

Table 4. 1: Number of children living with the respondents.

Number of children		Number of Households
	1	14
	2	23
	3	23
	4	20
	5	4
	6	6
	7	4
	8	1
	9	2
	12	1
	13	1
	14	1
	Total	100

Most (80%) of the respondents had between one and four children living with them at the time of this survey. Respondents with more than four children were relatively few in this study.

Other variables of demographic nature also included in the questionnaire were history of child birth from the mother, household size, mother's educational level, occupation and income per month. The sizes of the different households of the respondents are presented in Table 4.2.

TABLE: 4.2 Household sizes of respondents

Number of persons in household		Frequency
	2	2
	3	14
	4	24
	5	21
	6	18
	7	6
	8	7
	9	4
	10	1
	11	2
	15	1
	Total	100

As indicated in the table, most respondents had between 3 and 6 persons in their households.

Table 4.3: Percentage of mothers who had lost a child

Mothers report of child deaths	Percent
Lost a child	47
Never lost a child	53
Total	100

Twenty percent of the mothers had lost one or more children before six months of age and 25 percent had lost one or more children between six months and 5 years of age (Table 4.4).

Table 4.4: Number of children lost and the age of death

Number of children lost	Before 6 months	6 months to 5 years
	Frequency	Frequency
0	80	75
1	15	17
2	1	4
3	2	2
5	1	1
6	1	1
Total	100	100

The 0 in the table reflects no child lost in that age category while the remaining number indicates the actual number of children that were lost by the respondents. The socio-economic characteristic of the mothers considered here in relation to the health of their children included the level of education,

occupation and income per month. In Table 4.5, the respondents are classified by their highest educational level.

Table 4.5: Classification of the mothers by their highest qualifications

Educational Level	Percent
No formal education	1
Islamic/primary	33
Secondary	52
Post secondary	14
Total	100

Most (52%) of the respondents had a secondary school certificate or what could be called the General Certificate of Education ordinary level (GCE O/L). Those with primary or Islamic education were 33% of the total respondents while 14% of them had post secondary school education. Only one of the respondents said she had no formal education. Based on discussions with them, most of them come to these communities by marriage and so received their education in their community of birth.

Table 4.6: Respondents Occupation

Occupation	Percent
No response	6
Trading	47
Farming	1
Food selling	13
Others	33
Total	100

Trading was the single dominant occupation accounting for 47% of the respondents. Another 13% of the respondents might be classified as traders, but they chose to distinguish themselves as food vendors and 6% of the respondents did not answer the question. The remaining 33% of the respondents were involved in what could be described as miscellaneous occupations. Some women classified as others said that they sell seasonally when there is farm produce.

Table 4.7: Reported income per month of the respondents

Monthly income	Percent
No income	19
N500-N1000	52
N1001-N2000	14
N2000-N3000	9
N3000-N4000	1
N4000-N5000	1
N5000-N6000	2
> N6000	2
Total	100

Table 4.7 indicates the income of the respondents per month. As indicated in the table, 19% of the respondents had no monthly income. Those who earned between N500 and N1000 accounted for 52% of the total respondents. Earners of income within the other ranges in the table were relatively small. This gives the indication that most of the respondents have relatively low monthly incomes which means they had little to be spent on food (N127= 1 USD (2007).

Table 4.8: Percentages of mothers who breastfed their child with colostrum

Feed baby with colostrum	Percent
Yes	91
No	9
Total	100

Immediate initiation of breast feeding, as indicated in Table 4.8 was not really a problem among the respondents since 91% of them said they fed their newborn infants with the first milk (colostrum) at birth. Only 9% of the respondents said they did not give this milk product to their children. A reason given for not feeding colostrum was that, it looks yellow in color and so they believed it was dirty and could not be good for the child.

The respondents who feed their babies with other foods apart from breast milk are tabulated in Table 4.9:

Table 4.9 Percentages of respondents who fed complementary foods between 1 to 2 months.

Type of food	Percent
No other food	95
Water/pap (Corn paste)	2
Formula milk	3
Total	100

Table 4.9 shows that 95% of the group did not give any complementary food in addition to breast milk as early as the first one or two months after birth.

In spite of this apparent knowledge of the importance of breast milk by the respondents, Table 4.10 illustrates that 68% of them reported introduction of some other foods to their child as early as 3 months.

Table 4.10: Other complementary foods given to the child (3months)

Other complementary food	Percent
No response	3
Any special food	68
No	29
Total	100

Among foods introduced are pap (corn paste), soybean meal, Bournvita (a cocoa beverage) and other beverages from tea products. As many as 5% of the respondents introduced these foods as early as one or two months after birth. However, half of them claimed they usually stop the use of such food when the babies have problems like diarrhea and apply such remedies as oral rehydration therapy and other self medications.

Some of the socio-economic variables investigated in the study were the number of times the respondents go to the market, whether respondents use their personal money for buying food items and the amount of money they spend in the market. Table 4.11 shows the frequency with which the respondents go to the market and Table 4.12 shows the amount of the respondents personal money spent at one time in the market.

Table 4.11: Number of times the respondents went to the market

No Times	Percent
No market	33
Weekly	67
Total	100

Some of the women in the study do not really go to the market for food items because of religious injunctions which confine them to the house. As indicated by Table 4.11, those (67%) who do go to market do so on a weekly basis. In Table 4.12, the amount of the respondents' personal money spent per trip is presented.

