

**FACTORS ASSOCIATED WITH HOUSEHOLD FOOD SECURITY AND
NUTRITIONAL STATUS OF CHILDREN UNDER FIVE YEARS:
A CASE FOR URBAN AND RURAL COMMUNITIES IN
GARISSA DISTRICT, KENYA //**

BY:

MUSTAFA ABDI HASSAN, BSC

(Bsc. Animal Husbandry)

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**dissertation presented to the Department of Food Technology and Nutrition
in partial fulfilment of the requirement for the award of the
Degree of Masters of Science in Applied Human Nutrition
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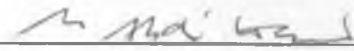
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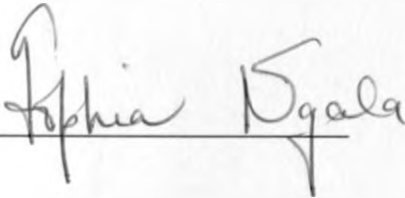


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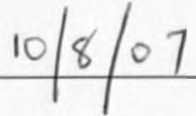


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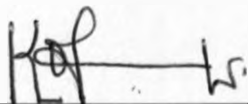
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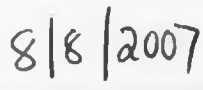
Prof. Wambui Kogi-Makau, PHD.
Associate Professor,
Applied Human Nutrition,
Department of Technology and Nutrition,
University of Nairobi



Date



Ms. Sophia Ngala
Lecturer,
Applied Human Nutrition,
Department of Technology and Nutrition
University of Nairobi



Date

DEDICATION

This work is dedicated to all my family members with gratitude and affection.

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ABSTRACT

This was comparative study of factors affecting food security and nutritional status of under five-years-old children in rural and urban community of Garissa District was conducted. A total of 302 children from 302 households selected by simple random sampling were studied. Data were collected using structured questionnaires and anthropometry.

The main objective of the study was to determine factors that are associated with household food security and nutritional status of the children under the age of five years in Garissa District.

Urban and rural livelihoods and lifestyles obviously differ. The study found that while levels of key determinants of malnutrition, such as expenditure, living conditions, or education, may differ between rural and urban areas, the nature of the determinants and the magnitudes of their effects are very nearly the same, but differ greatly when it comes to food security. On the other hand, these differences in levels do not necessarily express themselves in differences in outcomes: the level of food security is roughly the same in rural and urban areas, while levels of stunting, wasting and underweight differ quite dramatically.

What explains these results? For nutritional status of children, most of the urban-rural difference does appear due to differences in the levels of critical determinants, such as in income or mother's educational level. For example, stunting of children 0-60 months old is higher in rural than in urban areas (23 percent versus 20 percent, respectively). Wasting of children 0-60 months old is also much more prevalent in rural than in urban areas (26.6 percent versus 20.3 percent, respectively). Prevalence of underweight for rural and urban areas was 32.5 percent and 25.7 percent, respectively. There were, however, no significant differences between urban and rural

areas on the average levels of the indices. The study results shows that an average income of \$ 21 buys the rural households, which constitutes 75% of the study population were living below poverty line as per cut off point set by Unicef which is \$30 per household. The percentage of total household expenditure spent on food is among food security indicators used by most economists. On average 65.4% of the total expenditure including health was spent on food alone suggesting, a food insecurity indicator problem among the studied household. The significant positive association between nutritional status and income p-value of 0.01, 0.04 and 0.04 stunting in rural areas, wasting and urban areas, and wasting and rural areas, respectively, were observed.

Within the context of the significant variables in the study, this difference in urban-rural levels of stunting, wasting and underweight is explained by noting that expenditure levels and maternal education are much lower in rural areas. Expenditure levels of food items in rural areas are only about half those in urban areas, and 90.4 percent of rural mothers are illiterate or have no education at all, while a lower 85.1 percent of urban mothers do not have any education.. The prevalence of malnutrition decreases with the level of education of the mother. Stunting in urban areas seems to be high up to 20.6% for children whose mothers never went to school and drops to 12.5% for children whose mothers went to primary school. The same trend was observed for rural areas. However, there is no significant evidence in between (p 0.05) to suggest significant positive association between the level of education of the mother and all the nutritional indicators. On the other hand, the levels of some critical determinants of food security are also very different between rural and urban areas, but levels of food security, as measured by calories, protein and iron are much the same. Iron and protein levels are almost the same in urban and

rural areas, while calorie levels are significantly higher in urban than in rural households. Household size is higher in rural areas than urban areas. Expenditure levels are higher in urban areas than rural areas.

None of the households visited met the required daily calories requirement. Overall only 12.5% of the visited households met the required daily protein and iron intake. With respect to protein, only 8.3% of the household visited from rural areas were found to be food secure. Of the households visited in the urban areas, 25% were found to be food secure. This means that there are more food secure households in urban than rural areas.

Factors associated with nutritional status are; income activities, ownership of livestock, ownership of houses, types of houses, expenditure on food items and cough/cold.

Factors associated with food security are; marital status of the mother, per capita expenditure and family size. It is concluded that household food security is worsened by small household size, level of education of the mother and lower per capita expenditure. It is recommended that there is need for communities to foster activities that increase household income, which will in turn improve on household income and expenditure on child care, and by implication child nutritional status. Different income groups (youth, women) need to be encouraged so that income may inturn be expanded. Women's education is an important factor in improving children's nutritional status. In the long term ,improving girls education and women literacy and job skills will raise household income.

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ABBREVIATIONS

- ACC/SCN – Administrative Committee on coordination/Sub-Committee on Nutrition.
- ANP- Applied Nutrition Programme
- CI - Confidence Interval
- CBS – Central Bureau Of Statistics
- CU- Consumer Unit
- EPI- Expanded Program on Immunization
- EWS- Early Warning System
- FAO- Food and Agricultural Organization
- FBS- Food Balance Sheet
- FCND- Food Consumption Nutrition Division
- FfW-Food for Work
- FSR- Food Security Reserves
- FIVIMS- Food Insecurity and Vulnerability and Mapping Systems
- HH - Household
- Ht/age - Height for Age
- IFPRI - International Food Policy Research Institute
- IFSP- Integrated Food Security Program
- IMR-Infant Mortality Rate
- ITDG- Intermediate Technology Development Group
- Kcal - Kilocalories
- KDHS - Kenya Demographic and Health Surveys
- Kgs - Kilograms

- KSH - Kenya shillings
- MUAC –Mid-upper arm circumference
- NCHS - National Centre for Health Statistics
- NGOs –Non-Governmental Organization
- p- value – Probability value(level of significance)
- P.E.M - Protein Energy Malnutrition
- RDA - Recommended Daily Allowances
- SD - Standard Deviation
- SPSS -Statistical Package for Social Scientists
- UNICEF –United Nations Children’s Education Fund
- UNU - United Nations University
- UON – University of Nairobi
- WHO - World Health Organisation
- Wt/age - Weight for Age
- Wt/ht - Weight for Height

OPERATIONAL DEFINITIONS

Anthropometry – Physical measurements of weight, length/height, mid-upper arm circumference, head circumference, etc, (Pacey and Payne, 1985).

Food security-ability of household to access sufficient and safe food for a healthy and active life at all times (Berg, 1987). In this study a household is food secure if its members meet the recommended daily requirements of energy, protein and iron. It is food insecure otherwise.

Household(s)-Refers to people living together in a compound that comprises members of a nuclear family, and other relatives who had lived in the compound for a period of at least three months prior to the survey, and all eating from the same pot/kitchen.

Household head: refers to the person (male or female) who is the major decision maker on household income refers to household's annual cash earnings equivalent from all sources including sales ,salary ,value ,of food crops consumed by the household and remittance.

Malnutrition-Failure of body functions which occur when intake of nutrients fall below certain minimum requirement. (Pacey and Payne, 1985).

Indices of malnutrition-indicate level of malnutrition and may include:

- (a) Anthropometric measurements namely;
- Weight for age-indicating degree of underweight
 - Weight for height-indicating degree of wasting
 - Height for age-indicating degree of stunting

Maternal income: refers to mother's annual cash earnings from all sources, apart from those general for the household, and on which she is a major decision maker on income generation, but not necessarily the controller of realised income.

Nutrition security: goes beyond the concept of access and availability and includes aspects of use and utilization of food in quality and quantity as well as intra-household food distribution. Anyway, the term “nutrition security” is hardly found in any documents and therefore rarely used, whereas food security is commonly applied, but not all users imply the meaning of using this term.

Household Food Security: Access to adequate food for a healthy life for all house hold members throughout the year.

Household Food Accessibility: The ability f the household to produce or purchase enough food for a healthy life for all its members throughout the year. In this study, accessibility is measured by amount of food produced from the own farm and amount of income received in the household in a year.

Food availability per Household: The physical presence of a stable food (Maize and Beans) in the household at the time of the research (and the number of days will last as estimated by the household respondent).

Stunting-refers to deficit in linear growth achieved pre and post-natal. This indicates long-term cumulative effects of inadequate nutrition or health (Pacey and Payne, 1985).Stunting refers to an anthropometric status whereby height of a child is below -2 SD Z-scores of the expected height of a reference child of the same age.

Underweight-This refers to low body weight relative to age. It reflects both long-term and short-term nutritional or health experiences of an individual or a population (Pacey and Payne, 1985).It refers to anthropometric status whereby weight of child is below -2SD Z-scores of the expected weight of a reference child of the same age.

Wasting-This refers to low body weight relative to height. Usually results from acute shortage of food and /or severe disease (Pacey and Payne, 1985).wasting refer to an anthropometric status whereby weight of child is below -2SD Z-scores of expected weight of a reference child of the same height.

Z-score or standard deviation (SD) scores- the deviation of the anthropometric value(s) for an individual child from the median value of the reference population (National Centre for Health Statistics of the United States of America (NHCS)/ (World Health Organization (WHO), divided by the standard deviation for the reference population. (Pacey and Payne, 1985).

CHAPTER ONE

1.0 INTRODUCTION

1.1. BACKGROUND

Malnutrition causes a great deal of human suffering-both physical and emotional. It is a violation of a child's human rights (Oshaug, Eide, and Eide 1994). A major waste of human energy, it is associated with more than half of all children's deaths worldwide (Pelletier, 1995). Adults who survive malnutrition as children are less physically and intellectually productive and suffer from higher levels of chronic illness and disability (UNICEF, 1990). The personal and social costs of continuing malnutrition on its current scale are enormous.

The causes of child malnutrition are complex, multidimensional, and interrelated. They range from factors as broad in their impact as political instability and slow economic growth to those as specific in their manifestation as respiratory infection and diarrhoeal disease. In turn, the implied solutions vary from widespread measures to improve the stability and economic performance of countries to efforts to enhance access to sanitation and health services in individual communities. Debates continue to flourish over what the most important causes of malnutrition are and what type of interventions will be most successful in reducing the number of malnourished children.

An understanding of the most important causes of malnutrition is imperative if the current unacceptably high numbers of malnourished children are to be reduced. In 1995, out of 167 million children under five years old, almost one-third were estimated to be underweight in developing countries. South Asia has, by far, the highest underweight prevalence of 50 percent. The region also has the highest number of malnourished children, i.e. 86 million or 50 percent of

the developing-country total. About one-third of Sub-Saharan African children and fifth of East Asian children are underweight. While the prevalence of underweight in the regions of the Near East and North Africa (NENA) and Latin America and the Caribbean (LAC) are below 15 percent, pockets of severe malnutrition within them, particularly in some Caribbean and Central America countries, remain. The United Nations Food and Agriculture Organization (FAO) has estimated that almost 200 million Africans were undernourished at the dawn of the millennium, compared with 133 million 20 years earlier (FAO, 2000). The rate of increase in undernourishment in Africa vastly exceeds that of other developing regions. Yet West Africa has gone against the trend in the rest of Africa, with its numbers and the prevalence of undernourishment falling dramatically over the period, and this is reason for optimism that trends can be reversed in other parts of Africa (FAO, 2002). Countries that stand out are Benin, Ghana and Nigeria, but they were the only Sub-Saharan African countries that had consistent declines in both the numbers and the prevalence of undernourished people over the past 20 years (IAC, 2004).

About 33 percent of people in Sub-Saharan Africa are undernourished, compared to about 6 percent in North Africa and 15 percent in Asia (FAO, 2002). More than 60 percent of the undernourished are in Eastern Africa, with more than half of the populations in Congo Democratic Republic(DRC) and Mozambique affected, while Angola, Cameroon, Ethiopia, Kenya, Tanzania, and Zambia show prevalence rates between 40 and 50 percent. Nigeria's prevalence rate is low, but its large population means that the country accounts for 22 percent of the food insecure in West and Central Africa (IAC, 2004).

SSA countries had an increase in the average prevalence of stunting for children under five years of age, with the numbers increasing from 35 million in 1980 to 47 million in 1995 (ACC/SCN, 2000) and expected to rise to 49 million by 2005 (Smith and Haddad, 2000). The eastern Africa region is the most affected region in SSA. Over the period 1980-2000, the number of stunted preschool children increased from about 12.9 million to 22 million and the trend is estimated to continue, leading to about 24.4 million by 2005 (ACC/SCN, 2000; de Onis et al., 2000).

In general, the situation in Kenya, like any other Sub-Saharan African country has been deteriorating due to extreme poverty, constant droughts and internal conflicts (UN, 1992). Diet quality in many parts of Africa is weak and inadequate and there are underlying problems of chronic malnutrition due to marginal access to food, seasonality problems and the chronic lack of basic services in many countries.

Insufficient household food security in arid and semiarid lands is a major cause of malnutrition caused by limited food production. Studies conducted in arid lands of Kenya indicate a high prevalence of malnutrition in these areas (CBS, 1996). Garissa district is an arid area. A different study carried out in Kenya indicated that calory intakes of arid and semi arid land dwellers are below the recommended amount and the population is at risk of malnutrition (KDHS, 1998).

According to Kenyan Demographic and health survey (KDHS, 2003), wasting is highest (10 percent) in children age 12-23 months and lowest (3percent in children age 48-59 months). The survey data show few sharp differences in wasting by background characteristics except that the level among children in North Eastern Province is extraordinary high (27 percent). Eleven percent of children in North Eastern province are severely wasted. These levels may reflect food

stress in the province, which is traditionally a region with food deficits. Women with no education also have very high levels of wasted and severely wasted children (15 and 4 percent, respectively)

20 percent of children under five are underweight, representing a slight decline from the 1998 KDHS results (22 percent). The proportion of severely underweight children is 4 percent. The proportion of underweight children is highest (27 percent) in the 12-23 months age group and lowest (2 percent) for those less than 6 months of age. Male children (22 percent) are more likely to be underweight than female children. Urban children are more likely to be underweight (13 percent) than rural children (21 percent). At the provincial level, North Eastern province has the highest proportion of moderate and severely underweight children (34 percent), while Nairobi province has the lowest proportion.

A higher proportion (33 percent) of male children under five are stunted, compared with (28 percent) of female children living in urban areas are moderately and severely stunted to a lesser extent with (24 percent) while compared with rural children (32 percent). At provincial level coast province (35 percent) has the highest proportion of stunted children, while Nairobi province has the lowest (19 percent).

According to a nutritional survey carried out in Modogashe division of Garissa by the Applied Human Nutrition Programme (University of Nairobi, 2000), acute malnutrition rate of 27.2% was found using weight for height below (-2. Z- scores) and of severe malnutrition 6.6% (< -3 Z-scores) Mwadima (2000)

1.2 STATEMENT OF THE PROBLEM.

In spite of the perceived nutritional advantage of children in urban areas, recent evidence suggests that urban poverty and malnutrition have been increasing, both in absolute and in relative terms (Haddad, Ruel, and Garret 1999). Data from 9 out of 14 countries studied show that both the number of underweight preschoolers and the share of urban preschoolers in overall numbers of underweight children have been increasing in the past 10 – 15 years. These 9 countries constitute a large percentage of the developing world, given that they include China, Nigeria, Egypt, and the Philippines.

Thus, although childhood malnutrition has typically been a less severe problem in urban than in rural areas, the accelerated rates of urbanization currently observed in the developing world raise new concerns regarding increasing rates of urban malnutrition. Understanding the relative importance of the various determinants of childhood malnutrition, and whether they differ between urban and rural areas, thus becomes key to designing effective program and policy responses specifically tailored to the needs of different population groups.

A nutritional survey carried out in Modogashe division of Garissa by the Applied Human Nutrition Programme (University of Nairobi) cited Mwadime (2000) found acute malnutrition rate of 27.2% using weight for height below $-2Z$ scores and severe malnutrition ($<-3Z$ scores) to be 6.6%. In another study by Mwadime (2000) the prevalence of acute malnutrition was 21.1%. Of this, 8.4% had severe malnutrition. It is clear that the study districts have high and unacceptable level of malnutrition. Hence acute food insecurity and human suffering were manifested by an increasingly high rate of malnutrition implying that malnutrition is a public health concern.

1.3 OBJECTIVES OF THE STUDY

Main objective

To determine factors that are associated with household food security and nutritional status of children under the age of five years in Garissa District.

Specific Objectives:

1. To determine socio-economic and demographic status of studied household.
2. To determine food availability and adequacy in the household.
3. To determine water, sanitation and hygienic practices of household with children aged below five years.
4. To assess the dietary intake of children under five years of age.
5. To determine the nutritional status of children under five years old.
6. To determine morbidity of children under five years.
7. To determine factors that are associated with nutritional status of children under five years old.
8. To determine factors associated with food security among children under five years old.

1.4 STUDY QUESTIONS

1. What are the households that are food secure doing that is not done in food insecure households?
2. Which types of households are prone to food insecurity?
3. What coping strategies are employed by food insecure households?
4. What are the most frequent diseases in the area?
5. What are the sources of water and how do households treat drinking water?

6. What is the nutritional status of children under five years old?

7. How do the findings in the study differ between rural and urban households?

1.5 STUDY HYPOTHESIS

There is no significant difference in nutrition status in children aged less than five years in urban and rural households in Garissa district

1.6. JUSTIFICATION

The information of stunting among under-five in Garissssa district where the study belongs was reported to be 27.2% using weight for height below -2Z scores(UON,ANP, 2000), and severe malnutrition (<-3Z scores) to be 6.6%. In another study it was established that the prevalence of acute malnutrition to be 21.1%. Of these, 8.4% was severe malnutrition. (Mwadime, 2000). This however indicates that under nutrition is a thorn on the flesh to the public health.

