RISK FACTORS OF CHILDHOOD MALNUTRITION AMONG CHILDREN AGED 6 TO 59 MONTHS IN MAKUYU DIVISION, MARAGUA DISTRICT, KENYA

BY

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DECLARATION

I hereby declare that this thesis is my original work and, to the best of my knowledge, has not been presented for a degree to this or any other university.

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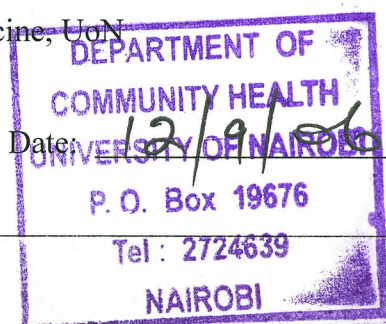   Signed: _____ Date: ___31/8/06_____

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DEDICATION

This work is dedicated to my parents Daniel Maina and Mary Njoki, for their love of education. To Dr. Muriithi Githui, Karl Maina, Karlyn Njoki and the late Antony Wachira for being an inspiration in my life. To all children of the world who may have suffered in one way or another due to malnutrition.

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LIST OF ABBREVIATIONS

ACC/SCN	Administration Committee on Coordination / Subcommittee on Nutrition
ANC	Antenatal Care
B/F	Breastfeeding
CORPS	Community Owned Resource Persons
FAO	Food and Agriculture Organisation
FGD's	Focus Group Discussions
FP	Family Planning
GOK	Government of Kenya
HAZ	Height for Age Z-scores
HH	Household
HHH	Household Head
CIMCI	Community integrated management of childhood illnesses
Kgs	Kilogramms
Kshs	Kenya shillings
MCH/FP	Maternal Child Health/Family Planning
MOH	Ministry of Health
NCHS	National Centre for Health Statistics
ORS	Oral Rehydration Salts
PEM	Protein Energy Malnutrition
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
UN	United Nations
UNICEF	United Nations Children's Fund
WAZ	Weight for Age Z-scores
WHO	World Health Organization
WHZ	Weight for Height Z-scores

OPERATIONAL DEFINITIONS

HOUSEHOLD: All the people who live together and operate as a unit, including such members as unrelated servants and relatives, who share food from the same pot and share resources of livelihood. They must have lived in the household for at least 3 months prior to the study.

HOUSEHOLD SIZE: The total number of people living in a household for at least 3 months prior to the study period.

DIARRHOEA: Three or more loose watery stool passed in a day for at least five days.

HEIGHT-FOR-AGE: This is a nutritional index which is a measure of chronic or long term nutritional problem. It is the measure for stunting.

WEIGHT-FOR-AGE: This is the nutritional index which is a measure for under weight or overweight.

WEIGHT-FOR-HEIGHT: This is a nutritional index which is a measure of acute malnutrition or wasting

Z-SCORE: This is one of the systems that is used to compare a child or a group of children to the reference population. This system expresses the anthropometric value as a number of standard deviations or Z-scores below or above the reference mean or median value. Z-score cut off point of <-2sd is used to classify low weight-for -age, low height -for -age and low weight- for height

ABSTRACT

A descriptive cross-sectional study aimed at assessing the risk factors of childhood malnutrition in Makuyu division of Maragua District was carried out between the months of December 2002 and April 2003. The survey sought to establish the prevalence of childhood malnutrition among children aged 6-59 months and explore the risk factors associated with childhood malnutrition in the area. The study population comprised of children aged 6-59 months whose mothers gave consent to take part in the study.

Multistage sampling method was used to select the study subjects. Two sub-locations from each of the three locations in the division were sampled. These sub-locations included Thangira, Marura in Kambiti Location; Muhohoyo and Pundamilia in Makuyu East Location and finally Milimani East and Gathara in Makuyu West Location. A structured questionnaire was used to gather quantitative data while focus group discussions and key informant interviews were used to gather qualitative data. The information collected using the questionnaire included information on socio-demographic features; maternal factors, some factors on child care; information on health and health seeking behaviour; and information on housing, water and sanitation.

A total of 385 mothers responded to the study questionnaire. Anthropometric measurements of height and weight of the index child were taken, and together with the age of the index child ere converted to anthropometric indices which were used as nutritional status indicators for the children. The chi-square tests of significance and pearsons correlation tests, were used to analyse the relationship between the dependent and the independent variables.

The results of the study showed that 30.5% of the study children were stunted, 10.9% were underweight and 2.8% were wasted. The prevalence of stunting was higher among the female children than among the males (30.8% and 30.2% respectively), while the proportion of wasting and underweight were higher among the males (3.8% and 12% respectively) than among the females (1.8% and 9.9% respectively). The prevalence of stunting and underweight were highest

among children aged over 36 months (34.6% and 14.4% respectively) and lowest among children aged between 6-12 months (19.3% and 4.2% respectively), while that of wasting was highest among children aged 18-24 months (4.7%). In general the prevalence of stunting and underweight increased with increase in age while that of wasting was higher among younger children than among older ones.

The main risk factors found to be associated with childhood malnutrition in the study area were, age of the child, the birth order, household income, maternal characteristics, child feeding practices, morbidity and environmental sanitation. Underweight was associated with index child birth order (P=0.000), maternal occupation (P=0.043) and with maternal morbidity status (P=0.041) Stunting on the other hand was associated with the duration of breastfeeding (P=0.046) while wasting was associated with whether the children were fed individually or whether they shared a plate with others (P=0.041)

The results of this study provide baseline data for further studies that may carried out in the area. The information shall be used for planning purposes and also in decision making in order to help implement appropriate strategies aimed at improvement of the overall health and nutrition status of the population. The study recommends more awareness creation on health and nutrition as well as sanitation and hygiene. Access to microfinance facilities for women should also be considered. There is also need to strengthen intersectoral collaboration among various sectors and government offices in the study area.

CHAPTER 1

1.0 INTRODUCTION AND BACKGROUND INFORMATION

Nutritional status of young children is an important indicator of changes in the health status and food availability[1]. It is a useful tool as an early warning of distress and ill health within the population. Generally, it gives the current status of the child in terms of immediate factors such as inadequate current intake of food, childhood diseases including diarrhea, leading to wasting while the accumulated impact of chronic deprivation leads to stunting.[1] Malnutrition is an impairment of health resulting from deficiency, excess, or imbalance in intake of nutrients. It includes undernutrition, which refers to a deficiency of protein and energy, and overnutrition, which is due to excess intake of one or more nutrients, usually calories. The most common form of malnutrition in the developing countries is the protein energy malnutrition (PEM) of mild to moderate levels.[2]

Childhood malnutrition is a widespread problem with devastating consequences; it weakens the immune system and worsens illnesses. It is an underlying cause of more than half of the deaths of children under five years of age worldwide.[2, 3] Out of the 12 million children under five years of age who die each year in developing countries, 6 million (55%) are either directly or indirectly related to malnutrition.[3] About 80% of deaths associated with childhood malnutrition, are due to mild or moderate forms of malnutrition rather than the severe forms. Malnourished children who survive have diminished learning capacity and lower productivity in adulthood. Malnutrition reduces the quality of life and financially drains families, communities and countries[2].

In Africa, one out of every three children is underweight and in several countries on the continent, the nutritional status of children is worsening.[3,4] In Kenya there has been insignificant positive change in the nutritional status of children over the last decade. Available data shows that the nutritional status of children under five years of age has improved only slightly at the National level[1, 5] (Table 1). Protein energy malnutrition (PEM) continues to be a major public health problem with devastating consequences. PEM of mild to moderate forms, manifesting as stunting, wasting and underweight in children is especially widespread. Among the population of

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children under five years of age in Kenya, 30.6% are stunted, 19.1% are underweight and 4.8% are wasted. [1,5]

Table 1: Trends in Nutritional Status of Children in Kenya 1994-2003

Nutritional Status Index	Year			
	1994	1998	2000	2003
Stunting (Height for Age)	33.6%	33%	35.3%	30.6%
Wasting (Weight for Height)	7.8%	6.1%	6.0%	4.8%
Underweight (Weight for Age)	22.5%	22.1%	21.2%	19.1%

Source: 5th Nutrition Survey, GOK 1994, KDHS 1998 and 2003

The factors that cause malnutrition are complex and are often interrelated. The causative factors vary in their relative contribution to malnutrition from one area to another. To enhance conceptualization, the factors that cause malnutrition have been grouped into basic, underlying and immediate levels in the now widely accepted UNICEF frame work on causes of malnutrition (Figure 1).
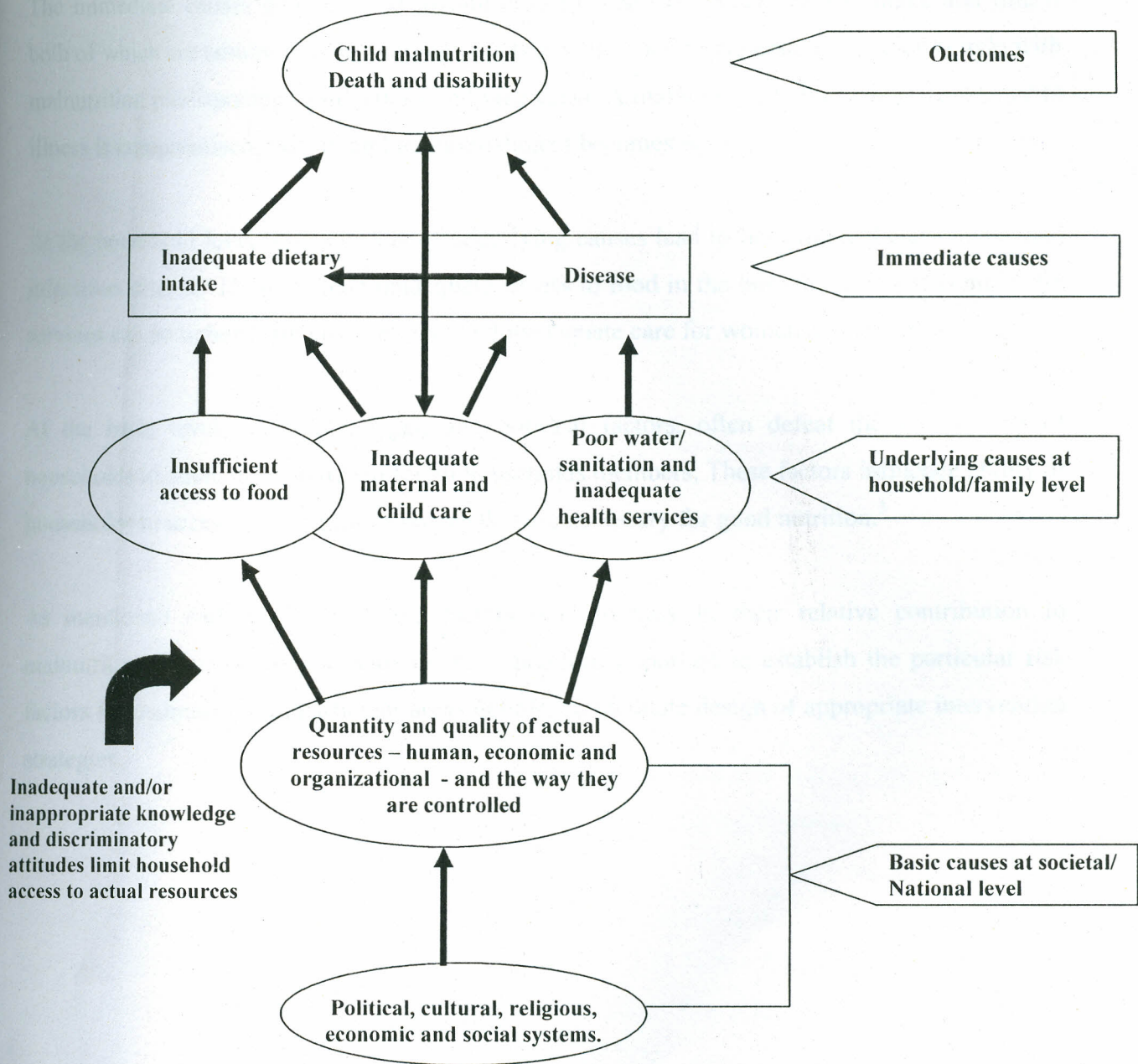
Figure: 1 Conceptual framework on the causes of malnutrition

Source: UNICEF, 1998. State of the World's Children

The immediate causes of childhood malnutrition include inadequate dietary intake and illness both of which are common in developing countries. These tend to operate in a vicious circle with malnutrition predisposing to infections and vice versa. A malnourished child whose resistance to illness is compromised, falls ill and malnourishment becomes worse.