Table 4.12 Mothers use of their own money for food

Use personal money	Percent
No	57
Yes	43
Total	100

Table 4. 12 reveals that 43% of the respondents use their personal money to buy food and in Table 4.13 the amount of money used is displayed in the Nigerian naira (Currency).

Table 4.13: Weekly markets expenditure by respondents

Amount	Percent
No response	36
₦500-₦1000	64
Total	100

(N127= 1 USD (2007)

Observation also reveals that even women who do not go to the market usually spent some of their personal money for food. Table 4.13 shows the amount spent by the respondents who visited the market. Expenditures ranged between ₦500 and ₦1000 per week.

Table 4.14: Respondents who reported food taboos

Taboos	Percent
No	60
Yes	40
Total	100

Table 4.14 reveals that 40% of the respondents affirm that there are certain foods that they do not eat. Discussions with them showed that some of these foods, such as pork and snails, are forbidden by their religion. Pork is deemed to be unclean while snails are believed to make children lose control of their saliva. Furthermore, it is believed that a child whose mother eat snails will be slow to grow and sluggish like the snail. The type of lighting used by the respondents is presented in frequency and percentages in Table 4.15.

Table 4.15: Types of light used in the house

Type of light	Percent
Kerosene	93
Gas lamp	1
Electricity	6
Total	100

From the distribution in the table, 93% of the respondents used kerosene lamps in their houses while only one said they used a gas lamp. Only 6% said they had electricity in their homes. The respondents' sources of drinking water were mainly from wells of two types as indicated in Table 4.16.

Table 4.16: Sources of drinking water

Sources of water	Percent
Rain water	2
Bore hole	40
Ordinary well	58
Total	100

As indicated in the table, 2% of the respondents depended on rain water for their water supply while 40% of the respondents made use of a bore hole as their source of water. Most (58%) of the respondents said they depended on wells dug within their homes for their water supply. The types of toilet systems used by the respondents are tabulated in Table 4.17.

Table 4.17: Types of toilet systems available for the household

Toilet types	Percent
Flush toilet	4
Pit latrine	96
Total	100

The pit latrine clearly was the dominant toilet system. Only 4% of the respondents said they used a flush toilet. As illustrated in table 4.18, 18% of the respondents said they have farm land.

Table 4.18: Women's ownership of farm land

Land ownership by women	Percent
Yes	18
No	82
Total	100

As shown, 82% of the respondents had no farm land. The distribution of the socio-economic variables discussed above mainly point to the fact that most of the respondents are from low economic status in the society. For example, the kerosene lamp was the most common source of lighting the house among the respondents and the major source of water supply for the respondents was the ordinary well. The ordinary well provided the source of water for 58% of the respondents while 40% of the total respondents depended on the borehole. The dominant toilet system was the pit latrine. Most (96%) of the respondents made

use of a latrine while 4% of the respondents said they used a flush system. Only 18% of the respondents said they owned land. And 79% of the respondents said they had some livestock. Most of the respondents did not have farms or gardens because they were tenants and therefore had no land for such purposes.

In most (62%) of the cases couples lived in two rooms. Some (22%) lived in three rooms, made up of one as sitting area while the other two served as sleeping rooms. Those who lived in more than three rooms were relatively small accounting for only 16% of the total.

On the average, mothers could be said to have had 4 children at the time of this survey, and 47.0% of them claimed to have lost one or more children. Most of the children lost were before 6 months and 5 years after birth. The average size of each of the families was 6 persons per household.

Table 4. 19 Food security index

Food Security index	Frequency	Cumulative frequency
5	2	2
6	2	4
7	3	7
8	8	15
9	9	24
10	28	52
11	25	77
12	17	94
13	4	98
14	1	99
15	1	100

In the food security table, four questions (#23, 25, 26 and 27) from the questionnaire (Appendix C) were analyzed. These questions asked if they have to reduce the size of the meal, were eating the same kind of food because it comes from their farm, had no money to purchase food and whether, they have t have gone to bed hungry. When these questions were summed up, four answers of always will =4, often =8, sometimes=12, rarely =16 and never will equal to 20. These questions were on the scale of always, often, sometimes, rarely and never. Of the respondents15 % fell into always and often which shows incidences of food insecurity, while the remaining 17% fell into some times and the rest into rarely and never.

Food security as reported by respondents

In this section, the feeding pattern of the respondents is assessed in relation to the number of times they eat their meals or miss their meals, the type of food they eat and the frequency of consuming different foods. Table 4.19 presents the responses of the women on their food security

Table 4.20: Food security as reported by respondents (n=100)

Feeding pattern questions	Always	Very often	Some Times	Rarely	Never
1. How frequently can you not eat because there was no money to purchase food?	1	3	17	27	52
2. How frequently do you always have the food type you want to serve to your family?	57	11	32	-	-
3. How frequently do you and your children eat the same type of food for several days because it comes from your farm and it is available?	9	3	36	19	33
4. How often does your spouse contribute towards the purchase of food?	75	10	15	-	-
5. How often do you have to reduce the size of your child's usual meals for lack of money?	2	5	24	29	40
6. How often do your children go to bed hungry because there is not enough money to buy food?	-	1	6	25	68
7. How often do you have enough money to buy fruits and vegetables as part of the family meal?	28	8	55	5	4

As indicated in the table, 52% of the respondents claimed they have never gone to bed hungry because there was no money to purchase food for the family. The remaining 48% have at one time or the other gone to sleep without supper because there was no money to purchase food, albeit 27% said this was rare. As shown in the table, 57% of the respondents said they always had the food they want to serve to their family while 11% of them said they very often get such food and 36% said they sometimes get the food they want to serve to their families.