Garissa district is believed to be rich in livestock production, yet the rate of infant mortality are estimated at 86 per 1000 in Garissa torn and 146 per 1000 in interior the figures compared unfavourable with the national average of 72.5 per 1000. It is quite common for majority of households to live on one meal per day at the time of drought, which reoccurs almost after two years. This may be caused by inadequate food availability and lack of money to purchase food.

Also it is a common cultural practice for Somali families to share food with the children. In this situation, protein, energy among children might have been contributed by inadequate food intake. It is a cultural habit of the pastoral communities in Kenya to take two meals per day (ANP, 1997). Apart from routinely nutritional surveys, no studies that attempted to statistically

associate between factors affecting food insecurity and malnutrition in urban and rural areas among Somalis. The rate of the population growth within Garissa town itself is higher than the national population growth rate. This stands at almost 4.7% annually. Thus, although childhood malnutrition has typically been a less severe problem in urban than in rural areas, the accelerated rates of urbanization currently observed in the developing world raise new concerns regarding increasing rates of urban malnutrition. Understanding the relative importance of the various determinants of childhood malnutrition, and whether they differ between urban and rural areas, thus becomes key to designing effective program and policy responses specifically tailored to the needs of different population groups.

Information on factors affecting food insecurity and malnutrition in urban areas primarily inhabited by the Somalis is scarce as most programmes are designed to alleviate poverty and food insecurity in rural areas. This research provides insights into the factors that affect food security and malnutrition in both urban and rural areas, in ways that can assist policy makers and programme administrators to act most effectively to reduce poverty and food insecurity in rural and urban areas.

1.7 EXPECTED BENEFIT

The outcome of the study would assist authorities in the area to develop guidelines to be used by village authorities and health committees in monitoring and evaluating the impact on child nutrition. This would lead further to initiate measures that would empower households and village authorities to devise appropriate intervention and to improve the nutritional status in the area.

Meanwhile, the findings will be used by the policy makers, non governmental organizations in planning activities for improving nutritional status and food related problems.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

The concept of food security has evolved, developed, multiplied and diversified since the World Food Conference of 1974 (Maxwell and Smith, 1992). The main focus has shifted from global and national to household and individual food security and from food availability to food accessibility. The shift to food accessibility is partly attributed to Sen's (1981) seminal work on entitlement theory. Despite these developments, much of the literature on urban food security has concentrated at higher levels, paying little attention to the household level. More so the issues of food accessibility are yet to receive due attention. On the other hand, while food security and nutrition status are separate yet inextricably linked components, some have continued to apply the two concepts interchangeably. Food security is necessary but not sufficient for nutrition status. Similarly, poor nutritional status should not be interpreted wholly as indicative of inadequate food intake. (UNICEF, 1990) and Engle et al. (1999) cited (Ssewanyana, 2003) highlight these differences in their conceptual framework on nutrition.

Globally, while many may doubt the estimates of urbanization and the number of urban poor, most would agree that the world has experienced rapid rates of urbanization and an increasing number of the poor. Roughly, the number of people living in urban areas was expected to surpass that in the rural areas by the year 2005 and to account for about 60% of the global population by the year 2020 according to the Food and Agriculture Organization (FAO, 2001). While the percentage of the total population living in urban areas of less developed countries is still low (below 23% by 1995), the growth rates are greater than those of industrialized nations. For example, for the period 1970 to 1995 the growth rate was 5.1%; it is expected to be 4.6% for the

period 1995 to 2015 compared with only 1.1% and 0.6% over the same periods, respectively, for industrialized countries (UNDP, 1998). Concomitantly, the number of urban poor is said to be increasing in most developing countries (Haddad et al., 1999). In South Asia, for example, the growth in the urban poor was 52% for the period 1980 to 1990 and expected to rise to 53% for the period 1990 to 2000 (Hussein, 1990). The most worrying issue is how to satisfy the food needs and meet the other basic needs of the growing population in the urban areas and ensure their nutritional security.

While progress in food security has been reported, positive signs of progress have not been reported in all developing countries, but only in some regions. In sub-Saharan Africa (SSA) and South Asia, no positive progress on food security has been reported. The number of chronically undernourished persons increased for SSA from 167.7 million to 194 million during the period 1990-1992 and 1997-1999, respectively, and for South Asian countries from 288.8 million to 303 million persons over the same period (FAO, 2001). The picture is also not promising in terms of micronutrient deficiencies, particularly iron, vitamin A and iodine. In 1995 over 2 billion people were estimated to be at risk of micronutrient deficiencies, with higher prevalence of iron deficiencies (Latham, 1997). Micronutrient deficiencies have been reported even among calorie-secure populations.

It is evident from the literature that nutrition status has been examined at individual level with much attention to that of children aged 0-5 years. This is so because this group of the population is more vulnerable to inadequate food and poor nutrition. Poor nutrition in infancy and early childhood will result in poor physical and mental development and may affect their productivity in adulthood (Martorell, 1993) and cause them to suffer from chronic illness and disability

(Barker, 1994). Globally, the number of stunted children declined from 221 million in 1980 to 182 million in 2000. in contrast

More specifically, Haddad et al. (1999) found the absolute number of undernourished children and the share of underweight children to be increasing at a faster rate in urban areas than in rural areas. What could possibly explain this rising number of malnourished children in SSA countries? More importantly, what explains the increasing prevalence of child under-nutrition in urban areas? One lamentable situation is that SSA countries are trapped in increasing food insecurity, nutritional insecurity and increasing urbanization, which increase poverty levels. Against this background, there is need to understand the underlying causes and their contribution to child malnutrition, for which food insecurity and poverty are among the key factors.

2.1. CAUSES OF MALNUTRITION

Malnutrition is not a simple problem with a single solution. Multiple and interrelated factors are involved in the development of malnutrition. This is a result of immediate and underlying causes:

a. Immediate causes

Immediate causes of malnutrition are inadequate dietary intake and diseases.

b. Underlying causes

The underlying causes are insufficient household food security, inadequate maternal and child health services and unhealthy environments.

c. Basic causes

Immediate and underlying causes of malnutrition are in turn caused by a combination of economic structure, political and ideological super structure as well as cultural beliefs

Education of the Caregiver

Maternal education has been consistently associated with positive child health and Nutrition outcomes (Caldwell 1979; Cochrane, Leslie, and O'Hara 1982; Cleland and van Ginneken 1988). The mechanisms by which maternal education is beneficial for the child are not well understood. It is not clear whether maternal education influences Health through an improvement in child care practices directly (such as with the development or enhancement of caring skills and better use of health care facilities), or whether the influence is more a result of increased maternal income resulting from better employment opportunities, or both (Cleland and van Ginneken 1988; Behrman and Wolfe 1984, 1987). There is evidence that in some cases, maternal education and socioeconomic status interact so that maternal education is more important among poor households that have access to a minimum level of resources (Bairagi 1980; Doan 1988; Ruel et al. 1992). In Accra, maternal education was the single most important determinant of good care practices, whereas household income, assets, and food availability were not associated with good care practices (Maxwell et al. 1998). The impact of maternal education on the nutritional status of children was mediated through improved care practices.

Maternal education also appears to have a greater effect on children's nutritional status at certain ages. Sahn and Alderman (1997) showed this to be the case in Maputo (Mozambique), where maternal education was significantly associated with height-for-age Z-scores only among children less than two years of age. Income, on the other hand, was important only for older children. Results from Ecuador, Mexico, Paraguay, Peru, and the Dominican Republic showed that maternal schooling was associated with increased use of health services. In the Philippines, maternal schooling had a positive effect on children's energy intake, maternal practices related to

hygiene, and the use of health services for preventive purposes (immunization) (The Cebu Team 1991). These positive behaviours, in turn, reduced the incidence of diarrhoea among young children.

Employment and the Caregiver

The characteristics of employment in urban areas may make the provision of adequate caring for children more difficult (Engle et al. 1997). Many women in cities are more active in the informal sector, where wages are generally low and hours often uncertain and long (Merrick and Schink 1976). The conditions of many urban occupations may be less compatible with child care in that they make it more difficult for a mother to take a child with her if the work is on the street or in an office, as opposed to out in the field as in a rural area.

Leslie (1989) has examined the relationship between women's work and child welfare, including the nutritional status of children under five. She notes a conflict in perspectives between the Child Survival literature, which tends to emphasize the negative impact of women's work on child health due to less time spent in child care activities and shorter duration of breast-feeding, and the Women in Development literature, which tends to emphasize the positive influence of increased women's income.

It is usually assumed that maternal employment outside the home is a major determinant of the use of breast-milk substitutes and is associated with reduced initiation of breast-feeding as well as shorter duration of any breast-feeding. A comparative analysis of demographic health survey (DHS) data from 15 countries estimated the proportion of breast-milk-substitute use attributable to employment away from the baby during the first 6 months of life (Hight-Laukaran et al. 1996). The results showed that, contrary to general beliefs, maternal employment was not a main

determinant of breast-milk-substitute use in developing countries. The proportion of breast-milk-substitute use attributable to maternal employment ranged from 0.7 to 22 percent and was less or equal to 5 percent in 10 of the 15 countries studied. Similar findings were reported in studies undertaken in Nairobi, Bogota, Bangkok, and Semarang (Java), where maternal employment per se was not found to be a consistent predictor of breast-feeding duration and use of infant formula (Winikoff, Castle, and Hight Laukaran 1988).

Overall, the impact of maternal employment on child health and nutritional status appears to be linked not only to income, but to other related factors such as type of work (for example, wage labour and self-employment), place of work, length of working day, the availability and quality of substitute child care, and the child's age. A study in Guayaquil (Ecuador) showed that, in times of recession, maternal employment had a negative impact on child care giving time and on children's nutritional status, not only because more women started to work and tended to work longer hours, but also because women returned to work when their children were younger (Moser 1989).

2.2 HOUSEHOLD COMPOSITION

Most studies report a negative association of household size with either child food intake or nutritional status (Onchere, 1984; Mrisho, 1987; Braun and Pandya- Lorch, 1991; Esrey and Sammerfelt, 1991). One of the reasons given for the negative relationship is that a smaller family size allows mothers time for interacting, stimulating, teaching and disciplining their children (Frank, 1991). It also implies that the per-capital food available diminishes with larger household size. (Onchere, 1984)

Most studies have shown a worsening situation of nutritional status with an increase in family size only in children less than five years, while others have shown an increasing trend of higher malnutrition rate with increasing size in the household. In the literature, there are controversial views about household size influence on child nutrition status. The present study establishes the influence of household size on child nutritional status.

2.3 CARING BEHAVIOURS

Breast-feeding is the best example of a caring behaviour that provides unequivocal nutritional, health, and emotional benefits to the child, as well as potential positive effects to the mother (UN ACC/SCN 1991). Breast-feeding also provides immunity to the child and protection against infectious diseases. The beneficial effect of breast-feeding is thus particularly important for children living in contaminated environments such as urban slums. In these settings, where it is almost impossible to prepare complementary liquids or breast-milk substitutes hygienically, infants exclusively breast-fed have significantly lower diarrhoeal morbidity and mortality, compared to those who receive mixed feeding (Victora et al. 1989; Brown et al. 1989; Popkin et al. 1990). Thus, exclusive breast-feeding for the first 4 to 6 months may be particularly important in urban areas.

There is a general belief that urban mothers are less likely to initiate breast-feeding and more likely to wean earlier if they do breast feed. This is supported by studies carried out in Thailand, Egypt, and Ghana (Khanjanasthiti and Wray 1974; Brink et al. 1983; Grimble 1981, cited in Atkinson 1993). Some studies suggest that, in relation to breast-feeding and child care practices, the work-related variables, such as flexibility, number of hours, types of environment, and Levels of stress are more important than work per se or urban versus rural location (Uyanga 1980, cited in Haddat 1985).

2.4 Food Security

2.4.1 Food security in Africa

Food security situation in Africa is complex. Clearly increased food availability is a necessary component but not a sufficient for food security. Over the past 20 years, per capita crop and livestock production in Sub-Saharan Africa declined by about 0.2 percent per year (FAO, 2000). In the last 10 years there has been a reversal to an annual per capita increase of 0.3 percent. Hence, while recent production trends per capita have been encouraging, projected aggregate demand growth of 2.8 percent per year to 2015 is likely to exceed projected production growth of 2.6 percent per year over the same period. This will represent a challenge for Africa and implies major food imports in the absence of significant productivity growth.

The 1996 World Food Summit in Rome defined food security as a state when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. People's food and nutrition security needs vary over their life cycles, as do the implications for their physical and mental health and well-being. Food security means far more than having sufficient food on a national basis to meet human needs - whether from domestic production (food self-sufficiency) and/or commercial/aid imports (food self-reliance). Food security today is less a problem of general food availability than of access. Physiological utilization implies that in addition to food access, there are other factors to consider like safe drinking water, primary health care and environmental hygiene to minimize gastro-intestinal infections that can negate the benefits of a nutritious diet. Food security is distinguished from the three forms of hunger - transient, endemic and hidden - which are discussed later. With increasing urbanization in Africa there is a food and nutritional transition underway leading to problems of over nutrition such as increased obesity, diabetes, hypertension and cardiovascular risks. This is fuelled by supermarkets, new food

processing technologies, increased private foreign investment, television and media penetration, and the increasing opportunity costs of time.

2.4.2 Undernourishment

The FAO (2000) uses food balance sheets at national level to assess the extent of undernourishment, as measured by the proportion of the population falling below an Adjusted Average Requirement of 2,600-2,950 kilocalories per person per day, depending on the country and its population structures (age, sex, body weight). Its analysis shows that the incidence of undernourishment in Sub-Saharan Africa has stayed around one-third of the population from the 1970s to the 1990s. In 1995-97 this represented 180 million people. The FAO predicts a significant decline, to 15 percent towards 2030, but this will still number 165 million (40 percent of all undernourished people in the developing world). Less than 10 percent of the population of the Near East/North Africa is undernourished, and this prevalence rate has stayed the same for the past two decades. It currently represents 33 million people and is projected to grow to 38 million by 2015.

Projections to 2020 from the International Food Policy Research Institute (IFPRI) indicate that, as a consequence of poor growth in incomes, poverty is expected to remain pervasive in Sub-Saharan Africa (Pinstrup-Andersen et al., 1999). Food availability should increase marginally but remain at the unacceptably low average of 2,276 calories per day (compared to 2,633 for South Asia; 3,008 for Latin America and the Caribbean and 2,902 for the world). The situation in many countries in Sub-Saharan Africa will continue to cause concern, with per capita food consumption reaching only marginally acceptable levels. The FAO predicts that of the 17 countries below the recommended 2,200 kilocalories per person per day in 2015, 12 will be in Sub-Saharan Africa (FAO, 2000 as cited IAC 2004)

2.4.3 Child malnutrition

Food security, as indicated, is a complex set of factors, and undernourishment alone is not considered an adequate indicator. Some consider that child malnutrition, as measured by the numbers or prevalence of low weight-for-age preschool children is the best available indicator. Low food and nutrient intake, poor care for mothers and children and a poor health environment can lead to low weight-for-age (Smith and Haddad, 2000). As with undernourishment for the whole population of Africa, child undernutrition has been an increasing trend over the past three decades, with the prevalence of underweight preschool children rising from around 27 percent in the 1970s to more than one-third (33 million) currently. It is the only developing region where the numbers of malnourished children have been rising in recent years and if past trends continue, these numbers will continue to increase by about 10 percent to 36 million by 2025 - the only region where this will occur.

The Hunger Task Force of the United Nations Millennium Development Goals program has identified 342 regions of the developing world with more than 20 percent of underweight preschool children. Of these, 72 percent (245) are in Sub-Saharan Africa. Three-quarters of these underweight children are in smallholder rural households while one-quarter is in urban areas. Benin and Ghana have both reduced the prevalence rates of underweight children in recent years, but in Nigeria these have increased, contrary to the trends in under nutrition for its population as a whole. Of the 25 countries of Sub-Saharan Africa analyzed by the Hunger Task Force, only 10 showed reductions in the prevalence of underweight children, with the rest showing increasing trends. The Hunger Task Force did not find any region in North Africa with more than 20 percent of underweight preschool children. The FAO (2002) estimates that rates are much lower in North Africa (4-12 percent) than in Sub-Saharan Africa (13-47 percent). Food insecurity and

child malnutrition are much worse in rural than urban areas of Africa. World Health Organization (WHO, 1997) cited IAC (2004). Information from 32 African countries shows that in all but one of these countries, the percentage of the preschool children suffering low height-for-age (stunted) is higher in rural than urban areas. In half of the countries the number of stunted children was more than 50 percent higher in rural than urban areas. Estimates of underweight were very similar, with 30 of the 32 countries having a larger percentage of children in rural areas with low weight-for-age.

2.4.4 Transient hunger

The FAO (2002) estimates that 5-10 percent of the global hunger in any given year can be traced to specific shocks like droughts, floods, armed conflict, or political, social and economic disruptions. This is termed transient or acute hunger, and there is little direct contribution from agricultural productivity growth to alleviating this type of hunger - except that its effects will be more severe where productivity growth trends have been lower. The numbers of people affected by conflict in the world have fallen in the 1990s from around 40 million to 20 million. However the numbers affected by natural disasters have risen from 40 million to more than 70 million in the same period (Hoddinott, 2003) as cited IAC (2004).

Africa has had a disproportionate share of such shocks. However many food insecure countries have been relatively free of them, so the absence of such shocks does not guarantee food security. Indeed food insecurity and conflict derive from a common set of risk factors. These risk factors include poor economic conditions, repressive political systems, weak institutions, natural resource degradation, scarce resources and unequal access to them, productivity declines, rapid

poverty growth, social and cultural polarization and large-scale migration. Hence, addressing these risk factors can both prevent conflict and reduce hunger.