At the household level three clusters of underlying causes lead to inadequate dietary intake and infectious disease. These include inadequate access to food in the household; insufficient health services and an unhealthful environment; and inadequate care for women and children[3].

At the basic level, economic, legal, and political factors, often defeat the best efforts of households to attain good nutrition for all households members. These factors influence ability of households to access and control resources that are necessary for good nutrition.[3]

As mentioned earlier, the causative factors tend to vary in their relative contribution to malnutrition from one area to another. It is therefore important to establish the particular risk factors for malnutrition in particular areas in order to facilitate design of appropriate intervention strategies.

CHAPTER 2

2.0 THE RESEARCH PROBLEM

2.1 Problem Statement

Malnutrition has significant health and economic consequences the most serious of which is an increased risk of death. Other outcomes include an increased risk of illness and a lower level of cognitive development, which results in lower educational attainment. In adulthood, the accumulated effect of long term malnutrition can be a reduction in worker productivity and increased absenteeism from work place; these may reduce a person's life time earning potential and the ability to contribute to the national economy.[6]

Childhood malnutrition in Kenya continues to be a major public health problem. Despite efforts to prevent and control malnutrition by initiatives in the public and private sector, data shows that, childhood malnutrition is still a major problem. Trends show that both micronutrient and macronutrient malnutrition remain widespread problems.[1] Protein energy malnutrition of mild to moderate forms manifesting in children who are stunted, wasted and underweight is especially widespread with devastating consequences for the growth, health and development of children.

The percentage of stunted, wasted and underweight children did not change substantially in Kenya between 1993 and 2003.[5,7] The percentage of children below five years of age who were wasted was 7.8% in 1994, 6.1% in 1998 and 4.8% in 2003. The percentage of those who were stunted was 33.6%, 33% and 30.6% in 1993, 1998 and 2003 respectively. [1,5,7] These figures are way beyond the levels expected in a well-fed population, whereby it is expected that only 2% to 3% of children would be malnourished.[1]

Maragua District as a whole has minimal cases of severe malnutrition probably due to high agricultural and livestock productivity.[8] However, Makuyu division within the district has recorded severe cases of protein energy malnutrition as evidenced by hospital based records. Out of all the children seen with severe cases of protein-energy malnutrition in the various health

institutions in the district in 1996, 32.9% of kwashiorkor cases and 25.5% of marasmus cases were from Makuyu division.[8]

It is a well established fact that malnutrition is usually an outcome of multiple and complex factors which are often interrelated. Some of the critical risk factors associated with childhood malnutrition include, improper child feeding practices, morbidities, improper health seeking behaviours, poor sanitation and hygiene practices, improper child care practices and some socio-economic and demographic characteristics of the households. The causative factors vary in their relative contribution to malnutrition   and also from one area to another. To facilitate design of appropriate nutritional interventions, it is important to establish the particular risk factors for malnutrition in particular areas.

Though relatively high rates of malnutrition have been reported in Makuyu division, no comprehensive study has been undertaken in the area to determine the prevalence of childhood malnutrition and to establish the area specific risk factors for the high cases of malnutrition in the region. This study was therefore intended to establish the prevalence of childhood malnutrition and investigate the factors contributing to it in Makuyu Division, Maragua District.

2.2   Justification of the Study

Malnutrition remains a major public health problem in Maragua District. According to the 1994 nutrition survey done in Kenya, the prevalence of stunting in the district was 32.4% while wasting was 6.0%.[1] Hospital based data indicates that of all the severe cases of protein energy malnutrition seen in the various health institutions in the district in 1996, 39.2% of children with kwashiorkor and 25.5% with marasmus were from Makuyu[8]. This suggests that malnutrition is a major problem of public health concern in the division.

There are no current data available on the nutritional status of children in Makuyu. In addition, there has been no study carried out in the area despite evidence of severe forms of malnutrition. Therefore there was need to carry out a study to establish the prevalence of childhood malnutrition in the area and determine the area specific risk factors for childhood malnutrition.

2.3 Expected benefits of the study

The study findings provide information on the nutritional status of children 6 to 59 months old in the study area. These findings will act as baseline data for any further studies that may be carried out in future in the area. The study results will also be important for planning purposes and also in helping in decision and policy making for planning and implementation of appropriate strategies aimed at improvement of the nutritional status of children and the overall health of the general population.

2.4 Research questions:

The research questions addressed by the study were.

1. What is the current nutritional status of children 6 to 59 months old in Makuyu division, Maragua District?

2. What are the main risk factors for childhood malnutrition in Makuyu division, Maragua District?

2.5 Hypotheses

1. There is no relationship between the demographic characteristics of the households and the nutritional status of children 6 to 59 months old in Makuyu division.

2. There is no relationship between infant and young child feeding practices and the nutritional status of children aged 6 to 59 months.

3. Morbidities and health seeking behaviours do not influence the nutritional status of children.

4. Housing, water, sanitation and hygiene practices have no influence on the nutritional status of children.

2.6 The study objectives

Broad objective

1. To investigate the main risk factors of childhood malnutrition in Makuyu division.

Specific objectives

1. To determine the nutritional status of children 6 to 59 months;

2. To establish the influence of selected socio-economic/ demographic characteristics of the households   on the nutritional status of the children;

3. To asses the effect of selected maternal factors on the nutritional status of children;

4. To determine some aspects of child care and the child feeding practices of the study households;

5. To asses the health and the health seeking behaviour of the study households;

6. To assess the housing, water and sanitation level and hygiene practices in the study area.

CHAPTER 3

3.0   LITERATURE REVIEW

3.1   Introduction

Overall the absolute number of malnourished children worldwide has grown. Five hundred million children are chronically undernourished worldwide.[9,10] It is estimated that about 182 million pre-school children or 33% of the children under 5 years of age in developing countries are stunted while 27% are underweight.[11] The deaths of 6 million or 55% of children under 5 years of age in developing   countries is directly or indirectly related to malnutrition.[3] Figure 1 exemplifies the main risk factors of childhood malnutrition.

Great efforts have been made towards improvement of children's nutritional status.   Despite all efforts put, malnutrition continues to be a major public health problem of considerable magnitude in most developing countries of the world.[12]

In Kenya the nutritional status of children under five years of age has not significantly changed over the past decade. Although there are considerable regional disparities, estimates of prevalence of malnutrition indicate that about 30.6% of Kenyan children are stunted, 19.1% are underweight while 4.8% are wasted.[5] The proportion of Kenyan children who are stunted is about 15 times the level of stunting in a healthy well nourished population while the proportion for underweight and wasted children stands at 9 times more and 2 times more respectively.[7] Stunting is highest in the rural areas. A little over 35% of children in rural areas are stunted while the rate in urban areas is about 25%. Wasting stands at 6% in rural areas and 5% in urban areas.[6]

The Government of Kenya in it's National Development Plan has outlined the fact that malnutrition is a major problem that leads to a lot of child mortality.   Estimates indicate that about 23,000 children deaths in Kenya in the year 2000   were associated with moderate   to severe malnutrition.[13] The Government in it's plan has also indicated the need to develop strategies that will help address this problem.

It is important therefore that the levels of childhood malnutrition in different areas of the country and the risk factors contributing to it are well established so that appropriate intervention strategies are implemented.

3.2   Factors Influencing Childhood Nutrition

3.2.1   Child Care Practices

Child care is one of the key underlying causes of childhood malnutrition. Child care is manifested in the way a child is fed, nurtured, socialized and guided. Nutritionally care encompasses all measures and behaviours that translate available food and health recourses into good child growth and development.[3] Care can also be defined as the provision in households and the community of time, attention and support to meet the physical, mental, and social needs of the growing   child and other household members. Care is manifest in   six types of activities practiced by caregivers (typically women.)

These include breastfeeding and feeding of young children; psychosocial stimulation of children and support for their development; care for women, such as providing appropriate rest time or increased food intake during pregnancy; food preparation and food storage practices; hygiene practices; and care for children during illness, including diagnosis of illness and adoption of health seeking practices.[14]

Even when there is adequate food in the house and a family lives in a safe and healthful environment and has access to health services, children can still be malnourished without adequate care.   Adequate care and feeding practices require time, attention   and support and are essential to meet the physical and mental needs of children[15]

3.2.1.1   Infant and Young Child Feeding Practices

Breastfeeding Practices

Breastfeeding remains the unequalled way of providing ideal food for the healthy growth of infants and young children. It provides all the energy and nutrients an infant needs for the first

six months of life and continues to provide upto half or more of a child's nutritional needs during the second half of the first year and upto one third during the second year of life.[11]

Breast milk contains unique immunological properties, which protect against infections and chronic diseases. It has a positive contribution to the well being of mothers, food security which together with it's environment makes it a key aspect of primary health care and an   important aspect of sound socio-economic development.[11]

The thirty third world health assembly, resolutions reaffirmed that breastfeeding is ideal   for the harmonious physical and psychosocial development of the child.[21] The World Health Organization recommends that breastfeeding should be   initiated soon after birth and should continue at least until the child is about   two years old.[22]

Babies should be exclusively breastfed -meaning that they receive nothing but breast milk   for the first six months of life.[22, 23] Exclusively breastfed children are protected from diarrhoea, upper respiratory tract infections and malnutrition. They have been found to grow well mentally physically and psychologically   due to   close contact with their mothers.[24]

Studies done show that relatively to infants who are exclusively breastfed, infants not breastfed at all have at least 14 times the risk of death due to diarrhoea.[25]   Studies also show that breastfeeding initiation in many countries is high (well above 90%), but exclusive breastfeeding is said to be rare.[26]

A study conducted in a slum area in Ethiopia showed that 99% of mothers in initiated breastfeeding.[27] In a study conducted in Uganda, it was found that wasting was highest among children breastfed only to 3 months while stunting was highest among children breastfed for over two years.[16]

In Kenya breastfeeding is nearly universal with 97% of children born having been breastfed for some period of time. Overall 52% of children are breastfed within one hour of birth and 82% within one day after delivery. About 65% of the children are said to be given a prelacteal feed.

