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**BARRIERS TO CHILD NUTRITION SECURITY IN FOOD
SECURE HOUSEHOLDS: A STUDY OF MJINI VILLAGE IN
BUNGOMA, KENYA "**

By

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of Health Sciences, Kenyatta University.**

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*Barriers to child
nutrition security in*



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DECLARATION

This Thesis is my original work and has not been presented for a degree in any other university

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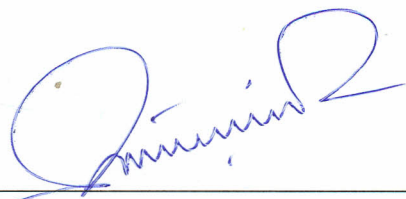
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DEDICATION

This work I dedicate to;

My late dad MARK ECHOKA and my son MARK, who was born during the course of my studies, all children below five years of age at risk of malnutrition and all those working towards the Millennium Development Goals of reducing child malnutrition by 2015.

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ABBREVIATIONS/ACRONYMS

DDP	District Development Plan
FGD	Focus Group Discussion
HAZ	Height for Age Z-score
IDD	Iodine Deficiency Disorders
IMCI	Integrated management of childhood illnesses
KAP	Knowledge, attitudes and practices
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics
PCM	Protein Calorie Malnutrition
PEM	Protein -Energy Malnutrition
SPSS	Statistical Package for Social Sciences
SD	Standard Deviation
WHO	World Health Organization
WAZ	Weight for Age Z-score
WHZ	Weight for Height Z-score

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ABSTRACT

Background: Food security is a key determinant of nutritional security. However, studies indicate that there are households that are food secure but still experience malnutrition, especially in children aged under five years of age.

Objective: The study was undertaken to establish barriers to child nutrition security in food secure households.

Methods: A cross-sectional study was conducted in Mjini village in Bungoma. A representative sample of some one hundred and seventy (170) food secure households with children aged 6-59 months was selected using multi stage sampling. Data was collected using an interview schedule, anthropometry, observation checklist and focus group discussions (FGD). Bivariate analysis using Pearson's chi-square and binary logistic regression analysis was used in data analysis.

Results: The following were found to threaten children's nutritional security in food secure households. Lack of knowledge on frequency of feeding (60% vs. 38%, $p=0.016$, $OR=2.5$), and on the 3 major foods groups (52% vs. 25.6%, $p=0.006$, $OR=3.13$), inadequate breastfeeding (48% vs. 13%, $p=0.008$, $OR=6.2$), untimely weaning (74% vs. 44%, $p=0.001$, $OR=3.6$), feeding child <3 times (59% vs. 35%, $p=0.009$, $OR=2.2$), lack of stimulation when feeding child (47% vs. 18%, $p=0.001$, $OR=4$), lack of deworming (90% vs. 75%, $p=0.004$, $OR=2.9$), poor environmental sanitation (79% vs. 44%, $p=0.001$, $OR=4.9$), storing cooked food uncovered (74% vs. 18%, $p=0.001$, $OR=6.8$), feeding child with dirty hands (59% vs. 18%, $p=0.001$, $OR=6.4$) and diarrhoeal morbidity.

Conclusion: Food availability alone is insufficient to assure nutrition security. It may have a limited effect on the nutritional well being of infants and children. Proper and sustained education of caregivers on care practices through multifaceted educational programmes dealing with behaviour/ attitude change and an evaluation and redesign of nutrition education are recommended.

CHAPTER 1: INTRODUCTION

1.1 Background of the study

Child malnutrition is one of the most important causes of infant and child mortality in sub Sahara Africa (Pelletier *et al.*, 1995). It still remains a major public health concern in the developing world, being associated with half of all deaths among the under five years old, mostly attributed to acute lower respiratory diseases, malaria, measles, HIV and AIDS and other communicable diseases like diarrhoea (WHO, 2005).

The major forms of malnutrition include Protein energy malnutrition (PEM) also known as protein calorie malnutrition (PCM), Vitamin A deficiency (VAD), iron deficiency anaemia (IDA) and iodine deficiency disorders (IDD). PEM is a typical manifestation and the most widely prevalent form of malnutrition in young children (Shanti and Dheeraj, 2004). PEM manifests itself in children as kwashiorkor or marasmus and is most frequent in children aged below six months to three years. Kwashiorkor is mainly caused by a diet that is low in protein, especially animal protein. Reasons for a poor diet may be lack of knowledge and cultural attitudes about certain foods (Jelliffe, 1985). Kwashiorkor is commonly precipitated by infection, which increases the risk of breakdown of tissue protein and may decrease intake of protein. Marasmus, on the other hand is principally due to diet low in both protein and calories. It is most common in the first year of a child's life as a result of early cessation of breast-feeding and attempted bottle-feeding with dilute milk. In the developing world in 1995, of the estimated 10.4 million deaths among children under five years of age, PEM was associated and causative factor in 5.1 million of these deaths, i.e. 49.1% (WHO, 1998).

Globally, over half of all child deaths occur in children who are underweight, some of these children may be malnourished as a result of lack of access to food, but more often it is because of infections or due to poor feeding practices or a combination of both. Severe deprivation among children in the developing world, that affect their health indicate that 33.9% are deprived of shelter (more than five people per room or a mud floor), 30.7% of sanitation (no toilet of any kind), 21.1% of water (only unprotected surface water available nearby), 16.1 % of nutrition (nutritional status far below the norm) and 14.2% of health (not immunized) (UNICEF, 2005). These deprivations affect the health of children, which in turn has a bearing on their nutritional status.

The underlying causes of malnutrition in many Asian countries include poverty, the low status of women, poor care during pregnancy, high rates of low birth weight, high population densities, unfavourable child caring practices, and poor access to health care. In sub-Saharan Africa, extreme poverty, inadequate caring practices, low levels of education and poor access to health services are among the major factors (IFPRI, 2004). In Kenya, stunting is also found to be the most prevalent form of malnutrition, rating at 30%. The rate of moderate underweight stands at 20% and 4% for severe underweight, while the rate of wasting is 6% (UNICEF, 2005).

Malnutrition adversely affects the child's intellectual development and consequently health and productivity in later life. This is because, the health status and later development of any individual is predetermined during childhood. The nutritional status of children under five years is also one of the indicators of household well-being and

one of the determinants of child survival (Thomas *et al.*, 1990). Therefore the nutritional status of children is key in determining their health, physical growth and development, mental performance and productivity in adult life. Children have the right to adequate nutrition (ROK, UNICEF and WHO, 2004).

Food is a major determinant of nutritional status. It is a daily and permanent unavoidable expenditure that any human being must comply with to avoid dire consequences. Food plays the central role in any socio-economic grouping (UON-ANP, 1995). However, malnutrition can be found in households that have no food shortage (Shanti and Dheeraj, 2004). A household is food secure if it can reliably gain access to food in sufficient quantity and quality for all household members to enjoy a healthy and active life. In addition, it is the ability of the household to secure, either from its own production or through purchases, adequate food for meeting the dietary needs of all members of the household. It is possible however for individuals in food secure households to be nutritionally insecure. Nutrition security is achieved when secure access to food is coupled with a sanitary environment, adequate health services and knowledgeable care to ensure a healthy and active life for all household members (IFPRI, 2004).

1.2 Statement of the problem and justification

Food security is a key determinant of nutritional status. It is the access to sufficient and good quality food for all people, at all times, for a healthy and active life. Food is a basic human requirement and it follows that, food is a top priority in most household

budget of needs. However, studies have shown that even in households that are food secure, malnutrition occurs (Kigutha, 1994). There is a general assumption that producing more food is the solution for alleviating malnutrition. This is the reason why most interventions to curb malnutrition address food security, not taking into account that the causes of malnutrition are multifactorial. Most studies on malnutrition have concentrated in food insecure settings like slums, refugee camps and food insecure regions. Not much has been done in food secure settings.

It is important to note that household food security may not necessarily result in improvement in the nutritional status of all household members. This is because nutritionally adequate food guarantees neither adequate consumption by all household members, nor the appropriate biological utilization of the food consumed (FSAU, 2003). It is also generally accepted that the aetiology of malnutrition is multifactorial and the proportional contribution by many such factors is unknown (Shanti and Dheeraj, 2004). These potential determinants are also highly interrelated. It is important to identify and understand the roles of these different actors that contribute to malnutrition. This will lead to more effective strategies and efficient use of limited resources, based on the factors that pose the most risk of predisposing vulnerable household members to malnutrition. The most affected by malnutrition and most vulnerable members of any household are children under five years of age.

Bungoma district, where the study was conducted is basically agricultural. In a 1999 national micronutrient survey in which the district was studied as a cluster district, a

proportion of 90% of the households studied were found to have had lunch and supper in terms of distribution of meals and food types consumed in a 24 hour- recall (ROK /UNICEF, 1999). The district was therefore considered food secure. However the district has a high prevalence (25%) of malnutrition in terms of underweight.

1.3 Purpose of the study

The purpose of this study was therefore to identify and understand the barriers that contribute to child nutritional insecurity, specifically child malnutrition in food secure households. Findings will help to enhance the body of literature in this area by demonstrating the importance of determining and understanding the various barriers to child nutrition insecurity beyond food security, in order to formulate meaningful strategies to combat child malnutrition.

1.4 Hypothesis

Children aged 6-59 months in food secure households are not malnourished

1.5 Objectives of this study

1.5.1 General objective

To establish the barriers to child nutrition security among children aged 6-59 months in food secure households in Mjini village, Bungoma.

1.5.2 Specific objectives

- a. To be able to identify households food availability, stability and accessibility.

- b. To establish the nutritional status of children aged 6-59 months in the study households.
- c. To determine knowledge, attitudes and practices of caregivers regarding nutrition, health and hygiene.
- d. To identify morbidity patterns of children aged 6-59 months in the study households.
- e. To establish which age group among the under fives is more vulnerable to malnutrition.

1.6 Research question

Why does child malnutrition persist in households that are food secure?

1.7 Significance of the study

Nutrition planning and advice to the community needs to be grounded on sound information and knowledge of the factors that contribute to malnutrition. This study aspired to fill the gaps in knowledge by identifying factors other than food insecurity that contribute to the prevalence of childhood malnutrition in food secure households. It is important to understand the various etiological determinants of malnutrition in order to formulate meaningful strategies to combat the problem if the millennium development goal (MDG) for reducing by half the proportion of malnourished children under five years of age by 2015 is to be achieved (ROK-KDHS, 2004). Understanding the roles of different actors will lead to more effective strategies and efficient use of

limited resources, based on the factors that pose the most risk of predisposing vulnerable household members to malnutrition.

The study focused on establishing why there are households that are food secure but still experience malnutrition (nutrition insecurity) among its members and especially children below five years of age. Children under five years of age were chosen as study subjects because their nutritional status is one of the indicators of household well being and one of the determinants of child survival. These children are distinctly vulnerable and establishing the exact risk factors that predispose them to malnutrition will help inform policies towards the appropriate interventions.

The findings of this study are expected to enrich the knowledge of nutritionists, health personnel, the community and other stakeholders in the area of nutrition and provide information to policy makers to take intervention actions to alleviate the problem of malnutrition among the under fives. The results are valuable for programme management in many sectors including food security, health, water and sanitation.

1.8 Study limitations

- i. In assessing the influence of disease on child malnutrition, estimate of disease was unsubstantiated by laboratory analysis.

- ii. In assessing the association between deworming as a preventive health practice and child malnutrition, influence of worms was unsubstantiated by laboratory analysis.
- iii. The study was a case study, therefore not generalisable.

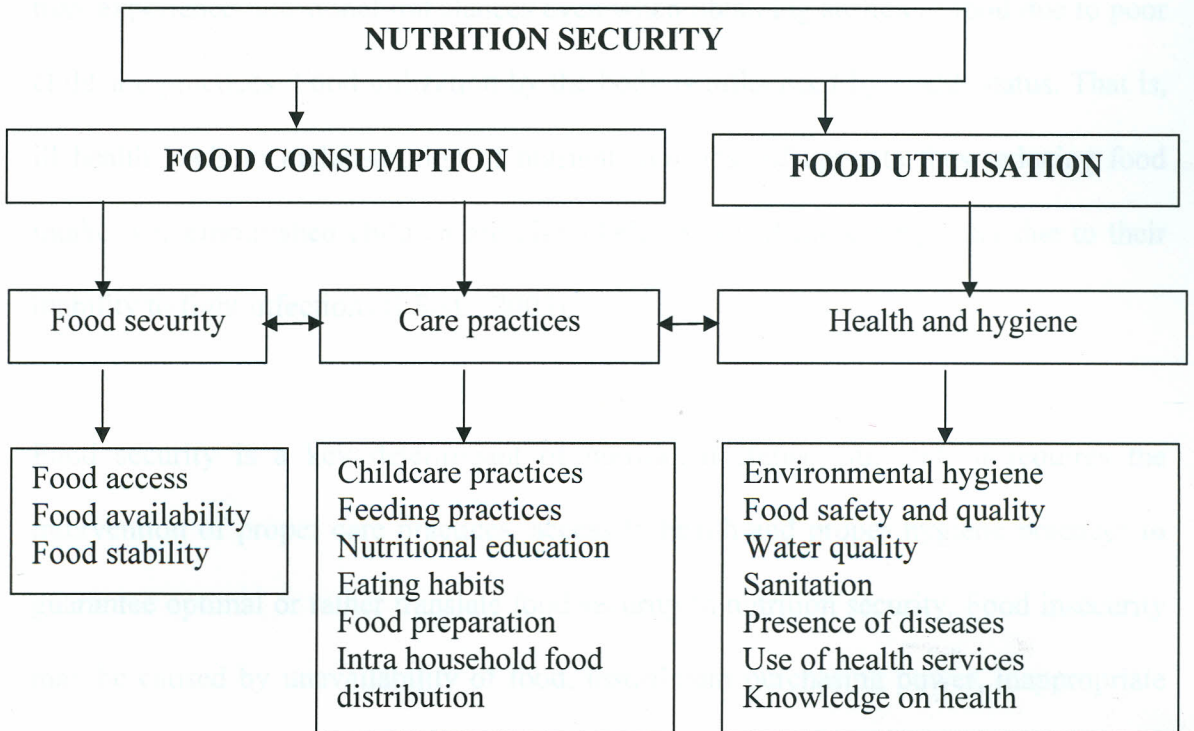
1.9 Assumptions

In determining sample size, it was estimated that there were about 330 households with children below five years of age. Of these 90% (300) were assumed to be food secure based on the 1999 Micronutrient survey where, 90% of households in the district were considered to be food secure

1.10 Conceptual framework

The conceptual framework used in this study is a modification of the expanded UNICEF conceptual framework for understanding possible causes of poor nutritional status. Specifically, this framework postulates that food insecurity, poor conditions of health and sanitation, and inappropriate care practices are the major causes of poor nutritional status (FSAU, 2003).

Figure 1.1: Grouping of factors that influence nutrition security at household



Source: (UNICEF).

Nutritional status is influenced by the basic determinants of food, care and health. Further, various individual and household resources determine the adequacy and quality of the food, health and care that the child receives. Resources for ensuring that adequate food is made available to a child include both the adequacy of food at the household and caregiver's actions that translate the available food to be available to the child. Similarly, for a child to receive adequate healthcare, it is essential that the health services are available, accessible and affordable and that a caregiver be equipped to use those services in terms of knowledge, time and money.

Food consumption is influenced by care practices and food security. However, children may experience nutritional imbalances even when obtaining sufficient food due to poor childcare practices. Food utilization by the body is influenced by health status. That is, ill health leads to malabsorption of nutrients and loss of appetite thus reducing food intake. Undernourished children are also likely to fall ill more frequently due to their inability to fight infections (FSAU, 2003).

Food security is a key determinant of nutritional status. But still, it requires the intervention of proper care practices, access to health and proper hygiene practices to guarantee optimal or rather translate food security to nutrition security. Food insecurity may be caused by unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at household level (FSAU, 2003).

In defining care practices and resources for care, care refers to behaviour and practices of the caregiver (mother, sibling, father and childcare providers) to provide the food, health care, stimulation and emotional support necessary for children's healthy growth and development. These practices translate food security and healthcare resources into children's well being (Engle, 1999). Care practices cannot occur without resources to provide the care i.e. knowledge, beliefs, education, physical and mental health and confidence to put knowledge into practice.

Care practices at household level involve psychosocial care, hygiene practices, home health practices, specific care during periods of vulnerability e.g. during childhood

illnesses and food preparation techniques. These practices entail ensuring that the food and healthcare resources provided to individual members result in optimal utilization. Caregivers need human resources (knowledge, beliefs, education and ability to put knowledge into practice), economic resources (finance and time) and organizational resources (responsible alternative caregivers) in order to provide adequate attention and focus to the children (FSAU, 2003).

Health practices at household level include seeking and access to health services as well as control and treatment of communicable diseases. All this entail knowledge in terms of recognizing ill health and seeking the appropriate intervention. Hygiene practices entail general household and environmental hygiene, access to clean and safe water, proper sanitation. Presence of diseases aggravates malnutrition and weakens health status of children (FSAU, 2003).

1.11 Operational definitions of terms

Anthropometry	Measurement of an individual's physical measurements and is used as a screening tool to identify malnutrition and monitor nutritional interventions
Caregiver	Refers to any person providing full time care to the child
Care	Behaviours and practices of the caregiver (mother, sibling, father and childcare providers) to provide the food, health care, stimulation and emotional support necessary for children's healthy growth and development.
Diet	Selection of foods, which are commonly eaten by a person or population.
Food secure household	This is a household's ability to get sufficient food to the household door based on accessibility (purchasing power), food prices (affordability), food availability (source), and family dependency ratios.
Household	All people who live together and operate as a unit, and who cook and share food from the same source of livelihood
Intra-household food distribution	Ensuring that the needs of all household members are met, prioritizing the vulnerable ones, in terms of ensuring the food available to the household must be shared according to individual needs
Malnutrition	Malnutrition is defined as state of nutrition where the weight for age (WAZ) index is below $-2SD$ from the reference value of the National Centre for Health Statistics reference (NCHS).
Nutrition security	Condition that is achieved when secure access to food is coupled with a sanitary environment, adequate health services and knowledgeable care to ensure a healthy and active life for all household members
Oedema	The abnormal accumulation of large amounts of body fluids in the intercellular tissues. It is a key clinical feature of severe malnutrition

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Food and nutrition security remains Africa's most fundamental challenges for human welfare and economic growth. The continuing burden of inadequate food and nutrition are enormous and the aggregate costs at the national level impose a heavy burden on efforts to foster sustained economic growth and improved general welfare. The level of access to components of food and nutrition security is closely tied to agricultural productivity i.e., higher production enhances household food security. It is possible however for individuals in food secure households to experience nutrition insecurity, hence malnutrition (IFPRI, 2004).