Food aid is one of the most effective devices for alleviating transient hunger in such emergencies. It is noteworthy that per capita food aid in conflict countries has risen over the period whereas in natural disaster countries it has fallen (Hoddinott, 2003). Conflict and natural disasters are termed covariant shocks, in that large numbers of households are simultaneously affected. In such situations, food aid is the most effective insurance mechanism to reduce vulnerability to transient hunger and starvation, as households have few options. Garissa, being drought prone area, the population living under absolute poverty can be estimated at 68 percent of the total district population. They are usually dependent on relief food from the government and other organizations. The over reliance on relief distribution may also be a factor which causes poverty since people are fed throughout the year thus limiting their innovations to look for alternatives. Other shocks, such as adult illness, are more idiosyncratic to the household, and they do better at offsetting such shocks.

2.4.5 Endemic and hidden hunger

Endemic or chronic hunger is of a more permanent nature, caused by poverty and lack of access to balanced diets including both energy-rich and protein-rich foods, leading to protein-energy malnutrition. Productivity growth can play a major role in alleviating this insidious form of hunger. Billions of people in developing countries also suffer from hidden hunger, caused by a deficiency in micronutrients such as folate, iodine, iron, selenium, and vitamins A and C. After

Asia, Africa has the highest prevalence rate of hidden hunger, with pregnant and lactating women and preschool children most at risk (FAO, 2002; CGIAR, 2002; Graham et al., 2001).

Micronutrient malnutrition can damage cognitive development, lower disease resistance in children and reduce the likelihood that mothers survive childbirth. Lack of dietary diversity is a key causal factor. Increasing the amount and variety of micronutrient-dense fruits, vegetables, livestock and fish products in diets can alleviate this form of hunger. Income growth leads to a more diversified diet, and again agricultural productivity growth is the primary ingredient for this in Africa. It can also contribute to lowering the prices of micronutrient-dense foods, thus allowing the malnourished better access to them. Food fortification is another strategy, as in the case of iodized salt. More recently biofortification has become another possibility, by manipulation of the genes controlling micronutrient content in staple foods such as rice.

Agricultural productivity growth in Africa is vital in attaining food security because agriculture represents 70 percent of full-time employment, 33 percent of gross domestic product (GDP) and 40 percent of its exports earnings (IFPRI, 2002). Agricultural productivity growth is hence the engine of economic growth. Also more than three-quarters of the poor and hungry in Sub-Saharan Africa reside in rural areas and depend on agriculture for their livelihoods, either directly or indirectly. Indeed the dependence on agriculture is greater in those countries where hunger is most prevalent (FAO, 2002 as cited in IAC, 2004). Smallholders dominate the sector and have shown a capability of adopting new technology options where the right incentives and market opportunities exist.

Recent IFPRI research shows that each 10 percent increase in smallholder agricultural productivity in Africa can move almost 7 million people above the dollar-a-day poverty line (IFPRI, 2000). Currently there are some 110 million Sub-Saharan Africans below this poverty

line. Due to the growth multipliers between agriculture and the rural non-farm sector the urban poor benefit along with the rural poor from broad-based agricultural productivity growth. As a rule-of-thumb, IFPRI has estimated that for every dollar of additional income created in the agricultural sector, society as a whole will grow by about 2.5 dollars. The IFPRI research also suggests that income-increasing productivity enhancements among smallholders tend to be particularly powerful in efforts to reduce poverty, both inside and outside agriculture.

Factors affecting food scarcity worldwide include:

- Population increase
- Low agricultural production.
- Poverty and disease
- Inadequate environmental policy
- Seasonality.

2.5 FOOD AVAILABILITY

The access that a household has to food depends on whether the household has enough income to purchase food at prevailing prices or has sufficient land and other resources to grow food. It also depends on whether it can receive assistance to compensate for any shortfalls.

Determining factors to mention are; household demographic structure, education level of household members and location (including the difference between region or urban/rural areas).(Garrett and Ruel ,1999)

2.6 LAND SIZE

In certain countries where land is not commonly owned, size of land owned by a household becomes an asset either in form of cash or kind. Families with large farms are able to harvest enough to protect themselves from nutritional distress.

A study conducted in North Nepal by (Naborro, 1981) showed that a higher rate of wasting and stunting was detected among the children from families with small land farm. This, when compared to those children from households with larger farms. Therefore, in this case, a clear positive co-relation between nutrition status and land size exists, especially in relation to weight for age.

Also a study conducted in Maputo, Mozambique, shows that, in urban areas, nutritional status declines if a household has no land. This can be the case in urban areas where landholdings are associated with poor environmental conditions and poor access to health care. Therefore, households with inadequate land are food insecure.(Garrett and Ruel ,1999)

2.6 METHODOLOGY AND MEASUREMENT

Methods

Broadly speaking, the literature exploring associations between measures of food security uses one of two approaches.

The first focuses on dichotomizing households into two groups: those who are food secure and those who are food insecure. These are used in the construction of contingency tables, which cross classify indicators. For example, it must be noted that this procedure of using recommended dietary requirements has received enormous criticism (see, for example, Poleman, 1981; Srinivasan, 1985; Payne, 1990). To overcome this problem, some researchers have used different cut-off points of the recommended daily dietary intake to examine households at risk of food insecurity.

Moreover, households could be classified by whether per person caloric availability is above or below a certain value (the .cut-off.) and cross classified against dietary diversity. Studies that have used this approach include Chung, Haddad, Ramakrishna and Riely (1997) and Habicht, Meyers and Brownie (1982) as cited Haddintt 2000.

For example, Rogers (1996) and Alderman and Garcia (1994) use a cut-off point of 75%, while Delisle et al. (1991) set it at 60% for calories and 75% for protein and iron. This study uses the Delisle et al. (1991) suggested cut-off for calories, protein and iron.

A drawback to contingency tables (as well as related approaches such as logits and ROC analysis) is that the cut-off is based on an estimate of caloric requirements. The measurement of these requirements is based on a formula that takes into account the age, sex, physiological status and activity levels of individuals (Swindale and Ohri-Vachaspati, 1999, for a detailed explanation and examples.) Any arbitrariness in these calculations is carried over to the calculation of the cut-off. In the case of contingency tables, further arbitrariness is introduced via the choice of the cut-off for the proxy indicator. Also, these analyses do not take into account the fact that there are variations in the severity of food insecurity. No distinction is made between misclassifying a household just below the caloric threshold and one far below this cut-off. Put another way, by restricting our analysis to a zero-one (yes-no) variable, we throw away information on the variation in caloric availability and this would seem to be informationally inefficient (Diskin, 1995 as cited Haddintt 2000).

An alternative approach is to construct measures of association treating both the underlying measure of food security and the proxy as continuous variables. Pearsonian and Spearman correlation coefficients are index numbers that show to what extent two variables are linearly

related. However, these correlation indices have several limitations. First, an observed correlation could be driven by just one part of the distribution of joint variables. As a consequence, the calculated coefficient might just prove to be statistically significant. A second problem is that of false correlation where some other variable is correlated with both measures, producing a false correlation between the two variables that are observed. An alternative approach that overcomes these limitations is linear regression techniques. The dependent variable is the measure of household consumption or caloric availability (Diskin, 1995).

Gap of Knowledge

The National health and demographic survey (2003) showed that the prevalence of wasting, and underweight among under five children in the district was the higher compared to other districts however, the associated factors of this problem were not well established in the reports.

This study will establish factors that are associated with household intuitionalist.

CHAPTER THREE

3.0 STUDY SETTING AND METHODOLOGY

3.1 BACKGROUND INFORMATION ON THE STUDY AREA

3.1.1 Location and Size and Administration

Garissa district is located in Northern Eastern Province of Kenya. Bordering, Wajir district to the North, Lamu district to the South, Tana River and Isiolo district to the West and the Republic of Somalia to the East, it covers an area of 33,620 square kilometers- about 7.45% of the whole country. The district lies between latitude $0^{\circ} 58' N$ and longitude $30^{\circ} S$ and $38^{\circ} N 34' E$ and $41^{\circ} 05' West$.

Recently the district was divided into two parts, Garissa and Ijara. Its administratively divided into 11 divisions 42 locations 36 sub locations. The provincial and district headquarters is located in the central division where the highest population is also found.

3.1.2 Population size and structure

With an estimated population of 251,025 in 2001, the district is generally youthful because 58.8% of its population is made of youth (the age group 0-19 represents 58.8% of the district population). Most of this group is dependent therefore demanding more investment in food production. Numerically (males; 132,391, females; 118,634- in 2001) male exceeds females except for the age group 70- 74 and got. This means that life expectancy for females is higher than men. Somalis and Muslims are mostly the inhabitants.

3.1.3 Social economic situation

The population living under absolute poverty is estimated to be 68% of the total district's population. The district income distribution is skewed with a large proportion of the population having no reliable income.

The district income is thus concentrated among few individuals operating businesses mainly with in Garissa town and livestock dealers. The Northern division of Modagasha, Liboi, Shanta-Abaq, Dhadhab have people with very low income levels. Resulting from 1991-1993 drought, most of households lost nearly all their livestock hence reducing their source of income. These disadvantaged group moved to Garissa town where they have continued to rely on relief food. Most of these districts of female headed household have no reliable source of income and have continued depend on relief food.

Only a few individuals doing business mainly within Garissa town and livestock dealers generate income for the district. Most of the livestock sold through Garissa town comes from neighbouring districts. The drought of 1990-1993 greatly reduced the income of the livestock owners resulting in many moving to Garissa town and divisional centres to depend on relief food (G.O.K, 1997).

3.1.4 Infrastructure

Out of 1651 Km classified road network. Only 3 km out of the total network are tarmac ked, less than 150km are graveled; the rest are all earth roads. The gravelled roads are 50km along Garrisa-Dadaab road, 40km along Garrisa-Modashe road and 60km along Garrisa-Sankuri road. Garissa District is very vast with poor road network. This renders most parts of the district to be inaccessible posing a challenge when planning for poverty reduction programmes. Some parts of

the district are far from the district headquarters making it difficult to access within a day. During the rainy seasons, all parts of the district are cut off from Garissa Town making movements of goods and provision of services impossible.

The available water bodies adequately serve about 30% of the Human population and about 20% of livestock while the rest of the district does not have adequate supply of water.

River Tana is the single reliable surface water. In fact, there are 11 operational water supplies whose source is Tana River. The rest of the district is served by 31 operational boreholes mostly in the Northern district of Shanta-Abaq, Liboi and Dadaab. Apart from the town water supply, all the other water sources have no treatment works. There is potential for ground water exploitation in the Northern part of the district to reduce the distance traveled in such of water.

3.1.5 Education

There are a total of 408 teachers in the primary schools and 116 in secondary schools in 1995 given a teacher pupil ratio of 1:31 and 1:20 in both primary and secondary schools respectively.

Fifty-eight primary schools, nine secondary schools, two youth polytechnic schools, a farmers training centre and a teacher training college are the educational facilities within Garissa municipality, within Central division.

Most of the population is illiterate with only about 20% being literate. As such population cannot compete fairly with people from other parts of the country for job opportunities. This high illiteracy rate makes operation and maintenance of community assets difficult. There is generally lack of education facilities in most parts. (GDDP, 2002-2008).

Underemployed human resources have hampered development due to low creation of employment opportunities in the competitive sectors of the economy.

3.1.6 Health services and morbidity

One hospital, five health centres and fifteen dispensaries, five private clinics and one mobile clinic provide health services in the district. Except for the general hospitals, which are over utilized in adequate equipment, drug and personnel have led under utilization of health facilities.

The major causes of disease within Garissa district are diarrhea disease, malaria, upper respiratory tract infection anaemia and pneumonia.

The district has a fast rising HIV/AIDS incidence. In 1996 and 2001 the incidence rose from 7 per cent to 11 per cent respectively. The town accommodates the poor people who lose their livestock forcing them to indulge in risky sexual activities.

The district has a very low awareness of the pandemic due to illiteracy and ignoring some preventive measures of the disease. (G.O K., 2002-2008).

3.1.7 Topography and climate

With altitudes ranging between 70 m and 400 m above sea level, Garissa is a low land devoid of any mountains, hills or valleys. There is even distribution of rain within the district but due to the coastal winds the southern divisions of Hulugho, Masalani and Bura receive relatively more rainfall than the northern divisions. The district is classified as a drought arid and semi-arid area. Actually the mean rainfall range between 23.6 mm and 34.2 mm. The temperatures are quite

high too ranging between 20.5°C and 38°C. frequent Frequent draughts and unreliable rains do not favour the growth o f pasture for livestock rearing and agricultural activation .

Community Activities

Pastoralists have, over the years, employed adaptive strategies to cope with the vagaries of nature. In arid ecosystems of sub-Saharan Africa, forage distribution is highly stochastic in time and space. Mobility is a cardinal strategy for pastoralists to mitigate the effects of fluctuations of climate, such as periodic droughts and erratic rainfall. Evidence from many studies suggests that pastoralist land use is inherently rational and is an ecological adaptation given the constraints of arid land.

Garissa district is part of the arid communal rangelands of northern Kenya. The predominant economic activity is livestock production based on nomadic pastoralism, as in other sub-Saharan arid rangelands. This became very clear during the devastating drought of 1970 and 1971. Consequently, many pastoralists in Garissa district and the entire northern Kenya became dispossessed from the pastoral economy because they lost entire livestock herds or remained with less than the minimum herd size required to meet basic subsistence needs. Most of the dispossessed pastoralists moved to settlement centres to seek survival opportunities, with most of them becoming recipients of famine relief handouts. Others ventured into irrigation farming along the eastern side of Tana River within 30km of Garissa Township. As a result, several farms came into existence in the early 1970s.

3.1.8 Nutrition

There is a low nutritional level because of food deficiency. The 1990-1993 drought brought malnutrition to unprecedented levels prompting intervention of food donation by various NGOs working within the district to the displaced people. Malnutrition is attributed to lack of balance diet and insufficient food intake. The prevalence of malnutrition in Modogashe and in Liboi with 41% and 36% respectively. For children under five years of age 34% are stunted, while 13.6 % are wasted and 45.5% are underweight. In Garissa town 28% of under fives years of age are malnourished according to a survey conducted in the health facilities (MOH and actual North Sud cited GOK, 2000). The population living under absolute poverty can be estimated at 68 percent of the total district population. They are heavily dependent on relief food from the government and other organisations. The over reliance on relief distribution is also a factor which causes poverty since people are fed throughout the year thus limiting their innovations to look for alternatives. (Garissa District Development Plan, 2002-2008).

3.1.9 Drought:

The prevalence of long drought poses the greatest challenge in Garissa District. Drought reduces the forage and water for livestock, leading to great loss to the economy of the district. This requires excavation of silted pans and replacement of bore holes in the entire district to reduce loss of livestock during prolonged droughts. This problem that recurs almost after every two years poses the greatest challenge to development since the district is always either preparing for drought or tackling drought related emergencies. This challenge has hindered promotion of livestock and agricultural production in the district.

The government of Kenya through the NCPB and NGOs are helpful in this area. For food demand and production levels. However the NCPB stores are not accessible to the whole population because of their low purchasing power and due to the high cost of transportation. Therefore there is a serious deficit in food availability, which will have to be addressed. In 1997, the district was affected by the El Nino rains and floods, which reduced goats' population by 80 percent , cattle by 20 percent and camels by 50 percent. This increased the number of the poor in the district. The farmers along the river lost their water pumps through floods. Their camels and farms were destroyed pushing them below the poverty line.

3.1.10 Agricultural production

The arid nature of the district makes livestock keeping the major economic activity. The main types of livestock reared include camel, cattle, sheep and goats and main livestock products are milk, meat, hides and skin. Most of livestock population is concentrated along the Tana River Ijara and Marsabit.

This is mostly done along River Tana through irrigation and in flood receding areas. Farming is also carried out along dry riverbeds and in depressions where they discharge their waters. Ijara, Masalani and Hulugho have rain fed cultivation because they get higher rainfall than the rest of the district. Food security, employment creation, income generation and saving of foreign exchange are possible because the district has an irrigation potential of over 28,000 ha. Tomatoes, bananas and paw paws are at the moment grown in about 1200ha (Republic of Kenya, 2002). This helps the small-scale agro-based industries much. In the southern regions mangoes and oils seeds are grown through rain fed agriculture. This means that small-scale industries for the extraction of oil are possible in the region.

3.2 METHODOLOGY

3.2.1 Study Design and Study Population

This study was cross sectional, descriptive and analytical as well as comparative in nature. Data from urban and rural households was compared to establish differences and associations of prevalence of malnutrition with the livelihood, food consumption patterns, water, sanitation and hygiene and morbidity.

The study population consisted of children in Central division and in three other divisions (Dadaab, shanta-abaq and Raya). Hereinafter, these children were identified as urban and rural groups respectively.

3.2.2 Sampling Frame

The sample frame of the study consisted of all households in the six target sub-locations with children less than five years old. Using village registration and growth monitoring forms (containing anthropo and health records of all underfive in each sub location. A list of households with children in the desired age group (0-60) in each sample sub location was prepared. The exact number of children drawn from each Urban / Rural was proportional rate to their population frame. A list of households with children under five in the six sub-locations were developed, 76 children from the urban and 226 children from the rural were randomly selected giving a sample of 302. According to the government of Kenya, 75% of the population in Garissa district lives in rural areas, with the other 25% living in urban areas(the Govt of Kenya, 2002 – 2008). Using this, it was possible to determine sample sizes for urban and rural areas using sampling proportionate to the sample size (PSS).