However exclusive breastfeeding is not common with only 29% of children under two months being fed on breast milk alone. Overall 13% of infants under 6 months are exclusively breastfed. The frequency of breastfeeding is however said to be high with 92% of children under six months of age breastfeeding six or more times in twenty-four hours.[5, 7]

Breastfeeding initiation is reported to be almost universal in central province with 98.2% of the children being breast fed at some point. Overall 61.8% of the children are said to be breast fed within the first hour of birth while 86.4% are breastfed within one day of birth. About 30.1% of the children are said to receive a prelacteal feed. [5]

In Kibera slums of Nairobi, it was found that most mothers (98.2%) breastfed all their children and most (92.6%) did it for upto 6 months of age though not exclusively. Breastfeeding was reported to have been stopped either abruptly by 57.9% of mothers or gradually by 42.1% of mothers. The main reasons given by the mothers for stopping breastfeeding were that the child refused, that they wanted to wean their children and also due to the next pregnancy.[28] In yet another study done in Nairobi it was found that the mean age of stopping breastfeeding was 6 months with some mothers reporting having stopped breastfeeding as early as in the first month of the child's life.[29]

A study conducted in Kirinyaga District, Kenya on the prevalence and risk factors of vitamin A defficiency among pre-school children, found out that the rate of breastfeeding was 40% with only 30% of the infants being exclusively breast fed for only one month.. The mean period of breastfeeding was found to be 3.19 months. It was found that 28% of the study children stopped breastfeeding between the age of 19 and 24 months while a good number of mothers (31%) continued breastfeeding even after children were 36 month old. [30]

Another study conducted in Kathonzweni Division of Makueni District revealed that there was poor exclusive breastfeeding practices with 50.6% of the children receiving complimentary foods within the first three months of life. It was also found out that there was short duration of breastfeeding with the main reason of stopping breastfeeding being next pregnancy. The stoppage of breastfeeding was done between the age of 13 to 18 months. [18]

The average length of breastfeeding in Maragua District is said to be 14.7 months while children are exclusively breastfed for an average of 24 months.[1]

Complementary Feeding Practices

It is recommended that at about six months of age, breast milk should be complemented with appropriate solid feeds. Breast milk on its own is sufficient to meet all nutritional needs of an infant until six months of age   after which complementary feeds are required to meet the additional requirements for energy and nutrients.[5,23, 31]

The period when complementary foods are introduced is crucial to child health and development. Children are particularly vulnerable during this transitional period, and if their needs are not appropriately met, malnutrition and diseases may   follow. It is essential those complementary foods are introduced at the right time, are nutritionally adequate, hygienically prepared and fed, and that they are fed in sufficient quantity.

The period is said to be a potentially dangerous time for infants and young children since the diet changes from clean breast   milk, which contains anti-infective factors to foods, which are more often prepared, stored, and fed in   unhygienic ways. There is usually a higher rate of infection particularly diarrhoeal diseases, during the period of introduction to complementary feeds than in any other period in life.[25, 31]

Malnutrition is said to be more common during this transitional period because families may not be aware of the special needs of the infant, may not know how to prepare complementary foods from the foods that are available locally, or may be too poor to provide sufficient nutritious foods.[25] The World Health Organization warns that faulty feeding practices begin with giving any other nourishment but breast milk before complementary feeding is nutritionally required. The organization further warns that nutritionally inadequate or contaminated food, and starting complementary feeding too early or too late are major causes of malnutrition in   infants and young children.[22]

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Proper food hygiene during complementary feeding period is crucial to infections prevention and especially prevention of diarrhoea. Exposure to diarrhoea pathogens during complementary feeding period can be minimized by striving to ensure that foods and utensils do not become contaminated.[32] A household study done in Peru found that food served with a cup and spoon almost never had high level of faecal organisms, while same kind of food given in feeding bottles had greater rates of contamination.[33]

Evidence available generally indicates that mothers start to give foods other than breast milk to their infants at an age earlier than the recommended six months. In a study carried out in Uganda, it was found out that the mean age of introduction to complementary feeds was 4.9 months. The reasons given for early introduction to complementary feeds were that the breast milk was not enough; that the child was old enough and that the mother was too busy. Most mothers (70%), gave their children complementary feeds such as local starchy foods, such as bread, millet, cassava, sweet potatoes and bananas. Only 18.1% gave milk while 11.1 % gave enriched porridge.[16]

Another study done in a slum area of Uganda showed that, most children were given complementary feeds early at the age of 0 to 3 months of which 7.5% were fed on complementary feeds before the age of one month. The study also found that 20.4% of the study children were given complementary feeds late at the age of 7 to 30 months. Most mothers used milk as the complementary food while others used plain porridge, enriched porridge, fruit juices, water and black tea. The study found that underweight and stunted children were more among those children who were given introduced to complementary feeds late.[34]

A study carried out in Kibera slum in Kenya showed that children were given complementary feeds at the age of 1 to 12 months with an average of 4.8 months. The most frequently used complementary food was found to be porridge while about 46.2% of mothers gave their children water. Use of a cup and spoon was found to be the most commonly used feeding method.[35]

In a study done in Kathonzweni Division of Makueni District, it was found out that porridge was the main complimentary food with very little amounts of animal protein and fruits in the

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complimentary foods.[18] In Kirinyaga District in Kenya, it was found that mothers introduced complementary feeds to their children at the age of 3 to 6 months. The reason given for early introduction to complementary feeds was that the children were crying indicating that they were hungry.[30]

The national statistics indicate that supplementation of breast milk starts early in Kenya, About 26% of infants under 2 months of age, are given just plain water, 14% are given water based liquids/juices, 15% other types of milk other than breast milk and 16% are given food. By two to three months, almost half of the children are given complimentary foods while by 6 to 7 months, 81% of the infants have been introduced to these foods. About 54% of children under 6 months of age receive solid or semi-solid foods. The most commonly used complimentary foods for breastfeeding children under 6 months are milk products (36%), foods made from grains (28%), and fruits and vegetables (23%).[5]

Dietary Care during Illness and Recovery

A sick child needs food so that he or she can fight infections without using up all the nutrient reserves in the body. Sometimes mothers mistakenly believe that a sick child should have little or no food. This is attributed to the fact that a sick child   usually has little or no appetite.[31]

In a study carried out in Eastern, Central and Southern African countries, on appropriate nutrition during illness, it was recommended that children should continue to eat regularly during illness and that they should be provided with an extra meal each day for a week following an illness. The same study recommended that children with diarrhoea should be given oral rehydration salts(ORS) in addition to breast milk and regular foods.[36]

It is recommended that breastfeeding should continue almost always even if the child has diarrhoea and that the child should receive adequate fluid intake. Sick children should also be given small frequent meals, since infections affect appetite. Children suffering from measles, diarrhoea, respiratory infections and other serious infections should be given plenty of foods, which are rich in vitamin A.[31]

In Thailand food is withheld from children with diarrhoea until it ceases.[37] A study conducted in Turkey showed that 78.8% of parents fasted their babies due to the belief that food would increase the severity and duration of diarrhoea. The same study showed that 16.4% of parents stopped breastfeeding while 59% gave diluted cows milk to their children.[38] In a study done in Uganda, food withholding was reported in 50.5% of the mothers. The most commonly withheld foods included fruits, bananas, irish potatoes and vegetables. Only 10% of the mothers reported withholding milk during diarrhoea.[34]

In Kibera slums, Nairobi 23.9% of mothers were found to withhold some types of foods from their children during diarrhoea. These mothers mainly withheld semi-solids and liquid foods which were said to exacerbate diarrhoea. However 96.9% of mothers continued to feed their children during diarrhea, but only half of them gave their children special foods. Porridge was the most common food used as the special food during diarrhoea.[35]

In a study done in Makueni Kenya, it was revealed that only a small fraction (8.4%) of the households reported withholding food from children when unwell. The foods commonly withheld included porridge, beans, meat, and salt. [18]

In a situation analysis of women and children in Kenya, UNICEF found out that although withholding foods such as maize and beans; water and tea, is now known to be inappropriate during diarrhoea, this is still practiced in some communities in Kenya. Some traditional practices such as giving herbs, gruel and porridge during diarrhoea, were however considered appropriate.[39]

3.2.1.2 Characteristics of Child Care Givers

The characteristics of care givers for example age, knowledge, their attitudes and practices goes a long way in influencing the nutritional status of children. Skills and abilities of care givers are crucial to the quality of care, particularly the selection and preparation of food for the family including the children.[9] In most households the principal care giver is the mother[16]. However the responsibility of care is shared with other members of the household as well as neighbours.

A study done in Thika District and another one done in Tororo Uganda observed that children are often left on their own or with siblings as young as three years who require care themselves.[16,17] In Tororo District in Uganda it was found that the largest proportion (97.9%) of study children were left in care of other people. Majority of these were left in the care of older siblings. Other care givers included neighbours, grandparents, relatives while other children stayed home alone.[16]

In a study done in Kathonzweni Division of Makueni District, it was found out that the principal care giver was the mother while grandmothers were the main alternate care givers. Elder siblings were ranked second as alternate child care givers.[18] Participation of fathers in child care has been found to be minimal.[16,17] In a study conducted in Kisumu, it was noted that the primary alternate care givers were the elder siblings and that not only were the majority of alternate care givers young (under 12 years) but their education level was also low with 25.8% having no education at all.[21]

A study conducted in rural Iran showed that the nutritional status of children of mothers working outside the home was found to be poorer than that of children of non- working women. This finding was partly attributed to the quality of alternate child care since the older siblings who were left to care for the young children while the mothers were away were probably minimally competent in feeding and other related child care tasks.[20] However the study done in Uganda found no significant association between the alternative child care giver and the nutritional status of the index child.[16]

3.2.2 Childhood Morbidities

The interaction of infection and malnutrition has an overwhelming impact on health status, particularly in lower socio-economic groups. It is a major cause of death, sickness and disability in infants and young children.[9] Out of thirteen million infants and children who die each year in developing countries, majority of the deaths are due to infections and parasitic diseases and many if not most of children die malnourished.[32]

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There are certain infections that are particularly important as a cause of poor growth. Among these, diarrhoea, malaria, respiratory tract infections such as pneumonia, are the most prevalent among children under 5 years of age. Diarrhoea associated with malnutrition is probably the commonest cause of death in young children worldwide.[40]

It is important for mothers to recognize early the signs of illness and seek for help early. Proper utilization of health services ensures that a child remains healthy. Growth monitoring is a reliable and practical means of recognizing growth faltering in individual children. In addition immunization against diseases such as measles may prevent growth faltering.[32]

An essential element of good health is access to curative and preventive health services that are affordable and of good quality. UNICEF recommends that families should have a health center within a reasonable distance and that families should seek health on time.[3]

In an urban community in Gambia over 35% of deaths in children aged 0 to 3 years were found to be caused by diarrhoea coupled with malnutrition.[40] Studies done in Kibera slums in Nairobi and in Kirinyaga District, showed that the most common illnesses among children included cough, runny nose, diarrhoea and fever due to malaria. However no association was found between the nutritional status of the index children and the prevalence of these illnesses.[35, 41] Nearly half of the study children in Kibera were found to be infested with gastro-intestinal parasites with the prevalence of *Ascaris Lumbricoides* being the highest. Infestation with *Ascaris Lumbricoides* was found to affect the nutritional status of the study children significantly.[35]