Only 33% of the respondents claimed they have never eaten consecutively the same type of food for several days. For 67% of the population involved in the study, they have at one time or the other depended on one type of food for several days because it either was from their farms or because it was the only food available in the house or because they could not afford other foods.

The responses on how often their spouses contributed towards feeding indicate that 75% of the husbands always contribute towards the purchases of food in their homes. Those who said their spouse often contributed were 10% of the total respondents while 15% of them reported that their spouses sometimes contributed to the purchase of food in their houses.

Most (69%) of the respondents, rarely or never reduce their children's food because of lack of money. And about 31% of the respondents reported various amounts of food reduction for children because of inadequate resources. In the same vein most (68%) of the respondents said that their children never have to go to bed hungry because there is not enough money to buy food and 25% of them said such an incidence is rare in their homes. Only 6% of the respondents

said their children go to bed hungry at times because there is not enough money to buy food for the family. However for some families, this was very often

From the distribution on item 7 in the table, buying of fruits and vegetables is not really a priority. For 55% of the respondents, fruit and vegetables were occasional items bought to supplement the family's meals. Only 28% of the respondents said they always buy fruits and vegetables. And for 4% of the respondents, money is never made available for fruits and vegetable at all.

The recommended immunizations are as indicated in Table 4.20. In the table, the columns with yes are those whose babies were immunized for the specified diseases.

Table 4.21: Frequency of major immunization of the respondents' children

Vaccination	Yes	No
BCG vaccine	53	47
DPT vaccine	-	100
Measles vaccine	10	90

Bacillus calmette-guerin (BCG) happens to be the vaccine that is taken while the baby is still within the first month of its birth. The high frequency for it shown in the table is due to the fact that those who deliver their babies in the hospitals were usually asked to check back at a specific time at which the BCG is administered. The lack of adherence to other immunizations could be attributed

partly to the low socio-economic status of the mothers and partly to their low income level. In some cases some mothers could not afford the necessary transport fare to the health care centre. And when what is considered a risk like the birth of the baby has been overcome, the burden of trying to get fare to the health care centre for immunization is not considered a worthy endeavor.

The types of food available and the frequencies at which they are consumed by the respondents are presented in Table 4.20. The table shows the rate at which the available types of foods were reported to be eaten by the respondents and their households during the week preceding the time of this survey. The number of days the food was eaten within the week is numbered from none indicated with 0 to 7 which means that such food was eaten seven times the week preceding this survey. (Appendix B**)** The frequency at which the food was eaten is expressed in percentage in the table. The most common food in the table is determined by its availability to the respondents. This is necessary to overcome the occasional incidence of eating certain foods which are really not affordable to the respondents but by accident became available.

Table 4.22: Food diversity table

Food diversity		N	%
Cereals	Yes	96	96
	No	1	1
Legumes	Yes	88	88
	No	9	9
Roots & yams	Yes	73	73
	No	24	24
Vitamin- A rich fruit	Yes	62	62
	No	35	35
Other-Fruit&Veg	Yes	97	100
	No	0	.
Meat	Yes	20	20
	No	80	80
Milk	Yes	31	31
	No	66	66
Eggs	Yes	88	88
	No	12	12
Fish	Yes	47	47
	No	63	63
Oil	Yes	92	92
	No	5	5

As indicated in the table, roots and tubers were not very common to the respondents unlike other parts of Nigeria (FOS 1999). Under cereals, maize, rice, sorghum and millet were very common and were easily available to the respondents. Two factors could account for this availability of the cereals. One of is that the ecological zone favors the production of these crops and in most cases they are the major crops produced by most farmers in the northern area in Nigeria. The second reason is that they are relatively cheaper because of their availability in the ecological zone.

Some of the legumes that were commonly available are beans, soy beans and groundnuts. Groundnut is not really used on most occasions because, although it is locally produced, it is sold off immediately after harvest. The beans and soy bean are also produced within the zone. However, they are relatively cheap because they also are imported from neighboring countries to supplement the local production.

Fruits are actually scarce and very expensive. Fruits of any kind are not easily affordable to the average respondents. Oranges and mangoes could be cheap during their harvesting period and this data was collected during the dry season. Some other fruits could be in the market but only some relatively rich people could afford them.

The vegetables common in the area and affordable to the people are okra, onion and tomatoes. These three vegetables are locally produced and could be the sole business of some local farmers. Their prices vary by the seasons. In their seasons of production, they are practically available to every one who

needs them because they become very cheap. Most farmers dispose of their production at harvest due to lack of preservation and storage facilities for their products. However, they could be costly after their harvesting periods.

Dry fish is available throughout the year but is relatively expensive. Since it is sold in pieces, it is easily available to most consumers as observed in the table (appendix B). Fresh fish is relatively expensive and in most cases is out of reach to ordinary consumers. Meat (beef) is relatively expensive and in most cases is sold at fixed prices. Below certain amounts, the butchers would not sell any meat. For example, one can not buy any meat for less than ₦30.0 in the market, but with less than that amount one could buy a piece of fish.

Groundnut oil is relatively cheap and is locally produced. The price varies considerably by seasons. Other sources of oil are fatty extracts from cow's milk (butter) which is also locally produced. The prices are relatively cheap because their producers dispose of them on a daily basis.