3.2.3 Sample Size Determination

A minimum sample size of 304 household with children each less than five was required. This was determined using the following formula

$$N = \frac{2Z^2 pq}{d^2} \quad (\text{by Fisher et al. 1991})$$

Where

N = the desired sample size group

Z = the standard normal deviate, set at 1.96 which corresponds to 95% confidence level.

p = the proportion of the children estimated to be malnourished (0.33) in

q = 1 - p proportion of the children who are well nourished = (0.67)

d = degree desired accuracy set at = (0.075)

Therefore $N = 2(1.95)^2 \times 0.27 \times 0.73/0.075^2 = 302$

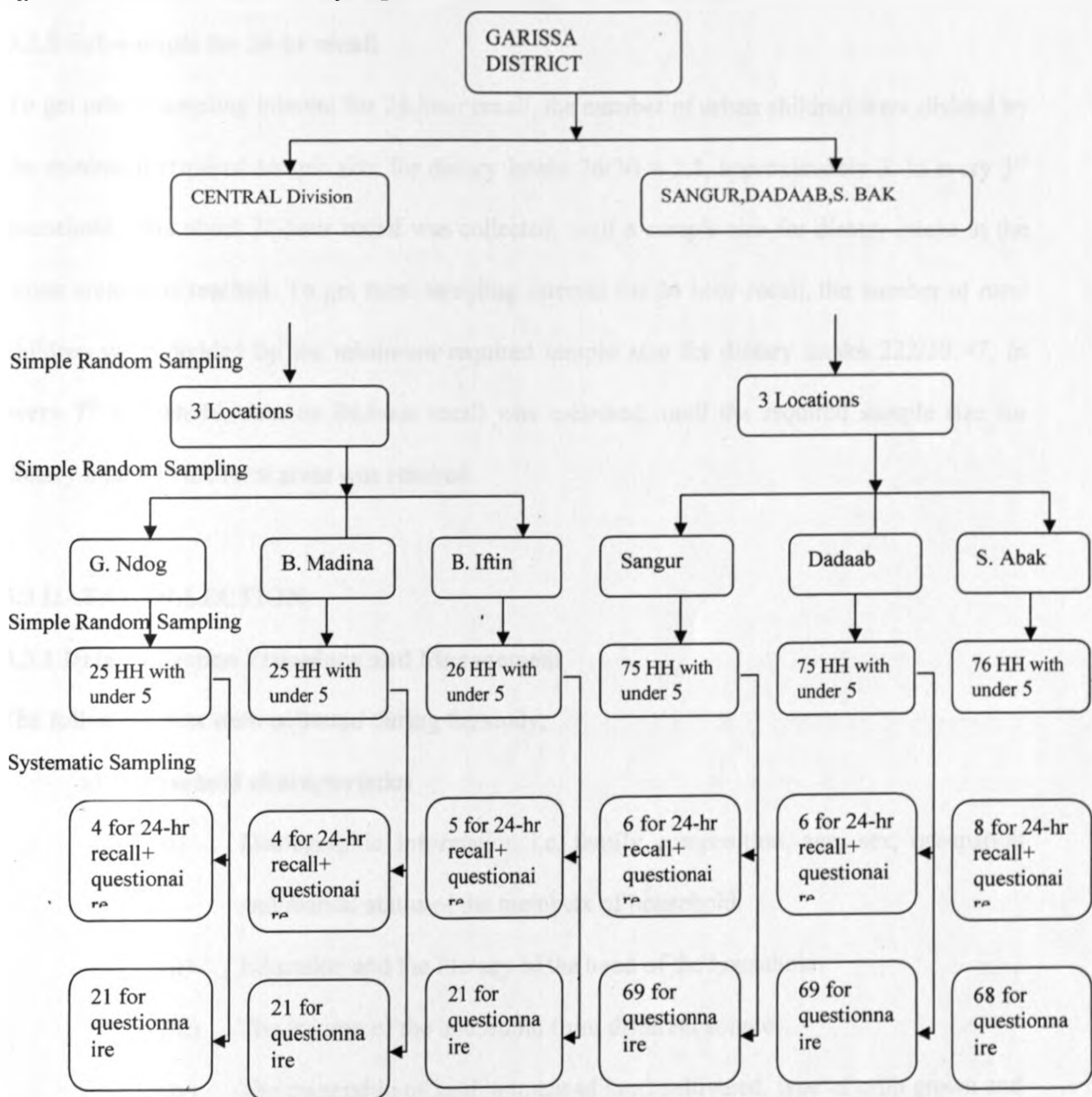
3.2.4 Sampling Procedure

This study was carried out in the six randomly selected sub-locations in Garissa District. A preliminary survey for identification and registration of all households with children less than five years old was carried out. From that 302 were randomly selected in this population: 76 under five children from central division and 226 under five children from the other three rural divisions. The selected households were interviewed to gather information on demographic characteristics, socio-economic status, water, sanitation and hygiene, morbidity, food consumption pattern. A Sub-sample for 24- hour recall was done by systematic random sampling from the sampling units in each sub-location. A sub-sample of 33 households were interviewed

for dietary intake using 24hr-recall. This number, which is the minimum sample size (30 cases), as recommended by Fisher et al (1983), was asked to describe their dietary intake for the last 24hr-recall. In each household visited therefore, a child aged between 6-59 months was randomly selected as the interest child for the purpose of data collection. In case more than one child is found, a simple random sampling was done as for criteria of inclusion. During the actual interviews, six (6) of the households were not interviewed because of failed appointments. So the actual households interviewed were 222 in rural areas and 74 in urban areas.

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Fig 1 : Flow Chart of the Sampling Procedure of the Research



3.2.5 Sub-sample for 24-hr recall

To get urban sampling interval for 24-hour recall, the number of urban children were divided by the minimum required sample size for dietary intake $76/30 = 2.5$, approximately 3. In every 3rd household, data about 24-hour recall was collected, until a sample size for dietary intake in the urban areas was reached. To get rural sampling interval for 24 hour recall, the number of rural children were divided by the minimum required sample size for dietary intake $222/30 = 7$, In every 7th household, data on 24-hour recall was collected, until the required sample size for dietary intake in the rural areas was reached.

3.3 DATA COLLECTION

3.3.1 Data Collection Procedure and Management

The following data were collected during the study;

a) Household characteristics

- (i) Demographic information i.e. family composition, age, sex, occupation and marital status of the members of household.
- (ii) Education and the literacy of the head of the household.
- (iii) The income of the household from different sources.
- (iv) The ownership of land, amount of land cultivated, type of crop grown and livestock kept.
- (v) The ownership of certain household assets.
- (vi) Type of housing energy used for lighting and cooking and the main source of water.

- b) Nutritional status**
 - (i) Age of the child
 - (ii) Weight of the child
 - (iii) Height of the children
- c) Food security**
 - (i) Household expenditure survey
 - (ii) Income
 - (iii) 24-hr dietary recall

3.3.2 Twenty Four- Hour dietary intake Recall

The dietary intake was obtained using 24-hr recall, which gave the types and amount of foods eaten in the last 24 hours in the household by the index child. To estimate the amounts consumed during the day, any leftovers and food not eaten in the same day was subtracted after separate estimation. Volumes were approximated using household measures and weighed using kitchen scales. Volumes were measured using pots, plates, cups, sufurias or tins and converted to weights. Volumes of water used for cooking was measured using graduated measuring cylinders. For foods served piecemeal, respondents estimated the sizes consumed which was later converted into standard weights. All minerals and food supplements used were recorded by amounts and types used. A structured questionnaire was used to collect this information. Food models of various types used as memory aids also assisted the respondents in assessing portion size of food items consumed and a kitchen scale was used to help in quantifying measures, (Burk and Pao, 1976).

3.3.3 Food Frequency Questionnaire:

The food frequency questionnaire was designed to obtain qualitative, descriptive information about usual food consumption pattern. This consisted of two components: a) a list of foods and b) a set of frequency of use response categories. A list of foods was given and their frequency of consumption was obtained from the respondents (mother of the index child) (Gibson, 1990).

3.3.4 Nutritional status:

Nutritional status was assessed by use of anthropometrical measurements of height, weight and age. Heights were measured using height / length board, and weight using the Salter scale. The Heights of children less than two years old were taken while the children were lying on the height board; for the older children the heights were taken while standing. Assessment of nutritional of children was measured in terms of anthropometric scores, HAZ, WAZ and WHZ. These scores were computed using EP Info version 2000 software package. These scores were then compared with National Centre for Health Statistics (NCHS) reference population as a standard recommended by the World Health Organisation. A child with a Z-score of less than -2 standard deviation of the NCHS reference standards was considered as undernourished (Ssewanyana, 2003). Height for age (stunting), weight for height (wasting) and weight for age (underweight) were used. These three indicators reflect different but interrelated aspects of protein-energy malnutrition (PEM). Height for age reflects the degree of stunting and is thus a measure of chronic malnutrition. Weight for height indicates the degree of wasting and is thus used to estimate acute malnutrition and need for immediate action. Weight for age is a reflection of both stunting and wasting and thus a useful measure of nutritional progress in a community of mixed child age composition.

3.4. RECRUITMENT AND TRAINING OF FIELD ASSISTANTS

After obtaining the necessary research permit, three field assistants, two nutritionist and one family health field educator were recruited on the basis of their qualifications. The minimum qualification was Kenya Certificate of Secondary Education. Two are females while the third was male. Eventually the three field assistants who was high had Diploma. They also had to good social standing within the community. The assistants were thereafter trained for two days and the training involved creation of common understanding of objectives and terms:

- Awareness of types of foods that are commonly consumed among Somali community.
- Trained on interviewing techniques, administration of questionnaires, Ethics during fieldwork.

In order to achieve the objectives of the study, field assistants were trained.

The principal investigator trained them on the following:

- a) Interviewing techniques.
- b) Measurement technique of 24-hour recall.
- c) Accurate taking of all anthropometric measurement and how to handle questionnaires.
- d) Selection and identification of households
- e) Obtaining informed consent from the mother and the caregivers in the study. The principal investigator had had meetings with them and explained the purpose of the study and the procedures, an oral and written consent letter were signed.

3.5 PRE-TESTING OF THE TOOLS OF THE STUDY

The principal investigator recruited and trained enumerators on the techniques, clarifying the different questions in the questionnaire, and meaning of the various codes on the questionnaire,

weight and height measurement on the children. Practical training was also conducted. Twenty households were randomly selected to be used in gauging the appropriateness of the study instruments. The aim of household selections was to evaluate the performance and efficiency of the enumerators and the research tools.

Based on the result of pre-testing, slight change was made on the questionnaires; for example SECTION E: Food Security: Question nineteen was reformulated and replaced and growth monitoring sections omitted. The structured questionnaire was pre-tested in the actual field situation.

3.6 DATA QUALITY CONTROL

The validity of the tools of the study was assessed through pre-testing. Careful training and close supervision of the interviewers was done. Measurement of all weights and heights were done in kilograms and centimetres respectively and the measuring equipment was calibrated during this process. The data collected was screened and cleaned for inconsistencies. Questionnaires with missing information were returned to the field. The respective households were contacted for further clarification. Further cleaning and validation of the data was done during entry. After entry, any outliers that occurred were dealt with.

3.7 DATA ANALYSIS AND PROCESSING

Upon arrival from the field, Data was entered, cleaned and analysed using SPSS version 11.5 at Applied Nutrition Programme (ANP). Outliers were omitted before the analysis. Means and proportions was calculated for quantitative data respectively. Chi square and tests were used to look for associations between the depended dichotomous variable with reference to nutritional status (wasting, stunting and underweight) also between rural and urban areas in Garissa district.

Regression analysis was also used to find associations between nutritional status and continuous variables like income, expenditure and household size. T-test was used to test for differences in means between continuous variables. Assessment of nutritional status based on height for age (stunting), weight for height (wasting) and weight for age (under weight) were used (Gibson, 1990). Quality control at the entry and nutritional conversion stages were ensured through EPI-Info software (2002). A p-value of less than 5% was considered statistically significant. Graphs were plotted using Microsoft excel version 10 and SPSS (statistical package for social science) for both qualitative and quantitative data. For the dietary intake assessment Kenya food composition table were utilized for the calculation of the mean nutrient intake in terms of calorie and protein.

3.8 DESCRIPTION OF THE VARIABLES

The literature on the determinants of household food security and child nutrition outcomes makes it clear that the choice of the dependent and independent variables varies across studies. In particular, differences in the variables being controlled for in various studies have led to numerous debates in the literature. This issue is discussed for child nutrition outcome models by such studies as Strauss (1990) and for household food security by such studies as Behrman (1995) and Teklu (1996). Therefore, this section describes the variables used in the empirical econometric analyses. The dependent variables are presented first, then the independent ones.

Dependent variables it is evident from the available literature that there has been a shift from objective measures to subjective measures (see, for example, Maxwell, 1996;

Maxwell et al. 1999). While some researchers have used such objective measures as food availability as a proxy for household food security, others have measured the same using food intakes. The latter takes into account the food accessibility issues. To be treated cautiously is the

empirical evidence based on studies where these two measures of household food security have yielded different results.

Households consume a variety of foods, which are converted into their calorie, protein and iron equivalents. Each meal was weighed and the weights constituent ingredients recorded. Using food composition tables, the daily dietary intake for each index child were recorded. Those recorded were Energy (Kcal), proteins (grams) and iron (grams).

The standardized anthropometric indicators including height-for-age (HAZ), weight-for-age (WAZ) and weight-for-height (WHZ) commonly expressed as standard Z-scores were taken as dependent variables for the reduced-form child nutrition models. WHZ, a measure of wasting, is used as an indicator of the current nutritional status of a child, where a low WHZ score indicates the child is excessively thin. HAZ, a measure of stunting, is an indicator of long-term nutritional status of a child. Finally, WAZ is a composite measure that incorporates aspects of both stunting and wasting, making the interpretation of the indicator difficult.

Independent variables; in this category are characteristics of the individual child, the household and the community.

Individual child variables: The individual child characteristics include age in completed months at the time of the survey for all children in the household less than five years of age entered using a linear spline. The piecewise linear specification allows the age variable to have different effects on the child's anthropometric outcomes. The age-specific dimension is emphasized here, as some studies such as Sahn and Alderman (1997) have found it to be important in understanding child nutrition outcomes. Other variables include gender entered as a dummy variable taking a value of 1 if male child to capture any gender differences.

Household level variables: These can be divided into parental and other household characteristics. Parental characteristics are included to control for household background; they include mother's education and the education of the natural father. Education is based on the highest level of formal education. Maternal education is assumed to have a direct link to child nutrition through better child-care practices and resource allocation in the household.

Other household level variables include household composition, headship, income and asset index. The headship variable entered as a dummy variable is expected to capture the effects of household organization on the allocation of resources including food within the household. The real household income variable was measured by income from all income activities; employment, casual, business, agriculture and so on. These were accumulated for the past one year prior to the study and were converted to monthly basis. The total household expenditures are derived, on a monthly basis, as a sum of food expenditures and non-food expenditures including expenditures on health, semi-durables and durables. Household income variable is expected to have a positive impact on both the anthropometric outcomes and dietary intakes. Household composition enters through linear indicators of the number of persons, excluding visitors, in the demand for dietary intake.

Community level variables: The variables are said to represent the overall availability of services such as health, schools and food prices in the community. Distance to social facilities is used as a proxy for the overall availability of such facilities within area and the distance to the nearest such facilities if not available in the area. These variables enter the anthropometric outcome models as distance to the nearest facility and weighted food group prices. The food types are derived for major food groups including cereals, roots bananas, meat and dairy

products, legumes, oils, and other miscellaneous, Groundnuts, fresh and dry beans, fresh and dry peas, and soybeans make up the legume group, whereas beef, goat meat, poultry, fresh milk and eggs make up the meat and dairy products group. The miscellaneous group includes vegetables and fruits such as onions, cabbage, pumpkin, pineapple and avocado.

CHAPTER FOUR

RESULTS

The results of the study are presented into two sections. The first one presents the descriptive aspect of the study while the other one present the result of the study or the analytical results

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY

It is apparent from Table 1 that the average household size was 9.2 (SD=11.8) in the urban areas and 6.3 (SD=2.1) in rural areas. However, the overall average household size for the entire population was found to be 7 (SD=6.1) with the range being from 2 to 13. There was no difference observed in the sizes of male headed households the female headed households. However, mothers who were widowed represented households with the least average household size of 5.2 (SD=1.8) while those from polygamous households had the highest average household size of 9.3 (SD=11). Household size was found to decrease with the increase in level of education with mothers having no education representing an average household size of 7.1 (SD=6.4) while those with higher education representing an average household size of 5.3 (SD=2.3). There was no difference in household sizes in regard to the occupations of the mothers. Dependency ratio was 1:1.27 and 1:1.05 for urban and rural areas respectively. A t-test was done to establish whether there was any difference in the dependency ratios. A p-value of 0.049 was observed at both 99% and 95% confidence intervals. This meant that there is sufficient evidence to conclude that there is a higher dependency ratio in urban areas than in rural areas.

As displayed in Table 1, 89% of the households were headed by male, with female headed households accounting for the remaining 11%. The average number of years that the household

have lived in the area under study was found to be 10.3 (SD=8). Seventy point nine percent (70.9%) of the women were in monogamous marriages with polygamy marriage accounting for 17.8%. A few were single, while rest were either divorced or widowed. Chi-square tests between female or male headed households in both urban and rural areas showed no significant difference between urban and rural areas ($p>0.05$). In other words, one cannot significantly say that there are more male headed households in urban areas than in rural areas or vice-versa. Majority of them have lived in the area for many years with only 28.1% having moved to the area in the last 5 years.

Illiteracy level among mothers was found to be very high, with 89% of the mothers indicating lack of any basic education. It was found that only 3.1% had adult education while Primary and secondary education accounted for 6.9%. Only 1% of the mothers were found to be educated beyond secondary education. Due to this high illiteracy level, most of the mothers were found to be housewives (79.2%). Only 1%, the only ones with higher education were in formal employment.

Table 1: General characteristics of the study population

Characteristic	Description	Status in the population(N=296)
Household head	% headed by male	89
	% headed by female	11
Household size	Mean hh size in urban areas	9.2 (SD=11.8)
	Mean hh size in rural areas	6.3 (SD=2.1)
Mothers' Marital status	% Single	0.7
	% Married Monogamous	70.9
	% Married Polygamous	17.8
	% Divorced	5.5
	% Widowed	5.1
Mothers' Educational level	% No education	89
	% Adult education	3.1
	% Primary	5.5
	% Secondary	1.4
	% Higher education	1
Mothers' occupation	% Housewife	79.2
	% casual work	5.2
	% Crop farming	4.2

	% Animal farming	4.2
Table 2. Access to Water, Latrine Ownership and Environmental Sanitation		
	% Other activities ¹	6.1
Latrines	% with latrines	53.3
	% without latrines	46.7
Access to Water in urban areas	Average time to get water-dry season (Mins)	18.8 (SD=21)
	Average time to get water-rainy season (Mins)	20.6 (SD=30.9)
Access to Water in rural areas	Average time to get water-dry season (Mins)	40.8 (SD=37.5)
	Average time to get water-rainy season (Mins)	37.8 (SD=34.5)

hh=household

Mins=Minutes

From **Chart 2**, it is clear that diseases like cough/cold, fever and malaria were very common in the region under study. Eighty nine percent (89%) of the mothers reported that their children had suffered from malaria in the previous 14 days prior to the study. Stomach problems, skin diseases and tonsillitis are were only found to have affected few children.