Immunization may be of limited benefit if environmental factors which influence infection and nutritional status of children are not tackled. A study carried out in Gambia found out that despite high rates of immunization and high levels of medical care, the infant mortality rate was still high and the nutritional status of children under five years was still very poor.[42]

However a study done in Uganda, found that occurrence of malnutrition was significantly lower in children who were fully immunized for age than those who were not. It was observed that there were significantly more sick children (92.5%) among those who were not fully immunized

for age as compared to 68.7% sick children among those who were fully immunized for age.[34] In a study done in Tanzania, it was found out that proportion of stunting was higher among children with incomplete immunization than in those who were fully immunized. However underweight and wasting rates were found to be higher among the fully immunized children.[43] In yet another study done in Tanzania , it was observed that the proportion of children who were wasted and underweight decreased with increasing immunization score.[44]

The most important childhood illnesses in Kenya include diarrhoea, malaria, acute respiratory infections. Overall 57% of children are considered fully immunized. Full vaccination coverage among urban children stands at 57% while it stands at 56% among rural children. The proportion of fully vaccinated children in Central province stands at 79%.[5]

In Kathonzweni Division of Makueni District, more than 80% of children had received full immunization. The most common type of illnesses included, diarrhoea, fever, upper respiratory tract infections, and malaria. Nearly half of the children were taken to hospital when ill though 59.4% of the households used more than one hour to the nearest health facility. [18] In Mwea irrigation scheme, illness from episodes of diarrhoea was found to be significantly correlated to poor nutrition condition of the study children.[45]

In Uganda 34.4% of mothers reported taking their children to hospital for diarrhoeal treatment while 28.2% used herbs, 20% bought drugs and 15.1% used ORS.[34] In Siaya District, Kenya it was found that when children were ill, their families sought for treatment from government health facilities, private practitioners and traditional herbalists while some purchased self prescribed drugs from the local shops. Another group reported resorting to prayers sometimes when they were unable to meet the medical expenses.[46] In Vihiga Division of Kakamega District, majority of the people reported seeking health from the nearest Government health facility since there was availability of free drugs.[47]

3.2.3   Housing, Water And Sanitation

UNICEF estimates that about 1.1 billion people worldwide lack access to safe water, which is a fundamental requirement for good nutrition. It also estimates that about 2.9 billion people   lack

access to adequate sanitation with only 18% of rural dwellers having access to adequate sanitation services.[3]

In Kenya it is estimated that about 75% and 50% of the country's urban and rural population respectively have access to safe drinking water.[13] About 24% of Kenyan households obtain drinking water from either rivers or streams, 21% have piped water in their compounds and 11% use a public tap. Almost one in five households uses wells as a source of drinking water, the majority of which are covered or protected wells. A majority of households (53%) are within 15 minutes of their water source.[5]

The predominant flooring materials used by Kenyan households are mud dung earth and sand with a share of 62% while cemented floors take a share of 34%. About 77% of rural households use earth for flooring the houses while 71% of urban dwellers use cement. Close to 69%of Kenyan households live in dwellings with corrugated iron roofs, while the rest (22%) have grass or thatched roofs. Most households in Kenya (77%) have 1 to 2 persons sleeping together in a single room with an average of 2.6 persons.[5]

About 80% of rural households in Kenya have access to some type of sanitary facility with 70.3% of these having a traditional pit latrine, 7.3% having ventilated improved pit latrine, 1.7% having flush toilet. The rest of the households are reported to have no sanitary facility and they use bushes or fields. In central province, 84.3% of the households have traditional pit latrines while 9.5% and 5.5% have flush toilet and ventilated improved pit latrine respectively.[5]

National Health Sub-sector Strategic Plan identified the major causes of morbidity in Kenya as diseases and conditions arising from poor environmental management and hygiene conditions. These environmental problems relate to lack of safe drinking water, poor hygiene and sanitation, and poor waste disposal systems. These problems more often than not result to waterborne diseases such as typhoid and cholera.[48]

A study conducted in India confirmed that poor housing and poor sanitary conditions adversely affected the nutritional status of children.[49] Stunting and wasting levels were found to be

significantly higher among children from households with mud and dung floors than among those from households with cemented floors. In a study done in Uganda, the levels of malnutrition were generally found to be higher among children from households whose water sources were unprotected than in households whose water sources were protected.[34]

However no relationship was found between the source of drinking water and the nutritional status of the study children according to a study done in Siaya District.[46] These results concur with those of a study done in Kibera slums of Nairobi.[35] In Kirinyaga, it was found that 53.2% of the study households used water from rivers, canals and unprotected springs. About 29.9% of mothers in the study households reported boiling water as a way of treating it.[41]

According to a study done in Botswana, an estimated 42% of the study children lived in households with no latrines. Of these children 28% were found to be underweight as compared with 25% of children from households which had a latrine.[50] Conflicting results were found in a study done in Tanzania where a significantly higher proportion of underweight children (30%), was found among households with latrines as compared to 16.7% among those without latrines. [43] However the results of the study done in Kibera where majority of study children did not have access to latrine, showed no relationship between the nutritional status of the children and access to latrine.[35]

3.2.4 Household Factors

Household Size and Household Income

Studies done on the effect of household size on the nutritional status of under fives have revealed that children from larger households are significantly shorter for their age and eat nutritionally poorer quality and quantity foods than children from smaller households.[51]

Smaller families are said to allow mothers to spend more time interacting, stimulating, teaching and disciplining children. Large family size apart from limiting the amount of food per capita in the household may lower the quality of attention given to individual children.[52] On the other

hand, other studies have supported large households arguing that the more they are, the more economic contribution by active household members to labour for household tasks and agricultural work and to child care.[53]

The socio-economic status of a family will influence the availability of resources to the household. An economically well off family is more likely to have a better nutritional status because they are more likely to purchase nourishing foods. [54]

The findings of a study carried out in Uganda showed higher malnutrition levels in smaller households than in larger households. The difference was however only significant in stunting where the levels were 39.2% in smaller households and 22.7% in large households.[34] Results of a study done in Botswana showed no relationship between the size of the household and the nutritional status of children.[50] These findings concur with those of a study done in Nairobi.[35] In a study done in Siaya District, it was found that there were more underweight children from families with five to eight children than those from families with one to four children.[46]

A pilot food price subsidy scheme carried out in the Phillipines found strong relationship between malnutrition and low incomes. The study recommended the augmentation of the purchasing power of the low income households alongside nutritional education in order to improve the nutritional status.[55] In rural Bangladesh, a higher family income was found to be of relatively greater benefit to the children of literate mothers in improving the nutritional status of children.[56]

Yet another study carried out in the Philippines found out that income increases may have only a small effect on the nutritional status of children. Although increased income has a positive effect on household food intake, it does not necessarily result in improvement of nutritional status.[57] According to a study carried out in Botswana, children from households with one or more working adults were less likely to be underweight.[50] In Sengerema District of Tanzania it was found out that there was a significant positive association between income and nutritional status of the children. [43]

In a study of the nutritional status of children in the Mwea irrigation scheme of Kenya, it was established that there was a strong link between malnutrition and income expenditure in the household.[45] In a study done in Limuru it was shown that there was a smaller proportion of malnourished children from households that had high income.[58] In Kibwezi Division of Machakoes Kenya, it was found out that children from households that did not receive remitted income were more frequently severely malnourished than children whose families received a remittance.[59]

Household Food Security

UNICEF defines household food security as sustainable access to safe food of sufficient quality and quantity, including energy and protein and micronutrients in order to ensure adequate intake and a healthy life for all members of the household. Household food security depends on access to food financially, physically and even socially rather than the availability of the food. It is important that the access to the food is consistent and sustainable.[3]

Most households in Kenya are said to experience both transitory and chronic food insecurity. Transitory food insecurity is caused by erratic weather especially to those practicing agriculture, rampant changes in food prices and/or wages. At the household level, the harsh socio-economic impact of the current economic crisis has continued to adversely affect food security, which further compromises the household nutritional status.[60]

It has been suggested that a household in the rural area that spends less than 978 Kenya shillings per person per month lives below the poverty line.[61] A study carried out in Kirinyaga found out that on average, over 40% of the study households spent between 800 to 1200 Kenya shillings per month on food.[41] In a study done in Uganda, it was revealed that wasting and underweight were high in households that spent less amount of money on food.[16] In Ethiopia, it was found that the level of food availability as measured by the mean per capita calorie and protein intake, was relatively higher in the well nourished households compared to those households that were termed as malnourished.[27]

In Nakuru, the high-income households were found to consume the highest amount of rice, wheat flour, bread, fats, milk, eggs and beef while the low income group consumed the highest amount of maize meal. The mean expenditure on foodstuffs was found to be high among the high income group of households and lowest in the low income group of households. In addition the expenditure on food items was not influenced by the number of household members.[62]

A study done in Embu on household food security revealed that, 20% and 40% of tobacco growing households and non-tobacco growing households respectively, were not able to meet their daily calorie requirement from both purchased and produced sources of food. It was argued that on average, households growing tobacco had significantly higher permanent income and thus were more food secure compared to households that were not growing tobacco.[63]

3.2.5 Maternal Factors

Maternal Age and Marital Status

The age at which child bearing starts has important health implications for the child and mother.[7] However a study conducted in Uganda showed no significant association between maternal age and the nutritional status of the study children. In the same study however, stunting and wasting were found to be higher among children of younger mothers than those of older mothers.[16] In yet another study done in Mbarara slums in Uganda, the level of stunting was found to be higher among children of younger mothers compared to those of older mothers. This was attributed to the fact that older mothers have more and better experience in child care than their young counterparts.[34]

In another study carried out in the slum areas of Ethiopia, maternal age was also found to have no influence on the nutritional status of the children.[27] Another study done in Nairobi also found no significant relationship between the nutritional status of children and the age of the mothers.[35]

The mechanisms by which marital status affects child nutritional status, remains uncertain. However children of single parents are at a higher risk of poor care as compared to their counterparts whose father and mother are spouses. Hence children of married mothers are more likely to be well nourished than those of single parents.[63]

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In a study carried out in Uganda childhood malnutrition was found to be higher among children of single mothers than among children of married mothers in all the three nutritional indicators.[34] Stunting and wasting were however found to be highest among children of mothers who were married in another study done in Uganda.[16] In a study done in Tanzania it was found out that there was a higher proportion of undernourished children among unmarried mothers than among the married ones.[43]

In a study carried out in Kenya no association was found between marital status of the mother and nutritional status of the children.[35] In Mwea irrigation scheme, it was found out that children of married mothers were rarely chronically malnourished compared to those of single or separated mothers.[45] In yet another study done in Brooke Bond tea estate of Limuru, there was a higher proportion of stunted children among households of single and divorced mothers than in households where mothers were married or widowed.[58]