Table 4.23 Anthropometric indices

Weight for age	Number	Percent	
Z scores< -2	47	47	Underweight
Z score≥-2	53	53	Normal
Height for age			
Z score < -2	70	70	stunting
Z score≥-2	30	30	normal
Weight for height			
Z score < -2	15	15.5	wasting
Z score≥ -2	84	84.5	normal

Nutrition Status- height, weight and age values were used to calculate standardized z scores, weight for height (WHZ), height for age (HAZ), and weight for age (WAZ). A z score of -2 or less is an indication of malnutrition (World Health Organization, 1986).

In the weight for age (WAZ) section of the table, 47% of the children are underweight and 53% were normal. The height for age rows (HAZ) show that 70% of children were stunted and 30% were normal. The last rows show weight for height (WHZ). There was a 15% incidence of moderate wasting (Z score <-2) and 84.5% were normal.

Table 4.24 Anthropometrics table by sex

WAZ	SEX		Numbers	%	
	Boys	≥ -2	13	42.	
		< - 2	17	58.	
	Girls	≥ -2	40	57	
		< - 2	30	43	
HAZ	Boys	≥ -2	5	17	
		< -2	25	83	
	Girls	≥ -2	25	35	
		< -2	45	65	
WHZ	Boys	≥ -2	26	89	
		< -2	4	11	
	Girls	≥ -2	58	82	
		< -2	12	18	

Ch-square=0.137, likelihood ratio=0.136, Fisher' exact test=0.185

Boys appeared to be more affected by malnutrition, but the result of the chi-square test showed lack of significant difference. Perhaps this was caused by variation in numbers, that is having more girls in number (70) than Boys (30). Thus we can not conclude that malnutrition is worse in males than females from this analysis.

Table 4.25 Regression analysis

Multiple regression equation predicting weight for age Z.scores for children (WAZ)

	B	SE	P
Intercept	-1.51336	0.72072	0.0383
Sex	0.59554	0.26456	0.0266
Own farm	-0.71199	0.31247	0.0249

Adjusted R^2 = 0.0732 $p<0.0093$

By multiple regressions analysis, 7% of the variation in WAZ was predicted by farm ownership and sex of the child. Children whose parent did not own farm had lower WAZ score and the boys also had lower Z – scores than the girls.

Table 4. 26 Multiple regression analysis predicting height for age Z – scores (HAZ)

	B	SE	P
Intercept	-4.50564	0.81146	< .0001
Sex	1.09052	0.44529	0.0161
Number of children	-0.05347	0.02895	0.0679

Adjusted R^2 = 0.0816 p = 0.0060

Regression on height for age Z- scores also shows boys have lower Z scores and number of children tended to be significant; as the number of children increases, height for age decreases.

Discussion and Results

The first question of the study was looking at factors that contribute to malnutrition among children and socioeconomic status of the mother. The mothers for example lack the purchasing power to buy the necessary food items required for their healthy nutritional status. These inadequacies could be attributed to the low income level as seen in Table 4.7. The low income could also be attributed to the type of petty trading.

A report by UNICEF (1990) state that educated women are more likely to use the modern health care facilitates in caring for their children and are more aware of the nutritional problems their children will or may face, but inadequate knowledge can hinder their ability to generate resources or income for improved nutrition for their families. Malnutrition among the children on the other hand, may be due to their early introduction to the family meals and mixed feeding. As many as 68% had complementary food before 3 months or less, and these foods

were not in any way designed for infants. This development could also be attributed to the low socio-economic status of the respondents which could not really allow exclusive breast feeding so pap and water were introduced water as early as three months contrary to the WHO recommendation. The mother has to be well nourished before proper breastfeeding but if she is not eating properly, then she can not handle breastfeeding properly. World Health Organization (WHO,2001) recommends that women in the developing world should breastfeed exclusively until their babies reach six months because breast milk is clean and more hygienic for the health of the child. The World Health Organization (WHO, 2000) defines exclusive breastfeeding as feeding a child only with breast milk (no additional supplementation such as water, juices, or solids except on medical grounds like vitamin/mineral supplements). Women in resource poor countries are encouraged to breastfeed exclusively because it confers many nutritional and health benefits to the child. Breast milk contains immune factors that are protective. It is hygienic and thereby can reduce child morbidity and mortality. Water is discouraged because of lack of care and because improper storage and disinfectant may result in infection. My results are similar to studies carried out in Cameroon and Nigeria (Hamidu 2003, Kakute et al 2005) in which it was discovered that all women surveyed introduced water and food supplementation to their child prior to six months of age.

However, the basic cause of malnutrition of children could as well end in the fact that the respondents were too poor to afford the necessary food that could improve their nutritional health (affordability) bearing in mind that they

could easily afford food in the cereal categories because they are grown in the area or from their farm (availability).

This then brings this discussion to the second question of the study which sought the relationship between maternal occupations, income and literacy level on maternal health and child development. From the discussion of Tables 4.5, 4.6, and 4.7, the classification of the respondents shows that most were of the secondary school level. This level of education is completely inadequate in providing a decent living in Nigeria because of the very high level of unemployment. What it means is that holders of the secondary school level of education would literally have no paid job in the society where university graduate with two or more degrees have no employment (FOS, 1999) .This partly explains the dominance of petty trading and other miscellaneous occupations reported by respondents. This also accounted for the type of occupation that the respondents are engaged in and the level of income they get. This is part of the vicious circle mentioned previously. With this vicious circle of poverty, the maternal health and that of the child are confronted with many inadequacies. One of such inadequacies is the inability to feed the child with the required nutrients because even the mothers have no access to such foods. This finding agrees with Smith's 2005 report that more educated women are better able to process information, acquire skills and deliver positive care behavior. They tend to be better at using health care facilities and in keeping their environment clean (Engle et al 1999). More educated mothers may have better paid jobs and thus be able to earn higher income, take better care of the child's nutrition and reside

where there are functioning social infrastructures and hygiene to protect the child from infections and diseases. Empirical studies agree that more education for a woman is associated with longer life expectancies, lower death rates and improved child health and nutrition (Buchman 1996, Schultz 2002, Haddad et al 2003).