2.2 Aetiology of malnutrition

Malnutrition results from imbalance between the body's needs and intake of nutrients. It includes under nutrition in which nutrients are undersupplied and over nutrition in which nutrients are oversupplied. Under nutrition can result from inadequate intake, malabsorption, abnormal systemic loss of nutrients due to diarrhea, haemorrhage, renal failure or excess sweating and infections. Protein-energy malnutrition (PEM), a major form of under nutrition is characterized by not only energy deficit but also by a deficit in many micronutrients (MERCK, 2006). Therefore it is an indicator of other forms of malnutrition.

PEM, first described in the 1920s, was observed most frequently in developing countries. Current estimates indicate that approximately 150 million children (26.7%) younger than 5 years in developing countries are malnourished based on their low weight in relation to

their age. An additional 200 million children have stunted height secondary to poor nutrition. More than half of young children in South Asia have PEM, which is 5 times the prevalence in the Western Hemisphere. In sub-Saharan Africa, 30% of children have PEM. Two thirds of all malnourished children in the world live in Asia, and another one fourth live in Africa. Malnutrition is implicated in more than half of all child deaths worldwide. Although death from malnutrition in the United States is rare, in developing countries, approximately 50% of the 10 million deaths each year are secondary to malnutrition in children younger than 5 years (Grigsby, 2003).

Worldwide, malnutrition continues to be a significant problem especially among children who cannot fend for themselves adequately (MEDLINE, 2006). Malnourished children have lowered resistance to infection; they are more likely to die from common childhood ailments like diarrhoeal diseases and respiratory infections, and for those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness and faltering growth. Their plight is largely invisible: three quarters of the children who die from causes related to malnutrition were only mildly or moderately undernourished, showing no outward sign of their vulnerability (UNICEF, 2005).

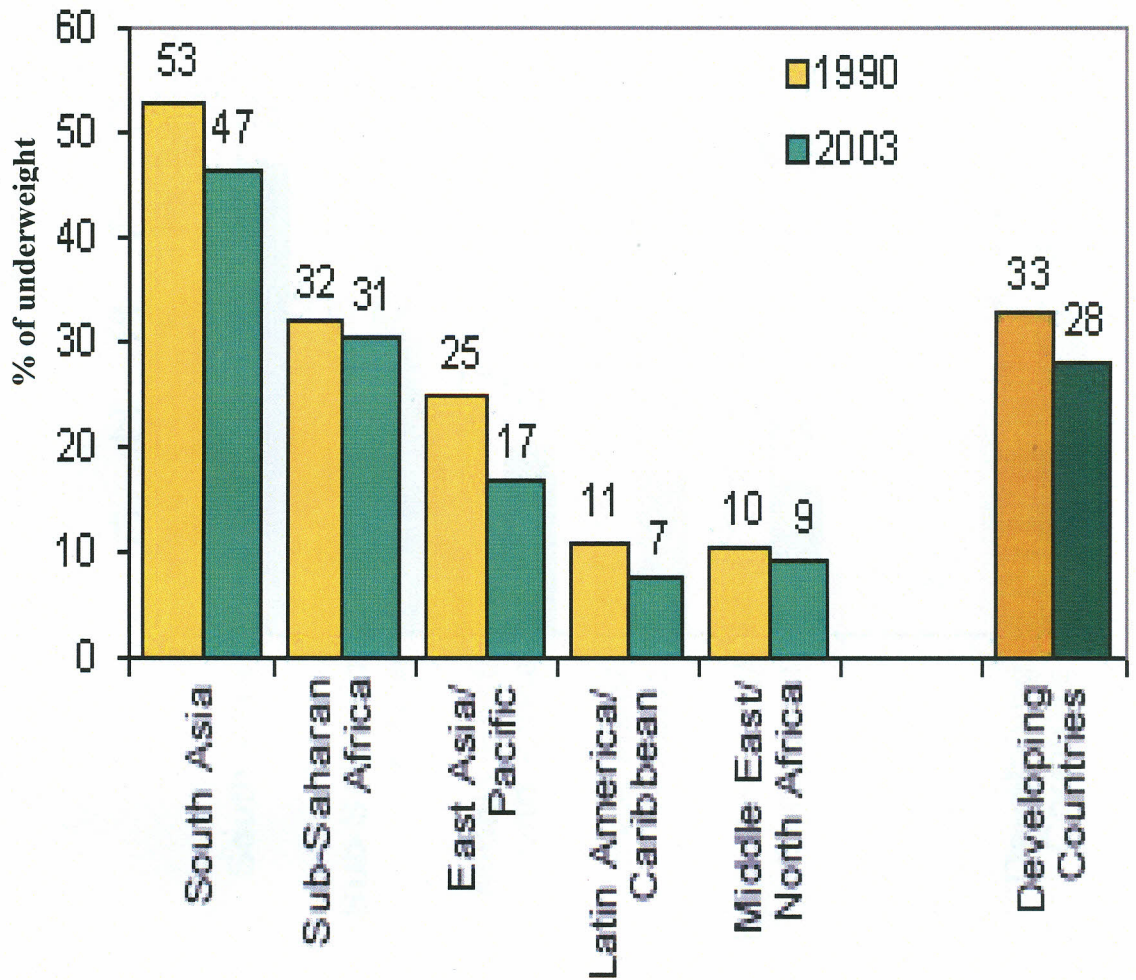
The underlying causes of malnutrition in many Asian countries include poverty, the low status of women, poor care during pregnancy, high rates of low birth weight, high population densities, unfavourable child caring practices, and poor access to health care. In sub-Saharan Africa, extreme poverty, inadequate caring practices, low levels of

education and poor access to health services are among the major factors (UNICEF, 2005).

2.3 Global overview of malnutrition

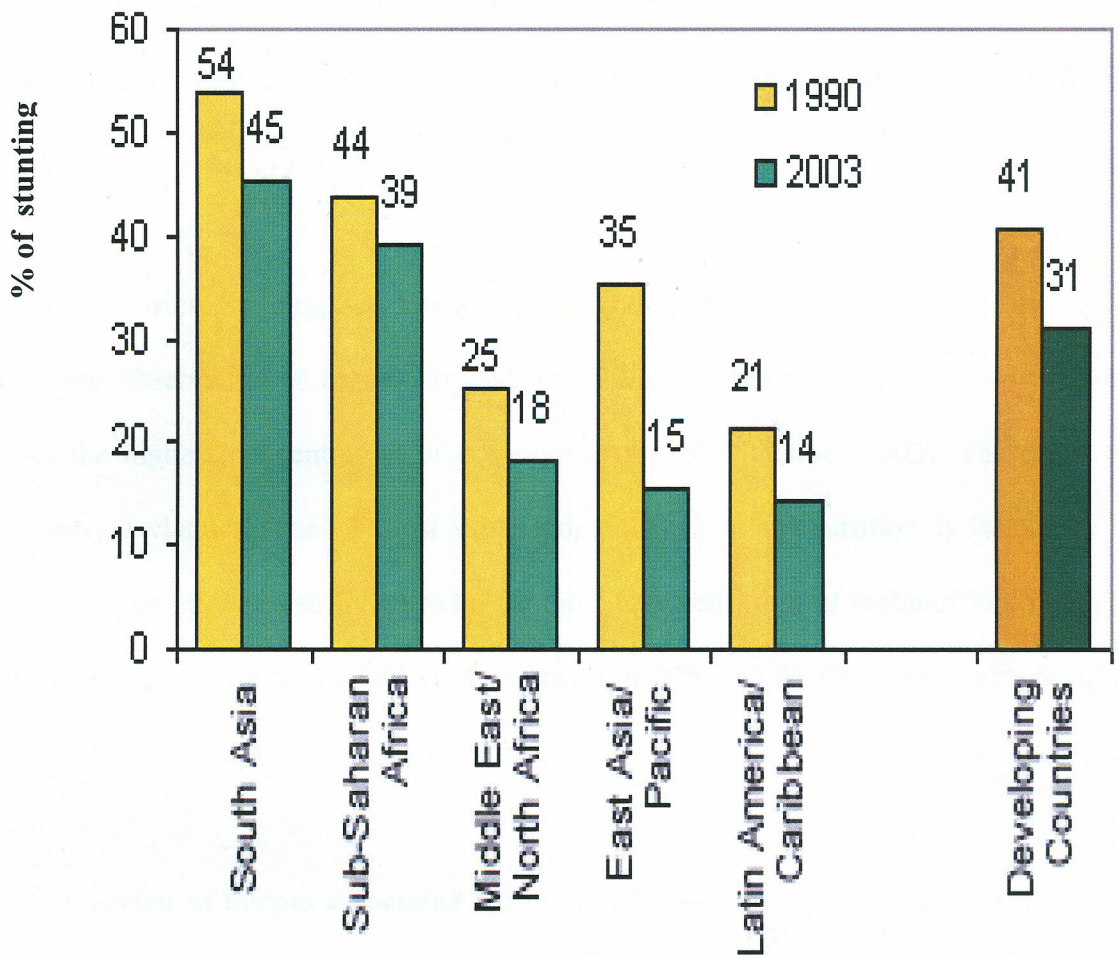
Overall, significant progress has been made in the reduction of child malnutrition, with underweight prevalence declining from 33 to 28 % in the developing world as a whole. The largest decline was achieved in East Asia and the Pacific where underweight levels decreased by a third (from 25% to 17%). This regional decline is driven primarily by improvements in China, where underweight prevalence declined by nearly 50% during the 1990s. However, underweight prevalence for other countries in the region did not decline at the same level. Substantial improvements were also made in the Latin America and the Caribbean region where rates fell from 11% to 7%, although overall levels were already relatively low to begin with. South Asia also experienced declines over the decade (from 53% to 47%). However, the region continues to suffer from staggeringly high levels of child malnutrition with close to half of all under five children being underweight (UNICEF, 2005).

Figure 2.1: Trends in child malnutrition around the world (underweight)



Source: UNICEF (2005)

Figure 2.2: Trends in child malnutrition around the world (stunting)



Source: UNICEF (2005)

The number of malnourished children in the developing world declined from around 180 million at the beginning of the decade to 155 million at the end of the decade. Half of all malnourished children live in South Asia and more than one fifth in Sub-Saharan Africa. The actual number of malnourished children in Sub-Saharan Africa has

increased over the decade, partly due to the lack of progress and the increase in overall population size. It is worth noting that only three countries, India, China and Bangladesh, make up half of all malnourished children in the developing world. In India, approximately 20 percent of children under the age of four suffer from severe malnutrition, while half of all the children suffer from under nutrition (Saito *et al.*, 1997).

In South Africa, Stunting was found to be the most prevalent form of malnutrition. The rate was observed to be highest in the Eastern Cape and Northern province- provinces with the highest concentration of poverty (Eyob and McIntrye, 2003). The effect of poverty, a characteristic of most urban populations, on malnutrition is immense. In Kenya, stunting was also found to be the most prevalent form of malnutrition, rating at 30%. The rate of moderate underweight stands at 20% and 4% for severe underweight. The rate of wasting is 6% (UNICEF, 2005).

2.4 Overview of factors associated with malnutrition

The dramatic growth of towns and cities in the developing world has brought with it new challenges, the major one being widespread urban poverty coupled with population explosions in slum areas. Rampant violence, flimsy housing and filthy living conditions along with hunger and malnutrition are becoming the daily lot for urban populations as cities grow (IFPRI, 2002). The concentration of malnutrition on the other hand is shifting from rural to poor urban populations, with the current estimate of the urban poor in sub Sahara Africa being more than 70% of the urban population. There is no

evidence that this proportion is decreasing; the evidence seems to point to an increase in the number of the urban poor. It is estimated that between the years 2000 and 2030, growth of the middle and lower income population in urban areas will be the highest exceeding rural and urban high-income populations (UN HABITAT, 2003). Most of these populations will be inhabitants of slums and mostly migrants from rural areas, migrating into the urban areas in search of employment opportunities and other services e.g. search of infrastructure.

A recent state of the world's children report (WHO, 2005) revealed severe deprivations among children in the developing world as follows; Shelter (more than five people per room or mud floor) 33.9%, Sanitation (no toilet of any kind) 30.7%, Water (only unprotected surface water available nearby) 21.1%, Nutrition (status far below the norm) 16.1%, and Health (not immunised) 14.2%. This is worse for children living in urban areas who might be up to 10 times more at risk of being stunted and especially if they are from poor households, compared to children from households of higher socio economic status (UN HABITAT, 2003). Poverty threatens childhood by exposing million of children to both communicable and non-communicable diseases that could be easily prevented. It is estimated that seven out of every ten deaths among children under five years of age in developing countries can be attributed to ARI (acute respiratory infections), diarrhoea, measles and malaria (UNICEF, 2005). Malnutrition aggravates and contributes to half of these deaths.

2.4.1 Malnutrition and food security

Food security is the access to sufficient and good quality food for all people, at all times, for a healthy and active life. However, malnutrition is found among children in households that have no food shortage. The period 6 months to 2 years when the child is dependant on someone to feed him/her, has the maximum malnutrition. Also there are many taboos and beliefs regarding food suitable for a child without any scientific basis. (Shanti and Dheeraj., 2004). These taboos are so deeply rooted in some communities and more often, they hinder a mother from giving the child the appropriate foods or a nutritionally appropriate diet.

Globally, considerable effort has gone into improving public health by providing clean water and adequate sanitation. Benin, Morocco, and Namibia are countries among others—where one should find reasonable access to food but where improved water and sanitation is clearly needed if they are to achieve nutrition security (IFPRI, 2004).

Nutrition and health surveys in Uganda (Kikafunda *et al.*, 1998) have indicated that although the country is well endowed with adequate food supplies, a large proportion of children under five years of age are malnourished. The 1988/1989 Uganda demographic health survey showed that almost half (45.5%) of the children below five years of age were stunted and almost one quarter (23%) underweight. It has been reported also that almost 60% of all deaths in children under five years of age in Uganda are directly or indirectly attributable to malnutrition. Although the causes of malnutrition are complex and multidisplinary, dietary and environmental factors have been found to play a major

role in malnutrition (Kikafunda *et al.*, 1998). But more often, like in this case, environmental factors like access to clean and safe drinking water and sanitation issues have a major influence on malnutrition.

Energy and nutrient intake of children depends more on diet quality rather than on household food security per se (Kigutha, 1994). A qualitative study conducted in four slums of Nairobi in 2002 identified food inadequacy as a major constraint of mothers of children under five years of age. However, they also found out that nutritional status is compounded by practices related to the way food was obtained, stored, prepared and served (APHRC, 2002). All these practices have no bearing on whether the food is available or not but are related to the caregivers practices in terms of the way she prepares and feeds the child.

2.4.2 Malnutrition and caregivers knowledge, attitudes and childcare practices on nutrition and health

Good care at the household level ensures that food and health care resources provided to individual members result in optimal survival, growth and development. Care practices involve psychosocial care, hygiene practices, food preparation techniques, specific care during periods of vulnerability e.g. during childhood illness, intrahousehold food distribution and eating habits.

Scanty data suggest that some common causes of malnutrition include inadequate breastfeeding, delayed and insufficient complementary feeding, and impaired utilization

of nutrients due to infections and parasites. High prevalence of malnutrition among young children in slums is also due to lack of awareness and caregiver knowledge regarding their food requirements and absence of a responsible adult caregiver (Shanti and Dheeraj, 2004). This is true because it has been reported that the level of knowledge a mother has an influence on nutritional status of her children (Kogi-Makau, 1992). Most mothers from the slums are not engaged in any form of employment and the few that are, are engaged in informal employment like running a vegetable kiosk or as house helps. These mothers have no option but to leave the child behind with a younger sibling or an alternative caregiver who may be irresponsible, because they cannot afford a responsible adult caregiver to look after the child in their absence. For those who opt to take the child along with them, these mothers have to trade off between paying adequate attention to the child and engaging in an activity meant to attract some form of income for example pay more attention to the customers if she is selling.

A study conducted to identify the role of care as an input into child nutrition and the contribution of a number of maternal and household resources to provision of that care provided unequivocal evidence of the crucial role of childcare practices as a key input into children's nutritional status. Children whose mothers had poor childcare practices were up to three times more likely to be stunted compared to children whose mothers had good care practices (Ruel and Purmina., 2002).

A study carried out to establish child care practices in households with malnourished and those with well nourished children in four slum areas of Addis concluded that

exclusive breastfeeding beyond four months, diet quality and frequency of feeding and failure to take children with diarrhea to hospital were the principal risk factors associated with nutritional well being of children in the study area (Gugsa, 1998). Exclusive breastfeeding beyond four months as a risk factor to malnutrition in the Addis study concurs with a study in a Nairobi slum where mothers reported that their husbands were a hindrance to exclusive breastfeeding (APHRC, 2002). The reason for this, they reported, was the nature of their husband's occupation that forced them to work during the night and spend the day at the house, warranting the full attention of the wives at the expense of the child.

The feeding practices of infants and children play key roles in the prevalence of malnutrition, one of the major causes of morbidity and mortality in developing countries. The feeding practices of 1464 children under age 5 years in the Gondar Zuria district of northern Ethiopia were surveyed between July 1993 and May 1994. The findings indicated that while there is no problem in Ethiopia with women initiating breast-feeding, the early termination of the practice, the delay in beginning a supplementary diet, and the low quality of the supplementary diet are of concern (Tessema and Hailu, 1997).

The contributions of knowledge and attitudes of nutrition-conscious behaviours of the mothers to childhood malnutrition have been unclear. A study to establish the relationship between caregiver's nutritional knowledge and the nutritional status of pre school children in a Nairobi slum found out that most mothers (97.5%) have access to

nutrition education. Prevalence of stunting (86.2%) and underweight (58.4%) was high but that of wasting (1.9%) was low. There was a significant relationship between the nutritional status of children and overall nutritional knowledge. However, unexpectedly a negative relationship was found between nutritional status and mother's ability to recognize clinical signs of malnutrition, knowledge in the weaning process and dietary management during sickness. The study concluded that knowledge alone was inadequate in ensuring children's nutritional security (Waihenya *et al.*, 1996).