Maternal Education
The United Nations Children Fund (UNICEF) reaffirms that children of more educated mothers have in general, more chance of both survival and healthy growth. A mothers level of education and access to information determines whether the mother knows the advantages of breastfeeding; whether the child will be weaned at the right time; whether the best available foods will be cooked in the best possible way; whether water will be boiled and hands washed; whether bouts of diarrhoea will be treated by administering foods and fluids; whether a child will be weighed and vaccinated and whether there will be adequate intervals between births.[64]

Maternal education is said to be associated with the level of care provided to the children since education increases both the ability to earn income and the ability to appreciate the importance of care giving. Better-educated mothers have better interaction with their children than those women with little or no education.[14]

In a study conducted in rural Bangladesh, maternal education was found to be associated with variables that reflect more intensive care for their children (that is, less distraction while feeding, a cleaner feeding environment, and more frequent initiation of child feeding.) The same study

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however found more education to be associated with less adequate feeding practices such as termination of feeding by the mother more often than by the child, a larger number of bottle feeds per day, and fewer breast feeds per day.[14]

In a study conducted in Zimbabwe, education was found to have significant negative effect on the duration of breastfeeding. Illiterate mothers breast-fed their children for a significantly longer period than mothers who had post-primary education.[65]

In Kenya mothers level of education was found to have an inverse relationship with the three nutritional indicators, children of mothers with secondary education were found to have the lowest levels of stunting and underweight at 19% and 11% respectively while 36% and 33% of children whose mothers had no education at all were stunted and underweight respectively. Women with no education at all were also found to have children with the highest levels of wasting (15%) compared to 2.8% of wasting among children whose mothers had primary education.[5]

In a study done in Mwea irrigation scheme in Kenya, it was found out that mothers education was positively correlated with the nutritional status of the children. Increase in the number of years of schooling of women was expected to improve the nutritional status of the children.[45] However another study done in Kibera slums of Nairobi and one done in Mosop, Baringo District, found no significant relationship between the education of the mothers and the nutritional status of the study children.[35, 66]

In yet another study done in Lower Nyakach Kisumu District, it was found out that literate mothers with at least five years of primary education had significantly more underweight children than the illiterate mothers.[19] Literature review therefore shows conflicting evidence as to the relationship between maternal education and the nutritional status of the children.

Maternal Occupation

Different investigators have found that overall, women spend more time than men in all work activities. In addition to child care women often must gather wood, fetch water, prepare food and

do farm work or other productive work. The effect on child nutrition are not straight forward with some studies suggesting that when women work outside the home, even on their own farms, their children are more likely to be malnourished, especially if they do not control income or if a child is under one year old. Other studies have found no negative effects on nutritional status of children from mothers working and some have found positive effects when mothers work was well paid.[14]

Some studies have demonstrated a positive association between mothers work and child nutritional status especially for children below two years old while others have shown no association at all. Women nowadays are greatly involved in economic activities which could jeopardize children's well being by displacing child care.[16, 67] Mothers have to look for income to meet their family needs and as a result, they do not allocate adequate time for child care.[16] Farming activities of women often involve a lot of labour which is often done in fields far away from home. For example, in Eastern Thailand, it is common for women to fill their infants stomachs with bulky glutinous rice to keep them from feeling hungry and to keep them in the village all day during the rice transplanting season.[67]

Despite the fact that women are involved in a lot of economic activities, they are rarely involved in the control of resources and in decision-making. A study done in rural Bomet and Murang'a Districts of Kenya showed that although women were the main workers in the farms, they were rarely involved in decision making when it came to the sale of the produce. Women were also found to be less involved in decision-making regarding allocation of money from sale of the farm produce. The study also showed that women especially those in the rural areas, face many problems, including gender inequality, illiteracy, legal and political discrimination. These constraints seriously limit women's involvement in decision making in all spheres of life including child care and access to quality food through purchase as well as quality heath care services.[41]

A study carried out in Vietnam showed that working women play a vital role in ensuring household food and nutrition security. The study further suggests that encouraging women to work promotes agricultural growth, greater income for women and better food and nutrition

security for all. This study concludes that allowing women to work, identifies three central pillars of food security, namely adequate food production, economic access to available food and nutrition security which depends on access to child care, health care, and clean water and sanitation.[68]

In a study in rural Iran, nutritional status of children of mothers working outside the home was found to be poorer than that of children of non-working women. This was attributed to quality of alternative child care or to a relationship between poverty and the consequent necessity of working outside the home.[20] These findings concur with those of another study done in Ethiopia.[27]

The results of a study carried out in Uganda showed that the prevalence of childhood malnutrition was higher in households of salary employed mothers than in households of mothers who were either housewives or self employed. The prevalence of underweight was found to be more among children of higher income group mothers than it was among children of mothers with no income and those of low income group mothers. However the same study observed that the levels of stunting were higher among children of mothers with no income, low income and middle income compared to those of high income mothers.[34] In another study carried out in Tanzania, maternal ownership of income was found to be significantly and negatively associated with child nutritional status.[43]

Another study carried out in Nairobi found no relationship between maternal employment and children's nutritional status.[69] These findings concur with those of another study carried out in Kibera slums in Nairobi.[35]   In a study done in Lower Nyakach, Kisumu District, it was found out that there was a highly statistical significance between wasting and maternal occupation. Children of business women were significantly more wasted than those of farmers.[19]   A study carried out in Thika found out that maternal employment did not affect the time allocated for childcare. In households where the mothers were employed more time was spent on child care.[17]

Maternal Health

Caregivers health and the nutritional status has an impact on the quality of care given to children.[14] In most households the principal care giver is the mother.[9,16] The capacity to provide care at the household level is said to largely depend on the health of the mother.[9] There are various factors that affect the ability of mothers to give appropriate care to their children.[67]

A study carried out in Uganda, on effect of maternal factors on the nutritional status of children, found out that, poor physical and mental health of mothers are a major constraint to providing care in the household. The study found out that improved physical health and nutrition of the mother is associated with improved caring capacity.[16] A malnourished mother has a reduced capacity to care for the children. Maternal malnutrition especially stunting is associated with reduced work output, which can affect the mothers ability to obtain resources needed for care and to interact with her children.[11]

Almost half of all women in developing countries have poor health due to low intake of iron and such condition can reduce the caregivers' ability to take care of children. When caregivers are ill, they are less able to give appropriate care to infants and young children.[14] Mothers with poor dietary intake, low haemoglobin levels and low vitamin B_6 status spent less time on child care, were less responsive to their infants and use siblings as alternative caregivers.[70] In Kenya, lower maternal calorie intake was associated with less physical contact with young children.[70] Mothers with anaemia were also found to interact less often with their children.[14]

It is important to note that gender roles, particularly the unequal power wielded by men and women, influence the extent to which women can make decisions about their health and quality of life. In many societies women's autonomy is limited, so that major family decisions including whether to use contraception and how many children to have, are a principal domain of husbands.[71]

3.3   Gap in Knowledge

The prevalence of childhood malnutrition and the risk factors contributing to it, has not been previously explored in Makuyu despite evidence of severe cases of malnutrition. Hence the need for the study to assess the nutritional status of the children and establish the risk factors associated with childhood malnutrition in the area.

CHAPTER 4

4.0 METHODOLOGY AND MATERIALS

4.1 Study Design

This was a descriptive, cross-sectional study that used both qualitative and quantitative techniques of data collection to gather information from the study population.

4.2 Study Site and Location

The study was carried out in Makuyu division of Maragua District, between December 2002 and April 2003.

Location

Maragua District is one of the 7 districts of Central Province the rest being, Murang'a, Thika, Nyeri, Kiambu, and Kirinyaga. Maragua was carved from Murang'a District in September, 1996. It has a total area of 1,065 km^2. It is bordered to the North by Murang'a District; to the South by Thika District, to the West by Nyandarua District, to the East by Machakos and to the Northeast by Kirinyaga and Mbeere Districts. It has 4 adminstrative divisions namely Maragua, Kigumo, Makuyu and Kandara. Makuyu Division where the study was conducted, covers an area of 195km^2 .[8]

4.2.1 Topography and Climate

Maragua District rises gradually from an altitude of 1,100 metres above sea level in the east to an altitude of 2,590 metres in the western side. The highest area in the west is drained by several rivers. Further to the west there are ridges that are too steep for any agricultural activities.

Makuyu Division receives less rain than the other divisions. In addition the division comprises of shallow poorly drained soils, which are mainly sandy in some areas. These environmental conditions make it very difficult for any meaningful agricultural activities. Efforts have been made to introduce drought resistant crops such as sorghum, cotton, cassava and pigeon peas in the area.[8]

4.2.2 Population and Administrative Units

Makuyu division is subdivided into three locations, namely Makuyu, Kambiti and Kamahuha. These are further subdivided into twelve sub locations. The local authority in the division is the Makuyu town council, which has six wards.[8]

Population

According to 1999 population and housing census report, Maragua had a population of 387,778 people with annual growth rate of 1.8%. The District has a very youthful population with 45% of the population being below 15 years of age. This exerts a dependency burden on the working population. Elderly people above 65 years comprise 6% of the population. Youth of 15-28 years who are mainly job seekers constitutes 22% of the population.[8]

The settlement pattern in the District corresponds with the natural resource endowment. There is very high population density in the high and medium potential areas and relatively sparse population density in the lower zones of Makuyu. Makuyu Division has the least population with 315 persons per square kilometer. This sparse population is attributed to the aridity of the area. [8]

4.2.3 Agriculture and Economic Activities

Makuyu Division, which is generally a flatter area, is mainly arid and semi-arid and reliable agriculture is only feasible with irrigation. Farming activities such as coffee and pine-apple growing in the District thrive only by irrigation. Makuyu division is dominated by coffee and pineapple farms. Coffee is the main cash crop and is grown by small scale farmers as the area is relatively dry. The food crops grown include maize, beans, sorghum, and millet. Drought resistant crops such as cassava have been introduced to supplement food production in the division. Agricultural programs in the area are geared towards intensifying production of drought resistant food crops and introducing cash crops such as cotton and tobacco.

The division has the highest number of large-scale farmers with a total area of 1,000 hectares and about five hundred permanent and seasonal employees. These farms are mostly owned by

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multinational companies such as Kakuzi. The average farm size is about 0.93 hectares for the small-scale farmers while for the large scale farmers, the average farm size is 20 hectares.[8]

4.2.4 Health Facilities

According to the district development plan, Maragua District is well provided in terms of health facilities. It has two mission hospitals, six health centers, twenty five dispensaries and eighty seven health clinics. The average distance to the nearest health facility is 10 kilometres.[8]

Makuyu division has one health center, two dispensaries and one private clinic. According to Medical Officer of Health records, these facilities are not fully utilized due to low population in the area. There is also lack of medical staff, equipment and inadequate supply of water. Some of the patients prefer to travel to Thika district hospital because of its accessibility from Makuyu.[8] The current existing medical staff in the division includes one clinical officer, one laboratory technician, fourteen registered and community nurses and six family health field educators.[8]

4.3 Study Population

The study population comprised of children aged 6 to 59 months in the study area.

4.4 Sampling and Sample Size Determination

Sample Size Determination

The formula that was used to determine the minimum sample size   was as follows; [72]

$$N=Z^2p \, [1-p]/d^2$$

where N is the minimum sample size

P was the hypothesized proportion of children who were malnourished in the study area. According to the fifth nutritional survey carried out in 1994 in Kenya, 32.4% of children in Murang'a district were said to be stunted. Therefore 32.4% was used as the hypothesized proportion.

z was the standard normal   deviate which   corresponds to 95%

Confidence interval or at 5% significance level set at 1.96

d was the degree of precision [degree of accuracy desired for the study]

set at plus or minus 5%[0.05] for this study.

q was equal to 1-p which is 1-0.32 = 0.68.