A correlation test carried out in the study also shows some negative correlations between the number of children and weight for height Z scores (r=-23, p=.023). This is because the more children, the more resources or food needed to feed them and the less food for each. Because the children are many and they will not eat enough and so the incidence of malnutrition or stunting will be higher. There is also a positive correlation between times the respondents could not eat because there was no money and how often they buy food (r=.45, p=.01) and the amount spent on food (r = .48, p=.01). This is because the less income, the fewer number of times of food the households can eat. Regression analysis also shows WAZ scores were affected by sex and farm ownership as children whose parents do not have farms had lower Z scores. Not having a farm is related to not planting and so not enough food and so the case of malnutrition in the children. Males also have lower Z-scores compared to females. Height for age was also mildly significant as it was affected by sex and number of children; again, boys had lower Z scores compare to the girls. And as the number of children goes up, the more mouth to feed and so HAZ z scores goes down.

The third question was if unavailability of foods that are affordable and accessible related to the incidence of infant malnutrition. From type of food

consumed (Table 4.19), it was observed that most commonly eaten foods in the study area are those grown locally within the zone. Even these foods grown in the zone were subject to seasonal variations. The most effective means to therefore reduce child malnutrition would be strategies that utilize existing foods, among other approaches. Among the foods grown in the zone, some like soybeans have a high percent of protein but the processing of this food source is another matter. In most cases the use of the soybean is limited to the 'Tofu', a kind of cake made mostly by young girls for sales and in most cases this is not made available to the family. The question then is what ways can soybean be preserved or made available for the households to yield its nutritional content to fight malnutrition.

Another aspect of reducing child malnutrition is devising a storage means for storing harvested products in a way that such products could be made to last between the harvesting seasons. These would ease the prices and make such farm products available to and affordable to low income groups like the ones involved in this study. These findings also agree with the observation by Smith & Haddad (2001) that food availability contributes substantially to reductions in malnutrition among children. Other studies that see food availability as a means to substantially reduce malnutrition in developing countries are Foster, 1992, Von Braun et al., 1992, Maxwell 1996a.

Taboos and superstitions were not really common among the respondents because of the dominance of the Islamic religion. Those who did not belong to the Islamic religion were mostly Christians. If anything like restriction is observed,

such restrictions were more based on the low economic status of the respondents which did not allow them to have access to some of the nutritional foods in the market.

CHAPTER V

CONCLUSION

This chapter summarizes the study, procedure of investigation used for collecting and analyzing the data. It discusses major findings and draws conclusions after recommendations, and indicates areas for further research.

Summary

This research focused on the relation of dietary and socioeconomic characteristics of mothers to child growth in Sabon Gari Local Government Area, Zaria, Nigeria. The socioeconomic characteristics of mothers include age, occupation, income, educational level, number of children, child deaths, diets of respondents, gardening, livestock and land ownership. Anthropometric parameters were used to assess health of children and this included age, gender, weight in kilogram (kg) and height in centimeters (cm). Child heights and weights were converted to weight for height, height for age and weight for age z-scores using the World Health Organization's software (WHO Anthro 2006). Other variables considered for children included immunizations, and age of introduction of complementary food or family food.

The findings revealed that there is malnutrition in the children, as revealed by the anthropometric indices (weight for age Z scores) W/A, 47% of children were underweight and 53% were normal, height for age H//A, 70% of the children were stunted and 30% were normal and weight for height, 15% show mild wasting and 84% had Z score above -2. Also males were more affected as they tended to have lower Z scores than girls.

Malnutrition in the children may be due to early introduction of complementary foods or mixed-feeding or due to supplementation with water and pap to the children as early as one month and three months of life, because the mothers lack the purchasing power to buy the necessary food items required for them because they have to be healthy to produce enough milk for the baby. World Health Organization's (WHO 2001) recommendations are that women in the developing world should breastfeed exclusively until their babies reach six months. World Health Organization (WHO 2000) defines exclusive breastfeeding as feeding a child only with breast milk (no additional supplementation such as water, juices, or solids except to deliver medications like vitamin/mineral supplements). Women in resource poor countries are encouraged to breastfeed exclusively because it confers many nutritional and health benefits to the child. Studies by Kakute et al (2005) in Cameroon and Hamidu (2003) in Nigeria reported that all women surveyed introduced water and food supplementation to their child prior to six months of age. They also reported the importance of breast milk, because breast milk is hygienic and has protective factors necessary for child health thereby reducing child morbidity and mortality.

These inadequacies (introduction of complementary foods) could be traced or may be attributed to the level of education and subsequently low-income. This could be linked to the vicious circle of poverty where lack of good food hinders effective out-put and vice versa.

The result also shows that the respondents could afford food in the cereal categories because of its availability. Most of the respondents were of the secondary school level; this level of education is inadequate in Nigeria with a very high rate of unemployment.

One of such inadequacies is the ability of the mothers to feed the child with the needed nutrients because even the mothers have no access to such foods (Engle et al, 1999). Educated mothers may have better paid jobs and thus be able to earn higher income, take better care of the child's nutrition, and reside where there are functioning social infrastructures and hygiene to protect the child from infections and diseases. Empirical studies agree that more education for a woman is associated with long life expectancies, lower death rates and improved child health and nutrition (Buchman 1996, Schultz 2002, Haddad 2003).