A mother's inability to recognize clinical signs of malnutrition e.g. presence of oedema in a child with kwashiorkor can be detrimental because the child's weight is normal due accumulation excess fluids. Knowledge in the weaning process is important in terms of knowing what foods to introduce to the child first and which ones to follow. Dietary management during childhood illnesses is important in terms of knowledge regarding frequency of feeding a sick child and giving the appropriate foods that will replace energy and foods that will attract the child's lost appetite.

2.4.3 Malnutrition and environmental sanitation and hygiene practices

Practices that promote and maintain good health in the population include seeking and accessing health care services as well as control, treatment of communicable diseases and ability to recognize ill health. Sanitation issue like disposal of human waste, garbage and cleanliness of household environment affect the health status of a population. Sanitation is important especially in urban areas where people are relatively congested. Access to sufficient quality and quantity of water is essential for nutritional security

(FSAU, 2003). There is a synergistic interaction between malnutrition and poor health status as one fuels the other (WHO, 1999). A child who is constantly sick will not feed well due to lack of appetite and will continue to get malnourished as the effects of the sickness take toll on the child's health. It is estimated that seven out of every ten deaths among children under five years of age in developing countries can be attributed to ARI, diarrhoea, measles and malaria (UNICEF, 2005).

One of the childhood diseases in the world is diarrhoea. It has been established that diarrhoea has a synergistic relationship with malnutrition. This vicious cycle results in an adverse effect on growth. In Bangladesh, 90% of preschool children suffer from some degree of malnutrition, and, as in many other countries, diarrhoea is one of the most important causes of malnutrition and child mortality. Poor hygiene and sanitation are major contributors to the diarrhoea (Nasar *et al.*, 1994). A global water supply and sanitation assessment report 2000 notes that approximately 4 billion cases of diarrhoea are recorded each year, leading to 2.2 million deaths, mostly among children under the age of five. These deaths represent approximately 15% of all child deaths under the age of five in developing countries. Water, sanitation and hygiene interventions reduce diarrhoeal disease on average by between one-quarter and one-third. Intestinal parasitic infections can lead to malnutrition, anemia and retarded growth, depending upon the severity of the infection. These can be controlled through better sanitation, hygiene and clean water supply (WHO/UNICEF, 2000).

Worm infestation remains one of the main problems of child development. This is especially a greater health hazard in developing countries. Intestinal worms infect about 10% of the population of the developing world (Rehydration project, 2000). It is one of the major causes of childhood malnutrition, anaemia, stunted physical and mental growth, psycho-social problems and this along with repeated gastrointestinal and upper respiratory tract infection contributes to high morbidity in children and remains a major cause of high infant and child mortality. It is known that intestinal parasitic infestations contribute significantly to poor growth and malnutrition in children. It is highly recommended that measures to reduce worm infestation including mass chemotherapy; should deserve high priority because of the known harmful effects of these worms (Hlaing, 1991). Distances from water points also determine the amount of time dedicated to other productive activities like childcare (FSAU, 2003). This is true because, the longer the distance, the less time a mother has to provide adequate care and to avail enough time to cook and feed the child. This water must be safe for consumption and sufficient in quantity.

Infectious diseases caused by inadequate sanitation facilities, poor hygiene practices and the ingestion of contaminated drinking water are the main causes of child malnutrition in Viet Nam today. Malnutrition currently affects 36.7 % of all Vietnamese children under five years of age. Beyond contributing to general malnutrition, diarrhoeal and parasitic diseases also impair children's physical development, cognitive function and ability to learn. Heavy infections can even result in complications leading to acute or chronic disability. While there are numerous reasons explaining why rural households continue to

lack access to suitable sanitation facilities, the problem is primarily attributable to a lack of knowledge about the importance of sanitation, failure to put knowledge into practice, insufficient governmental inputs, and a general lack of attention to the problem of environmental sanitation in (UNICEF Vietnam/MOH report, 1999).

Slum dwellers form a large part of urban inhabitants. They are often exposed to new environmental dynamics of poor housing, water supply and sanitation with poor access to health care (Awasthi and Agarwal., 2002). These conditions can accelerate the disease burden and hamper proper utilisation of nutrients by the ailing body. This in one way or the other aggravates malnutrition. In India, most data on prevalence of malnutrition in urban slums available from individual studies indicate that the prevalence of malnutrition in urban slums of India being much high (FSAU, 2003). For instance, in a study in an urban slum of Vadodara, 63% of 3157 under five children were found to be malnourished (Bhalani and Kotecha., 2002). Many malnourished Indians in cities of Delhi and Bombay are affected by improper sanitation, contaminated drinking water and urban pollution. This highlights the fact that malnutrition in urban slums is aggravated by slum conditions. Other Studies in Manila, Philippines and Cairo Egypt show that slum children suffer more and die more often from diarrhoea and acute respiratory infections than rural children (EHP, 2003).

A cross sectional study carried out to identify hygiene and health seeking practices that contribute to the prevalence of childhood malnutrition in four slums of Addis Ababa concluded that, lower utilization rate of health services, unhygienic household and poor

handling of drinking water and food to be important areas of concern and which constitute a threat to children's nutrition security in the slums of Addis Ababa (Gugsa *et al.*, 2001).

It is generally accepted that the etiology of malnutrition is multifactorial and the proportional contribution for many such factors is unknown as many of the potential determinants are highly associated. The existing body of literature demonstrates the importance of various components of childcare that improve the nutrition and health of the child, and food security has been strongly emphasized. This study sort to enhance this body of literature by demonstrating the importance to determine and understand the various barriers to child nutrition insecurity beyond food security, in order to formulate meaningful strategies to combat child malnutrition.

CHAPTER 3: MATERIALS AND METHODS

3.1 Introduction

The objective of this study was to establish the barriers to child nutrition security among children aged 6-59 months in food secure households. This chapter discusses the materials and methods that were used to achieve this objective.

3.2 Research design

This was a cross-sectional survey both descriptive and analytical in nature. Emphasis was put on the following key areas; child anthropometry, dietary intake patterns of children, caregivers knowledge, attitudes and practices on food, nutrition, hygiene and health and morbidity patterns of children in the study area.

3.3 Variables

3.3.1 Dependent variable

Nutritional status was the outcome or the dependent variable. This was determined using anthropometry. Weight, height and age of individual children were taken and compared with the U.S National Center for Health Statistics/World Health Organization international reference standards and presented as indices; Weight for age (underweight), height for age (stunting) and weight for height (wasting). Weight for age index was used to classify the children into categories of malnourished and well-nourished children i.e. nutritionally insecure and nutritionally secure respectively.

3.3.2 Independent variables

The independent or predictor variables included attributes of caregiver's knowledge in relation to nutrition, health and hygiene and caregivers childcare practices in regard to nutrition, health and hygiene. The other independent variable was morbidity or illness patterns of the study children.

3.4 Location of the Study

Bungoma is one of the eight administrative districts of western province. Total area of the district is 2,068.5km², which is about 25% of the total area of the province, with a population projection of 1,086,727 persons with an annual growth rate of 4.3%. The district has an estimated population of 207, 768 children under five years of age (ROK/CBS Bungoma, 2001). The population of Bungoma district is more or less evenly distributed. However there is a tendency of most of the people to be concentrated around the major urban centres like Bungoma town.

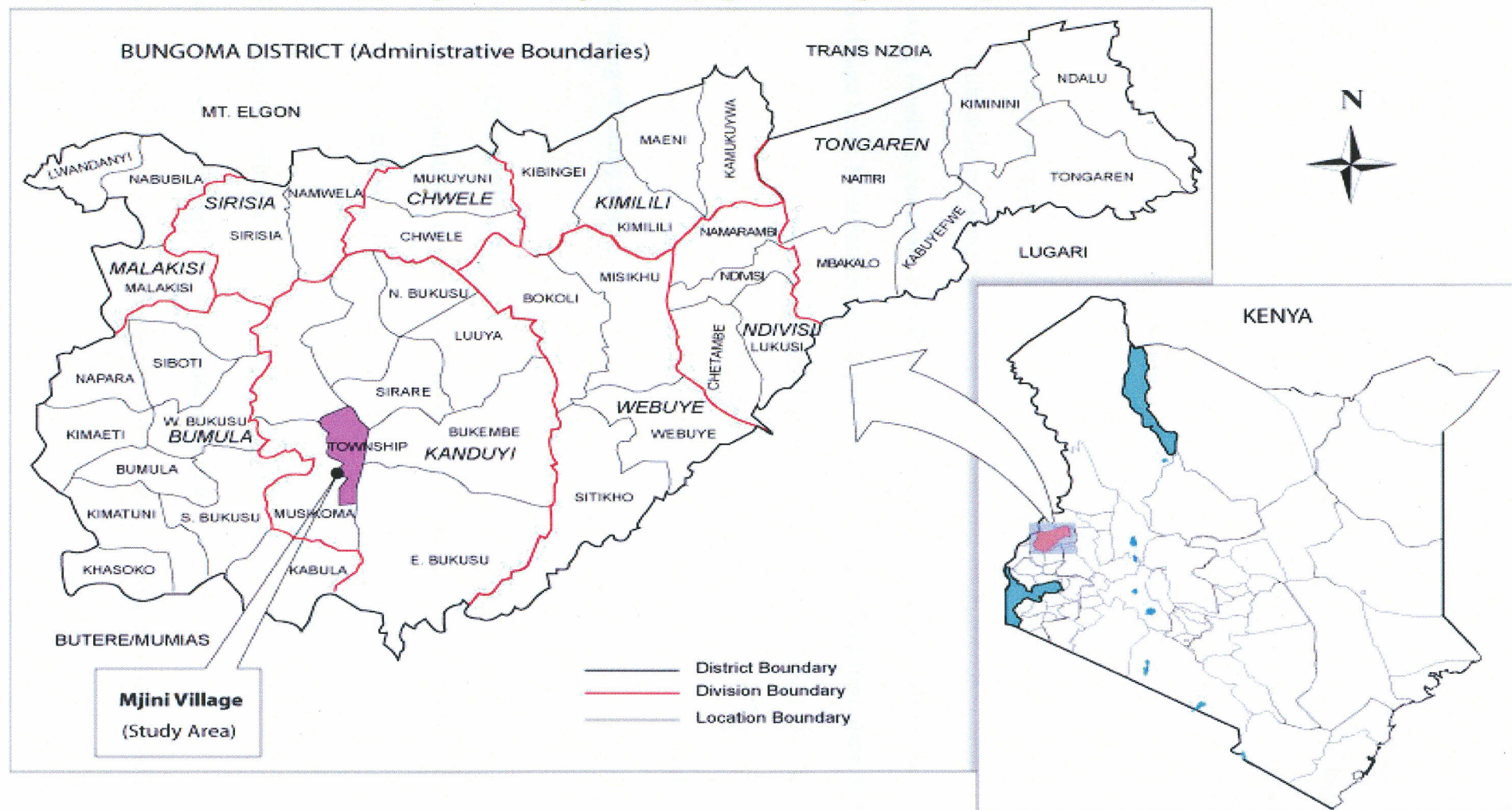
The district experiences two rainy seasons, the long and the short rains. The long rains start in March and continue into July, while short rains start in August and continue into October. The annual rainfall in the district varies from 1,250 mm to 1,800 mm. The soils of the district show considerable variations in fertility and drainage patterns. The good soils coupled with gently slopping terrain in most parts of the area make the district one of the most arable in the country. The district has an estimated 183,800 ha of arable land comprising 89% of the total land area. Crops grown in this area include

coffee, tea and millet, a variety of fruits and vegetables sugar cane, cotton, pasture, sunflower, pyrethrum, maize and potatoes (ROK/CBS Bungoma , 2001).

The district is basically agricultural and is regarded to form part of Kenya's grain basket, thus food is plenty and affordable. The staple food in the district is maize. Other foods grown include millet, sorghum and sugarcane. According to the 1999 National Micronutrient Survey report, Bungoma District met the food security criteria, which was having both lunch and supper in terms of distribution of meals and food types consumed in a 24 hour- recall. Therefore, it was considered food secure. However, it still rates among the regions with high prevalence of malnutrition in Kenya. In terms of weight for age (WAZ) indicator, Bungoma as a cluster for western region had 25% of the children studied underweight, compared to Kitui, a cluster for dry humid/semi arid highlands which had 27% of the children studied malnourished (MOH/UNICEF, 1999). This highlights the fact the despite the district being a food secure zone, it still rates high in terms of prevalence of malnutrition.

Figure 3.1: Map of the study area

Map of Study Area (Mjini Village, Bungoma District)



Mjini village was purposively selected as the study area owing to the fact that it is within Bungoma, an agricultural zone of Kenya that is considered food secure. It has a unique peri urban setting combining both a slum environment and a rural village setup. The village has an entire population of 2825 persons with 520 children under five years of age (ROK, CBS Bungoma, 2001). It is estimated that there are about 550 households within Mjini village, 60% of this having at least one child below five years of age.

The population composition of Mjini slum is heterogeneous, comprising various ethnic groups with different languages, religion and cultural backgrounds. Luhya (Bukusu) speaking Muslims dominate the village. The village has four sub-villages each headed by a village head. Most residents of Mjini obtain their staple food from their own farm. There is adequacy of other local food supplies and at least in all the households interviewed, the head of the household was involved in some form of employment. The average spending on food per day in each household was averagely 150ksh per day depending of family size.

3.5 The target population

The study population comprised of children aged between 6-59 months drawn from food secure households. Their caregivers were the study respondents.

3.5.1 Inclusion criteria

- Food secure households with children aged 6-59 months
- Residents in the study area for at least one year at the time of recruitment.

- Children with no signs of chronic illnesses, other than chronic malnutrition

3.5.2 Exclusion criteria

- Households that are food insecure
- Non-residents in the study area for at least one year at the time of recruitment.
- Chronically ill children.

This inclusion/exclusion criterion was considered owing to the fact that food security was the main interest of the study, children under five years of age are the most affected by malnutrition, are most vulnerable members of any household and also their nutritional status is one of the indicators of household well being and one of the determinants of child survival, hence their inclusion. Residency in the study area for a least one year to was considered to ensure that visitors or newcomers whose nutritional status had already been affected or compromised by other factors not within the study area were not included. Children without chronic illness were considered because chronically ill children already have their nutritional status compromised.

3.6 Sampling method and sample size determination

3.6.1 Sampling techniques

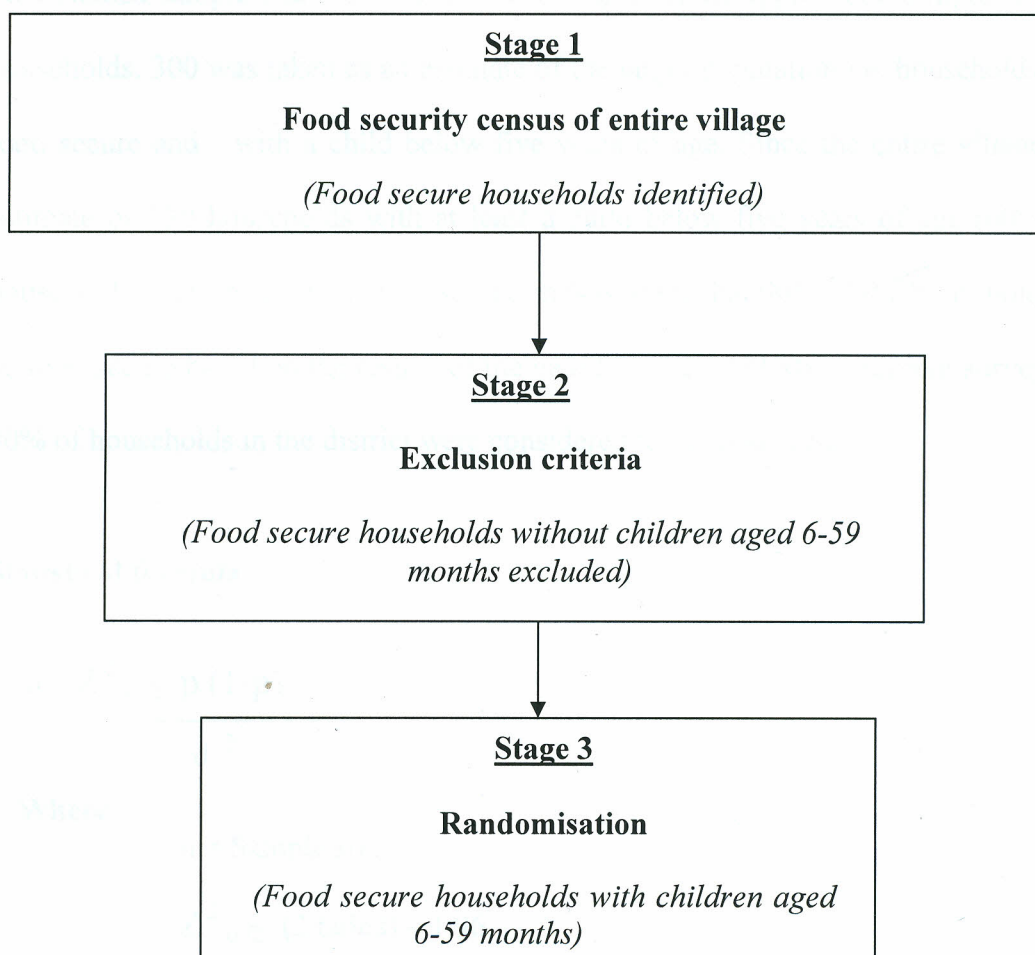
Multi-stage sampling was used. This is because the study had two arms (food security and children aged 6-59 months). Stage one involved screening by means of a house-to-house preliminary food security census to identify and determine the food security status of the households. Criteria for identification of food secure households was based

on accessibility to food (purchasing power), availability of the food (source) and affordability based on market prices and family dependency ratios. Further, criteria for selection of food secure households was based on responses whether breakfast, lunch and supper were always, sometimes or never served in the household during food lean and food plenty periods. Variables describing the meals patterns were constructed. A food secure household was one where both lunch and supper were consumed always along with frequency of consumption some staple foods (maize, rice, milk, meat and fish) over a period of one week during food lean and food plenty periods. Other variables describing the frequency of consumption of the various staple foods were also constructed. Households that reported to frequently consume these foods under consideration were classified as food secure (MOH/UNICEF, 1999).