Using the above formula, the minimum sample size was calculated as shown:

N= [1.96x1.96xo.32x0.68] / [0.05x0.05]=334

Sampling Frame

This included all house holds in the study area with children aged 6 to 59 months old.

Sampling Procedure

Multi stage sampling procedure was applied to select the study population as follows;

i. Two sub-locations were randomly selected from each of the three locations in the division.

ii. Households with children aged between 6 to 59 months within the selected sub locations were identified and listed by mapping.

iii. Systematic random sampling was used to select households.

iv. Children aged 6 to 59 months old from these households and whose mothers gave consent took part in the study. Where a household had more than one child aged 6 to 59 months, the youngest among them was taken as the index child.

Inclusion Criteria

i. Children aged 6 to 59 months in the study households,

ii. Those children in the above age brackets whose parents especially the mother consent to participation in the study,

iii. The parents must have lived in the area for at least five years prior to the study.

Exclusion Criteria

i. Children whose parents especially the mother did not consent to take part in the study.

ii. The children whose parents had moved into the area in the last five years prior to the study.

4.5 Variables

Dependent Variables

The dependent variable was the nutritional status of children aged between 6 to 59 months as indicated by weight for age, weight for height, and height for age.

Independent Variables

These included variables related to;

(a) socio-economic/ demographic characteristics such as;

    i.   Household head characteristics such as age, sex, education, occupation

    ii.   Household size

    iii.   Household income

    iv.   Household food security

(b) Maternal factors such as;

    i.   Maternal age

    ii.   Maternal marital   status

    iii.   Maternal education level

    iv.   Maternal occupation

    v.   Maternal health

(c) Child care practices such as;

    i.   Breastfeeding

    ii.   Complementary feeding practices

    iii.   Feeding of children during illness

(d) Child morbidity status and health and health seeking behaviour

    i.   Disease prevalence

    ii.   Immunization of children

    iii.   Health seeking behaviours

(f) Water, sanitation and hygiene practices such as;

    i.   Source of water

    ii   Methods of waste disposal

    iii Type of housing

    iv. Size house

4.6 Data Collection

Data collection was done between the months of January and March 2003.

4.6.1 Study Tools and Instruments

Both qualitative and quantitative methods of data collection were used. Focus group discussions and key informant interviews were used to gather qualitative data for verification and validation of quantitative data. A checklist with open-ended questions were used to help in the focus group discussions and in the key informant interviews. The quantitative data were collected by use of structured questionnaire.

A salter scale which could take a maximum weight of 25 kgs and with a precision of 0.1 kg together with weighing pants were used to take the weight of the children, wooden height/length measuring board, with a precision of 0.1 cm was used to measure the children's height/ length.

4.6.2 Training of Field Assistants and Pretesting Study Tools

Six field assistants were recruited to assist the researcher in data collection. They were residents in the study area and were familiar with the area. The field assistants at least held a secondary certificate of education. They were trained on the study objectives, methodology (method of data collection) and recording. The assistants were also trained on basic field ethics. This training continued through out the period of pretesting.

They were also trained on translation of questionnaires from English to either Kiswahili language or Kikuyu (the vernacular language). This helped minimize bias which might have occurred if the respondents understood the questions differently. The assistants were also shown how to take weight, height, length and they participated in pre-testing of the study instruments which enhanced their field experience.

Pre-testing of the study questionnaire was done in Mihang'o sub-location within Makuyu which was not sample for the main study. This was done in order to ensure validity and reliability of the tool.

4.6.3 Quantitative Data

The quantitative data was collected by use of a structured questionnaire, which was administered to mothers of children aged 6 to 59 months old in the study households. The questionnaire was utilized to gather information on the socio-economic/demographic characteristics, child care practices, infant and young   children feeding practices, health and health seeking behaviours, household food security, and access to safe water, sanitation and hygiene practices. Illiterate mothers could answer questions since they were interpreted to them in the local language.

4.6.4 Qualitative Data

Focus Group Discussion (FGDs)

Focus group discussions (FGDs) were used to elicit qualitative data following prepared guidelines. Guiding the discussion, the principal investigator elicited views mainly on health problems affecting children in the area, infant and young child feeding practices, health seeking behavior, sources of livelihood and food security in the area. The FGDs were helpful in eliciting views that were not obvious from the quantitative data and also in clarifying some issues that emerged in the quantitative data.

Eligible participants of the FGDs were women between the ages of 15 to 50 years who had not participated in the questionnaire interview. Initially the target was to conduct four FGDs, but only two were conducted since the principal investigator felt substantial amount of information on the topics of concern had been elicited from the two groups.

The groups comprised of 10 mothers each. The first group comprised of mothers aged between 18 to 30 years while mothers in the second group were aged between 30 to 40 years. The discussions were held in a common hall in one of the dispensaries in the region.

Key Informant Interviews

Following prepared guidelines, two key informant interviews were conducted by the principal investigator. These were mainly done to elicit information on health problems affecting children in the area, feeding practices, food security and means of livelihood in the area. One of the key

informant was a nurse who had worked and lived in the are for over 10 years, while the other one was incharge of food security programmes in one of the locations.

4.6.5 Anthropometric Measurements

Nutritional status of children was to be determined using anthropometric measurements. Standard recommended procedures were followed in taking all the measurements. These included;

a. *Weight Measurements*

The weight of children was taken using a suspended weighing scale   and pants. A portable hanging scale with a maximum capacity of 25 kgs and demarcations at every l00g was used. The scale was suspended on a low branch or held manually by one field assistant. Two readings that did not differ by more than 0.lkg   were taken   and the average of the two was computed later.

b. *Length /Height Measurements.*

A wooden length board was used to take the recumbent length of children who were less than two years old.   Two field assistants were required to correctly position the child and ensure accurate measurements of length. Two readings that did not differ by more than 0.5 cm were taken. The average of the two measurements was used. Height measurement was taken using the length board for children who were over 24 months old. The height measurement was taken with the child standing upright on the board. The height was recorded to the nearest millimeter.

N/B These measurements of weight, height/length combined with data on age and sex, provided the basic information needed to compute the nutritional status indicators. These raw values were transformed into the nutritional status indices of weight- for- height, height- for- age, and weight-for-age. The National Centre for Health Statistics (NCHS) reference standards which are recommended by the World Health Organisation (WHO) were used in assessment of the nutritional status.

4.7   Data Quality Control

The following was done in order to minimize bias and errors and to improve on the quality of data collected.

- The research assistants were trained on the study objectives and the methodology.

- A structured questionnaire written in English was used. The research assistants were trained on translating the questionnaires from English to either Kiswahili or Kikuyu for those respondents who could not understand English. This ensured that questions were not understood differently.

- Pre-testing of the questionnaires was done. This enabled identification of any errors in the data collection tool and corrections were made before the actual data collection.

- Informed consent was sought from mothers of the children who took part in the study.

- Scale accuracy was checked regularly using a standard weight.

- Immunization cards and birth certificates where available were used to determine the exact age of the children.

- Confidentiality of responses was emphasized to the respondents.

- Supervision of data collection was done continuously inorder to ensure completeness of the questionnaire.

4.8 Data Processing and Analysis

The data were transformed into codes that had been developed during the questionnaire preparation, entered and analysed using the Statistical Package for Social Sciences (SPSS). Frequencies of all the variables were generated and used in checking for outliers.

The anthro statistical programme was employed to convert raw anthropometric data (the weights, heights/lengths of the children) into anthropometric indices and compare them with the National Center for Health Statistics (NCHS) reference figures.

Using the Statistical Package for Social Sciences (SPSS) analysis for each variable was done. Bivariate analysis was used to explain the relationship between independent and dependent variable. The chi-square test was used to test the significance of relationship between variables that were related to nutritional status.

Multivariate analysis was used to determine which independent variable had the greatest impact on the nutritional status of the children. Qualitative data were analysed thematically. Presentation

of descriptive data was done in form of descriptive statistics, frequency distribution and graphic forms.

4.9 Study Limitations

1. Financial constraints led to delay in data collection.

2. Despite explaining the purpose of the study to the mothers, some thought that the information about their children was being collected so that they could be enrolled in the feeding programmes or for school bursaries.

3. Some mothers, especially those of older children had difficulties remembering the exact periods of breastfeeding and introduction of complementary feeding.

4.10 Ethical Considerations

Permission to conduct the study was sought from the Research Section of the Ministry of Education. Consent was also sought from the administrators, mainly the Maragua District Commissioner and the local leaders (chiefs and sub-chiefs). Informed verbal consent was sought from mothers of children who were 6 to 59 months old in the study households prior to administration of the questionnaire. This was sought after explanation of the nature and purpose of the study had been done clearly. The mothers were also assured that any information that they gave would be treated as confidential and that any name or information that would identify them as respondents would not be given to anyone at all. Only those mothers who gave consent were interviewed. Children with infections were referred to the nearest health facility for treatment by the principal investigator.

CHAPTER 5

5.0 RESULTS

5.1 Introduction

This chapter presents both the descriptive and analytic results of the study. The descriptive results avail information on social economic and demographic characteristics of the study population such as age, sex, marital status, education, ethnicity, household size, household income, household food security and religion. Presented in this chapter also are variables on child care such as breastfeeding, complimentary feeding practices, dietary care during illness and recovery and health and the health seeking behaviour. The way these variables interact with each other and with the nutritional status of the study children is also outlined.

5.2　　Demographic Features of the Study Population

5.2.1　　Population Size and Structure

The study covered a total of 385 households with a total of 2085 persons. The observed household size ranged from 1 to 16 persons with a mean household size of 6 persons (sd=2.30). Out of these 42.3% of the households had 1 to 4 persons, 47.1% had 5 to 8 persons, 10.1% had 9 to 12 persons and 0.5 % had 13 to 16 persons. The number of children under 5 years of age in the study population ranged between 1 to 4 children per household with a mean of 2 children under 5 years old (sd=0.55) per household.