The question on using available food and their knowledge of nutritional value to reduce child malnutrition also shows that the commonest foods consumed in the area under study are those grown locally within the zone. Even the foods grown in the zone are subject to seasonal variations. Among the foods grown in the zone are soybean, with very high percent of protein but the processing of these foods may be another problem as some vital nutrients may

be lost. This finding also agrees with the observation of Smith & Haddad, 2001 that food availability contributes substantially to reductions in malnutrition among children. Other studies that see food availability as a contributing factor to the problem of malnutrition in developing countries are Foster, 1992, Von Braun et al, 1992, and Maxwell 1996. These studies show that the problem of food availability in developing nations is responsible for the inability of the people to gain access to food due to poverty.

Taboos and superstition were not really common among the respondents. If anything like restriction is observed, such restriction was more inclined to be based on the low economic status of the respondents which did not allow them access to some of the nutritious foods appropriate for better health status.

In conclusion, the high prevalence of malnutrition observed in this study calls for comprehensive public health intervention. These measures should include emphasis on health education programmes focusing on good nutrition for the children and efforts made by the local government to introduce good meals or balanced nutritious meals at the local health centre as an example for mothers to emulate. Local government should also encourage non-governmental organizations to come and encourage teaching on small scale ventures that will generate income for the households and also improve diet diversity. e.g. gardening around the houses.

Implications of these findings

There is malnutrition among the children in this area. They need interventions in order to have a better future or lessen their suffering .This is

necessary because women who are malnourished as infants are more likely to grow up within a similar environment throughout their life cycle and subsequently give birth to malnourished infants, thereby perpetuating the intergenerational effects of malnutrition and the cyclical nature of poverty.

Recommendations

1. Government should devise means for preserving and storing harvested products so that such products could be made to last between the harvesting seasons. These would ease the prices and make such farm products available to and affordable to low income groups.

2. Women should be educated on the importance of exclusive breast feeding, using the traditional birth attendants or community base organizations that are within the community. Women should be discouraged from mixed-feeding of food to babies prior to 6 months of life.

3. Public enlightment to discourage monodieting and promote diversity of foods intake should be undertaken by the government through schools, mass-media and folk media.

4. Nutrition education concerning the child's feeding should be taught practically to mothers during antenatal care or be handled by the local government office since they are closer to people at the grass-roots. There

should be a forum where women interact with the health care providers to learn more about children's health.

5. Home gardening should be encouraged among women to enhance vitamin and mineral intakes through vegetable and fruits.

6. Livestock keeping should also be encouraged among women as this will provide eggs and meat for the household and may generate some income.

7. Women empowerment (financially) for sustainable development towards economic security is necessary to equip them with the capacity to live meaningfully. (Women in this study were found to have #500-1000 a month which is equivalent to about $10 dollars a month at the time of this study**)**

Suggestions for further study

There should be further research on the health status of the mothers and possibly micro-nutrient deficiencies among the mothers. (Using blood samples to test for low nutrient)

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APPENDIX A

Oklahoma State University Institutional Review Board Approval form for human subjects

Oklahoma State University Institutional Review Board

Date:	Tuesday, December 19, 2006
IRB Application No	HE06113
Proposal Title:	Indigenous, Available and Practical Nutrition for Safe Motherhood and Child Development in Sabon Gari Zaria (Local Government Area) North Western, Nigeria
Reviewed and Processed as:	Expedited

Status Recommended by Reviewer(s): Approved Protocol Expires: 12/18/2007

Principal Investigator(s

Esther Okwori	Barbara Stoecker
301 HES	421 HES
Stillwater, OK 74078	Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☑ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sue C. Jacobs

Sue C. Jacobs, Chair
Institutional Review Board

Appendix (B)

Types of food eaten in one week by the respondents, 0- 7 indicates number of times they eat their meals in a week

Food items	0	1	2	3	4	5	6	**7**
Roots and Tubers								
Yam or cocoyam	**8**	**26**	**36**	**20**	**6**	**1**	**3**	0
Garri or Cassava	**19**	**39**	**21**	**11**	**4**	**1**	**5**	0
Sweet potatoes	**13**	**35**	**26**	**14**	**5**	**2**	**5**	0
Cereals								
Rice	**11**	**24**	**26**	**13**	**9**	**3**	**14**	0
Maize	**3**	**8**	**18**	**16**	**13**	**10**	**2**	30
Sorghum	**33**	**12**	**6**	**5**	**2**	**1**	**1**	40
Millet	**16**	**8**	**10**	**7**	**3**	**3**	**53**	0
Legumes								
Bene-seeds (Acha)	**83**	**10**	**6**	**1**	**0**	**0**	**0**	0
Beans	**4**	**11**	**19**	**21**	**15**	**5**	**2**	23
Groundnut	**11**	**20**	**19**	**16**	**11**	**2**	**21**	0
Soy beans	**11**	**21**	**25**	**11**	**5**	**1**	**1**	25
Fruits								
Oranges	**6**	**15**	**15**	**14**	**15**	**6**	**2**	27
Mangos	**69**	**7**	**5**	**2**	**1**	**3**	**4**	9
Pear	**98**	**1**	**1**	**0**	**0**	**0**	**0**	0