Whether children have suffered diseases

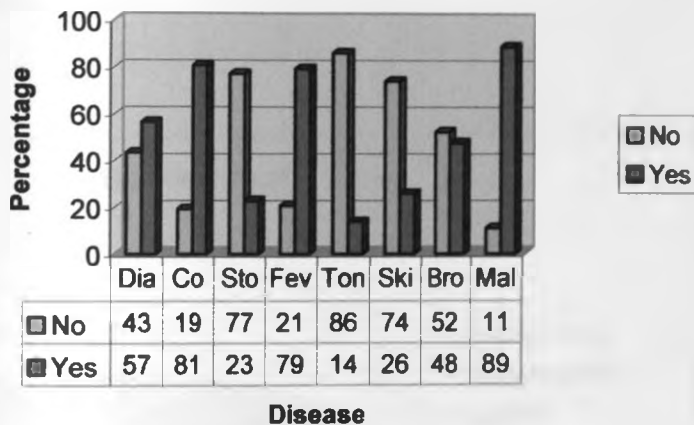


Chart 2: Child Morbidity Status

Key
Dia=Diarrhoea
Co=Cough
Sto=Stomachache
Fev=Fever
Ton=Tonsillitis
Ski=Skin rash
Bro=Bronchitis
Mal=Malaria

Majority of the respondents (62%) indicated that their children are treated at dispensaries with 25% reporting health seeking for their children in hospitals. Apart from home care, dispensaries,

MCH and hospital, very few respondents also indicated they use other options like traditional healers and herbalists. **Chart 3**

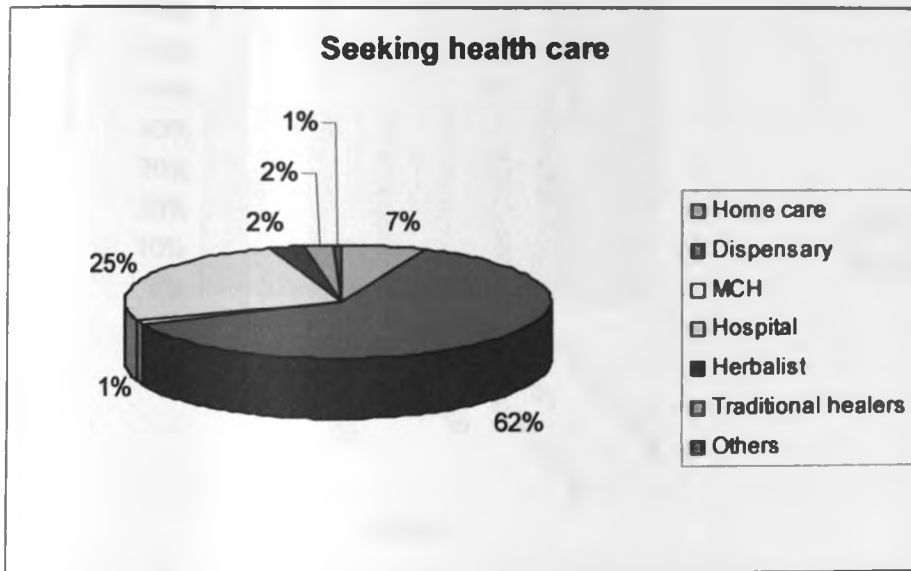


Chart 3: Child Health care seeking Practices

From **Chart 4**, it can be seen that 50% of the households have latrines while the other 50% do not. Animal dung and animals sleeping in the houses was also observed to a greater percentage. However garbage and human feces were not very much visible. Only 10% of the respondents treat drinking water. The methods used are boiling, chemicals and herbs.

Sanitation and hygiene

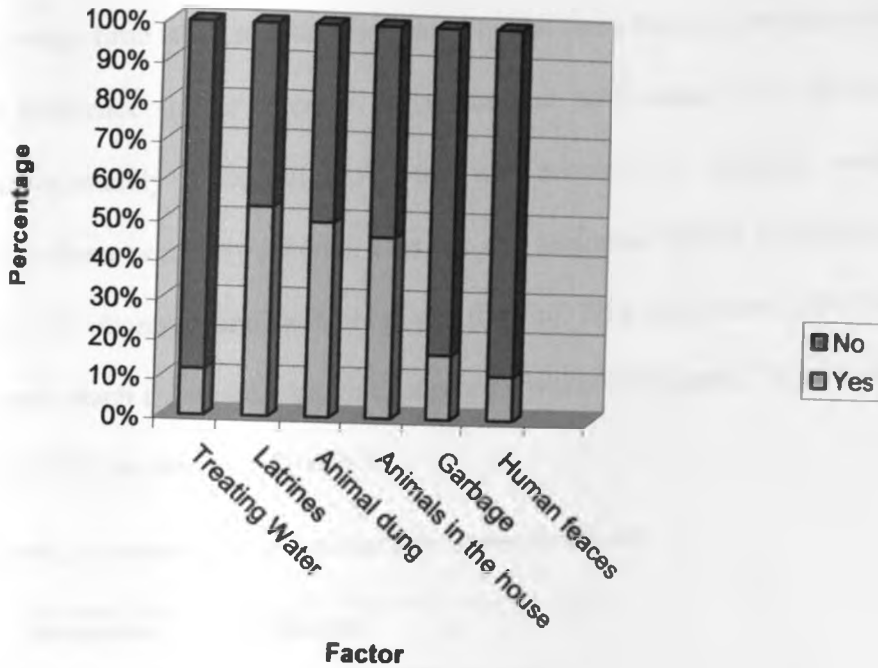


Chart 4: Sanitation and hygiene

The average time taken by the households to get to the nearest water point in urban areas was 23.7 (SD=34.3) minutes during dry season and 20.6 (SD=30.9) during rainy the season. Over 79% of the households in urban areas accessed water within 30 minutes. This percentage rose to 88.3% during rainy season. The average time taken by the households to get to the nearest water point in rural areas was found to be 40.8 (SD=37.5) minutes during dry season and 37.8 (SD=34.5) during rainy the season. A majority (57.3%) of the households in rural areas accessed water within 30 minutes. This percentage was found to rise to 59.1% during rainy season. Average time taken in minutes to reach to the nearest health centre was found to be 24.7 (SD=32.8) in urban areas and 69.3 (SD=72.5) in rural areas. (Table 2)

Average time taken to reach the nearest health care centre was as displayed in Table 9 There was a difference in the average for urban and rural areas. This difference was found to be approximately 45 minutes. A t-test was necessary to establish whether this difference is significant or merely random. This test was performed at 95% confidence interval and a p-value of 0.00 observed, indicating high significance. Fifty six percent (56%) of the households under study reach the nearest health care centres within 30 minutes. This percentage was found to rise to 77.8% in one hour. **(Table 3)**

Table 3: Average time taken to reach the nearest health care

Parameter	Residence	
	Urban	Rural
	74	22
Mean time	24.67	69.67
Std Deviation	32.840	72.528

P = 0.00

4.2 SOCIO-ECONOMIC CHARACTERISTICS OF THE STUDY POPULATION

From the **Chart 5**, the major occupations of the households are casual labour, sale of livestock, husbands' salaries and business. It is clear that there are income activities that are only a reserve for rural residents. Activities like sale of root crops and livestock were only found to be practised in the rural areas. It was also evident that most of the households residing in the urban areas rely mostly on husbands' salaries. Almost as many households in rural areas as in urban areas were involved in business. Other sources of income were knitting, sewing, weaving and so on.

From **Chart 5**, it can be seen that most of the mothers (86.3% and 76.9%) in urban and rural areas respectively are housewives. A small percentage of mothers are involved in other activities like sewing, knitting and weaving. When establishing a relationship between mothers' occupation and wasting, P-values of 0.4 and 0.08 were observed in urban and rural areas respectively. Stunting and mothers' occupation gave p-values of 0.6 and 0.3 for urban and rural areas respectively. Similarly underweight gave p-values of 0.3 and 0.09 for urban and rural areas respectively.

As illustrated in **Chart 6**, ownership of the selected household items was found to be not very pronounced both in urban and rural areas. Radios, sofa sets and wardrobes were owned by a small percentage of households. Mosquito nets were very rare, perhaps explaining why children in the region are susceptible to malaria.

Table 4: Household income activity in urban and rural areas

Activity	Urban N=74 (%)	Rural N=222 (%)
Sales of cereals	1.7	1.4
Sales of roots	0.0	1.8
Sales of livestock	0.0	24.7
Business	12.1	12.3
Husband's salary	39.7	16.0
Causal labour	24.1	27.4
Mother's salary	3.4	1.8
thers	19.0	14.6
Total	100.0	100.0

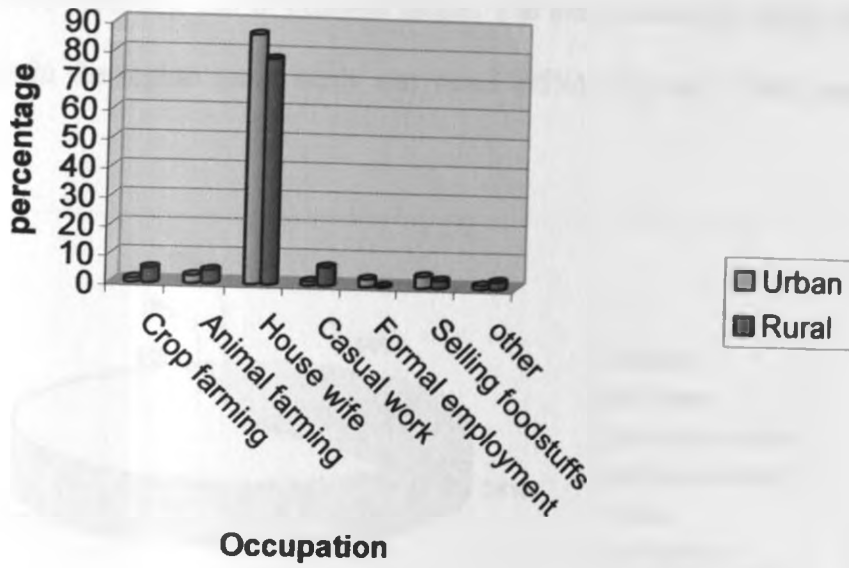


Chart 5: Household income activity in urban and rural areas

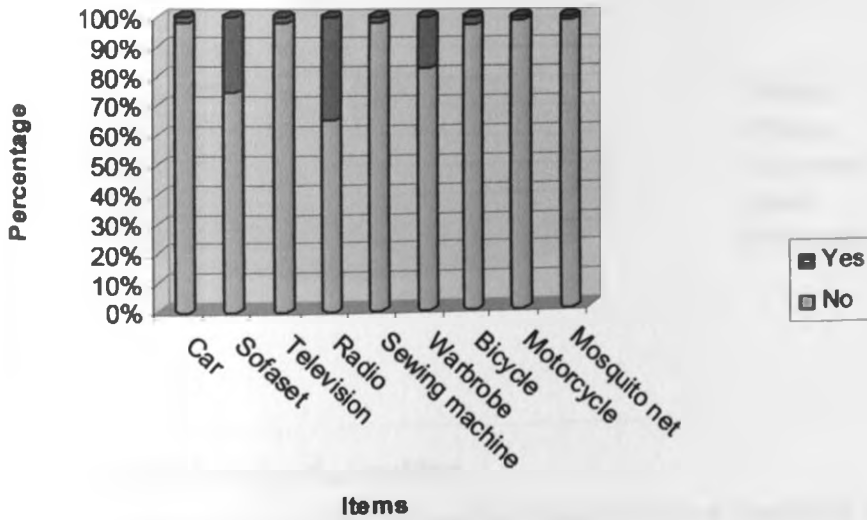


Chart 6: Ownership of household items

Fifty eight percent (58%) of the respondents reported that they used hurricane lamps for lighting, with only 1% reporting use of pressure lamps. The main source of energy for cooking for the households in the region under study was wood (95%). The rest of the households (5%) used charcoal.

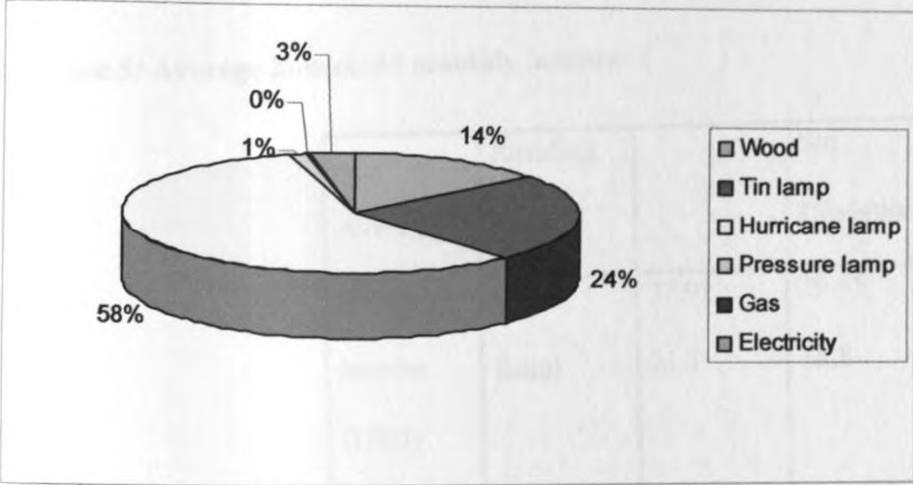


Chart 7 Source of lighting

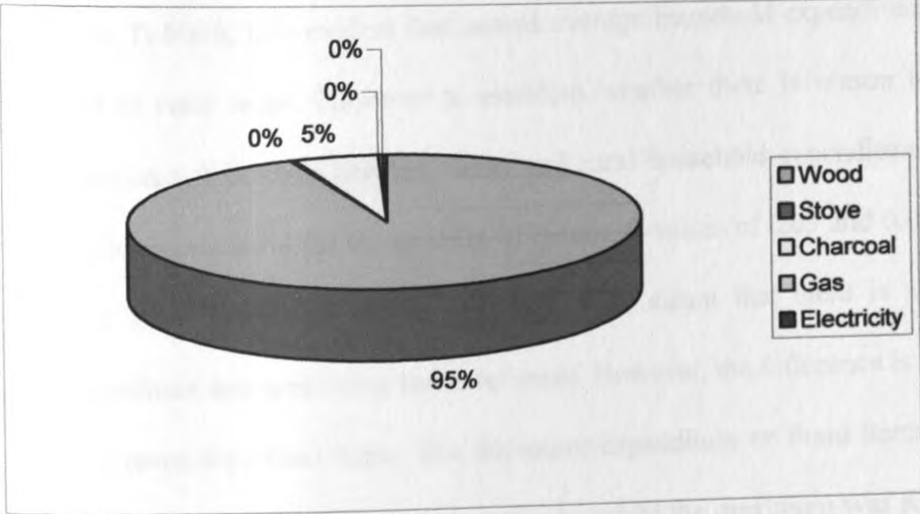


Chart 1: Source of energy for cooking

The average household monthly income was found to be as described in Table 5. The figures were converted to USD at KES 70 per 1 USD. A t-test for equality of means for both urban and

rural areas was performed at 95% confidence interval and a p-value of 0.00 was observed. This showed that there was sufficient evidence to suggest that there is a difference in the income levels between urban and rural households.

Table 5: Average household monthly income

Average Monthly income (USD)	Residing Area		Std. Deviation
		Urban	37.91
	Rural	21.5	18.8

From **Table 6**, it is evident that annual average household expenditure is higher in urban areas than in rural areas. However to establish whether there is reason to believe that there is a significant difference between urban and rural household expenditure, a t-test was done 95% confidence interval for the equality of means. P-values of 0.03 and 0.00 for food items and non-food items respectively were observed. This meant that there is a significant difference in expenditure between urban and rural areas. However, the difference is more pronounced for non-food items than food items. The minimum expenditure on Food items was Ksh. 6000 and Ksh. 3600 in urban and rural areas respectively, while the maximum was Ksh. 80000 and Ksh. 60000 respectively. It was observed that half of the households in urban areas spent less than Ksh. 18000 each on food items. This was however less than that of rural household, which spent less than Ksh. 25000.

Table 6: Average annual expenditure in KES

	Residing Area	Mean	Std. Deviation	Minimum	Maximum	Median
Expenditure on Food items	Urban	31097.87	28943.27	6000.00	80000.00	18000.00
	Rural	25879.87	13693	3600.00	60000.00	25000.00
Expenditure on non-food items	Urban	20209.45	16787.17	3000.00	50000.00	12660.00
	Rural	9874.22	9579.96	1500.00	40000.00	7000.00

4.3 NUTRITIONAL STATUS OF CHILDREN

A community's food and nutritional status is normally measured by the nutritional status of children less than five years of age. This is the most vulnerable group to growth faltering, diseases, mental impairment and death. The nutritional status of a population can therefore be assessed using anthropometric standards according to the National Centre for Health Statistics (NCHS). The indices used are Height for Age (HFA), Weight for Age (WFA) and Weight for Height (WFH). The three indices by which a child or a group of children is compared to the reference are known as "percentage of the median", "percentiles" and "z-scores" respectively. The one to use is an issue that has been debated for a long time. Nonetheless, z-score is acknowledged to have a statistical meaning and therefore recommended. Moreover, it is advisable to report nutritional status data as z-scores rather than percentage of reference median or percentiles so as to be able to compare information from different studies (Beaton, 1993; WHO 1994). The z-score is simply the number of standard deviations (SD) from the median of the reference population (NCHS data).