Christians were the majority in the study population being 98.5% out of which 26.8% were Catholics and 71.7% were Protestants. Muslims constituted only 0.8% while the rest were either traditional African religion followers or non-believers.
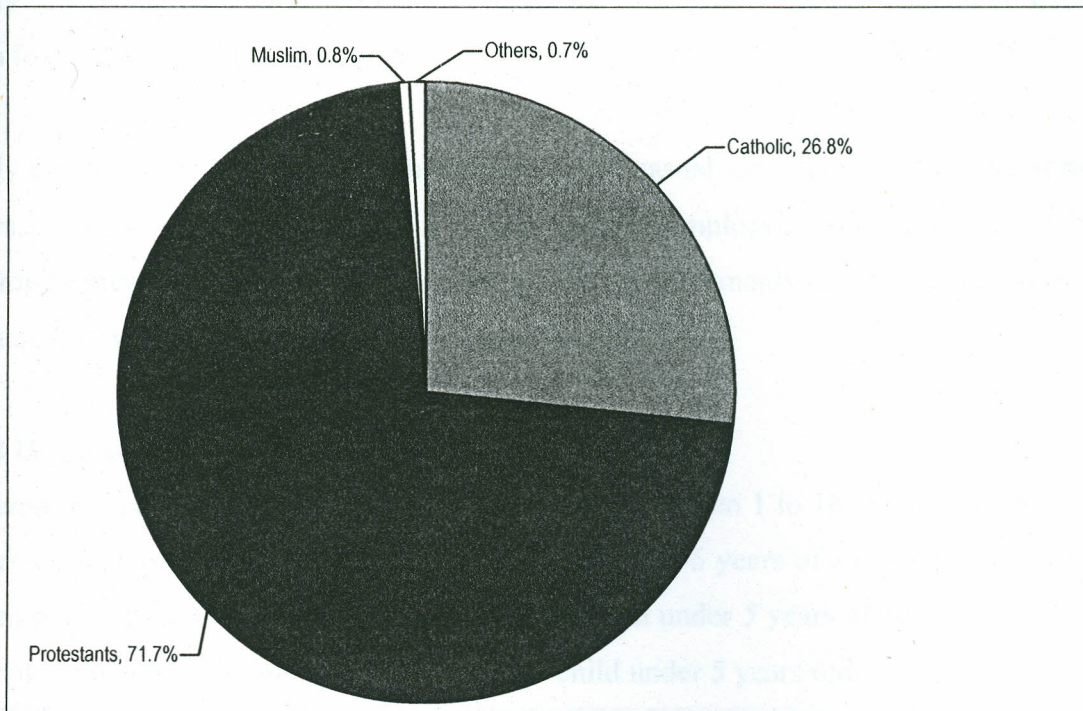
Fig. 2: Distribution of the study household by religion. (N=385)

The age of the head of the household ranged between 20 to 76 years with an average of 36 years (sd=10.10). Over 56% of the household heads had acquired upper primary education (standard 5 to 7 or to 8), 24.9% had completed secondary education, 6.2% had incomplete secondary education, 4.7% had attained upto lower primary education, 4.9% college/university education, 0.8% adult literacy education, while 2.3% had no form of formal education at all.

Most (40.3%) of the household heads were casual labourers, 22.9% were subsistence farmers, 20% were self employed, 15.1% had some form of salaried employment, 1.3% were cash crop farmers while 0.5% were housewives.

5.2.2   Household Characteristics

5.2.2.1 Characteristics of the Household Heads

The age of the household head ranged between 20 and 76 years with a mean of 36.2 years. All the households' heads were members of the particular households. Over 56% of the household heads had acquired upper primary education (standard 5 to 7 or to 8), 24.9% had completed secondary education, 6.2% had incomplete secondary education, 4.7% had attained upto lower

primary education, 4.9% college/university education, 0.8% adult literacy education, while 2.3% had no form of formal education at all.

Slightly over 40% of the head of the households were casual labourers, 22.9% were subsistence farmers, 20% were self employed, 15.1% were salaried employed, while 1.3% and 0.5% were cash crop farmers and housewives respectively. The key informants reported that men in the area were mainly involved in casual work or in small-scale farming.

5.2.2.2 Household Size and Household Income

The number of persons living in the household ranged between 1 to 16 persons, with an average of 6 persons per household. The number of children under 5 years of age ranged between 1 to 4 children per household. The average number of children under 5 years of age was 2 children per household, with majority of households having 1 child under 5 years old.
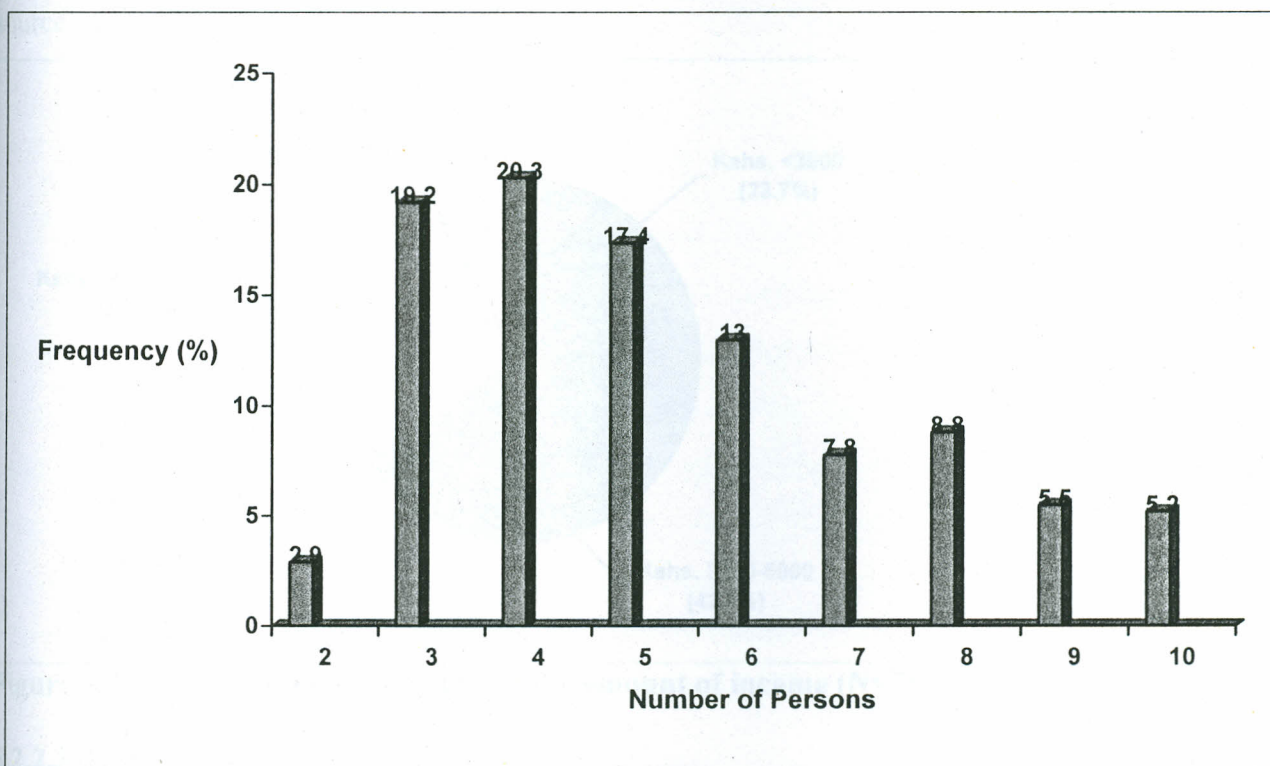
Figure 3. Distribution of the study population by household size (N=385)

Household Income

The main sources of income for households in the study area were casual work (38%), food crop production (30%), salaried employment (16.6%) and self employment (14.3%). Cash crop

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production was only a minor source of income for only about 1% of the households. The total monthly income, from the main source of livelihood ranged between Kshs 1000. to Kshs. 40,000 per month, with an average of Kshs. 5221 Most of the households (42.1%) received amounts between Kshs. 3000 – 5000 23.7% received between Kshs. 5000 – 10,000 26.4% received upto Kshs. 3000 while the rest received over Kshs. 10,000 (Fig 4)

At least 95.8% of the study households reportedly owned radios, 64% owned bicycles; 47.8% owned sofasets; 15.8% owned Television sets, 14% owned wheelbarrows while only 7.3% had sewing machines. Reportedly, 75.6% of the study households owned chicken, 46.5% owned cows, 42.6% owned goats, 5.2% owned sheep while only 3.6% owned donkeys.

The FGD participants reported that the main source of livelihood for the households in Makuyu was from casual labour in the large fruits and coffee plantations in the region such as Kakuzi. Households also reported that they obtain income from sale of farm produce such as fruits, maize and beans. Some households were also reported to carry out sand harvesting activities as a source of livelihood.
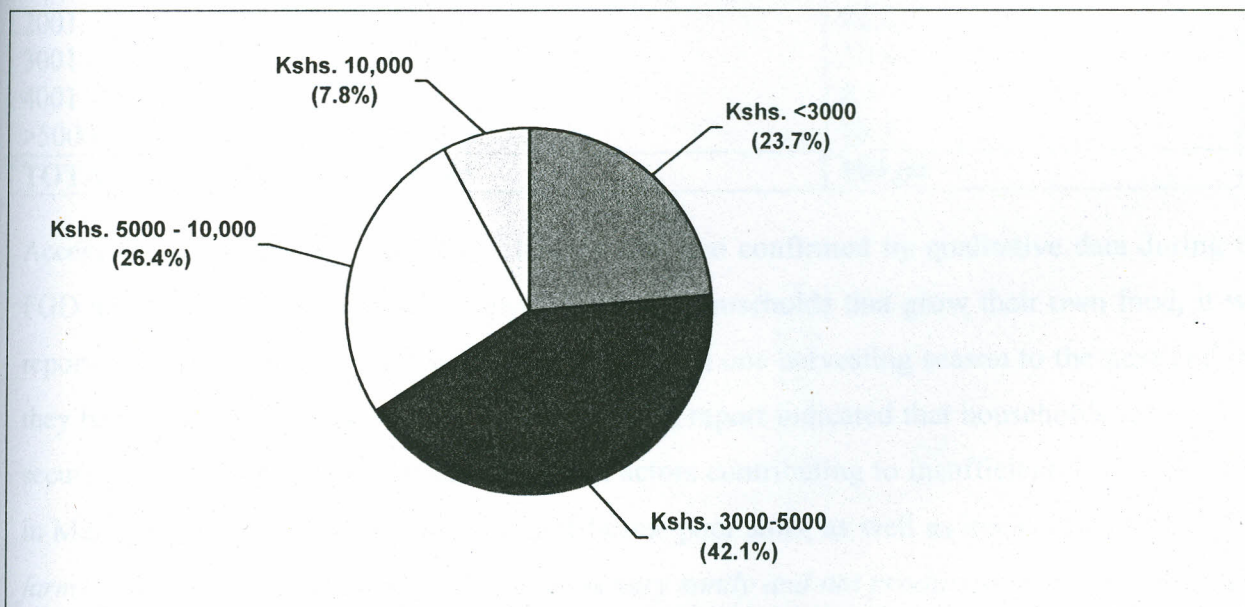
Figure 4. Distribution of households by the amount of income (N=385)

5.2.2.3 Household Food Security

Over 95% of the household that grew their own food, reported that the food grown was not enough to feed the household and had to resort to other means of meeting the deficit. Those

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means included purchasing the food, which was done by 99.5% of the households while the rest obtained help from their relatives. The total acreage of the farm reported ranged from 0.25 acres to 6 acres with an average of 1.22 (Sd-0.875) and a modal acreage of 2 acres. Over 52% of the households reported that their main source of food was from the farm while 47.8% obtained food through purchasing.

The amount of money spent on food per month ranged between Ksh.200 and Ksh.9000 with an average of 2986 Kenya shillings. Majority of the households (72.8%) spent between Kshs.1000-4000 on food per month.