Banana	**22**	**17**	**34**	**11**	**6**	**2**	**8**	0
Pineapples	**32**	**26**	**24**	**9**	**3**	**2**	**4**	0
Water Melon	**38**	**27**	**14**	**7**	**3**	**3**	**1**	7
Paw-paw	**26**	**33**	**20**	**7**	**2**	**1**	**3**	8
Vegetables								
Spinach	**12**	**29**	**21**	**12**	**7**	**3**	**16**	0
Okra	**9**	**11**	**24**	**28**	**5**	**3**	**3**	17
Onion	**2**	**3**	**1**	**1**	**3**	**2**	**1**	87
Tomatoes	**1**	**3**	**2**	**1**	**3**	**2**	**1**	87
Fresh maize	**69**	**9**	**14**	**1**	**2**	**3**	**2**	0
Ogwu	**90**	**5**	**3**	**1**	**1**	**0**	**0**	0
Bitter leaf	**80**	**10**	**5**	**2**	**1**	**2**	**0**	0
Water leaf	**43**	**30**	**19**	**5**	**1**	**2**	**0**	0
Fish/Animal sources								
Fresh fish	**63**	**11**	**8**	**5**	**3**	**2**	**1**	7
Dry fish	**2**	**6**	**7**	**11**	**5**	**5**	**2**	62
Meat	**80**	**7**	**4**	**4**	**1**	**4**	**0**	0
Milk	**10**	**15**	**25**	**19**	**7**	**4**	**2**	18
Eggs	**12**	**12**	**14**	**23**	**8**	**2**	**1**	28
Fats and Oils								
Red palm oil	29	17	25	14	6	1	2	6

Appendix (C)

College of Human Environmental Sciences

Department of Nutritional Sciences

Oklahoma State University

Stillwater, Oklahoma

74078-6141

Questionnaire

Instruction: Please kindly answer each question with honesty. All information given will be treated confidentially and used for this research work only. Thanks for your co-operation.

1. Age: of mother……..

2. Age of a child including months and year ……..
   (Sex) - M ( ) F ( ) Tick the one that is applicable.

3. Weight of a child …….

4. Height of a child ……..

5. Number of living children …….
6. Have you ever lost any child?

Yes No

- If yes, how Many.....
- Before 6 months……..
- 6 months to 5 years……..
- Greater than five years……

7. Household Size
   …….

8. Number of children over five years
……

9 .Mother's Educational level obtained:

- Number of years, Specify_____
- Primary education
- Secondary education
- Post secondary education
- No formal education
- Islamic education

10. Occupation: (choose all that apply)

- Trading
- Farming
- Food selling
- Others……

……..

11. What is your income in a month? (In Naira, the Nigerian currency)

- #500- 1,000
- #1,000- 2,000
- #2,000- 3,000
- # 3,000- 4,000
- #4,000 – 5,000
- #5,000 – 6,000
- More than 6, 000…….

…….

12. Did you feed your youngest baby with the first milk (colostrums) at birth?

Yes No

If no, Please give details of what he or she was feed

……
……
……

13. Do you make any special foods for your baby or babies?

Yes No

14. What food do you feed your baby?

…….

15. What age did you start feeding this to your baby?
Specify……

16. When was the baby introduced to the family meals?

- 3-6 months
- 6-12 months
- 12-18 months
- 18 months and above

17. If your baby has diarrhea and vomiting, what do you do? (Choose all that apply)

- Stop feeding
- Give ORT
- Self medication
- Herbs
- Medication and herb
- Go to the community health centre

18. Tick against all immunizations your child has had

- BCG
- DPT/Oral polio, how many? …….
- Measles
- None

19. How many times per week or per month do you go to the market to purchase food?

- Weekly
- Twice a week
- Monthly
- Twice a month
- Do not go to the market at all

20. Do you always use your own money to purchase food?

- Yes No

21. About how much do you spend each time that you purchase food?

- 500-1000
- 1000-2000
- 3000-4000
- 4000-5000

- Others specify……

22. Are there foods you don't eat or give to your child< five years of age because they are traditionally forbidden for women and children?

Yes No

If Yes, Please give the food and the reason
Example, eggs
Snails etc ……..
……..
……
……
……
……

23. Is there a time you (mother) could not eat because there was no money to purchase food?

- Always
- Very often
- Sometime
- Rarely
- Never

- Others specify……

24. Do you always have the food type you want to serve to your family?

- Always
- Very Often
- Sometimes
- Rarely
- Never

25. Have you and your children ever eaten the same type of food for several days
Consecutively because it comes from your farm and it is available?

- Always
- Very often
- Sometimes
- Rarely
- Never

If no, how often does your spouse contribute towards the purchase of food?

- Always
- Very Often
- Sometimes
- Rarely
- Never

26. Have you ever reduced the size of your child's usual meals for lack of money?

- Always
- Very Often
- Sometimes
- Rarely
- Never

27. Have your children ever gone to bed hungry because there is not enough money to buy food?

- Always
- Very Often
- Sometimes
- Rarely
- Never

28. Do you always have enough money to buy fruits and vegetables as part of the family meal?

- Always
- Very Often
- Sometimes
- Rarely
- Never

29. What kind of light do you have in your house?

- Kerosene lamp
- Gas lamp
- Electricity
- Candle
- None

30. Source of drinking water

- Pump or tap
- Bore hole
- River or Streams

- Other……

31. What kind of toilet facility, do you and the children use?
    - Water System
    - Pit toilet
    - Bush
    - Others……