In this regard, HAZ, WAZ and WHZ are z-scores for HFA, WFA and WFH respectively. Children found to be below minus two standard deviations ($WHZ < -2$) in terms of weight for height are classified as too thin for their height, or wasted, a condition reflecting acute or recent nutritional deficit. HFA is a measure of linear growth, such that children whose height for age lies below $-2SD$ of the reference median are too short for their age, or stunted, a condition that reflects cumulative effects of nutritional deficit over a period of time. Children found to be below $-3SD$ in terms of weight for age are classified as severely underweight. Those between $-3SD$ and $-2SD$ are moderately underweight.

From the study, 22% of the children were found to be stunted ($HAZ < -2$) whereas 78% were found to be normal. Likewise, 23.4% of the children were found to be wasted ($WHZ < -2$) and 76.6% were found to be normal. One in every twenty, that is 20.7% of the children were found to be moderately wasted ($WAZ < -3$), while 9.0% were moderately stunted ($-3 \leq WAZ < -2$). Chart 9 shows distribution children nutritional status by region (urban and rural). From the chart, it is clear that all the nutritional indices (stunting, wasting and underweight) have a higher prevalence in rural areas than in urban areas. These results are shown in Table 7, Chart 9.

Table 7: Distribution of Children by Level of Nutritional Indices

Residence of HH	Moderately wasted (%)	Severely wasted (%)	Moderately stunted (%)	Severely stunted (%)	Moderately underweight (%)	Severely underweight (%)
Urban (N=74)	13.5	9.5	5.4	16.2	6.8	18.9
Rural (N=222)	14.9	11.7	12.6	10.4	11.3	21.2
Average (N=296)	20.7	15.6	9.0	13.3	9.05	20.05

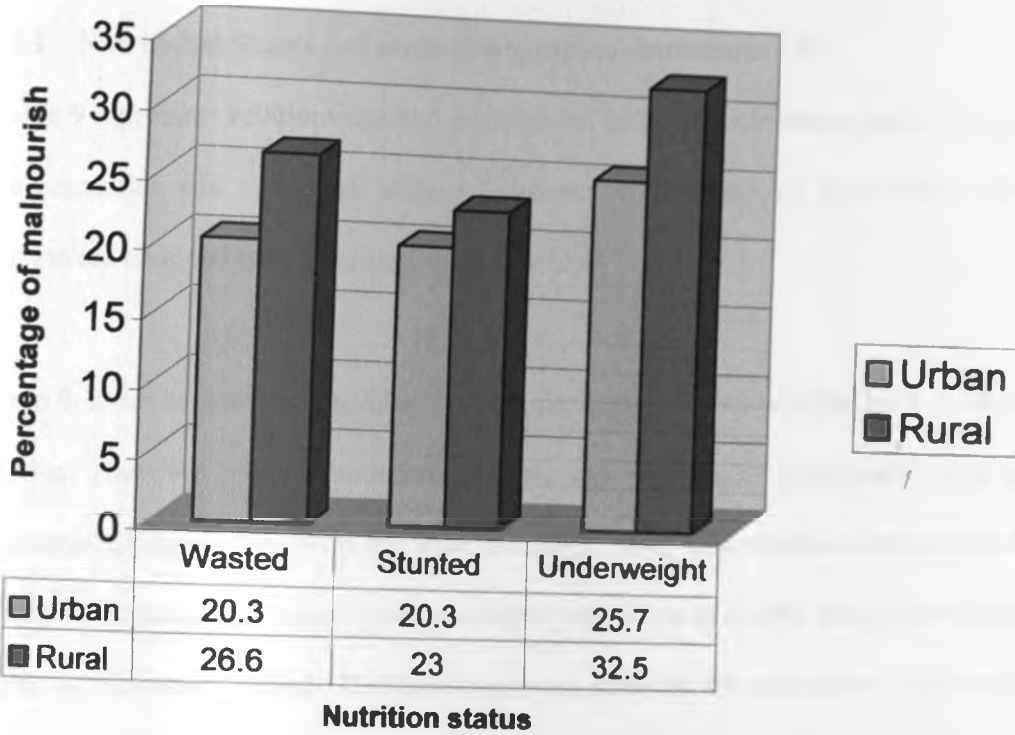


Chart 9: Prevalence of child malnutrition

The results for the t-test at 95% confidence interval for difference in nutritional indices of urban and rural households are presented in **Table 8**. It showed that there is no significant difference in nutritional indices scores between rural and urban areas.

Table 8: Comparison of House Hold Nutrition estates between Urban and Rural Areas.

A Test of Hypothesis

	Residing Area	N	Mean	Std. Error	P-values (t-test)
WAZ	Urban	74	-1.6592	.6849	0.59
	Rural	222	-1.4251	.1055	
HAZ	Urban	74	-1.9585	.9297	0.44
	Rural	222	-1.2940	.3889	
WHZ	Urban	69	-4.9280	3.8718	0.09
	Rural	211	-1.2176	.1100	

4.3.1 Nutritional Status and socio-demographic characteristics

Table 9 represents relationships and associations between socio-demographic characteristics of the population and nutritional status of children in the area. All significance values for this section are obtained from Pearson Chi-Square tests.

From 9, it can be seen that prevalence of malnutrition decreases with the level of education of the mother. However, not all nutritional indices have significant relationship with the level of education of the mother. From the table stunting in urban areas seems to begin high at 20.6% for children whose mothers never went to school and drops to 12.5% for children whose mothers went up to Primary school. The same trend was observed for rural areas. However, there is no evidence ($P>0.05$) to suggest significant positive association between level of education of the mother and stunting. Wasting and Underweight also seem to follow the same trend with the rise in level of education. However still, this factor does not seem to significantly influence wasting and underweight status ($P>0.05$). Wasting was found to be slightly associated, although not to a significant level, with the level of education of the mother in rural areas ($p=0.17$) than in urban areas ($p=0.39$). Although not significant, the relationship (refer to p-values in Table 8) between household heads and nutritional status, households headed by women showed higher prevalence of malnutrition for both urban and rural areas.

Prevalence of malnutrition seemed to increase with increase in household size both in urban and rural areas. This is however not significant in both urban and rural areas ($p=0.36$ and $p=0.28$) respectively.

Table 9: Child Nutritional Status and Socio-demographic characteristics

Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Household head	Urban (N=74)	Male headed	22.4	20.9	7.5	16.4
		Female headed	0	42.9	0	42.9
		Significance	p=0.16	p=0.19	p=0.21	
	Rural (N=222)	Male headed	21.2	26.4	10.9	21.2
		Female headed	36	28	16	20
		Significance	P=0.09	p=0.87	p=0.75	
Education level of mothers	Urban (N=74)	No education	20.6	22.2	6.3	22.2
		Adult education	100	0	0	0
		Primary	12.5	37.5	12.5	0
		Secondary	0	0	0	0
		Higher education	0	0	0	0
		Significance	p=0.42	p=0.17	p=0.47	
	Rural (N=222)	No education	28.8	26.9	11.2	21.3
		Adult education	37.5	50	37.5	25
		Primary	25	12.5	0	25
		Secondary	0	0	0	0
		Higher education	0	0	0	0
		Significance	p=0.75	p=0.39	p=0.34	

Table 10¹: Nutritional status and socio-economic characteristics in both rural and urban residence

Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Occupation of mothers	Urban (N=74)	Crop farming	0	100	0	100
		Animal farming	0	50	0	50
		Housewife	20.6	12	7.9	14.3
		Casual Work	0	0	0	0
		Formal Employment	50	0	0	0
		Selling foodstuffs	33.3	66.7	0	66.7
		Others	0	0	0	0
		Significance	p=0.85	p=0.15	p=0.38	
	Rural (N=222)	Crop farming	18.2	36.4	9.1	27.3
		Animal farming	50	0	10	10
		Housewife	22.9	25.9	10.8	21.7
		Casual Work	14.3	42.9	14.3	14.3
		Formal Employment	0	0	0	0
		Selling foodstuffs	50	16.7	16.7	33.3
Others		0	42.9	33.3	16.7	
Significance		p=0.27	p=0.32	p=0.98		
Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Income activity of the household for last 1 year	Urban (N=74)	Sales of cereal crops	0	100	0	100
		Business	0	57.1	28.6	28.6
		Husbands Salary	21.7	26.1	4.3	13
		Casual Work	14.3	21.4	7.1	14.3
		Mothers Salary	100	0	0	0
		Others	18.2	0	0	27.3
		Significance	p=0.05	p=0.04	p=0.21	
Rural (N=222)	Sales of cereal crops	0	33.3	0	0	
	Sale of root crops	0	25	25	25	
	Business	0	37	3.7	25.9	
	Husbands Salary	22.9	20	8.6	8.6	
	Casual Work	26.7	26.7	11.7	26.7	
	Mothers Salary	25	50	0	25	
	Sale of livestock	18.5	25.9	13	20.4	

Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Livestock	Urban (N=74)	%Owning Livestock	5.6	44.4	12	25.3
		Significance	p=0.07	p=0.14	p=0.05	
	Rural (N=222)	% Owning Livestock	25.9	27.1	12	24
		Significance	p=0.11	p=0.92	p=0.03	
Land	Urban (N=74)	% Owning Land	0	0	0	0
		% Not owning Land	20	20	6.7	13.3
		Significance	p=0.6	p=0.6	p=0.8	
	Rural (N=222)	% Owning Land	24	32	12	24
		% Not owning Land	25.3	24.2	10.7	23
		Significance	p=0.8	p=0.4	p=0.9	
House	Urban (N=74)	% Owning House	18.4	26.5	8.2	24.5
		% Not owning House	23.8	14.3	0	9.5
		Significance	p=0.6	p=0.26	p=0.11	
	Rural (N=222)	% Owning Livestock	22.9	28.7	11.7	21.8
		% Not owning House	26.1	8.7	8.7	17.4
		Significance	p=0.73	p=0.04	p=0.77	
Roof Type	Urban (N=74)	% Grass/Thatch	5.3	21.1	10.5	21.1
		% Makuti	14.3	14.3	0	28.6
		% Tiles	50	25	0	25
		% Iron Sheets	25	25	6.8	15.9
		Significance	p=0.13	p=0.93	p=0.92	
	Rural (N=222)	% Grass/Thatch	22.8	30.7	15	22.8
	% Makuti	31.6	26.3	15.8	15.8	
	% Tiles	-	-	-	-	
	% Iron Sheets	22.2	19.4	4.2	20.8	
	Significance	p=0.78	p=0.34	p=0.31		

Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Wall Type	Urban (N=74)	% Mud	17.1	22	9.8	24.4
		% Plaster	40	10	0	10
		% Wood	0	0	0	0
		% Brick/block/stone	19	28.6	4.8	9.5
		% Other	-	-	-	-
		Significance	p=0.4	p=0.64	p=0.56	
Wall Type	Rural (N=222)	% Mud	22.9	27.6	8.6	20
		% Plaster	0	0	0	0
		% Wood	27.8	25	5.6	25
		% Brick/block/stone	26.1	13	13	17.4
		% Other	19.2	32.7	19.2	25
		Significance	p=0.42	p=0.5	p=0.11	
Floor Type	Urban (N=74)	% Mud	14.7	20.6	2.9	29.4
		% Cemented	36	20	4	8
		% Brick/tiles/stone	11.1	33.3	11.1	22.2
		% Other	0	33.3	33.3	0
		Significance	p=0.09	p=0.76	p=0.04	
	Rural (N=222)	% Mud	22.2	29.9	11.9	23.2
		% Cemented	32	0	8	8
		% Brick/tiles/stone	-	-	-	-
		% Other	-	-	-	-
		Significance	p=0.27	p=0.00	p=0.14	

4.3.2: Nutritional Status and socio-economic characteristics

Socio-economic characteristics and their relationship, or lack of it, to the nutritional status of the target population are represented in Table 10¹. From Table 10¹, it was found that there is no significant relationship between the mother's occupation and nutritional status of the children. P-

values of between 0.15 for wasting in urban areas and 0.98 for underweight in rural areas were observed, suggesting no significant relationship. This is in accordance with another study in Tanzania (1996) which found no association between the occupation of the household help and any of the child nutritional

A strong relationship was found to exist between household income activities and nutritional status, especially in urban areas. Those households relying on husbands' salaries in urban areas showed a higher prevalence of malnutrition. Prevalence of stunting was found to be 25.9% in rural households owning livestock. Livestock ownership was found to have a positive significant relationship to nutritional status of children less than five years. From Table 7, p-values of below 0.05 were observed, which is an indication of a significant relationship between underweight status and ownership of livestock.

A p-value of 0.5 was observed for both urban and rural areas when establishing any possible relationship between wasting and expenditure on non-food items. This meant that there is no positive association. This was the same for stunting where a p-value of 0.5 was also observed. Underweight status showed a p-value of 0.3 both for rural and urban areas. This indicates that it is more associated with expenditure on non-food items more than wasting and stunting, although not to a great extent.

From **Table 11**, there was observed a significant relationship between nutritional status of the population and monthly income. P-values of 0.03, 0.04 and 0.04 for stunting in rural areas, wasting in urban areas and wasting in rural areas respectively were observed. Nutritional status was found to be influenced by expenditure on food and non-food items although not to a

significant level. However, if one was to check which expenditure was more influential in determining nutritional status of children less than 5 years of age, expenditure on food items would be a factor, though not significant in both urban and rural areas. Likewise expenditure on non-food items did not have significant relationship with nutritional status for each of the three indices both in urban and rural areas.

Table 21: Child Nutritional Status by Income, and Expenditure in Rural and Urban

Characteristic	Stunting		Wasting		Underweight	
	Urban	Rural	Urban	Rural	Urban	Rural
p-value for Monthly income	0.6	0.03	0.04	0.04	0.3	0.09
p-value for Expenditure on non-food items	0.5	0.5	0.5	0.5	0.3	0.3
p-value for Expenditure on food items	0.6	0.4	0.4	0.7	0.2	0.9

4.3.3 Nutritional Status and Morbidity

From **Table 12** coughing for children in urban areas was found to have a very strong relationship to both wasting and underweight ($p=0.02$ and $p=0.01$ respectively). Children who had suffered from diarrhoea in the last two weeks showed prevalence of wasting in rural areas at 27% and those who had not at 25%. This showed that children who have experienced diarrhoea showed a

higher prevalence of wasting than those who have not, although this is not significant ($p>0.05$). Malaria was found to have a relationship, although not significant at 5% significance level, with nutritional status of children. Children who had suffered malaria two weeks prior to the study showed a higher prevalence of wasting, stunting and underweight respectively than those that had not.

Access to health care was critical in determining nutritional status of children. P-values (from Chi-squares test at 5% significance level) of 0.6 and 0.1 for stunting in urban and rural areas. Wasting gave p-values of 0.5 for both urban and rural areas. Likewise underweight gave p-values of 0.6 and 0.04 for urban and rural areas respectively.

Table 12: Child Nutritional Status and Morbidity

Characteristic	Residing Area	Description	Stunting (%)	Wasting (%)	Severely Underweight (%)	Moderately Underweight (%)
Diarrhoea	Urban (N=74)	Children suffered diarrhea	21.1	21.1	2.6	21.1
		Significance	p=0.86	P=0.44	p=0.26	
	Rural (N=222)	Children suffered diarrhea	24.6	27	14.3	23
		Significance	p=0.54	P=0.77	p=0.09	
Cough/Cold	Urban (N=74)	Children suffered cough/cold	20.4	14.3	2	16.3
		Significance	p=0.96	P=0.02	p=0.01	
	Rural (N=222)	Children suffered cough/cold	21.6	27	20	37
		Significance	p=0.24	P=0.55	p=0.56	
Malaria	Urban (N=74)	Children suffered malaria	20.7	24.1	6.9	20.7
		Significance	p=0.85	P=0.83	p=0.96	
	Rural (N=222)	Children suffered malaria	22.5	26	11	21
		Significance	p=0.53	P=0.80	p=0.95	
Worms	Urban (N=74)	Knowledge of worms	18.8	25	3.1	25
		Significance	p=0.76	P=0.77	p=0.57	
	Rural (N=222)	Children suffered malaria	27.5	25	2.5	25
		Significance	p=0.48	P=0.76	p=0.21	
Deworming	Urban (N=74)	Children dewormed	17.6	26.5	2.9	14.7
		Significance	p=0.5	P=0.65	p=0.57	
	Rural (N=222)	Children dewormed	27.8	18.5	5.6	18.5
		Significance	p=0.37	P=0.13	p=0.23	

4.4 HOUSEHOLD FOOD CONSUMPTION AND FOOD SECURITY

This study measures household food security in terms of the adequacy of calorie, protein and iron intake levels adjusted for household demographic composition. The caloric intake ranged between 174Kcal to 713Kcal. All the children took less than the recommended daily allowance¹. The consumption of protein was also generally low with an exception of 3 (9%) who consumed enough. The protein intake ranged between 0.34 g and 21.11g. The frequently consumed foods were sugar, oil, tomatoes, Anjera and rice. Foods that were rarely consumed included fruits, vegetables, meat and eggs. Only 12.5% of the sampled households consumed more than 75% of the daily iron requirement.

From Table 12, 91.7% of the sampled rural households are food insecure while 8.3% are food secure. This was slightly different in urban areas where 87.5% were found to be food-poor.

¹ Foot note –recommended dietary intake for the different ages - sehmis book. Kcal <1 yr – 820, 1-2 yrs – 1150, 2-3 yrs 1350, 3-5 yrs 1550. Protein <1yr– 13.5, 1- 2 –13.5, 2-3 – 15.5, 3-5yrs 17.5

Table 33: Proportion of Children consume <75% of the RDA for protein as food security cut off point indicator.

Residential Area				75% of the required daily protein		Total
				Below	Above	
Urban	Age group	2-3 years	Percentage	80.0%	20.0%	
		3-5 years	Percentage	100.0%	.0%	100.0%
	Total		Percentage	87.5%	12.5%	
Rural	Age group	1-2 years	Percentage	100.0%	.0%	100.0%
		2-3 years	Percentage	71.4%	28.6%	
		3-5 years	Percentage	100.0%	.0%	100.0%
	Total		Percentage	91.7%	8.3%	100.0%

It's evident from study findings that consumption of variety of foods by the urban household may not have increased their probability of meeting the minimum recommended dietary requirement, food staples, which are richer in nutrient but deficient in other are the main dietary sources. The consumption of protein rich foods is still very low, and seems not to differ much from those of rural areas.