Money spent on food purchases per month was used taking into consideration the average cost of an average meal per day in the study area alongside the number of people who feed in that household. For example, a household that obtained their food solely through purchase and spend less than 3000 ksh per month and have more than 6 people eating regularly in that house hold were considered food insecure. This was based on a market survey conducted during the pre test, which indicated that on average, a household spent 1500ksh on the minimum depending on the family size. This was found to be an acceptable concept because for food purchasers, higher production generally means lower food prices in the market for a given income level (IFPRI, 2004)

Stage two involved exclusion criteria where food secure households with children not in the 6-59 months age bracket were excluded. Stage three involved using statistical package for social sciences (SPSS) to generate a random list of 170 food secure households from which the index child was drawn. Stratification of children into 6-18, 19-36 and 37-59 age groups was done during analysis. Sampling frame consisted of food secure households with children aged 6-59 months meeting the inclusion criteria.

Figure 3.2: Framework used in sampling



3.6.2 Sample size determination

A statistical formula recommended for cross sectional studies was used to compute the sample size. A total of 170 households were selected. Since there was no available estimate of the prevalence of malnutrition in children under five years of age in food secure households in a peri urban set-up, 50%-was used as the proportion of food secure households with this attribute (Fisher *et al.*, 1998). However the target population in this study which was households with children aged 6-59 months was less than 10,000, the desired sample size was therefore obtained by applying a finite correction factor (F c f) to the obtained sample size (385) so as to come up with the appropriate sample size of 170 households. 300 was taken as an estimate of the target population i.e. households that are food secure and with a child below five years of age. Since the entire village had an estimate of 330 households with at least a child below five years of age (60% of 550 households in entire village), an assumption was made that 90% of the households would be food secure based on the results of the based on the 1999 Micronutrient survey where, 90% of households in the district were considered to be food secure.

Statistical formula

$$n = \frac{Z^2_{\alpha/2} p (1-p)}{d^2}$$

Where;

n = Sample size

$Z^2_{\alpha/2}$ (2 tailed) = 1.96

d (Absolute precision) = 5%

P (Prevalence rate) = 50%

$$n = \frac{(1.96)^2 (0.5) (1 - 0.5)}{(0.05)^2}$$

$$= 385 \text{ Households}$$

Finite correction factor

$$(f c f) = 1 / (1 + n/N)$$

$$n_f = n / (1 + n/N)$$

$$= 385 / (1 + 385/300)$$

$$= 170 \text{ Food secure house holds with children aged 6-59 months}$$

Where; n_f = desired sample size when the target population is less than 10,000

n = sample size when the target population is greater than 10,000

N = an estimate of the target population i.e. households that are food secure and with a child below five years of age (300 households)

3.7 Research instruments

Data collection tools included anthropometry, interview schedule, focus group discussion (FGD) guides, and food frequency questionnaire and observation checklist.

3.7.1 Anthropometry

Nutritional status was assessed using anthropometry. Age, sex, weight and height were taken. Two weight measurements were taken and the average calculated to the nearest 0.1 kg using a digital UNICEF bathroom scale in light clothing i.e. vests only. Weights of children who could not stand on their own were obtained by first weighing the mothers, tier the scale and then hand the baby to the mother to get the baby's weight. Calibration was made at least twice daily using standard 20kg weight. Two length

measurements of children below 2 years was measured and the average calculated to the nearest 0.5 centimetres using length boards while a height meter was used for older ones. Child health cards were used to ascertain age and verify vaccination.

3.7.2 Food frequency questionnaire

The child's dietary intake pattern was assessed through food frequency questionnaire, which was incorporated into the main interview schedule. Food frequency recall data was used to assess dietary intake patterns of the index child, and because the study focused on PEM malnutrition, mainly proteins and energy giving foods were considered.

3.7.3 Interview schedule

The interview schedule was used to collect data on socio economic and demographic characteristics of household. A food security section was used to verify household food security status along with information on the amount of money spent on food per month. Data on water, sanitation and caregiver's resources such as experience and knowledge, preventive and curative healthcare seeking behaviours e.g. childhood immunisation and treatment for diarrhoea and intestinal worms, and duration taken before taking the baby to hospital was also inclusive in the interview schedule.

The presence of disease was assessed according to symptoms of the child in two weeks preceding the study as described by the mother. Because this estimate of disease was not substantiated by laboratory analysis, only data for diarrhoea was subjected to statistical analysis, although the symptoms of other diseases are commonly known

through out the study area. Morbidity was determined according to prevalence of diarrhoea, malaria and cough over the preceding two weeks as measured by the caregivers recall i.e. whether the child had fallen ill previous 2 weeks preceding the study. This information was verified using child health records and by the in charge of the health facility reported and identified as commonly used as the source of health care during episodes of illness by the household. In clinical assessment, presence of oedema was determined by the pitting method (Cameron and Hofvander, 1983).

3.7.4 Focus Group Discussions

Focus group discussions were conducted on three groups of caregivers basically regarding their attitudes, beliefs and perceptions on nutrition and health. The caregivers who were mothers of children aged 6 – 59 months were grouped into homogeneous groups i.e. according to age, education level and number of children. Three focus group discussions were conducted. One group consisted of young mothers who were mostly single and living in their parent's house, the second group consisted of mothers of closely spaced and more than two under fives in a household and the third group consisted of elderly caregivers who most were grandmothers to the children. Kiswahili was used in the discussions since the majority of Mjini residents are Bukusu-Muslims. The groups consisted of ten caregivers, with two facilitators and were tape-recorded. The discussions lasted for about 45-60 minutes.

3.7.5 Observation checklist

Environmental sanitation e.g. presence and use of latrines, garbage disposal and drainage, hygiene practices of households, socio economic characteristics of households and child feeding practices were obtained using observation. Spot checks were made to assess the hygiene practices for instance hand washing when feeding the child and how cooked food is stored.

Clinical signs of PEM (kwashiorkor and marasmus) were observed. The checklist was incorporated into the main interview schedule. Oedema (fluid accumulation in the body) was detected by pitting method i.e. pressing the thumb on the feet just above the ankle for three seconds to see if a dent will be left.

3.8 Pre test

A pilot study was carried out at around Kanduyi market where 10 households were identified. The interview schedule was administered to caregivers in 10 households. Anthropometry and clinical assessment of 10 children from the same household was done. The instrument was then modified to accommodate flow of questions. The instrument was also found to be very long, engaging the respondent for more than one hour. Some not very relevant questions were therefore omitted. It was also after the pre test that it was resolved that a study camp would be set for child anthropometry since carrying the anthropometry equipment house to house was tedious and time consuming.

3.8.1 Validity

At the end of each day, the completed questionnaires were checked to ascertain that all questions had been answered correctly and consistently. Whenever an error or anomaly was found, the field assistant was requested to visit the household again and verify or fill the missing information. A 20 kg iron bar was used regularly to check scale accuracy and ensure that measurements were correct. At regular intervals the investigator and field assistant compared the measurement values from the same child to ascertain that measuring techniques were similar and to reduce inter-observer error. Two weight and height measurements were taken and the average used in analysis. Vaccination records were used to ascertain ages of the children, vaccination as well as reported illnesses.

3.8.2 Reliability

Three field assistants with a minimum qualification of form four certificates were drawn from the community and trained in interview administration. The field assistants had participated in other surveys and as such, were familiar with anthropometry measuring techniques. Nevertheless further training in anthropometry and interviewing techniques was conducted. Reliability was achieved through close supervision of the field assistants. When reliable documentary evidence was not available and when there was a problem with age recall by the caregiver, interviewers used a local event calendar to determine the month and year of a child's birth.

3.9 Data collection procedures

Sensitisation and mobilization of study respondents and training of field assistants was first done. This was done after informing and seeking permission to carry out research from the area chief and village heads. Sensitization and mobilization of all caregivers of children aged 6 –59 months was done with the help of the village heads. The caregivers were mostly mothers of the children and a number of grandmother caregivers also responded to the interview.

Data were collected with the help of three-field assistant and a community nutritionist from the Bungoma District hospital. The field assistants with a minimum qualification of a form four certificate were drawn from the community and trained on interview administration. The selected children participated in the study by attending a study camp that was set up for anthropometry. Consenting caregivers responded to the interview from home.

3.10 Logistical and Ethical considerations

Clearance for research was sought from the Ministry of education, at the Office of the President and Kenyatta University. The Bungoma District commissioner's office through the area chief was informed about the study. Informed consent was sought from caregivers of the children who responded to the questionnaires who also ascended on behalf of the children. All responsible parties, who included the chief and his head men, the district nutrition officer and all study respondents, were detailed on the purpose of the study. Participation was fully voluntary and confidentiality was observed at all

times. Children who were found to be too ill to participate in the study were referred to the Bungoma District Hospital, which was nearest health facility. Malnourished children needing nutritional intervention were also referred to the maternal and child health clinic of the Bungoma District hospital.

3.11 Data analysis

Data coding, entry and analysis was done using SPSS. The data were first entered and verified in Microsoft (MS) excel programme. Most of the data entered were mostly categorical in nature apart from the anthropometry, which were continues data. The data were then exported to SPSS for analysis. The anthropometrical data were first translated into nutritional indices using the Anthro package. Z-scores were calculated in terms of weight-for-age (WFA), height-for-age and weight-for-height using the National Center for Health Statistics (NCHS) reference figures. The WFA (underweight) index was used to classify the children into the categories malnourished and well nourished children using Z-scores with cut off points of $-2SD$ as recommended (WHO, 1986). Households where the child's WFA index was below -2 Z-score on the NCHS reference were categorised as nutritionally insecure households, while those whose index was above a -2 Z-score on the same reference were categorised as nutritionally secure households.

The sample population was stratified into 3 different age groups of under fives during analysis. Stratification was made on the basis that children at different ages have varying nutritional and care needs; for instance, 6-18 months (breastfeeding and

initiating complementary feeding) 19-36 months (still breast feeding and on complementary feeding) and 37-59 months (feeding on their own and from family pot).

Overall nutritional knowledge was gauged using a set of 14 questions. Each question was awarded 1 mark for each valid answer and 2 points for each invalid answer. Knowledge was classified into three levels. Low scoring between 23-27 points, average scoring between 18-22 points and high scoring between 14 and 17 points.

Regarding food frequency recall data, a food-frequency score was created on the basis of the information on the number of days the child consumed different food groups in the previous week. For the scores, a total of four food groups (staples, milk, egg/fish/poultry and meat) was considered. For the food-frequency score, each food group was scored individually and the scores for each one were summed to derive a final food-frequency score. Different combinations of food groups were included in the score, depending on the age group. For the two younger age groups, the staple group was included, as well as two of the animal product groups, i.e., egg/fish/poultry and meat. The animal products were scored "0" if they were not consumed during the past week, "1" if they were consumed on 1–3 days, and "2" if they were consumed on 4 or more days. The staple foods received a score of "1" if consumed 3 days in the previous week at 6–18 months of age, and 4 days at 19–36 months of age. They were scored "0" otherwise. A higher score was given for regular consumption of animal products than for staple foods. The reason for this emphasis on animal products is that, although there is no specific recommendation at this time about the optimal frequency of intake of animal products, the

current recommendation is that children ≥ 6 months of age should consume animal products as often as possible, ideally every day. For children ≥ 18 months old, all three animal food groups (milk, meat, fish/egg/poultry) were included and a score of "2" was given for each when consumed 4 days per week or more. For these older children, the "staple" group was not included because little variability was found, i.e., most children consumed cereals or tubers regularly. The scoring of meal frequency was based on current feeding recommendations, according to which 6- to 9 months old infants should receive complementary foods at least twice a day, 9- to 12 months old infants three times a day, and 12 to 36 months old children, four times a day. The final child-feeding index was a summation of the scores obtained for each variable described above. The index ranged from 0 to 10 for all three age groups. Within each age group, the child feeding index scores were grouped into three categories of child feeding practices: low, average and high (Ruel and Purnima, 2002).

Frequency distribution of cases in form of cross tabulations was performed to display the position of cases in regard to nutritional status (malnourished and well nourished based on weight for age index) and the predictor (independent) variables of interest. Pearson's chi-square test was used to measure association or to determine whether the frequency distributions of the variables were statistically independent or significant. The statistical probability level considered statistically significant was $p < 0.05$ for all analyses. To identify the best subset of predictors of malnutrition in food secure households, binary logistic regression analysis was performed in addition to bivariate analysis using Pearson's chi-square. This was to further explore the effect of each variable while

controlling for the confounding effects of others and adjusted odds ratios were estimated. The variables were selected due to their apparent statistical significance in the bivariate analysis. The risk of a child being underweight relative to the exposure variables were identified by the logistic regression was determined using odd ratio statistics (Kikafunda *et al*, 1998).

Qualitative data (FGDs) that had been audio taped were transcribed word to word. Key categories and important themes that came up during the discussions were identified and discussed.

Variable	Number	Percentage	OR (95% CI)
Age			
0-5	150	94.1	
6-11	4	2.5	
12-17	1	0.6	
Education level			
None	10	6.2	
Primary	140	86.3	
Secondary	10	6.3	
Illiterate	1	0.6	
Married / food / month			
Yes	140	86.3	
No	1	0.6	
Non-vegetarian food			
Yes	140	86.3	
No	1	0.6	
Urban / rural			
Urban	140	86.3	
Rural	1	0.6	

CHAPTER 4: RESULTS

This chapter will highlight the main findings of the study based on the study objectives. Figures and table have been used in presentation of the results focusing broadly on findings regarding the nutritional status of the study children, caregiver's nutritional knowledge, attitudes and practices regarding childcare as well as morbidity patterns of the study children.

4.1 Household socio-economic and demographic characteristics

Table 4.1: Distribution of nutritional status with selected socio economic and demographic factors

VARIABLE	Malnourished (n=39)	Well Nourished (n=131)	Total (N=170)
Caregiver relation to child			
Mother	36(92.3)	124(94.7)	160(94.1)
Aunt	2(5.1)	6(4.6)	8(4.7)
Grandmother	1(2.6)	1(0.8)	2(1.2)
Education level			
None	3(7.7)	7(5.4)	10(5.9)
Primary	24(61.5)	80(61.5)	104(61.2)
Secondary	10(25.6)	31(23.8)	42(24.7)
Post secondary	2(5.1)	12(9.2)	14(8.2)
Money on food / month			
< Ksh 1500	1(2.6)	0	1(0.6)
Ksh 1500-3000	17(43.6)	53(40.5)	70(41.2)
>Ksh 3000	21(53.8)	78(59.5)	99(58.2)
Main source of food			
Own farm	32(82.1)	101(77.1)	142(83.5)
Purchased	10(25.6)	44(33.6)	28(16.5)
No eating in household			
<3	7(17.9)	28(21.4)	35(20.6)
3-5	15(38.5)	58(44.3)	73(42.9)
>5	17(43.6)	45(34.4)	62(36.5)

*Figures in parentheses are proportions expressed as (%)

Table 4.1 shows that majority of the caregivers who responded to the questionnaire were mothers (94.1%) of the child, 4.7% were aunties and only 1.2% was a grandmother. All these respondents (100%) were females. Majority had primary level of education (61.2%), 24.7% had secondary education, 8.2% had post secondary education and only 5.9% had no form of education. Overall, the majority of households main source of staple food was own farm (83.5%). Majority of the households (58.2%) spent above 3000 Ksh on food, 41.2% spent between 1500-3000 Ksh and only 1 household spent below 1500ksh on food per month.

4.2 Food security

Table 4.2: Distributions of households by meals served during food plenty and lean periods

Food plenty period			Food Lean period		
	Frequency N=170	Proportion (%)		Frequency N=170	Proportion (%)
Breakfast			Breakfast		
Always	163	95.9	Always	159	93.5
Sometimes	7	4.1	Sometimes	11	6.5
Lunch			Lunch		
Always	170	100	Always	146	85.9
Sometimes	0	0	Sometimes	24	14.1
Super			Super		
Always	170	100	Always	168	99
Sometimes	0	0	Sometimes	2	1

Table 4.2 shows that 95.9% and 93.5% of the households studied reported to have had breakfast always during food lean and food plenty seasons respectively, in terms of meal consumption. These were considered breakfast stable households. In respect to lunch all households (100%) reported to have had lunch always during food stable

periods and 85.9% households reported to have had lunch always during food lean periods. In respect to super, all households (100%) reported to have had super always during food stable periods and 99% households reported to have had super always during food lean periods. These findings confirm that the households were food secure in terms of meal consumption based on responses whether breakfast or lunch or supers were always or sometimes served as indicated in Table 4.3. The dominant staple foods were cereals (maize followed by rice). Overall, irrespective of the season, 98.8% of the households reported to consume maize and 92.9% rice frequently. Only wheat in the cereals group was infrequently consumed as shown in Table 4.3.