32. Do you (woman) own farm land?

    Yes No

33. Can you (woman) own, sell, purchase or inherit land?

    Yes No

34. Do you (woman) own livestock?

    Yes No

35. Do you have a garden around your house?

    Yes No

    If not, why not.....
    .....
    ……
    ……

36. Numbers of rooms in your dwelling
    ……

37. How many days did you and your children eat this food in the last week?

Food item	Weekly
Roots and Tubers	0 1 2 3 4 5 6 7
Yam or Coco Yam	0 1 2 3 4 5 7
Garri or Cassava	0 1 2 3 4 5 6 7
Sweet potatoes	0 1 2 3 4 5 6 7
Cereals	
Rice	0 1 2 3 4 5 6 7
Maize	0 1 2 3 4 5 6 7
Sorghum	0 1 2 3 4 5 6 7
Millet	0 1 2 3 4 5 6 7
Acha	0 1 2 3 4 5 6 7
Legumes	
Beans	0 1 2 3 4 5 6 7
Groundnut	0 1 2 3 4 5 6 7
Soy beans	0 1 2 3 4 5 6 7
Fruit	
Oranges	0 1 2 3 4 5 6 7
Mangos	0 1 2 3 4 5 6 7
Pear	0 1 2 3 4 5 6 7
Banana	0 1 2 3 4 5 6 7
Pineapples	0 1 2 3 4 5 6 7
Water melon	0 1 2 3 4 5 6 7
Paw-paw	0 1 2 3 4 5 6 7
Vegetable	
Spinach/ leaf vegetables	0 1 2 3 4 5 6 7
Okra	0 1 2 3 4 5 6 7
Onion	0 1 2 3 4 5 6 7
Tomatoes	0 1 2 3 4 5 6 7
Fresh maize	0 1 2 3 4 5 6 7
Ogwu	0 1 2 3 4 5 6 7
Bitter leaf	0 1 2 3 4 5 6 7
Water-leaf	0 1 2 3 4 5 6 7
Other	
Fresh fish	0 1 2 3 4 5 6 7

Dry fish	0 1 2 3 4 5 6 7
Meat	0 1 2 3 4 5 6 7
Milk	0 1 2 3 4 5 6 7
Eggs	0 1 2 3 4 5 6 7
Other	
Fats and Oil	
Red Palm oil	0 1 2 3 4 5 6 7
Ground nut oil	0 1 2 3 4 5 6 7
Other	0 1 2 3 4 5 6 7

Questions Modified

Source: Bickel, G., M.
Nmd, et al. (2000). Guide to measuring household food
Security, Revised 2000.

Appendix (D).

VITA

ESTHER OKWORI

Candidate for the Degree of

Master of Science

Thesis: RELATION OF DIETARY, SOCIOECONOMICS CHARACTERISTICS OF MOTHERS TO CHILD GROWTH IN SABON GARI LOCAL GOVERNMENT AREA

Major Field: Nutritional Sciences

Education:

QUALIFICATIONS: 2007: M.sc Nutrition, Oklahoma State University, Stillwater, USA. 2003, M.Ed Administration and Planning, Ahmadu Bello University, Zaria.B.Ed. Home Economics, Ahmadu Bello University, Zaria. 1989, Diploma in Adult Education, Centre for Adult Education and Extension Services, Ahmadu Bello University, Zaria.1987, Certificate in Catering and Hotel Management, Benue Polytechnic, Ugbokolo

RESEARCH WORK: 2003, A Comparative Analysis of the Views of Principals/ Teachers, Students and Parents on the Management of Day Secondary Schools in Benue State

1998, Nutrition Rehabilitation of Pre-school Children in Ahmadu Bello University Teaching Hospital, Zaria.

1989, The Effect of Malnutrition in School Age Children in Otukpo Local Government Area of Benue State

WORKING EXPERIENCE: 1998/1999, NYSC, Honorary Accountant, Bursary Department, Ahmadu Bello University, Zaria.

2000-2005, Programme Assistant, WREACH-OUT in providing basic nutritional information to mothers and for their children in communities in Northern Nigeria.

AWARD: 08/11/2005- 05/11/2008, Scholarship Recipient, Ford Foundation International Fellowship, IIE New York

Name: Esther Okwori Date of Degree: May 2008

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of study: RELATION OF DIETARY AND SCIOECONOMIC CHARACTERISTICS OF MOTHERS TO CHILD GROWTH IN SABON GARI LOCAL GOVERNMENT AREA, ZARIA.

Pages in study: 102 Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and methods: This study assessed socioeconomic factors that affect the diversity of food available to mothers and the nutritional status of their children, 0-5 years of age, in Zaria local government area.

Findings and conclusions: One hundred women and their children from five villages in Zaria local government area of Kaduna state, Nigeria volunteered for this study. The women responded to a socioeconomic questionnaire and the children's weight and height were assessed. Data were analyzed for demographic, socioeconomic and health status of the children. The results showed that the respondents could afford food in the cereal categories because of its availability. The results on using available food and their knowledge of nutritional value to reduce child malnutrition also demonstrated that the commonest foods in the area under study are those grown locally within the zone. Even the foods grown in the zone are subject to seasonal variations. The findings also revealed that there is malnutrition in the children as 47% were underweight, 70% were stunted and 15.5% had moderate wasting, which may be due to mixed-feeding or to complementary food as early as three months of life, or because the mothers lack the purchasing power to buy the necessary food items required for better health status. The result from regression equations also showed that WAZ scores are predicted by sex, and farm ownership.
The high prevalence of malnutrition observed in the study calls for public health attention with focus on nutrition education involving the local government area and non governmental organization

ADVISER'S APPROVAL: Dr. Barbara Stoecker