From Table 14, it can be noted that consumption of different food items was more pronounced in urban areas than rural areas. At least every food item investigated was found to have been consumed in the last 7 days by some households in urban areas. However, foods like sorghum, green grams, sugarcane, sweet potatoes and margarine was never reported to have been consumed at all in the rural areas 7 days prior to the study.

Table 14: Proportion of Households in Survey Areas Reporting Consumption of different food items from 7-day dietary recall survey

	Urban (N=74)	Rural (N=222)		Urban (N=74)	Rural (N=222)
	Percent (%)			Percent (%)	
Maize	88.7	99.1	Pawpaw	37.7	1.4
Sorghum	1.5	0	Cabbages	91.5	42.3
Millet	4.4	0.5	Sukumawiki	88.7	34.7
Rice	94.4	84.7	Carrots	60	8.6
Wheat	67.1	68.9	Tomatoes	90.9	54.1
Beans	90	93.2	Sweet potatoes	2.9	0
Peas	7.1	1.4	Eggs	54.3	6.3
Green grams	1.5	0	Beef	51.4	45
Bananas	84.1	20.7	Poultry	10	1.4
Lemons	60.9	13.1	Milk	91.5	91.4
Oranges	51.4	1.4	Fish	4.3	0.9
Avocado	21.7	2.7	Bread	36.6	1.8
Passion fruits	23.2	0.9	Sugar	95.8	91
Mangos	33.3	3.6	Cakes	14.7	1.4
Sugarcane	7.2	0	Vegetable oil	84.1	91
			Margarine	7.4	0

From **Table 15**, most households both in urban and rural areas had Anjera and tea for breakfast. In urban areas, breakfast was found to detail other snacks like chapati and pancakes, which were not consumed in rural areas. Rural area households substituted their normal breakfast of tea and Anjera with porridge, which was consumed to a very small scale in urban areas (1.5 % for rural and 17.9% for urban areas). Lunch patterns were somewhat uniform for both rural and urban areas, although there was more consumption of beans for lunch in rural areas than in urban areas.

Table 15: Distribution Household by frequency consumption of different food

	Urban (N=74)	Rural (N=222)
	Percent (%)	
Breakfast		
Anjera	38.2	39.0
Tea	47.1	39.0
Pancake	5.9	0
Chapati	7.4	1.9
Porridge	1.5	17.9
Lunch		
Rice	33.6	29.2
Beans	1.6	22.1
Ugali	23.0	15.8
Meat	32.8	20.9
Pasta	4.9	0
Kales	4.1	1.4
Supper		
Rice	41.7	21.9
Beans	43.9	30.0
Ugali	3.8	17.7
Maize	3.0	7.5
Meat	3.0	3.0
Pasta	1.5	0
Milk	2.3	11.7
Kales	0.8	0

Table 46: A comparison of household food security status using selected variables

N=32		Protein			Iron		
		At Risk (%)	Not at Risk (%)	P-value (Chi-square test)	At Risk (%)	Not at Risk (%)	P-value (Chi-square test)
Any male household head	Yes	84.6	15.4	0.3	88.5	11.5	0.6
	No	100.0	0		80.0	20.0	
Level of education of the mother	No education	87.5	12.5	0.9	87.5	12.5	0.9
	Adult education	100.0			100.0		
	Primary school Class 1 - 4	100.0			100.0		
	Primary school Class 5 - 8	75.0	25.0		75.0	25.0	
	Secondary school - Form 1-4	100.0			100.0		
Occupation of the mother	House wife	84.0	16.0	0.5	88.0	12.0	0.8
	Casual work	100.0			80.0	20.0	
	Sewing/ knitting	100.0			100.0		
Marital Status of the respondent	Monogamous marriage	94.1	5.9	0.1	94.1	5.9	0.2
	Polygamous marriage	66.7	33.3		77.8	22.2	
	Divorced	100.0			100.0		
	Widowed	100.0			50.0	50.0	
Have they ever dewormed children	Yes	76.9	23.1	0.04	92.3	7.7	0.4
	No	94.7	5.3		84.2	15.8	
N=32		Protein			Iron		
		Average		P-value (t-test)	Average		P-value (t-test)

Household Size	At Risk	6.93	0.74	7.21	0.07
	Not at Risk	7.50		5.50	
No of dependants	At Risk	2.89	0.43	2.93	0.58
	Not at Risk	3.50		3.25	
Per Capita Expenditure	At Risk	5172.84	0.0	5062.84	0.26
	Not at Risk	1870.00		3080.00	

It was observed that 52.4% of the households had experienced persistent food shortages due to recurrent droughts in the area under study. As a result of this, households have adopted various coping strategies. **Table 17** shows that majority of households rely on Relief food in the event of food shortage. Other coping strategies cited by the respondents include; credit buying, skipping meals and selling domestic animals. The main causes of food shortages for both urban and rural households were rainfall failure and lack of money.

Table 57: Coping strategies

Coping Strategy	Type of Households	
	Urban (%) N=74	Rural (%) N=222
Relief	54.5	63.3
Credit Buying	31.8	13.0
Skip Food/meals	13.6	16.9
Selling animals	0	6.8

Table 18 shows factors that are associated with food security. Marital status of the mother was found to have a positive association with food security. Male headed households represented those with more children meeting daily protein requirements than female headed households. However, this was not significant at 0.01. There were also positive correlations between ownership of animals and food security. Although the correlations are positive, they are not significant at 0.01

Table 68: Factors affecting daily protein intake

Factors	P-value
Occupation of the mother	0.67 ^a
Marital Status	0.04 ^a
Household Head	0.37 ^a
Household Size	0.16 ^b
No of cows owned at the time of the study	.911 ^b
No of goats owned at the time of the study	0.42 ^b
No of Sheep owned at the time of the study	0.42 ^b
No of camels owned at the time of the study	0.58 ^b
Expenditure on food in the last 1 year (Ksh)	0.37 ^b
Monthly Income	0.74 ^b

^a P-values from Chi-Square Tables

^b P-Values from Regression Tables

Table 19: Summary of factors affecting nutritional status and food security are presented in Table 19

FACTOR	Nutritional Status			Food security	
	Stunting	Wasting	Underweight	Protein	Iron
Presence of male household head	No	No	No	No	No
Education level of the mother	No	No	No	No	No
Marital Status of the mother	No	No	No	Yes(B)	No
Occupation of the mother	No	No	No	No	No
Income activities of the household	Yes(U)	Yes(U)	No	-	-
Ownership of livestock	No	No	Yes(B)	No	-
Ownership of land	No	No	No	-	-
Ownership of house	No	Yes(R)	No	-	-
Type of houses	No	Yes(R)	No	-	-
Monthly income	Yes(R)	Yes(B)	Yes(R)	No	-
Expenditure on food items	No	No	No	No	-
Expenditure on non food items	No	No		No	-
Diarrhoea	No	No	No	-	-
Cough/Cold	No	Yes(U)	Yes(U)	No	No
Malaria	No	No	No	No	No
Worms	No	No	No	No	No
De-worming	No	No	No	No	No

U=Urban, R=Rural, B=both urban & rural

CHAPTER FIVE

DISCUSSION

5.1 CHILD NUTRITIONAL STATUS

Nutritional Status

It is well established that child current nutritional status is conditioned by the child's preceding nutritional status. In addition, malnutrition in childhood is known to have important long-term effects on the work capacity and intellectual performance of adults, who are the caretakers of children (Martorell 1997) to which shows that women who were malnourished as children are more likely to give birth to low birth weight children who are this more likely to be malnourished themselves (Ramkrishan, 1999)

Prevalence of Stunting, wasting and underweight was found to be 20%, 23.4% and 29.1% respectively. These figures are comparable with those of earlier studies conducted in the district. CARE International conducted a study in 2000. In the study, prevalence rates of 22.7%, 20.7% and 27.5% for stunting, wasting and underweight, respectively, were observed. In this study, prevalence of malnutrition was higher among under-fives in the rural areas than urban areas. The study by CARE also found out that malnutrition rate was more in rural than in urban areas. This implies that children from rural areas are more susceptible to malnutrition than their counterparts from urban areas. This is perhaps due to difference in factors like household income, household expenditure, child labour and feeding patterns among other factors. The mean of Z-scores of the three indices of nutrition compares with the national figures. For example, the average measure of chronic nutrition (HAZ) for this study was found to be -1.12. This concurs with a national survey done by the Ministry of Health in 1998 and 2003 found that the measure for chronic under nutrition; height for age scores (HAZ) ranged from - 5.98 to 5.96 and -5.93 to 5.88 in 1998

and 2003 respectively. The corresponding mean scores for these two periods are estimated to be -1.18 and -1.19, respectively (KDHS, 2006).

5.2 FACTORS AFFECTING NUTRITIONAL STATUS

5.2.1 Child morbidity

Findings of the present study confirm those of previous studies in which infectious diseases had a negative effect on both child WFH and WFA (Mbago and Namfua, 1992; Waterlow et al, 1992). This is because diseases like cold/flu and fever cause increase in metabolism rate, which reduces body nutrient status. There is also reduced direct nutrient intake by the child due to loss of appetite. Furthermore, diarrhoea and vomiting cause direct loss of nutrients (Tomkins and Watson, 1989). Since cough/cold and diarrhoea account for recent nutritional deficit, a significant influence of these diseases on wasting was expected. However, while fever/cold was significant, diarrhoea was not. This could be because the study was conducted in dry season when diarrhoea cases are considerably low. It is suspected that the trend could be different if the study was conducted in the wet season (Intermediate Technology and Development Group, 2000). Lack of a significant relationship between morbidity and stunting is not surprising as the reference period was too short to expect any influence on the indicators.

5.2.2 Household Size

Recalling Table 1 of Chapter 4, the households under the study had an average of 7 persons per household. This average household size was higher compared to the national average of 6 persons per household (KNPS, 1999). The difference may partly be due to wider village coverage in the former study (national census) as compared to the present one. Houses with polygamous marriages had larger household sizes than those from monogamous marriages.

Single headed (never married) households reported a slightly lower household size of 4 (SD=2). But in all cases, there was no significant variation in the household sizes across all socio-demographic characteristics. This concurred with another study done in this region (Owadi, 2001).

5.2.3 Access to Health Care

Time required to reach the nearest health care centre was found to have a non-predictive association with level of stunting and wasting for children less than five years of age. Underweight was found to have a positive significant relationship in rural areas. Children from rural area, who are already at a greater risk of malnutrition, are further affected by the distances that have to be travelled to the nearest health centre. The results of this study are supported by other studies done in the past. In Uganda it was found that that availability and accessibility of basic health care is essential for lowering stunting rates in Uganda (Stephen; 2005). The study found out that distance to the nearest public health centre is negatively correlated with children's nutritional status.

5.2.4 Education of the Mothers

Women's education and relative status play a key role in household food security in many countries women and acquisition involved in food production are influenced by women's knowledge regarding nutritional benefits of different foods and their ability to direct household resources towards food for home consumption (Quinsumbiling et al (1995)

Illiteracy among mothers in this region was very high. Over 92% mothers reported lack of no formal education. Negligible percentage (1%) reported an education level above secondary. This

is also supported by a study done in Mandera district (Owadi, 2001). Mandera district borders Garissa district to the north. From the focus discussion groups, the high rate of illiteracy for mothers was as a result of cultural barriers, early marriages, forced marriages and lack of resources. It is normal that children whose mothers have attended some form of education are more likely to be well malnourished than those whose mothers have no formal education (KDHS, 2003). This is supported by this study where the prevalence of all indices of nutrition status tends to fall with the increase in level of education. Higher maternal education improved the nutritional status of children under five years of age (International Food Policy Research Institute, 2004). This study concurs with another study carried out in south western Kenya by (Kennedy et al., 1990) among sugarcane farmers and showed high levels of malnutrition from household where mothers did not have formal education as compared to households where mothers had formal education.

5.2.5 Occupation of the Mother

As already discussed, more than 92% of the mothers reported having no formal education. The much that one can do is limited to how much one knows, it is evident that majority (80%) are housewives. Maternal occupation was not found to have a significant relationship to the nutritional status of children. This is supported by findings of another study done in Tanzania in which maternal expenditure was not found to have an effect on the household nutritional status (TFNC, 1994). This is because majority of household heads seemed to also control their wives expenditure. Furthermore majority of the mothers relied on their husbands' earnings for their daily domestic nutritional needs.

5.2.6 Income and Expenditure

The Positive significant relationship between levels of income is a concurrence of other studies done in the past. A study done in Mali in 2004 showed that households whose level of income is higher represent those whose children have lowest prevalence of stunting and wasting (Penders, 2000). Income is considered to be a very important factor determining nutrition, at least in developing countries (FAO, WHO, 1995). Examination of cross-sections of food consumption data in developing countries reveals highly significant differences based on income class (United Nations Department of Technical Co-operation for Development, 2003). The World Bank also underscored the importance of income as the critical determinant of nutrition in developing countries. In 1980, the Bank maintained that the serious and extensive nutritional deficiencies that exist in almost all of these countries are "largely a reflection of poverty, people don't have enough income for food" (Hindle, 1990).

The predictive but non-significant factor on household expenditure for both urban and rural areas was also echoed by other earlier studies. In a study done in Mozambique, household expenditure was found to be one among other factors that affected the nutritional status of children 5–60 months old (International Food Policy Research Institute, 1999). The effects of this determinant did not significantly differ between urban and rural areas although average food expenditure in urban areas was higher than in rural areas. Expenditure on non-food items (like clothing, leisure, soap, etc) was higher in urban and rural areas. A study conducted in India found out that expenditure on luxuries and amusements in urban areas was higher in urban areas than rural areas (Yasoda Devi and Geervani, 2003). Higher expenditure on food items in urban areas than in rural areas perhaps explains why prevalence of all the three indices of nutrition are higher in rural areas than urban areas.

The monthly household income of 37 dollars and 21 dollars for urban and rural areas respectively concurrent with another study done among slum dwellers of Nairobi which found that most of these study population earned less than Kshs 2,500 (approx. US\$ 50) per month (Post-harvest consumption analysis of sweet potato in Kenya – Survey, Alumira and. Obara, 1995). The study also concurrent with another study in Garissa among woman of child bearing age (2004) which found that majority of the hose hold study were living below the poverty line.

5.2.7 Food Security

5.2.7.1: Food Intake

Food situation is improved, to some extent; by contribution of livestock especially milk. Most of the households however reported owning no livestock. That perhaps explained why households had experienced frequent food shortages. The predictive relationship between food availability and nutritional status in this has been supported other studies (Onchere, 1984). The results of the present study are also supported by impression found in the country that Garrissa district is generally food insufficient. The general diet pattern indicated inadequate consumption of vitamin, minerals and protein sources. (GOK 1997, 2000).

Caloric intake was below the recommended daily intake. This was the case in all the ages. The low caloric intake could be associated with cultural factors, social demographic factors and even social economic factors. The usual food consumption among the inhabitants of Garissa includes Anjera in the morning, and tea. The tea at this season of the year was without milk because the animals had been moved to Somalia in search of pasture and water. Garissa was suffering drought at the time of data collection. The rest of the days meals include rice with stew

(Tomatoes and some little potatoes). This could be fed to the child twice in a day making a total of three meals per day. Some children would only consume porridge in the course of the day. The intake of tea may be too much as to affect the appetite of the children. The tea contains too much sugar. This was further confirmed by the food frequency that showed that majority of the households were surviving on a diet mainly made of tea with a lot of sugar and anjera that carries low kilocalories.

Eggs were rarely consumed, as the Somalis do not rear chicken. The consumption of proteins was also below the requirements because the livestock had migrated to Somalia during the time of the study. This meant a low consumption of milk and meat. That also explains the reason why there was low consumption of animal products both in urban and rural areas. A high proportion of households (32.8% in urban areas and 20.9 in rural areas) reported having consumed meat products, but from 24-hour recall data, the per capita daily consumption seems to be very low. For example, only 0.174kg of beef was consumed. This concurred with another study done in Uganda that found that there was low per capita weekly consumption of animal products despite a high proportion of households reporting consumption of animal products Ssewanyana (2003). Low proportion of sampled household reported consuming milk products. The per capita daily milk intake was found to be 0.512lts. In general, actual daily protein was less of a problem among the sampled households than were the calorie intake levels. This is also consistent with findings by Ssewanyana (2001) and studies elsewhere as cited in Ruel et al. (1999) where protein and iron intakes in the urban areas are less of a problem even among the low income population.

The low protein and caloric intake could also be associated with social demographic issues. This could be as a result of the low level of education among the mothers. Social economic factors

could also lead to low food intake as a result of low income, which would mean little choice of foods. This combined with the poor food combination practiced in area could lead to low nutrient intake. The infrastructure, which is necessary for the provision of the necessary foods in the market, is also not in place. The place is marginalized politically, socially and even economically.

The intake of sugar is a very rampant practice. Sugar is added to rice, Anjera and tea in large amounts. Twenty-four hour recall data showed that the highest calories were from sugar. This means that there is a high consumption of empty calories, which would lead to micronutrient deficiency. The kind of foods consumed by the households indicates that there is limited dietary diversity. This would mean that the food is unlikely to meet the recommended dietary intake for a number of nutrients.

From the 7-day dietary survey, for most food groups, consumption of a single food item was higher in the urban areas than in the rural areas. Urban areas have on average a more varied diet, which includes food items from a variety of food groups compared to the rural areas. The exceptions to this are maize, beans and vegetable oil. These are consumed by a larger proportion of households in the rural areas.

There is ample evidence that urban diets are quantitatively and qualitatively different from rural diets in all regions of the developing world. In general, rural dwellers tend to eat more cereals, especially coarse grains, while urban dwellers tend to eat more varied diets with higher levels of animal protein and fats (Popkin and Bisgrove 1988). Alarcón and Adrino (1991 cited Oshaug in 1998) have demonstrated that in Guatemala, a slum population in the capital (mostly first

generation migrants from rural areas) obtained 41 percent of their total caloric intake from wheat bread, beans, and sugar, while a rural comparison group obtained 70 percent of their calories from maize. Consumption of products of animal origin was much higher among the city dwellers. Périssé and Kamoun (1987 cited Haddad in 1998) and in Kenya, "quasi-urban" groups devoted a proportion of their total cereal expenditures to bread (as opposed to maize) that was threefold greater than agricultural households of similar incomes (Kennedy and Reardon 1994). Finally, in a weighed intake study in Bangladesh, urban slum dwellers consumed more oils, leafy vegetables, pulses, and potatoes than a predominantly landless group of rural peasants, but consumed fewer cereals and other vegetables (Hassan and Ahmad 1991). The different composition of urban diets relative to rural diets has important implications for the nutrient adequacy of urban dwellers. First, it is interesting to note that all the studies described above have indicated that overall energy intakes were lower for urban residents than their rural counterparts.