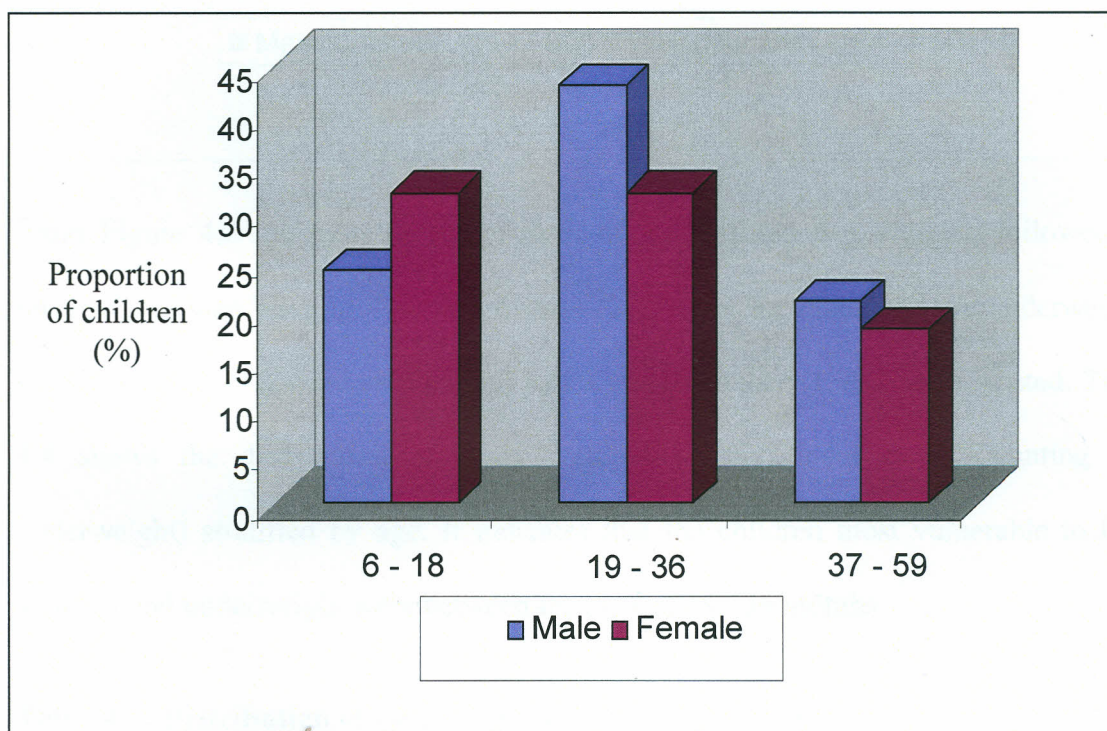
Table 4.3: Distribution of households by frequently (> 3 times per week) consumed staple food types served during food lean and food plenty periods

Food type	Food plenty periods		Food lean periods	
	Frequency No of HHs (N=170)	Proportion (%)	Frequency No of HHs (N=170)	Proportion (%)
Maize	167	98.8	167	98.8
Wheat	35	20.6	35	20.6
Rice	158	92.9	158	92.9
Sweet potatoes	98	57.6	98	57.6
Bananas	137	80.6	137	80.6
Beef	139	81.8	139	81.8
Eggs	124	72.9	124	72.9
Milk	167	98.2	167	98.2
Kale	163	95.9	163	95.9
Beans	138	81.2	138	81.2
Traditional vegetables	124	72.9	124	72.9

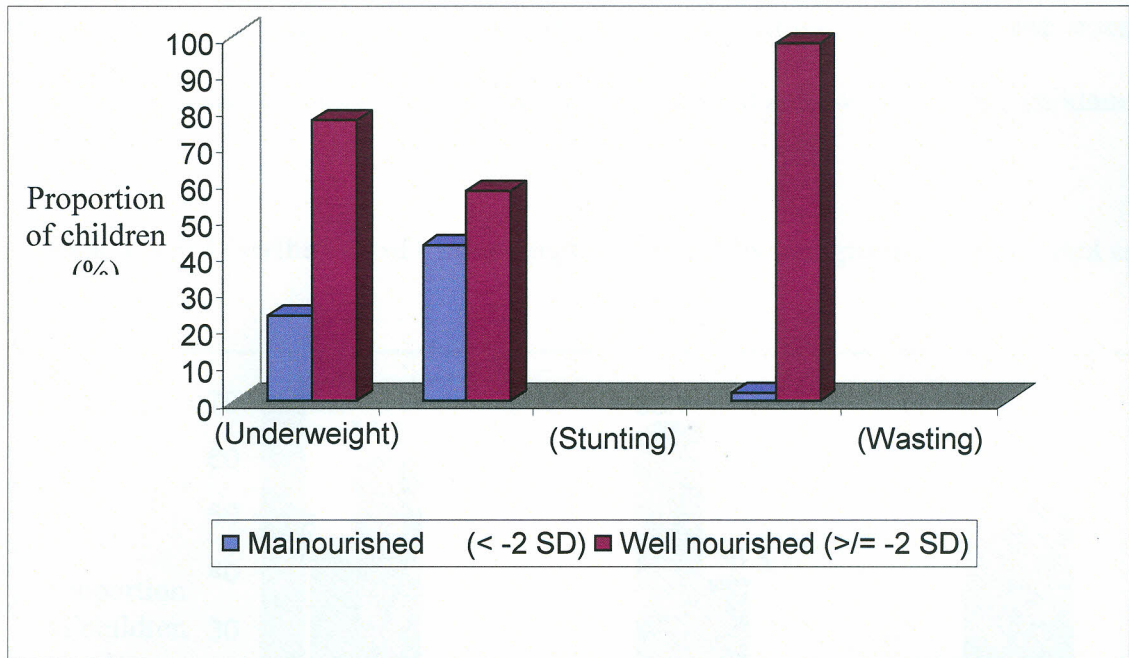
4.3 Nutritional status

Nutritional status, which is the outcome or the dependent variable, was assessed using anthropometry. Weight, height and age of individual children were taken and compared with the U.S National Center for Health Statistics/World Health Organization international reference standards and presented as indices; Weight for age (underweight), height for age (stunting) and weight for height (wasting).

Figure 4.1: Distribution of study children stratified by age (months) and sex



Of the eligible 170 children from whom anthropometrics data was obtained, there were slightly more males (51.2%) than females (48.8%). However, there were more females than males in 6-18 months age bracket as shown in Figure 4.1.

Figure 4.2: Distribution of children by nutritional status indicators

From Figure 4.2 the most prevalent form of malnutrition was stunting followed by underweight then wasting. Nearly a quarter (22.9%) of the children were underweight, nearly half (42.4%) were stunted and just a small number (1.8%) were wasted. Table 4.4 shows the distribution of study children by nutritional status (stunting and underweight) stratified by age. It indicates that the children most vulnerable to both stunting and underweight were between the ages of 19 –36 months.

Table 4.4: Distribution of nutritional status stratified by age

Age in months	Underweight n=39	Stunting n=72	Wasting n=5
6-18	7 (17.9%)	20 (33%)	1(20%)
19-36	22 (56.4%)	34 (43.5%)	1(20%)
37-59	10 (25.7%)	18 (23.5)	3(60%)

*Numerals in parentheses represent proportions expressed as %

For this study, child weight-for-age (underweight) was used as the index of nutritional status, because it reflects both chronic and acute malnutrition i.e. wasting and stunting. Underweight was therefore used to classify malnourished and well-nourished children.

Figure 4.3: Distribution of underweight stratified by age group (months) and sex

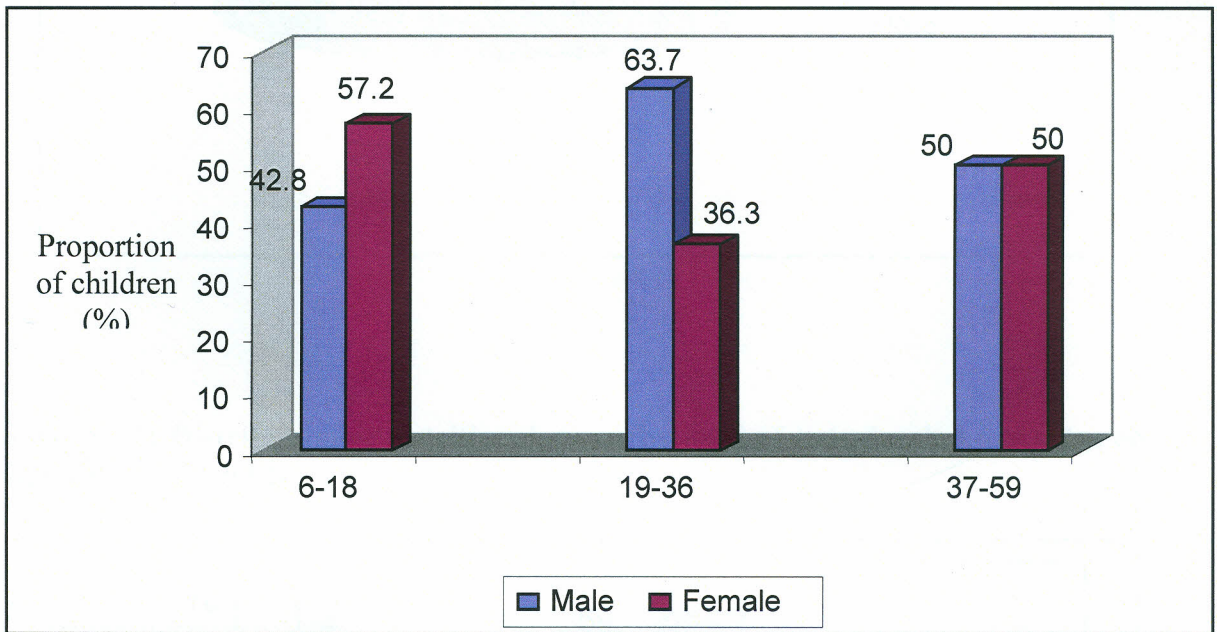


Figure 4.3 indicates that in 19-36 months age group, more males (63.7%) than females (36.3%) were malnourished. However, this was the opposite in 6-18 age group but uniform in 37-59 age group.

4.4 Caregivers' knowledge on nutrition and health

Figure 4.4 shows that in terms of overall knowledge, the majority (62.4%) of caregivers were classified as having average, 20% as having high knowledge and 17.6% as having low knowledge.

Figure 4.4: Distribution of overall caregivers knowledge on nutrition and health

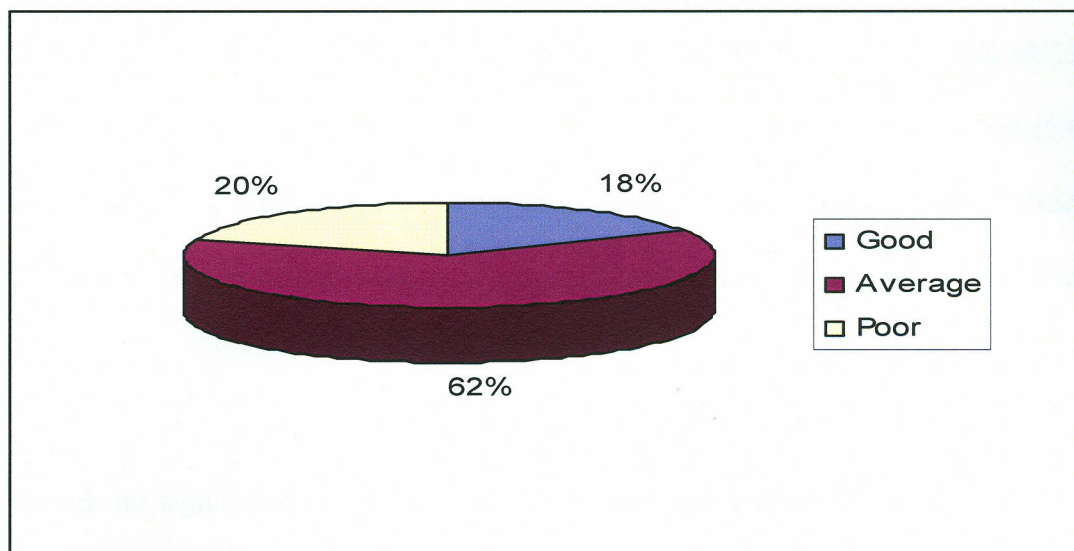


Figure 4.5: Distribution of nutritional status by level of caregiver's knowledge on nutrition and health

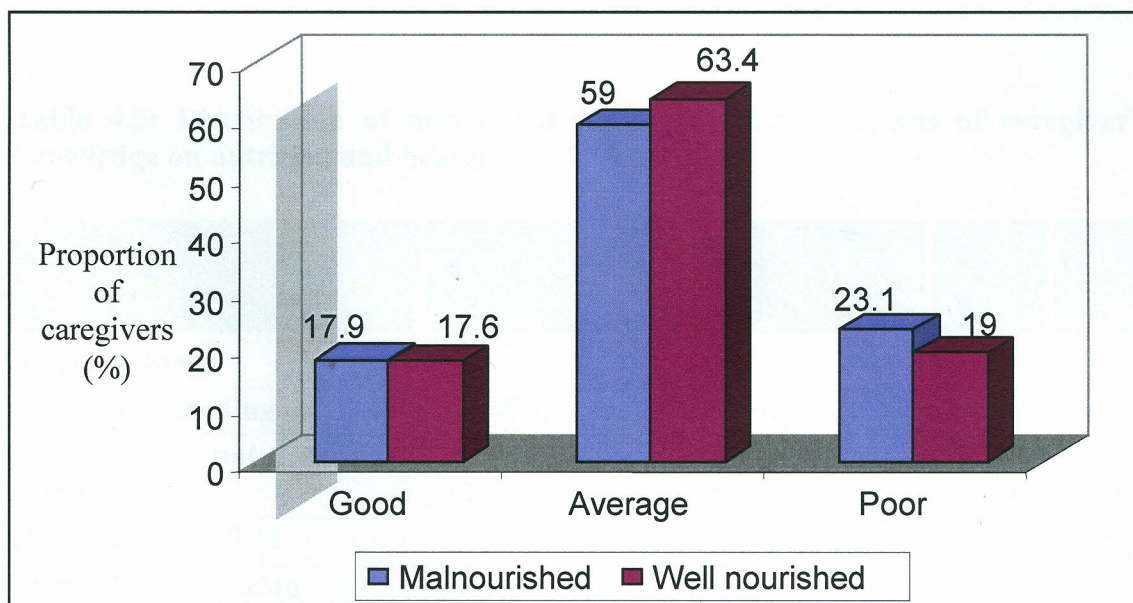


Figure 4.5 shows that the proportions of caregivers who had good knowledge was almost similar in both malnourished and well-nourished children (17.9% vs. 17.6%). However, there were a higher proportion of caregivers of well-nourished children (63.4%) who had average knowledge than caregivers of malnourished children (59%). Also, there was a slightly higher proportion of caregivers of malnourished children (23.1%) who had poor knowledge compared to caregivers of well nourished children (19.1%).

Although no significant association was found between caregivers overall knowledge and nutritional status of children ($p=0.846$, $\chi^2=0.335$), the chi- square tests showed that some aspect of knowledge were associated at statistically significant levels. The aspects on frequency of feeding and the three major food groups to include in a meal of a child were the only ones found to be statistically significant indicated in Table 4.5.

Table 4.5: Distribution of nutritional status by specific aspects of caregiver's knowledge on nutrition and health

Variable (Valid responses)	Malnourished n=39 (%)	Well nourished n=131(%)	X ²	P-value
Age of weaning	11	30	0.46	0.525**
Frequency of feeding	15(38.5)	81(61.8)	6.68	0.016*
Signs child not eating enough	22	53	3.10	0.098**
Clinical signs of PEM	19	82	2.4	0.139**
Causes of malnutrition	22	83	0.61	0.457**
What causes diarrhoea	24	76	0.15	0.716**
Diarrhoea management	17	76	2.52	0.143**
Three important food groups	10(25.6)	68(51.9)	8.35	0.006*

Numerals in parentheses are proportions expressed as %

*Significant at $p < 0.05$

** Not significant at $p < 0.05$

4.4.1 Knowledge on the three major food groups important for a child

Regarding knowledge on the three major food groups to include in a meal for a child, only (25.6%) of respondents from the malnourished group caregivers gave a valid answer, while over half (51.9%) of respondents from the well-nourished group gave a valid answer. This was found to be statistically significant ($p = 0.006$)

4.4.2 Knowledge on frequency of feeding a child

Regarding frequency of feeding the child, (38.5%) of caregivers from the malnourished group of children gave a valid answer, compared to nearly two thirds (61.8%) of caregivers from the well-nourished group of children gave a valid answer. This was also found to be statistically significant ($p = 0.016$)

4.5 Childcare practices on nutrition and health

Table 4.6 shows that terminating breast-feeding before 18 months ($p=0.008$), untimely weaning ($p=0.001$), infrequent feeding ($p=0.009$), lack of stimulation to make the child eat food ($p=0.001$), lack of deworming ($p=0.004$) were found to be the risk factors to child malnutrition food secure households

Table 4.6: Distribution of nutritional status by care practices on nutrition and health

Variable	Malnourished (n=39)	Well nourished (n=131)	X ²	P-value
Initiation of weaning				
< 4 Months	21(53.8)	28(21.4)	16.6	0.001*
4 Months	10(25.6)	73(55.7)		
> 4 Months	8(20.5)	30(22.9)		
Not dewormed				
19-36	21(95.5)	34(64.2)	7.79	0.004**
Frequency of feeding				
≤ 3 times	23(59.0)	46(35.1)	7.09	0.009**
>3 times	16(41.0)	85(64.9)		
Make the child eat food				
Coax	7(17.9)	62(47.3)	13.9	0.001*
Force	15(38.5)	44(33.6)		
Nothing	17(43.6)	25(19.1)		
Breastfeeding duration				
<18 months	14(48.3)	10(13.0)	14.98	0.001*
≥18 months	15(51.7)	67(87.0)		

Numerals in parentheses represent proportions expressed as %

*Significant at $p<0.05$

** Not significant at $p<0.05$

4.5.1 Weaning initiation and foods first introduced to the child

The foods reported as first introduced to the children by the caregivers were thin porridge, mashed potatoes/bananas, ugali and soup and cows milk. The proportion of children who had been weaned before the recommended age was higher (53.8%) in malnourished group than in the well-nourished group (21.4%). There was a higher proportion of children that had been weaned at the recommended age in the well-nourished group than in the malnourished group of children (55.7% vs. 25.6%). This was found to be significant ($p=0.001$).

4.5.2 Breastfeeding duration

Overall, (62.3%) of the children studied had ceased to breastfeed before the 18 months. Of these, the proportion of children from the well-nourished group who had been breastfed up to and beyond 18 months was higher in this group than in the malnourished group of children ((87% vs. 51.7%). This was found to be significant ($p=0.001$).

4.5.3 Deworming

Overall, only (43.5%) of all the children studied had been dewormed for the last three months. Of these, there was a higher proportion of children in the 19-36 months age group from the well-nourished group (24.4% vs., 7.7%) who had been dewormed than in the malnourished group of children. This was found to be significant ($p=0.004$).

4.5.4 Immunization

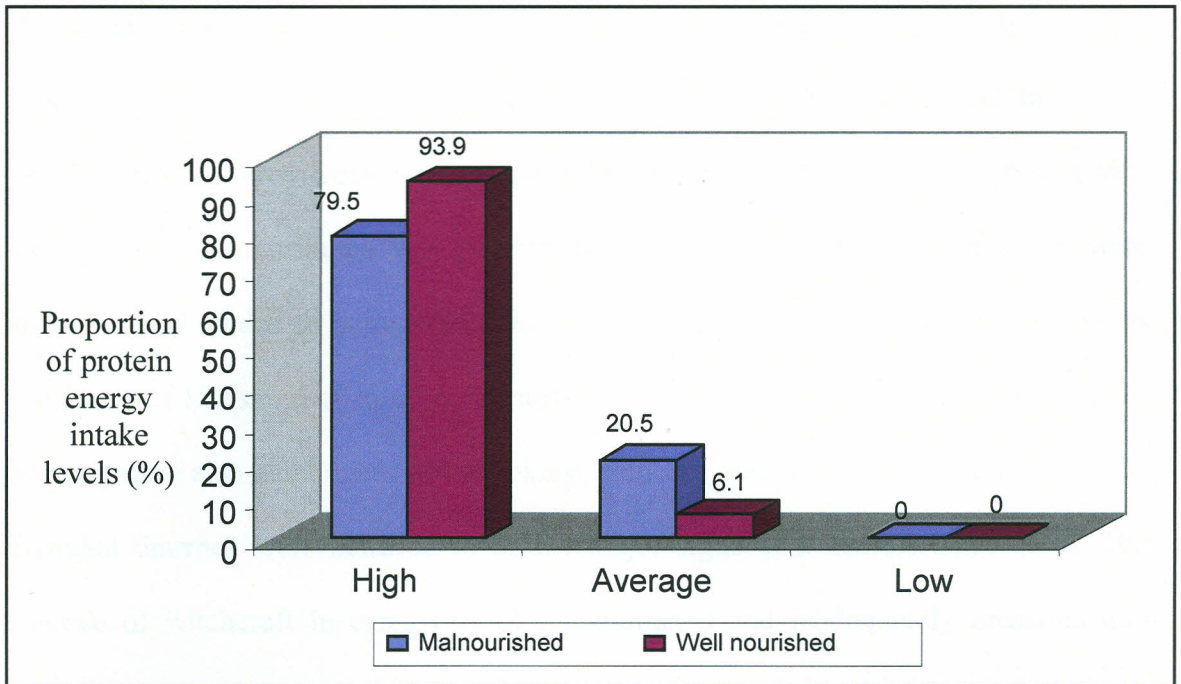
There was no statistical significance ($p=0.75$) found between the proportions of children from the well nourished (91.6%) and the malnourished groups (89.7%) who had been fully immunized for their age.

4.5.5 Feeding practices

The proportion of children who were being fed more than three times in addition to breast milk (for those who were still breast feeding) was higher in the well nourished children (66.5%) than in the malnourished children (35.9%). This was found to be statistically significant ($p=0.009$). The proportion of caregivers who stimulated child to eat by coaxing (persuade) their children to eat more food was higher the well-nourished group than in the malnourished group of children (47.3% vs. 17.9%). Also the proportion of caregivers who reported to force or “just leave” the child when they refused food was higher in malnourished group than in the well-nourished group (82.9% vs. 52.7%). This was found to be significant ($p=0.001$)

4.5.6 Dietary practices

Figure 4.7 displays the distribution of nutritional status by protein- energy intake levels by the study children as obtained from the food frequency recall. Overall, majority of the children (90.6%) had high intake levels and only a small proportion (9.4%) had average intake levels of protein – energy giving foods. No child was found to have low intake levels of energy protein foods from both the well-nourished and malnourished children. This indicates that majority of the children had adequate food intake levels.

Figure 4.6: Distribution of nutritional status by protein-energy intake levels

4.5.7 Health services utilization and choice

Overall, only (28.8%) of all the children studied had fallen ill within the last two weeks preceding the study and taken to a hospital. Of these, no statistical difference was found between the proportions of children from the well nourished (91.2%) and the malnourished groups (86.7%) who had been taken to hospital when ill. Majority (95.2%) of the households preferred the government health facility (Bungoma district hospital), which was reported as the commonly used health facility during episodes of illness.

4.6 Caregivers attitudes on nutrition and health

There was a general consensus that malnutrition was a consequence of poor feeding. However, a few caregivers believed that it was a disease arising from what they referred to “bad eyes”, and reason why most of the children had a string around their tummy to

protect them against “bad eyes”. When symptoms of Marasmus and Kwashiorkor were described, most caregivers said that they recognized them. Well over half of the caregivers knew of children with these conditions and about 20% said their own children had suffered from at least one of them. The most common cause to which kwashiorkor was attributed was poor feeding. Caregivers whose own children were malnourished tended to point to sickness as a cause; poor feeding was usually seen as the cause of kwashiorkor in other women's children. For marasmus, sickness and poor feeding were also mentioned. Baby looking “thin and unhealthy”, swelling of body and frequent diarrhea were believed to be the major signs of a malnourished child. The belief of witchcraft in caregivers of malnourished and inadequately breastfed and poorly spaced children was strong. The average spacing age was two years and it was “mzee” who made decisions regarding when to have the next child. Most caregivers did not distinguish child spacing from child limitation. Family planning as a method is an obvious solution, but very few caregivers who were mostly young mothers reported to have been on family planning. This very low utilization despite official promotion of family planning is strongly due to pro fertility attitudes in this part of the country. In discussing family planning, many mothers were interested, but often they said that their husbands were opposed to the idea, they feared even to raise the topic and feared to use family planning without their husbands “permission”. They said that they wouldn't dare go for family planning without the knowledge of the husband since most husbands resisted the idea of family planning. If they defied the orders, the husbands always “got the children elsewhere anyway”

A child was breastfed until at least he was able to walk and run around on their own and the only condition that would make the mother stop breastfeeding prematurely was if she got pregnant when the other child is still breastfeeding. If a breastfeeding mother became pregnant, it was thought that the breastfeeding child is in a “dangerous relationship” to the child in its mother’s womb. The breastfeeding child would therefore be weaned immediately for “its own good”. Why they would stop breastfeeding is because they believe that the milk is contaminated or “bad milk” and child would finish milk for the unborn baby. There was also a widespread belief that breast milk is not enough for babies. “How can a baby survive on breast milk alone?” Reason why complementary feeding was initiated early, as early as one month.

There was a general consensus that what is available or what is on the family table influences the choice of food the child is fed on and that there were no special considerations. Regarding who makes decisions regarding seeking healthcare and why most said it was the husbands and it was because he is the one who brought money. Mothers believed that they are the ones solely responsible for providing childcare in the house. Even if she has to work and the husband is at home, childcare was her responsibility. Majority of the mothers reported that their source of nutritional knowledge was from the maternal and child health (MCH) clinics while a few said that it was from their mother in laws.

4.7 Health promotive practice

Table 4.7 displays various hygiene practices and environmental sanitation as reported as well as observed from the households.

Table 4.7: Distribution of nutritional status by hygiene practices and environmental sanitation

Variable	Malnourished n=39 (%)	Well nourished n=131 (%)	X ²	P-value
Source of drinking water				
Piped	24(61.5)	78(59.5)		
Well	15(38.5)	53(40.5)		
Treating drinking water	18(46.1)	71(54.2)	0.78	0.466**
Children wearing footwear	6(20.5)	36(27.5)	1.54	0.274**
Cleanliness of toilet	18(46.1)	88(67.2)	2.97	0.105**
Waste and stagnant water in the compound	31(79.5)	62(44.6)	13.9	0.000*
Food and drinking water seen uncovered	23(74.2)	24(18.3)	26.1	0.000*
Feeding child with unwashed hands	23(59.0)	24(18.3)	24.8	0.001*
No drainage for dirty water	39(100)	131(100)	No statistics computed	

Numerals in parentheses represent proportions expressed as %

*Significant at $p < 0.05$

** Not significant at $p < 0.05$

4.7.1 Sanitation

The distribution of households with access to a latrine indicated satisfactory coverage in the study area. In addition, (67.2%) of the latrines from households with well-nourished children were graded as satisfactorily hygienic (clean) and with (46.1%) from the households with malnourished children. However, despite higher proportion of

households with well-nourished children having clean toilets there was no statistical association ($p=0.105$) found however between nutritional status and cleanliness of toilet.

4.7.2 Water source and storage

The dominant source of water was piped water (61.5%) followed by water from the well. The proportion of households who treated their drinking water (46.1%) was higher in households with well-nourished children (54.2% vs. 45.8%). However, there was no statistical association found between treatments of drinking water and nutritional status ($p=0.466$). There was a higher proportion of households with malnourished children with drinking and cooking water seen uncovered than in households with well-nourished children (74.2% vs. 18.3%). This was found to be significant ($p=0.001$)

4.7.3 Environmental sanitation

The distribution of households without drainage for dirty water indicated no coverage in the entire village. Overall, from all responding households with both well nourished and malnourished, no drainage for dirty water was observed. No statistics were computed for the variable was a constant. There was however a significantly higher proportion (79.5%) of households with malnourished children who had waste and stagnant water in the compound than in households with well-nourished children (44.6%). This was found to be statistically significant ($p=0.001$).

4.7.4 Feet protection

A slightly higher proportion of children from the well nourished had their feet protected compared to malnourished children (27.5% vs. 20.5%). However no statistical association was found between nutritional status and feet protection ($p=0.274$).

4.8 Morbidity patterns of study children

Table 4.8: Distribution of nutritional status by illness

Variable	Malnourished N=39(%)	Well nourished N=131(%)	Total N=170	X ²	P-Value
Illness of great concern					
Diarrhoea	15(38.5)	24(18.3)	41	6.9	0.032*
Malaria	15(38.5)	68(51.9)	83		
RTI	9(23.1)	39(29.8)	46		
Ill during last 2 weeks	31(79.5)	60(45.8)	91	13.9	0.001*
Illness suffered past 2 weeks					
Diarrhoea	20(64.5)	15(25.0)	35	31.3 n=91	0.001*
Malaria	6(19.4)	19(31.7)	25		
RTI	5(16.2)	26(43.3)	31		
Presence of oedema	18(46.2)	0	18	67.6	0.001*

Numerals in parentheses represent proportions expressed as %

*Significant at $p<0.05$

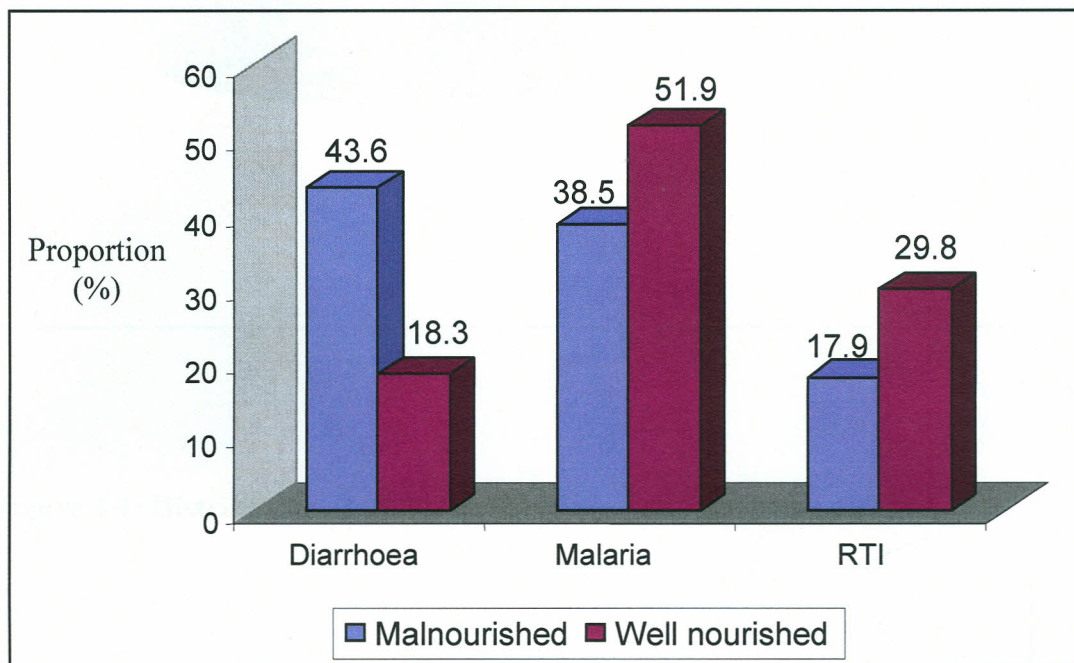
** Not significant at $p<0.05$

4.8.1 Illness of great concern in the household

Table 4.8 shows that overall, malaria was reported as the leading illness and reported as illness of great concern. Respiratory tract infections and diarrhoeal diseases were second and third commonest concerns in that order. However, there were a significantly higher proportion of households with malnourished children (43.6%) who reported diarrhoea as

the illness of great concern than households with well-nourished children (18.3%) as shown in Figure 4.7

Figure 4.7: Distribution of nutritional status by reported illness of great concern



4.8.2 Illness during past 2 weeks preceding study

Overall, 53.5% of the children studied had fallen ill for the last two weeks preceding the study. Of these, a significantly higher proportion were children in the malnourished group of children (79.5%) compared to (45%) from the well-nourished group, who had been ill the past 2 weeks preceding the study. Illnesses reported to have been suffered by the children the past two weeks preceding the study were diarrhoea, malaria and cold and coughing in that order respectively. There was a higher proportion of malnourished children (65% vs. 25 %) who had diarrhoea as shown in Figures 4.8 and 4.9 respectively.

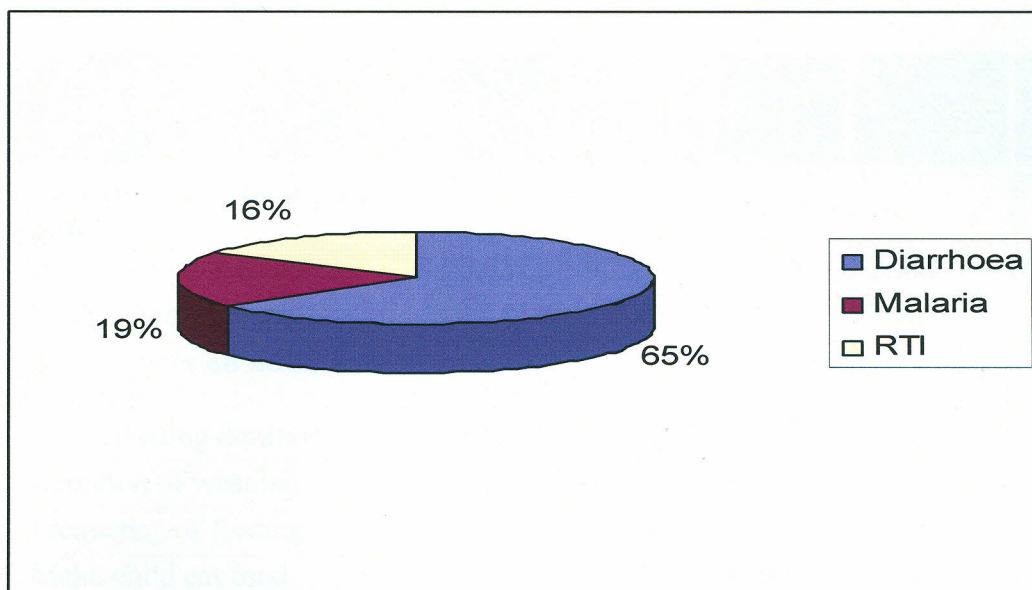
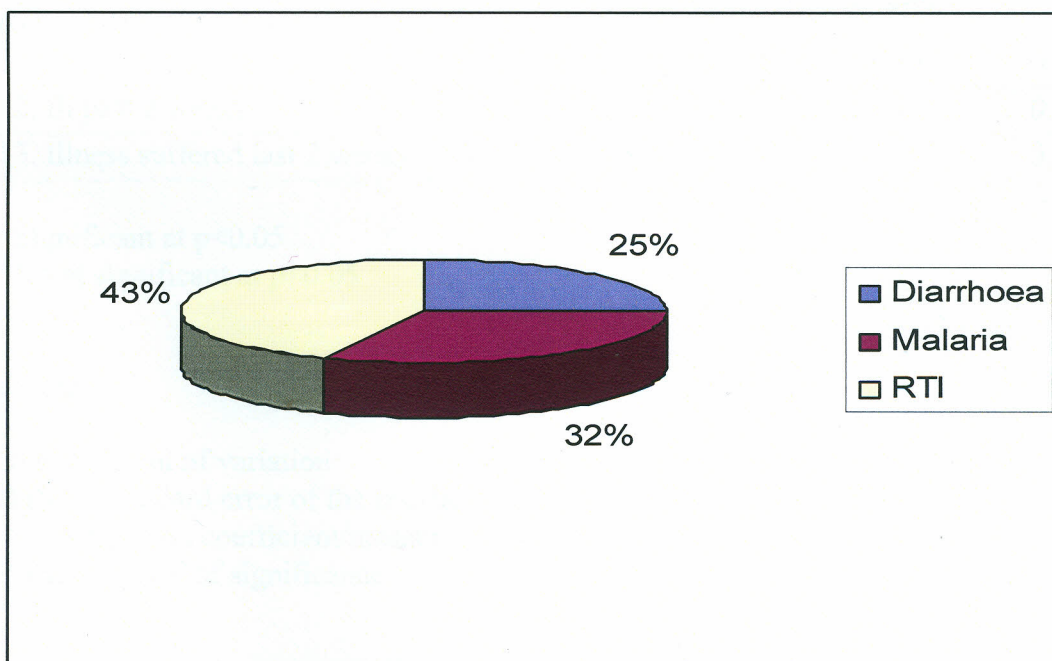
Figure 4.8: Distribution of illness suffered by malnourished children**Figure 4.9: Distribution of illness suffered by well-nourished children**

Table 4.9: Logistic regression analysis for the predictors of malnutrition by specific risk variables

Variable	B	B (SE)	R ²	Adjusted Odds Ratio	P-value
Knowledge on nutrition and health					
1. Frequency of feeding	0.952	0.375	0.058	2.592	0.011*
2. 3 major food groups	1.141	0.406	0.076	3.10	0.005*
Care practices on nutrition and health					
3. Breastfeeding duration	1.833	0.503	0.176	6.253	0.001*
4. Initiation of weaning	-0.420	0.224	0.031	3.60	0.061**
5. Frequency of feeding	0.977	0.373	0.016	2.256	0.009*
6. Make child eat food	-0.537	0.152	0.109	4.11	0.001*
7. Deworming	-2.463	1.063	0.17	0.85	0.021*
Hygiene practices					
8. Waste and dirty water	1.595	0.454	0.130	4.929	0.001*
9. Food seen uncovered	1.922	0.401	0.202	6.836	0.001*
10. Feeding child – dirty hands	-1.858	0.396	0.191	5.4	0.001*
Illness/ diarrhoeal morbidity					
11. Disease of great concern	0.536	0.263	0.038	1.709	0.042*
12. Ill past 2 weeks	1.523	0.434	0.124	4.585	0.001*
13. Illness suffered last 2 weeks	-0.244	0.284	0.011	0.783	0.390**

*Significant at $p < 0.05$

** Not significant at $p < 0.05$

Where;

B=coefficient of variation

B (SE)=standard error of the coefficient

R²=Correlation coefficient/measure of association

P-value=Level of significance

In addition to bivariate analysis using cross tabulations, further investigation into the risk factors for malnutrition in children was performed using binary logistic regression to

explore the effect of each variable while controlling for the confounding effects of others and adjusted odds ratios were estimated as displayed in Table 4.9. Knowledge on frequency of feeding and knowledge on three important major food groups, breast feeding duration, initiation of weaning, frequency of feeding, stimulation to make child eat, deworming, presence of waste and stagnant dirty water in the compound, food seen uncovered, feeding child with dirty hands, disease of great concern and illness the past two weeks were the variables selected for multivariate analysis. These variables were selected due to their apparent statistical significance in the bivariate analysis. The risk of a child being underweight relative to the exposure variables identified by the logistic regression was determined using odd ratio statistics (Kikafunda *et al.*, 1998). All the variables apart from illness suffered past two weeks and initiation of weaning remained significant influencers of malnutrition. Illness suffered past two weeks was not significantly related to the outcome variable (nutritional status), although in the earlier cross tabulations there was a suggestion of a significant effect.