A positive association between household size, per capita expenditure, and food security was found to exist. The households with larger family size represented those at risk of becoming iron insecure at 0.05 Significance Level. This concurs with another study done in Uganda (Ssewanyana, 2003). However, households with smaller family size represented those at risk of becoming protein insecure which contradicts the study by (Ssewanyana, 2003). Taking total household expenditure as a proxy for income, households with higher income per capita were represented those at risk of food insecure for all measures of household food security.

Just as interesting as what is significant, is what is not. Level of education (as represented by the highest level of education attained by an adult member of the household) did not affect

household food security, our result concur with that of Mozambique who find that level of education did not affect food availability at least beyond the effect of income, which is already included in the model. Finally, we might expect to find some association between food security and variables such the gender of the head of the household, occupation of the mother, de-worming of children and dependency ratio. The results show that these characteristics do not affect food security.

In general the results from this study conform to expectations: income (as represented by the community dummy variables) matter to household-level food security. Demographic structure of the household is also important, and probably affects availability through their influence on food consumption patterns. Only household size and household expenditure levels have a small differential effect on food security in urban and rural areas. The findings of this study compare with those of another study done in Mozambique (Garret and Ruen, 1999).

Contrary to expectation, the results of this study showed that families with higher income represented those who are at risk of food insecurity. This can be explained by the fact that most of the study households were headed by men. Most men are in charge of decision making. As a result, most of the income is not used for household nutritional purposes. Available literature reveals that income controlled by women is more likely to be spent on food consumption than that controlled by men. This comes from empirical studies done by IFPRI. For example, a study of Kenyan households, found that the greater the proportion of income which came from production of food for home use (which came primarily from land controlled by women), the greater were the beneficial effects on consumption and on nutritional status. Conversely, greater percentages of household income from non-farm sources, which are generally controlled by men,

were associated with low calorie consumption and nutrition (Kennedy and Oniang'o, 1990). Also children's nutritional indicators are better when households where females had great income share. The author argues more research along the line of Kennedy who look intra-household allocation issues could shed light on reasons

The percentage of total household expenditure spent on food is among the household food security indicators used by most economists following Engel's law. On average, 65.4% of the total household expenditure including on health was spent on food alone, suggesting a food insecurity problem among the sampled households.

5.2.7.2 Protein Intake and Social Demographic Characteristics

Protein intake was very low with only 8.3% of children meeting the daily protein requirement. The findings of this study compare with those of studies done in Embu, Kenya (among tobacco and non-tobacco farmers), which found out that only about 20% of households visited were meeting daily protein and calorie requirements (Mugo, 1995; Mwadime, 1992; Oniang'o and Kennedy, 1998). The positive association between marital status and food security concurs with another study done in the rural and poor urban areas of Mexico. The study found out that the greatest negative effect of food security was found in children cared for exclusively by their mothers. In the urban area, risk factors for food insecurity were father with unstable job and presence of small social networks (Reyes et al, 2004).

5.2.7.2. Protein Intake and Social Economic Characteristics

There was a negative association between protein intake and socio economic characteristics like income activities, income and expenditure. The results of this study contradicted with another

study done among households headed by farm workers. The results showed that Protein intake was positively associated with education of the mother, household size, per capita annual income, per-capita food expenditure (Ma. Belina N. Nueva España, 2002). It also contradicts findings of another study done among preschool children in the Libyan Arab Jamahiriya. The study found out that The consumption of milk, milk products, meat, fish, vegetables and fruit depends on socioeconomic status (mainly income, family size, socio-cultural level and nutritional education) (. Hameida, Billot and Deschamps, 2002).

5.2.7.3 Coping Strategies

The major coping strategies for both urban and rural households from the area under study were relief, skipping meals and credit buying. The strategy of skipping food was also found in another study done among Women in rural Bangladesh. The study found out that the main coping strategy was increased austerity: cutting down on number of meals a day, postponing expenditures on health, gathering wild foods and roots rather than purchasing the usual dietary items (Kabeer , 2000).

Another study done in South Somalia found that the first response when faced with adversity is the use of strategic food reserves, followed by selling of assets, such as cows and goats. Also, another common strategy is to migrate. Pastoralists move to areas with more water and pasture, while agriculturalists go to towns in search of casual labor or assistance from relatives.

In the final stage of destitution, people drastically reduce the variety of their food intake and - ultimately - cut back on the amount of food they eat (UNICEF, 2006).

The observed slight high level of calorie in urban than rural areas was expected. As reported earlier, this study was conducted during dry season, many of pastoral communities in the rural had lost their livelihood, and this could explain the low intake. On the contrary, a study carried out in Mozambique by (Garrett and Ruen, 1999) observed higher calorie availability in rural, the author argued that the difference is more likely due to regional, agro ecological influences not specifically captured in the study. Perhaps cultural preferences of households in the region for low-cost, energy-rich foods are at work, as well as other non-income factors. Perhaps the data do not adequately capture the value of consumption for urban households. More research along the lines of Sharma et al. (1996), who look at the ecoregional dimensions of malnutrition, and Huang and Bouis (1996), who consider the impact of non-income factors on consumption patterns, could shed light on the reasons for these regional, not strictly rural-urban, differences.

CHAPTER SIX

6. 0. Conclusion and Recommendations

6.1 CONCLUSION

Findings of this study suggest that a multiplicity of factors interact to influence child's nutritional status. Since the age group studied falls in the middle of the age ranges for children less than five years of age, the observed rate of malnutrition may also approximate the overall situation of the under-fives in the area. It can therefore be concluded that the prevalence of malnutrition is higher in the rural areas than in the urban areas.

The following conclusions can be made regarding factors influencing child nutritional status.

1. The prevalence of stunting is 20.3% in urban areas and 23.0% in rural areas, prevalence is wasting 20.3% in urban areas and 26.6% in rural areas while prevalence of underweight is 25.7% in urban and 32.5% in rural areas. The prevalence of all the three indices of nutritional status is higher in rural areas than urban areas.
2. Stunting is positively associated with household income activities and household monthly income.
3. Wasting is positively associated with household income activities, household income, ownership of livestock, type of house and diseases like cough and cold.
4. Underweight is positively associated with child morbidity status (a child reported ill from diseases like cough/cold is more likely to be underweight compared to the one who is not), monthly income, type of house and ownership of livestock.
5. Protein is positively associated with the marital status of the mother.

Our results largely accept the hypothesis that there is no significant difference between nutritional status of children aged less than five years from urban and rural households of Garissa district.

6.2 RECOMMENDATIONS

1. Women's education is an important factor in improving children's nutritional status. In the long term ,improving girls education and women literacy and job skills will raise household income
2. It is important to strength family life education/advocacy and services in order to minimise pregnancies in unmarried girls/women.
3. There is need for concerted effort to increase child food intake through advising on increased child feeding frequency to four or more times per day. This is supported by the fact that some households reported skipping meals as a coping strategy. A combination of both efforts to improve frequency of feeding and community appropriate nutrient density improving technologies may give better results. It is important to study the quality of foods eaten by young children in the area, in order to have a better understanding of the influence of dietary factor in child nutrition status and take appropriate measures for improvement. The government and Non-Governmental Organizations operating in the area may be encouraged to take up this challenge.
4. The expansion of government efforts to ensure provision of health care at affordable cost and at accessible centres should be encouraged.
5. It is recommended that safe and accessible water be availed for drinking, cooking and basic domestic use. This may be done by digging bore-holes since water levels in the area is very low and water needs is very high.

6. There is need for communities to foster activities that increase household income, which will in turn improve on household income and expenditure on child care, and by implication child nutritional status. Different income groups (youth, women) need to be encouraged so that income may in turn be expanded.
7. Nutrition education; in the short run there is need to encourage household to improve their intakes through allocation of food expenditure away from high-price dietary resources to less expensive ones. The promotion of food staple that are high in iron can also eventually lead to increase in calories and iron intake simultaneously. In Garissa district food consumption patterns is deeply entrenched in peoples' culture, making the introduction of new but nutritional food difficult. Therefore, promoting the move to richer foods should be at the centre of long-term strategy. This calls for more vigorous nutritional education meant to change consumption behaviours and a lot of sensitization programmes to promote awareness of the risks involved in dietary intake deficiencies.

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Appendix A

Household Questionnaire

UNIT OF APPLIED HUMAN NUTRITION, UNIVERSITY OF NAIROBI

FACTORS ASSOCIATED WITH HOUSEHOLD FOOD SECURITY AND NUTITION
STATUS OF UNDER FIVE YEARS OLD CHILDREN: (COMPARATIVE STUDY
BETWEEN URBAN AND RURAL COMMUNITIES IN GARISSA DISTRICTS, KENYA)

SECTION A: IDENTIFICATION

QUESTIONNAIRE No -----

Date of Interview----- (day/ month/ year)

Name of Interviewer -----

Name of Head of household (if not respondent)

Name of Sub-location-----

Name of location-----

Name of Division-----

Name of District-----

Household Number-----

Name of The Index Child----- (Sex)-----

SECTION B: DEMOGRAPHY

1. How many people are staying in this household? (Include father, mother, children and those living in the household at least for the last three months)-----
 please give following information for each.

Name	Sex	Age (in yrs)	Relationship to index child
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

Codes: relation to the index child

- 00= index 02= mother 04= other relatives (grand parents, uncle, aunt etc)
 01= father 03= brother / sister 05= other (specify)

2. For how long have you lived in this area?----- (years).

SECTION C: EDUCATION / MARITAL STATUS / OCCUPATION

3. What is the highest educational level of?

a) You (mother) -----

b) Household head (if not mother) -----

Codes: 00= No education

01= Adult education

02= Primary school – Class 1 – 4

03= Primary school – Class 5 – 8

04= Secondary school – Form 1-4

05= Higher education (Colleges)

06= Others (specify)

4. Please tell me your (mother) marital status? -----

Codes: 1= Single (not happened to be married)

2= Married Monogamies

3= Married Polygamies

4= Divorced

5= Widowed

5. What was the type of work performed most part of the last year by:

(a) You (mother of the child) -----

(b) Household head (if not mother) -----

Codes: 01= Crop farming

02= Animal farming

03= Both animal and crop farming

04= House wife

05= Casual work

06= Formal employment

07= Selling foodstuffs

08= Sewing/ knitting

09= Traditional healer

10= Iron smith

11= Business

12= Others (specify)

SECTION D: SOCIO-ECONOMIC STATUS

6. Do you own or rent this house you live in? _____ 1= own 2= Rented

7. If rental, how much do you pay per month? Kshs. _____

8. Record the type of roofing of the house (Observe)

a. Roof

1= Grass/Thatch 2= Makuti 3= Tiles 4=Iron sheets

5. Others specify _____

b. Wall

1= Mud 2= Plaster 3= Wood 4= Brick/block/stone 5= Iron sheets

6= Others (specify) _____

c. Floor

1= Mud 2= Cemented 3= Wood 4= Brick/tiles/stone 5= Others (specify)

8. Do you own or rent any piece of land and how much do you cultivate? _____ 1=

Yes 2=No

	Yes (In acres)	No	Urban	Rural	Cultivated
Owned					
Rented					
Total					

1= Yes 2= No

9. If you rent, how much money do you pay per year to rent that portion of land? _____ Ksh.

10. Do you own any livestock? _____ 1. Yes 2. No

11. What type of livestock did you own for the last one year? _____

Animal	Number owned last year	Number owned today	Variance	Milk production
Cows				
Goats				
Sheep				
Camel				
Donkeys				
Total				

12. (Observe) which and how many of the following items do they possess.

Assets	Own =1 None =0
Car	
Sofa set/easy chair	
Television	
Radios/cassette player	
Sewing machine	
Wardrobe/cupboard	
Bicycle	
Motorcycle/scooter	

SECTION E: FOOD SECURITY

15. Please fill the table, the food crops you grew last season, how long it lasted after harvest, and the number of bags remaining in the store.

Crop	Amount	Amount	Amount	Amount	Amount	Length of	
	Harvested (in hh units)	consumed (in hh unit)	Donated (in hh units)	spoiled (in hh units)	sold (n hh nits)	time	harvest lasts
Maize							
Sorghum							
Beans							
Potatoes							
Bananas							
Sukuma							
Pawpaw							
Pineapples							
Mangoes							

16. Have you ever experienced food shortages in the last one year?

1= Yes 2= No

17. If yes, when _____

18. What are three main problems that affect food availability in the household?

(Probe for ranking)

1. _____

2. _____

3. _____

19. What coping strategies do you use during food unavailability?

1. _____

2. _____

3. _____

20. Please, give information the head of the household's income activities for the last one year

Activity code

Estimated income earned in the past one year

(Ksh.)

Activity code for question 20

1= Sales of cereal crops 7= Husband's salary

2= Sales of root crops 8= Casual labour

3=sales of livestock 9= Mother's salary

4= Sales of home craft 10= Remittance

5=Business (specify)

6= Others (specify)

21. What were the major expenditure in the household per week, month and year in the table below?

Expenditure items	Amount (ksh.) per week	Amount (Ksh.) per month	Amount (Ksh) per year
1 Food			
2 Housing			
3 Education			
4 Medical			
5 Clothing			
6 Leisure			
7 Transport			
8 Loan			
9 Miscellaneous			
GRAND TOTAL			

FOOD CONSUMPTION PATTERN

22. What did you have for:-

Breakfast _____

Lunch _____

Supper _____

23. (Where applicable) What are the food groups frequently eaten for the last 7

FOOD EATEN	No. of times consumed							No. of times consumed for the last 7 days	Source of the food
	No. of days consumed for the last 7 days								
CEREALS	1	2	3	4	5	6	7		
Maize/ products									
Sorghum/ products									
Millet /products									
Rice									
Wheat/ products									
Others: specify									
LEGUMES									
Beans									
Peas									
Ground Nuts (njugu karanga)									
FRUITS									
Banana									
Lemon									
Oranges									
Avocado									
Passions									
Mangoes									
Sugarcane									
Paw paw									
Others: specify									

FOOD EATEN	No. of times consumed							No. of times consumed for the last 7 days	Source of the food
	No. of days consumed for the last 7 days								
VEGETABLES	1	2	3	4	5	6	7		
Cabbage									
Sukuma									
Carrots									
Tomatoes									
ROOTS AND TUBERS									
Sweet potato									
Irish potato									
ANIMALS PRODUCT									
Eggs									
Beef									
Poultry									
Milk									
Fish									
SNACKS									
Bread									
Sugar									
Cakes									
FATS & OILS									
Vega. oil/fat									-
Margarine									
Others									

SECTION F: WATER AND SANITATION

24. [Fill in] what are the two main sources of water that you use? 1st [] 2nd []

1= River 2= Piped water 3= Bore holes 4= Spring 5= Roof catchments

6= Wells

7= Others (specify) _____

25. How long does it take you to get from the source you use? _____ min/hours

(a) During dry season----- (Hr: min) _____

(b) During rainy season----- (Hr: min) _____

26. Do you treat your drinking water? _____ 1. Yes 2. NO

27. [If yes], which of the following methods do you use? _____

1. Boiling 2. Filtering 3. Chemicals 4. Others (specify) _____

28. Do you have any latrines? _____ 1. Yes 2. No

29. Observe the following and indicate (1= Yes) if the condition exists and (2=No), if it does not

1= Animal dung visible in the house

2= Animals in the living house

3= Heap of garbage within 10m from the house

4= Human faeces within 10m from the house

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SECTION G: MORBIDITY

30. Have you ever de- wormed your child? _____ 1.Yes 2.No

31. [If yes], when did you last de- worm your child? _____

32. Do you know about worms? _____ 1.Yes 2.No

33. If yes, what do you think are the causes of worm infestation?

1. _____ 2. _____

3. _____ 4. _____

31. What illnesses has the child experienced for the last two weeks?

Disease	
Diarrhoea	
Cough/ cold	
Stomach ache	
Fever	
Tonsils	
Skin rushes	
Bronchitis	
Malaria	
Others (specify)	

35. Where do you treat when your child is sick?

1. Home care 2. Dispensary 3. MCH 4. Hospital 5. Herbalist 6. Traditional healers
7. Witchcraft 8. Others (specify) _____

36. How much time is required to reach the nearest health centre _____ minutes

SECTION H: MORTALITY

37. In this household how many people live with you? _____
38. How many are under fives in this household? _____
39. Did any one die in the last one year? If no end the interview, if yes ask _____
40. How many were <5 years of age? _____
41. How many were >5 years of age? _____
42. What were the causes of death the under five children for the last three months?

Name of the child	Cause of death

Codes:

1. Illness 2. Accidents 3. Child birth 4.others (specify)

HOUSEHOLD FOOD INTAKE: 24 HOUR RECALL

43. What did the child ate the whole of yesterday?

Fill in the table below:

Period	Dish	Name of ingredients	Amount of ingredients in household measures	Amount in standard units (Grams)	Amounts served to index child (vol in ml)	amt consumed by index child (vol in ml)	Amount leftover by index child (vol in ml)
B/FAST							
MID MORNIN G							
LUNCH							

AFTER NOON							
DINNER							
AFTER DINNER							

SECTION I: ANTHROPOMETRY DATA

This section must be filled for the index child. If more than one eligible child (6-59 months) in a household, the index child be chosen randomly.

44. Name of the child, Sex..... (M/F)

45. Exact data of birth...../...../.....(day/ month/ year)

(Verify data of birth with growth card or birth certificate)

46. Weight of the child in Kg (tolerance, ± 0.5 gr)

First measurement Kg

Second measurement.....Kg

Average weightKg

47. Height/Length of the child in Cm (Tolerance ± 0.5 Cm)

First measurement.....Cm

Second measurement.....Cm

Average height/ length.....Cm

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