CHAPTER 5: DISCUSSION

5.1 Introduction

This study attempted to find out the barriers to child nutrition security in food secure households. The variables that were found to be significant risk factors to malnutrition in the study are as follows; Lack of knowledge on frequency of feeding a child (60% vs. 38%, $p=0.016$, $OR=2.5$), and knowledge on the three major foods groups (52% vs. 25.6%, $p=0.006$, $OR=3.13$), inadequate breast feeding (48% vs. 13%, $p=0.008$, $OR=6.2$), untimely weaning (74% vs. 44%, $p=0.001$, $OR=3.6$), feeding < 3 times (59% vs. 35%, $p=0.009$, $OR=2.2$), lack of stimulation when feeding child (47% vs. 18%, $p=0.001$, $OR=4$), lack of deworming (90% vs. 75%, $p=0.004$, $OR=2.9$), presence of dirty water and waste in the compound (79% vs. 44%, $p=0.001$, $OR=4.9$), storing cooked food uncovered (74% vs. 18%, $p=0.001$, $OR=6.8$), feeding child with dirty hands (59% vs. 18%, $p=0.001$, $OR=6.4$) and diarrhoeal morbidity i.e., diarrhoea as illness of great concern (43% vs. 18%, $p=0.001$, $OR=1.7$) and diarrhoeal as illness suffered by malnourished children 2 weeks prior to the study (79% vs. 45%, $P=0.001$, $OR=4.4$).

5.2 Nutritional status

For this study, nutritional status was the outcome (dependent) variable. The prevalence of both wasting and underweight was high. The prevalence of stunting found in this study was much higher than the national Figure of 30%. This was same for underweight, where by the national Figure is 20% for both severe and moderate underweight whereas 22.9%

was found for this study. The prevalence of wasting was found to be 1.8% much lower than the national Figure of 6% (UNICEF, 2005).

Weight for age (WA) /underweight was the indicator was used to classify malnourished and well-nourished children. Weight for age reflects both chronic (stunting) and acute (wasting) malnutrition. Underweight is not only characterized by energy deficit but also depicts deficiency of other micronutrients. Prevalence of underweight is also a Millennium Development Goal (MDG) indicator.

A general observation from this study that more males than females were malnourished in terms of both underweight (63.7% vs. 36.3%) and stunting in 19-36 months age group is not surprising. Findings from Ghana, Tanzania, Indonesia, Vietnam and India also indicate that more often it's the boys than girls who tend to be more underweight and stunted than girls among the under-five age group (SCN, 2002). Nutritional status data in Kenya also indicate that among the under fives, more males (22%) than females (18%) are underweight and also more males (33%) than females (28%) are stunted (UNICEF, 2005).

Findings from this study indicate that more children in the 18-36 months age group were malnourished. On the contrary, it is reported that the period 6 months to 2 years when the child is dependant on someone to feed him/her, has the maximum malnutrition (Shanti and Dheeraj, 2004). It is also reported that the first two to three years of a child's life are regarded as the most dangerous years. This period, when characterised with inadequate

birth spacing, children are not weaned timely and they often receive inadequate care (Eileen and Pauline, 1992). On the basis of inadequate birth spacing, findings of this study can hold as one of the factors that markedly affect the quality of childcare is child spacing. The picture of a mother with a chubby, happy infant and a miserable 18 month old is all too common (Whyte and Kariuki, 1991). As mentioned in this study, there was the perception among the mothers of the need to stop breastfeeding and abruptly start complementing the child's diet as soon as the mother realises that she is pregnant. In discussing birth spacing and when to have the next child, most mothers expressed that they often had the next child when the "other one" started walking. On average a child starts walking during the ninth to twelfth month. It is not clear whether a malnourished child generates a lower level of stimulation or whether lack of stimulation should be seen as causal leading to increased risk of malnutrition within 18-36 months age group in this study. In a situation where there is a new breastfeeding child, it is apparent that the displaced child is at greater risk of attention and stimulation from the caretaker (Whyte and Kariuki, 1991).

5.3 Knowledge on nutrition and health

Review of literature on relationship between caregiver's knowledge and nutritional status of children led to the conclusion that there is no conclusive evidence that nutritional knowledge has an advantage on nutritional status of children (Waihenya, 1994). This study did not also find any association between overall nutritional knowledge and nutritional status of children. It however showed that some aspects of knowledge to have significance to nutritional status. The proportion of children whose

caregivers did not know which three major food groups to include in a meal for a two year old was significantly high in the malnourished than in the well nourished group of children (74.4% vs.. 48.1%, $p=0.006$, $\chi^2=8.35$). These results concur with results of a study that sort to find out the relationship between childhood malnutrition and maternal knowledge and beliefs, where it emerged that in the households in which the mothers did not know the types of food that promote body building as opposed to those that knew had a significantly higher prevalence of malnutrition (Walia and Gambhir 1985).

Knowledge relating to frequency of feeding young children seemed to play a role in protecting children against underweight; a condition that reflects both acute and chronic nutrition deficiency. The proportion of caregivers who reported to feed their children more than three times in a day in addition to breast milk was significantly higher in caregivers with well nourished children than in the malnourished group (61.8% vs. 38.5%, $p=0.016$, $\chi^2=6.68$). In nutrition education, mothers are encouraged to give more than 3 feeds per day or at least five feeds in addition to breast-feeding (Waihenya *et al.*, 1996).

Some aspects of knowledge did not indicate any relationship to nutritional status and though the finding is disappointing, it is a good pointer to the ineffectiveness of nutrition education per se in providing nutrition security and tends to weaken to the argument that lack of awareness is a major causal factor of malnutrition in young children. This could indicate that women with knowledge are unable to apply it and this concurs with the contention that there is a gap between knowledge and its application

(Bengu, 1995). A generalised conclusion from this is that feeding practices or behaviour for whatever reasons do not match up to knowledge. The challenge therefore is to devise a multifaceted educational programme that deals with behavioural changes of caregivers for infants and children.

5.4 Hygiene practices

Poor hygienic practices and unsanitary household conditions are associated with high prevalence of infections, which in turn are associated with malnutrition. These conditions apart from causing direct infections can cause infections that result from consumption of contaminated food or water or fluids. An observation from this study that proper hygiene practices of households and lower diarrhoeal morbidity of children from well-nourished group compared with children from the malnourished group is not surprising.

The practice of feeding a child with unwashed hands was found to be one of the risk factors that expose children to malnutrition. The proportion of caregivers who fed their children with unwashed hands was significantly higher in malnourished group children than in children in the well-nourished group (59% vs.18.3%, $p=0.000$). Diarrheal morbidity was also significantly high in children in the malnourished group who had fallen ill two weeks preceding the study (51.3% vs.11.5%, $p=0.00$). This could be explained by the fact that the caregiver's hands might be a major route of transmission of potential pathogens capable of causing infections such as diarrhoea. And thus, contributed to the synergism between malnutrition and the disease. The effect of hand washing in reducing the incidences of diarrhoea has been reported. In a study conducted in a Calcutta slums, it was found that the exercise washing hands with soap before

feeding the child to be an effective measure in reduction of dysentery among children (Sircar *et al.*, 1987)

The observation that a higher proportion of malnourished children came from households that food and drinking water was seen uncovered in not unexpected (74.2% vs. 18.3%, $p=0.000$). Because such practice is likely to result in contamination that exacerbates the chance of negative nutritional consequences. In general, in view of the findings on household sanitation and hygiene practices, the households with well-nourished children had relatively better practices than in households with malnourished children. It therefore seems that the health education programmes aimed at encouraging good hygiene may be helpful in improving nutritional security in children.

5.5 Diarrhoeal morbidity

One of the childhood diseases in the world is diarrhea and its been established that it has a synergistic relationship with malnutrition (WHO, 1981). This vicious cycle results in an adverse effect on growth (Black, 1984). In Bangladesh, 90% of preschool children suffer from some degree of malnutrition and, as in many other countries; diarrhea is one of the most important causes of malnutrition and child mortality. Poor hygiene and sanitation are major contributors to the diarrhea (Ahmand and Hassan, 1983).

The contribution of diseases and especially infectious diseases like diarrhoea and intestinal worms cannot be ignored because of the overwhelming loss of nutrients from the body arising from such diseases (Burgess, 1994). Diarrhoeal diseases further interfere with food absorption (FSAU, 2003) The observation that there were a

significant high number of households with malnourished children as compared with the well nourished (64.5% vs. 25%, $p=0.001$) who reported diarrhoea as the disease of great concern is plausible as this reflects the well-known fact diarrhoea is common among children with poor nutritional status. It is also probable that poor household hygiene practices observed in the malnourished children are partly responsible for the high prevalence of diarrhoeal morbidity among the malnourished children (Necla, 1988).

5.6 Preventive health practices

It is an established fact that intestinal parasitic infestations contribute significantly to poor growth and malnutrition in children. Studies using height, weight or haemoglobin concentrations as indices to assess the nutritional status of infected and children treated for intestinal parasitism showed significant improvement in the nutritional status of the treated peers thus reiterating the contribution of worm infestation to childhood malnutrition. Deworming is a preventive health practice. The observation that there were a significantly ($p<0.05$) higher proportion of children aged between 19-36 months from the well-nourished group (24.4%) who had been dewormed than in the malnourished group (7.7%) is not surprising. It is highly recommended that measures to reduce worm infestation including mass chemotherapy; should deserve high priority because of the known harmful effects of these worms (Hlaing, 1991).

High coverage of vaccination against disease of childhood is reported as safeguard for better nutrition and health (Devi and Geervani, 1994). However, the results of this study

showed that immunisation status was not significant in both the malnourished and well-nourished groups of children. This did not suggest association of vaccination coverage as a preventive health practice to nutritional status. This confirms the importance of other factors in the causation of malnutrition and suggests that vaccination may be a necessary condition but not sufficient in itself for maintaining adequate nutritional status. This is not surprising considering the fact that the aetiology of malnutrition is multifaceted (UNICEF, 1990). However, the intimate association between malnutrition and diseases means that prevention of diseases by immunisation and improved hygiene are absolutely essential.

5.7 Child feeding practices

High quality complementary food provided from about the sixth month onward is a key component of good nutrition (WHO, 1998). However whereas nutrition recommendation were previously only concerned with food quality and to some extent food quantity, many practices related to how the food is actually provided to the children and fed to them has also been found to influence nutrient intake (Engle, 1999). One such practice is stimulating and helping child feed the child during meals. This practice is a recognised as an important component of psychosocial care, which has been associated with improved nutrient intake and growth (Bentley, 1995). Thus the results of this study that a significant relationship was found between encouraging the child eat more food and nutritional status is not unexpected. The proportion of caregivers who coaxed the child to eat food was found to be significantly high in well-nourished children than malnourished group (47.3% vs.17.9%, $p=0.001$). Thus, feeding

the child responsively i.e. encouraging the child to eat has been found to influence nutrient intake (Engle, 1999).

A study also on child feeding practices revealed that initiation of breast-feeding is not a problem in Ethiopia and the major areas of concern are the early termination of breast-feeding, the delay in initiation of supplementary diet and the low quality of supplementary diet (Tessema and Hailu, 1997). The results on breast-feeding duration and initiation of weaning of this study concur with results of these two studies. Breastfeeding duration greatly influenced underweight. Results on breastfeeding indicate that 106 children had stopped breastfeeding at the time of the study. Of these a significant high proportion of children from the malnourished group had stopped breastfeeding before the age of 18 months (43.8% vs.13%, $p=0.001$). Because of compelling evidence that breastfeeding is beneficial for children, WHO/UNICEF recommends exclusive breastfeeding for at least the first four months of life, and continuing breastfeeding and complementary foods for up to two years of age and beyond. In light of the recommendations by the WHO/UNICEF, infants who are breastfed for less than 18 months can be considered to have been complementary fed prematurely (WHO/UNICEF, 1990).

Timely complementary feeding may reduce malnutrition especially PEM. This conclusion came from a study on nutritional status and immunisation, complementary feeding practices and socio-economic conditions of under fives in three villages of

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

Summary of the main findings have been highlighted and implications of the findings discussed. Conclusions based on the findings have been made and recommendations based on relevant areas in relation to this study have been made.

6.2 Summary

The objective of the study was to establish barriers to child nutrition security beyond food availability. Lack of knowledge on frequency of feeding a child ($p=0.016$, $OR=2.5$), and knowledge on the three major foods groups ($p=0.006$, $OR=3.13$), inadequate breast feeding ($p=0.008$, $OR=6.2$), untimely weaning ($p=0.001$, $OR=3.6$), feeding < 3 times ($p=0.009$, $OR=2.2$), lack of stimulation when feeding child ($p=0.001$, $OR=4$), lack of deworming ($p=0.004$, $OR=2.9$), presence of dirty water and waste in the compound ($p=0.001$, $OR=4.9$), storing cooked food uncovered ($p=0.001$, $OR=6.8$), feeding child with dirty hands ($p=0.001$, $OR=6.4$) and diarrhoeal morbidity i.e., diarrhoea as illness of great concern ($p=0.001$, $OR=1.7$) and diarrhoea as illness suffered by malnourished children 2 weeks prior to the study ($p=0.001$, $OR=4.4$) were found to constitute a threat to children's nutritional security in food secure households..

6.3 Implications of the findings

Several complementary factors relating to how the food is utilized must be in place if all household members are to enjoy a healthy and active life resulting from proper nutrition. Findings of this study among them, a hygienic environment and proper childcare

practices and positive knowledge relating to nutrition and health are the main challenges and important advances in child nutrition that still remain to be achieved through continued and increasing investment in these areas.

6.4 Conclusion

For a long time, people thought that producing more food could combat hunger and malnutrition and that, prerequisite to achieving or maintaining a good nutritional status is the possibility of a sufficient consumption of food. But consumption alone or the fact that the food is available and accessible is not enough. Countries maybe foods secure but still have crippling rates of malnutrition. To curb these, attention should be directed to issues of household access to food and to the context within which the food is utilized i.e. sanitation, health services, care practices, level of knowledgeable care, and a broad range of related issues. These issues translate food security into a child's well being health wise and nutritionally. Results of bivariate analysis from this study confirm the importance of a number of hypothesized relationships between specific aspects of caregivers' knowledge, care practices, and environmental hygiene and nutritional outcomes. Therefore, several complementary factors relating to how the food is utilized must also be in place if all are to enjoy a healthy and active life resulting from proper. In general view of the findings on household sanitation and hygiene practices, the households with well-nourished children had relatively better practices than in households with malnourished children. It therefore seems that the health education programmes aimed at encouraging good hygiene may be helpful in improving nutritional security in children. The study therefore supports the need for a continued public education campaign strongly

emphasising the significance of hand washing before feeding young children, keeping drinking water/foods covered, keeping the house free from faecal material and seeking proper treatment for diarrhoea and other preventable diseases. Another generalised conclusion from this is that feeding practices or behaviour for whatever reasons do not match up to knowledge. This could indicate that women with knowledge are unable to apply it and this concurs with the contention that there is a gap between knowledge and its application (Bengu, 1995).

In view of the study finding, the null hypothesis that stated; *Children aged 6-59 months in food secure households are not malnourished has been rejected*. This study thus concluded that food availability and access to that food alone are insufficient to assure nutrition security (IFPRI, 2004).

6.5 Operational recommendations

- i. Periodic de-worming a component of integrated management of childhood illness (IMCI) strategy by the Ministry of Health is currently a national wide exercises targeting under fives attending MCH clinic. A follow up and probably an evaluation of this exercise should be carried out. The observation that there were a significantly ($p < 0.05$) higher proportion of children aged between 19-36 months from the well-nourished group (24.4%) who had been dewormed than in the malnourished group (7.7%) supports this recommendation. It is highly recommended that measures to reduce worm infestation including mass chemotherapy; should deserve high priority because of the known harmful effects of these worms. (Hlaing, 1991).

- ii. The primary role of mothers as individuals responsible for childcare seems so self-evident and is rarely questioned. 100% of the caregivers who responded to the interview were females. There is need therefore to raise awareness of men concerning their caring tasks and their participation in these tasks as the father makes decisions in the family. This came out clearly also from the focus group discussions. Therefore they should be included in the process of achieving behavior change in regard to childcare practices relating to nutrition and health.
- iii. Proper and sustained education of parents on feeding infants and children needs continuing emphasis. Knowledge relating to frequency of feeding young children and knowledge on three major food groups to include in a meal for a two year old were significantly related to malnutrition. In nutrition education at the MCH clinics, mothers are encouraged to give more than 3 feeds per day or at least five feeds in addition to breast-feeding (Waihenya et al, 1996). This is a good pointer to the ineffectiveness of nutrition education per se in providing nutrition security and tends to weaken the argument that lack of awareness is a major causal factor of malnutrition in young children. This could indicate that women with knowledge are unable to apply it and this concurs with the contention that there is a gap between knowledge and its application (Bengu, 1995). The challenge therefore is to devise a multifaceted educational programme that deals with behavioural changes of caregivers for infants and children. This should be sustainable and continuously emphasised.

- iv. Addressing hygiene behaviours critical in minimizing the frequency of infectious diseases and reducing child malnutrition. This calls for the need for a continued public education campaign strongly emphasising the significance of hand washing before feeding young children, keeping drinking water/foods covered, keeping the house free from faecal material and seeking proper treatment for diarrhoea and other preventable diseases.

6.6 Recommendations for further research

- i. According to (France, 1999), the quality of childcare is an aspect of healthcare provision that is assumed to be the responsibility of an individual mother. However, resources required by the caregiver especially psychosocial aspect have not been extensively studied in the developing countries. Aspects such as mental health, self confidence, autonomy and control of resources, reasonable workload and family and community social support, influence on child feeding decisions and their contribution as caregivers' psychosocial care as a key input in children health should be investigated, with a view to bring more attention to the whole concept of child care when designing interventions to improve child health and nutrition.
- ii. Evaluation & redesign nutrition education delivered at the MCH clinic, to find out its relevance, effectiveness and efficiency.

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Termination of participation

Participation from the study may be terminated if the child becomes acutely unwell before the proposed examinations are carried out.

Withdrawal of information

Nothing being requested in participation is entirely voluntary.

2. You may withdraw from participation at any time, without penalty, anytime.

3. You are free to ask any question about the study at any time.

4. If you have had any doubts about the study, you will be fully explained to you by the investigator and you will be given the opportunity to ask questions. All, which were to be asked, were asked.

Name of respondent _____

Relation to child _____

Signature _____

APPENDICES

1: Informed consent document

Barriers to child nutrition security in households with no food shortages: A case study of Mjini village in Bungoma town, Kenya

Introduction

My name is Elizabeth Echoka, a Public Health Nutrition student from Kenyatta University. I am working with several of my colleagues to collect information regarding risk factors associated with child malnutrition in this area. The information gathered from this study will be used to make recommendations to the relevant authorities to intervene in order to reduce child malnutrition in this area.

Procedures

If you agree to participate in this study by signing the section at the end of this form, your child's weight and height measurements will be taken. You will also be interviewed on childcare practices, health and hygiene practices, and be requested to provide information about the household.

Precautions

No risks are associated with the examinations to be undertaken in this study

Confidentiality

Any records relating to your household and your child's participation will strictly be confidential. Your names or that of the child will not appear in any reports from this study.

Benefits

1. Your child will be examined, i.e. weight and height measurements taken and if found to have any indications of malnutrition, you will be advised and informed accordingly, including referral to the nearest health facility for further management should need arise.
2. Information gathered from this study will be used to make recommendations to the relevant authorities to intervene in order to reduce child malnutrition in this area.

Termination of participation

Participation from the study may be terminated when the child becomes acutely unwell before the proposed examinations are carried out.

Participation information

You are being requested to participate in this study;

1. Participation is entirely voluntary
2. You may withdraw from participating in any part of the study or from the study entirely, anytime.
3. You are free to ask any questions pertaining this study, which is not clear to you after you have had the consent explained to you.

I, the undersigned have understood the above information which has been fully explained to me by the investigator and I voluntarily consent to participate. I had an opportunity to ask questions all, which were answered to my satisfaction.

Name of respondent _____

Relation to child _____

Signature _____ **Date** _____

2: Research instruments

2.1 Interview schedule

Barriers to child nutrition security in households with no food shortages: A case study of Mjini village in Bungoma town, Kenya

Household number _____ Date _____ / _____ / _____
 Name of index child _____ Sex _____ DOB _____ / _____ / _____
 Name of caregiver _____ Relation to child _____

A. Demographic and socio economic characteristics of household

Name of HH member	Relation to HH	Sex	Age		Marital status	Educ level	Occupation	Religion
			Yrs	Mths				
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								

1.Relation to HH

1=Head of HH
 2=Wife/Husband
 3=Son/Daughter
 4=Others

2.Marital status

1=Married
 2=Single
 3=Divorced/separated
 4=Widowed

3.Occupation

1=Casual worker
 2=Regularly employed
 3=Self employed
 4=Go to school
 5=Housewife
 6=Unemployed

4. Education level

1=None
 2=Primary
 3=Secondary
 4=Post second
 5=Other

5.Religion

1=Christian
 2=Muslim
 3=Other

6.Sex

1=Male
 2=Female

7. How much money do you approximately spend on food per month?

1. <Ksh 1500

2. Ksh 1500-3000

3. > Ksh 3000

8. Who owns the house you live in?

1. Rented

2. Own

3. Other (specify) _____

9. What is the main source of staple food in this household?

1. Own farm/garden

2. Purchased

3. Other(specify) _____

(If answer is purchased, proceed to question 11)

10. If farmed, is the food usually sufficient for the household?

1. Yes

2. No

11. How many people eat in this household?

1. $< / = 3$

2. 3-5

3. > 6

Food security

12. Please ask and indicate by ticking meals that are usually served in the household

Meal	Food stable months			Food unstable months		
	Always	Sometimes	Never	Always	Sometimes	Never
Breakfast						
Lunch						
Supper						

Codes 1= Food secure – Lunch Always, Supper Always
 2= Non-stable – Lunch Always, Supper Sometimes
 3= Food insecure – Lunch Always, Supper Never

13. Ask and indicate how many times per week the following foods consumed?

Food type	Food stable months	Food unstable months
Maize (ugali/Githeri)		
Millet (ugali)		
Wheat (chapati)		
Rice		
English potatoes		
Cassava		
Sweet potatoes		
Bananas (green)		
Beef		
Fish		
Chicken		
Eggs		
Milk		
Kale		
Cabbage		
Traditional vegetables		
Beans		
Ndengu		

Codes 1=frequently consumed (> 2 times a week to many times a week)
 2=Not frequently consumed (< 2 times a week)
 3=never consumed (never consumed)

C. Care practices

14. What is the age interval in months between this child and the follower?

1. <18 months 2. \geq 18 months 3. No other child

15. Is the index child breastfeeding?

1. Yes 2. No

(If answer is yes, proceed to question 17)

16. If not, how long was the child breastfed?

1. < 18months 2. \geq 18 months 3. Never breastfed

17. At what age did you introduce other foods, other than breast milk to the child's diet?

1. 4 months 3. > 4 months
2. < 4 months

18. Which foods did you first introduce to the child's diet?

1. Fresh fruit juice 4. Ugali and soup
2. Thin porridge 5. Cows milk
3. Mashed bananas/potatoes 6. Others (specify) _____

19. Who normally feeds the child?

1. Caregiver 3. Sibling
2. Child feeds self 4. Other (specify) _____

20. How many times do you feed the child in a day? _____

- 1.<3 times 2.3-5 times 3. > 6 times

21. What do you do to make the child eat more/enough food?

1. Coax 3. Beat
2. Force 4. Others (specify) _____

22. Who looks after the child in your absence?

1. House help 3. Father
2. Older siblings 4. Others (specify) _____

23. If maid or older sibling, how old?

1. Adult 2. Child

24. Intra household food distribution.

Please ask and indicate who in the household eats the following foods?

Food type	Under five	Older	Mother	Father
Milk				
Chicken				
Eggs				
Meat				
Fish				
Fruits				
Beans				
Green vegetables				

1= Fair distribution

2= Unfair distribution

D. Knowledge on nutrition and health*(Write the response as given in the spaces provided)*

1=valid response

2=Invalid response

3=do not know

25. At how many months should the first food other than breast milk be given to the baby?

_____ ()

26. Why do we give children other foods around this age? Give one reason

_____ ()

27. How many times should a child of two years be fed if food and other liquids are available?

_____ ()

28. How should the frequency of a sick child be different from that of a well child?

_____ ()

29. What is one of the signs that a child is not eating enough food?

_____ ()

30. Show a picture of a malnourished child (with kwashiorkor and marasmus) to the caregiver and then ask. What do you notice being wrong with the child?

_____ ()

31. What causes this condition

_____ ()

32. Can a child with this condition be cured?

1. Yes

2. No

()

33. If yes, (ask) how can it be cured

_____ ()

34. When do you consider a child to have diarrhea?

_____ ()

35. What causes diarrhoea?

_____ ()

36. Suggest one way in which diarrhea can be managed?

_____ ()

37. What three food items would you include in a meal for a two-year-old if food were available

1 _____ 2 _____ 3 _____ ()

38. What can be added to a child's food or drink to enrich it?

_____ ()

E. Hygiene, Morbidity patterns and Health seeking practices

39. What are the main sources of water for this household?
1. Well
 2. River
 3. Piped
 4. Others (specify) _____
40. What are the main alternative sources of water for this household?
1. Well
 2. Roof catchments
 3. River
 4. Piped
 5. Others (specify) _____
41. Do you treat your drinking/cooking water?
1. Yes
 2. No
42. If yes, ask how
1. Chlorine
 2. Boil
 3. Others (specify) _____
43. What is the approximate distance from the water points?
1. <2km
 2. 2-3km
 3. >5km
44. Is there a latrine in the compound? (Observe path)
1. YES-regularly used
 2. YES-not regularly used
 3. No
45. Which illnesses are of great concern in this household? (Number in order of importance)
1. Diarrhea ()
 2. Malaria ()
 3. Respiratory tract infections ()
 4. Worms ()
 5. Other (specify) _____ ()
46. For this illness, where is the treatment usually sought from first and last if not resolved

Illness	Source of treatment first	Source of treatment if unresolved

1. GOK health facility
2. Mission facility
3. Community pharmacy (CHWS)
4. Private clinic/Nursing home
5. Shops/kiosk
6. Private chemist
7. Traditional healer
8. Other (specify) _____

Note the most commonly used facility _____

47. Why do you prefer this facility?
1. Nearness
 2. Cost effective
 3. Services
 4. Other (specify) _____
48. What is the approximate distance from this household to the health facility? (Estimate)
1. <2km
 2. 2-3km
 3. >5km
49. Is child health card available?

1. Yes 2. No

50. If yes, verify by ticking in the boxes if immunized (Examine for BCG SCAR in all cases)

BCG/P	P/DPT	P/DPT2	P/DPT3	Measles	Vitamin A
Scar					

Is the child fully immunized at his / her age?

1. Yes 2. No

51. If no, ask why _____

52. Has the child been admitted to hospital during the last 3 months?

(If answer is no, proceed to question 54)

1. Yes 2. No

53. If yes, for what reason _____

54. Has the child been ill during the last two weeks?

1. Yes 2. No

55. If yes, for what illness _____

56. Describe the symptoms of the illness?

57. Did you take the child to hospital?

1. Yes 2. No

(If answer is No, move to question 60)

58. If yes, where was the treatment sought? _____

59. How long did you take before taking the child to hospital?

1. <6hours 3. After a day
2. >6 hours

60. Why didn't you take the child to hospital?

1. Health facility far 3. Other
(specify) _____
2. Lack of money

61. What did you do to manage the illness?

62. Has the child been treated for intestinal worms for the last 3 months?

1. Yes 2. No

63. Observe for the following clinical signs of PEM (kwashiorkor and marasmus)

Sign	YES	NO
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5.2.2 Observation checklist

Observe and indicate presence of the following;

		Yes=1	No=2
1	Walls material - Stone		
	- Mud		
	- Timber		
2	Floor material -Cement		
	-Earth		
3	Type of fuel -Gas		
	-Wood		
	-Charcoal		
	-Paraffin		
4	Radio/ Television		
5	Toilet		
6	Toilet in use (observe path)		
7	State of toilet floor -Clean		
	-Dirty		
8	Children wearing foot ware all the time		
9	Presence of open drains with dirty water		
10	Waste littered in the compound		
11	Food seen uncovered		
12	Proper general household cleanliness		

2.2: Focus group discussions guide

This will be administered to caregivers of children, basically regarding their attitudes, beliefs and perceptions on food, nutrition and health

FGD themes

1. What causes malnutrition
2. Decisions regarding birth spacing, number of children to have and when to have children
3. Decision regarding seeking healthcare and why, influences on the choices of food children are feed on?
4. Duration of breastfeeding and when to initiate weaning
5. Pregnancy when still breastfeeding
6. Responsible for providing for childcare in your household?
7. Source of nutritional knowledge

3: Abstracts presented in conferences and workshops

VENUE: Durban, South Africa
FORUM: 27th Africa Health Sciences Congress
DATE: 3-7th December 2006

Barriers to child nutrition security in food secure households: A case study of Mjini village in Bungoma, Kenya. By Elizabeth Echoka

Background: Food security is a key determinant of nutritional security. However, studies have indicated that there are households that are food secure but still experience malnutrition among its household members and especially children under five years of age. **Methods:** The objective of the study was to establish barriers to child nutrition insecurity beyond food. A cross-sectional study was conducted in July 2005. Mjini, a peri-urban village in Bungoma was purposively .A 1999 National Micronutrient survey indicated that Bungoma District is food secure, however the prevalence of malnutrition is still high.170 Food secure households with children in the 6-59 months age group were sampled. Data collection tools included an interview schedule, anthropometry, observation checklist and FGD. Bivariate analysis using Pearson's chi-square was used to assess relationships between child nutritional status and caregivers knowledge, attitudes and practices on nutrition, health and hygiene practices of households and morbidity patterns of the study children. To identify the best predictors of malnutrition in food secure households, binary logistic regression analysis was used. **Results:** The following were found to constitute a threat to children's nutritional security in food secure households. Lack of knowledge on frequency of feeding a child (60% vs. 38%, $p=0.016$, $OR=2.5$), and knowledge on the three major foods groups to include in a meal of a child (52% vs.25.6%, $p=0.006$, $OR=3.13$), inadequate breast feeding (48% vs. 13%, $p=0.008$, $OR=6.2$), untimely weaning (74% vs. 44%, $p=0.001$, $OR=3.6$), feeding < 3 times (59% vs.35%, $p=0.009$, $OR=2.2$), lack of stimulation when feeding child (47% vs. 18%, $p=0.001$, $OR=4$), lack of deworming (90% vs. 75%, $p=0.004$, $OR=2.9$), presence of dirty water and waste in the compound (79% vs. 44%, $p=0.001$, $OR=4.9$), storing cooked food uncovered (74% vs. 18%, $p=0.001$, $OR=6.8$), feeding child with dirty hands (59% vs. 18%, $p=0.001$, $OR=6.4$) and diarrheal morbidity i.e., Diarrhea as illness of great concern (43% vs. 18%, $p=0.001$, $OR=1.7$) and Diarrhea as illness suffered by malnourished children 2 weeks prior to the study (79% vs. 45%, $P=0.001$, $OR=4.4$). **Conclusion and recommendations:** The study concluded that food availability is insufficient to assure nutrition security. Several complementary factors relating to how the food is utilized must also be in place if all are to enjoy a healthy and active life resulting from proper nutrition. Proper and sustained education of caregivers on care practices through a multifaceted educational programme dealing with behavior/ attitude change, continued public education campaign emphasizing the significance of hand washing, keeping cooked food covered, good environmental sanitation, seeking proper treatment for diarrhea in children and an evaluation and redesign of nutrition education delivered at the MCH are recommended as being essential in addressing challenges to nutritional insecurity and in optimizing the success of public health programmes concerned with reducing child malnutrition.

Abstract 2:

VENUE: AVU MAIN CONFERENCE ROOM
DATE: 9th Jan 2006, 10.30 A.M
SUBJECT: RESULTS PRESENTATION SEMINAR

Barriers to child nutrition security in households that are food secure: A case study of Mjini village in Bungoma, Kenya. By Elizabeth Echoka

Background: Childhood malnutrition still remains a major public health concern in the developing world. The causes of childhood malnutrition are not obvious but related to factors that interact to influence nutritional status. Food security, a major determinant of nutritional security is the access to sufficient and good quality food for all people, at all times, for a healthy and active life. However, studies have indicated that there are households that are food secure but still experience malnutrition among its household members and especially children under five years of age. The objective of the study was to establish risk factors associated with child malnutrition beyond food.

Methods: A cross-sectional study that ended in July 2005 was therefore conducted. Mjini, a peri-urban village in Bungoma was purposively selected, owing to the fact that Bungoma district is an agricultural zone, therefore food is available and at affordable prices. 170 Food secure households with children in the 6-59 months age group were sampled, using multi-stage sampling method. Data collection tools included a structured questionnaire, anthropometry, observation checklist and focus group discussions. Data was analyzed using SPSS. Bivariate analysis using Pearson's chi-square was used to assess relationships between variables. To identify the best subset of predictors of malnutrition in food secure households, binary logistic regression analysis was used.

Results: The following were found to constitute a threat to children's nutritional security in food secure households. Lack of knowledge on frequency of feeding a child (60% vs. 38%, $p=0.016$, OR=2.5), and on the three major foods groups to include in a meal of a child (52% vs. 25.6%, $p=0.006$, OR=3.13), inadequate breast feeding (48% vs. 13%, $p=0.008$, OR=6.2), untimely weaning (74% vs. 44%, $p=0.001$, OR=3.6), feeding < 3 times (59% vs. 35%, $p=0.009$, OR=2.2), lack of stimulation when feeding child (47% vs. 18%, $p=0.001$, OR=4), lack of deworming (90% vs. 75%, $p=0.004$, OR=2.9), presence of dirty water and waste in the compound (79% vs. 44%, $p=0.001$, OR=4.9), storing cooked food uncovered (74% vs. 18%, $p=0.001$, OR=6.8), feeding child with dirty hands (59% vs. 18%, $p=0.001$, OR=6.4) and diarrheal morbidity i.e., Diarrhea as illness of great concern (43% vs. 18%, $p=0.001$, OR=1.7) and as illness suffered by malnourished children 2 weeks prior to the study (79% vs. 45%, $P=0.001$, OR=4.4).

Conclusions: The study concluded that food availability and access to that food alone are insufficient to assure nutrition security. Several complementary factors relating to how the food is utilized must also be in place if all are to enjoy a healthy and active life resulting from proper nutrition. It is envisaged that ultimately, the findings can be used to formulate strategies that aim to improve and protect nutritional security by enhancing other factors that contribute to nutritional security other than food security. Advice with a view to achieving sustainable behavior change in households, namely appropriate childcare practices and proper household hygiene practices are recommended as being essential in addressing challenges to nutritional insecurity and in optimizing the success of public health programmes concerned with reducing child malnutrition.

Abstract 3

VENUE: The Nairobi Hospital Lecture theatre
FORUM: 6th Continuous Nutrition Education Workshop-Organized by the Center for Nutrition Education and Research (CENER)
DATE: 14TH July 2006

Barriers to child nutrition security in households that are food secure: A case study of Mjini village in Bungoma, Kenya. By Elizabeth Echoka

Background: Food security, a major determinant of nutritional security is the access to sufficient and good quality food for all people, at all times, for a healthy and active life. However, studies have indicated that there are households that are food secure but still experience malnutrition among its household members and especially children under five years of age. The objective of the study was to establish risk factors associated with child malnutrition beyond food.

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Conclusions: The study concluded that food availability and access to that food alone are insufficient to assure nutrition security. Several complementary factors relating to how the food is utilized must also be in place if all are to enjoy a healthy and active life resulting from proper nutrition. It is envisaged that ultimately, the findings can be used to formulate strategies that aim to improve and protect nutritional security by enhancing other factors that contribute to nutritional security other than food security. Advice with a view to achieving sustainable behavior change in households, namely appropriate childcare practices and proper household hygiene practices are recommended as being essential in addressing challenges to nutritional insecurity and in optimizing the success of public health programmes concerned with reducing child malnutrition