Table 2. Distribution of Households by the Amount of Money Spent on Food per Month

Amount of money in Kshs.	n	Percentage (%)
< 1000	35	9.1
1000 – 2000	100	26.0
2001 – 3000	100	26.0
3001 – 4000	80	20.8
4001 – 5000	31	8.1
>5000	39	10.1
TOTAL	385	100.00

Access to food through purchase in Makuyu was also confirmed by qualitative data during the FGD and the Key informant interviews. Even for households that grow their own food, it was reported that the food grown does not last them from one harvesting season to the next and that they have to purchase food to meet the deficit. The report indicated that households are not food secure due to various problems facing them. Factors contributing to insufficient food production in Makuyu were found to be small sizes of farms, poor soils, as well as inadequate rainfall. *"The farms in Makuyu are too small and the soil is very sandy and not productive at all. We also have the problem of inadequate rainfall through out the year."(FGD)*

One key informant also said that the poverty level in the area is very high and some families are forced to sell food after harvest in order to perform other duties like paying school fees. This leaves such households with food that does not last them up to the next harvesting season. Households are also said to lack money for buying farm inputs such as agricultural machinery,

fertilizers and good quality seeds. Other households are housed within the large plantations in the area and are not allowed to do any subsistence farming within such farms. One FGD participant said, *"Our men drink a lot instead of working in the farms. They also use up the money for food on buying alcohol"*.

5.3   Maternal Factors

5.3.1   Maternal Age and Maternal Marital Status

The age of the mothers covered in the survey, ranged from 18 to 48 years with a mean of 28 years (Sd 6.06). Over 60% of the mothers were between the age of 20-29 years, 19% between 30-34 years, 13% between 35-39 years, while 5.2% and 2.9% were above 40 years and below 19 years respectively.
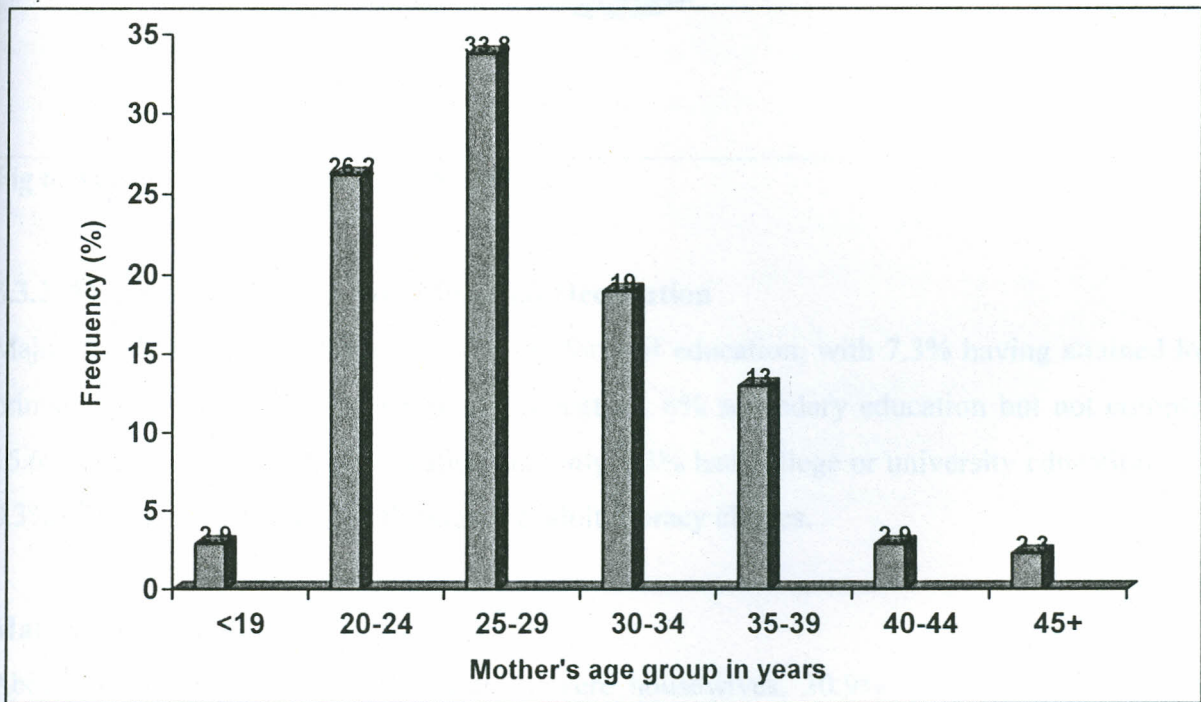
Fig 5. Distribution of mothers by age (N=385)

Maternal Marital Status

Most mothers (80.5%) were married, with majority (79.7%) being in a monogamous relationship, while 0.8% were in a polygamous relationship. Those who had never married at all consisted of 16.6%; those divorced or separated 2.1% while the rest were widowed.
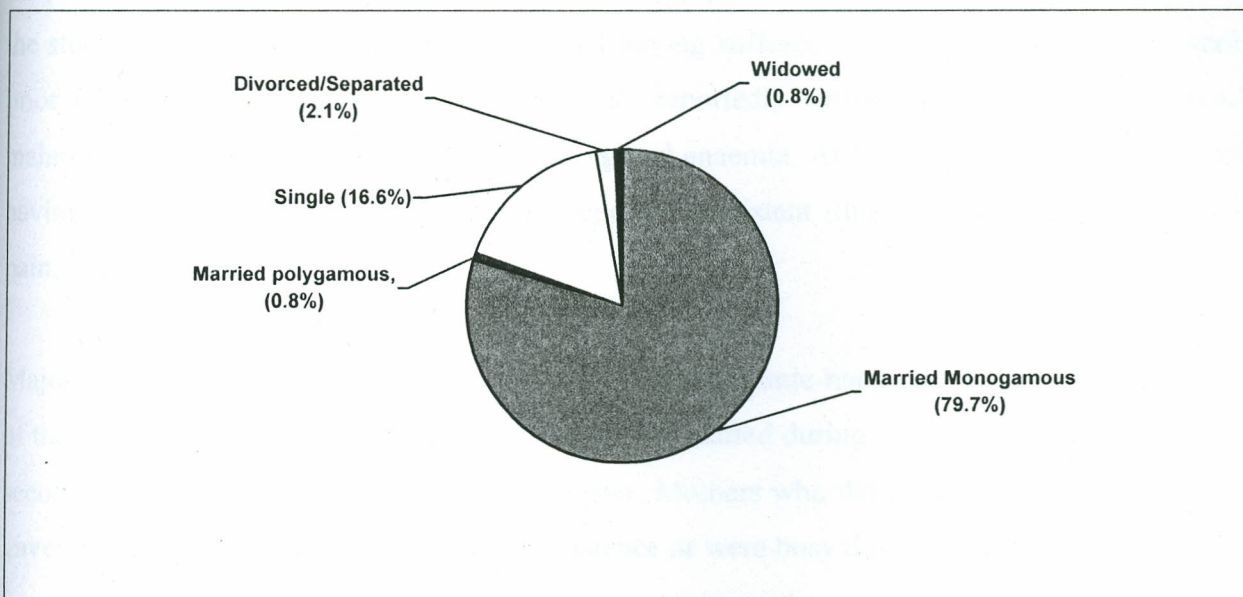
Fig 6. Mother's Marital Status (N=385)

5.3.2. Maternal Education and Maternal Occupation

Majority (98.4%) of the mothers had some form of education, with 7.3% having attained lower primary education, 66% upper primary education, 6% secondary education but not completed, 16.6% completed secondary education and only 2.3% had college or university education. About 0.3% of the mothers had gone through the adult literacy classes.

Maternal Occupation

About one third (29.4%) of the mothers were housewives, 30.9% were subsistence farmers, 25.2% were casual labourers, 2.9% were cash crop farmers, 9.6% were self employed (engaged in small scale businesses), while 2.1% were engaged in salaried employment.

The key informants reported that women were mainly involved in small scale farming of food crops and rearing of animals such as chicken and goats and performing household chores. Further information from FGD's revealed women's participation in casual labour. *"There are quite a number of women who work as casual labourers in the large fruits and coffee plantations*

in the region. Yet, there are those who engage themselves in small-scale businesses such as sale of fruits and tree seedlings."(FGD)

5.3.3   Maternal Health Factors

Respondents were asked if they had suffered from any illness during the two weeks preceding the study. About 40% of the mothers reported having suffered an illness during the two weeks prior to the study. The most common illnesses reportedly suffered by the mothers included malaria, back pain, cough, chest pain, vomiting and anaemia. At least 9.1% of mothers reported having a persistent illness. The commonly reported persistent illness included chest pain, back pain, and headache.

Majority of the mothers (96.9%) reported having attended ante-natal clinic during the pregnancy of the index child. Out of those who attended, 63.8% started during the first trimester, 18% in the second trimester and 18.2% in the third trimester. Mothers who didn't attend the antenatal clinic gave reasons such as being unaware of its existence or were busy doing other things.

Over 85% of the mothers were aware of at least a family planning method. By the time of the study 57.9% of the mothers were on family planning methods while 42.1% were not. The methods commonly used for family planning included injection (56.5%), pills (36.8%), barrier methods (5.7%) and natural family planning method (1.0%). Those who were not on any family planning method cited reasons such as religious beliefs, medical reasons, refusal by husbands, cost of the methods, while others said they couldn't use since they were not married.

Table 3. Summary of the general characteristics of the study population (N=385)

Characteristics	Status
Number of households in the study	385
Total number of persons in the study households	2085
Average household size	6(Sd=2.30)
Average number of children under 5 years old	2(Sd=0.55)
Religion	
1. Christians a .Catholics	26.8%
b. Protestants	71.7%
2. Muslims	0.8%
3. Traditional African religion / Pagan	0.7%
Household Head Education level	
1. Primary education	60.7%
2. Secondary education	31.1%
3. College/university	4.9%
4. Adult literacy education	0.8%
5. No formal education	2.3%
Household Head Occupation	
1. Casual labourers	40.3%
2. Subsistence farmer	22.9%
3. Self-employed	20%
4. Salaried employed	15.1%
Maternal Marital Status	
1. Married a. monogamous	79.7%
b. polygamous	0.8%
2. Single (never married at all)	16.6%
3. Divorced/Separated	2.1%
4. Widowed	0.8%
Maternal Education	
1. Primary education	73.3%
2. Secondary education	22.6%
3. College/University education	2.3%
4. Adult literacy education	0.3%
Maternal Occupation	
1. Housewives	29.4%
2. Subsistence farmers	30.9%
3. Casual labourers	25.2%
4. Self employed	9.6%
5. Salaried employed	2.1%

5.4   Characteristics of the Study Children

The index children were children aged 6-59 months in the study households and whose mother's gave consent to take part in the study. The parents of such children must have lived in the area for at least five years. Where a household had more than one child within the age bracket of 6-59 months, the youngest of them was taken as the index child.

Table 4. Distribution of the study children by Age (in months) and Sex (N=385)

Age of child (in months)	Males		Females		Total
	n	%	n	%	
6-12	31	8.1	28	7.3	59
12-18	22	5.7	18	4.7	40
18-24	22	5.7	26	6.8	48
24-36	50	13.0	56	14.5	106
>36	68	17.7	64	16.6	132
TOTAL	**193**	**50.1**	**192**	**49.9**	**385**

The number of index children included in the study was 385 of which 50.1% were males and 49.9% were females giving a male to female ratio of approximately 1:1. These children aged between 6 to 59 months constituted 19% of the study population. The distribution of the study children by age and sex is as seen in Table 4.

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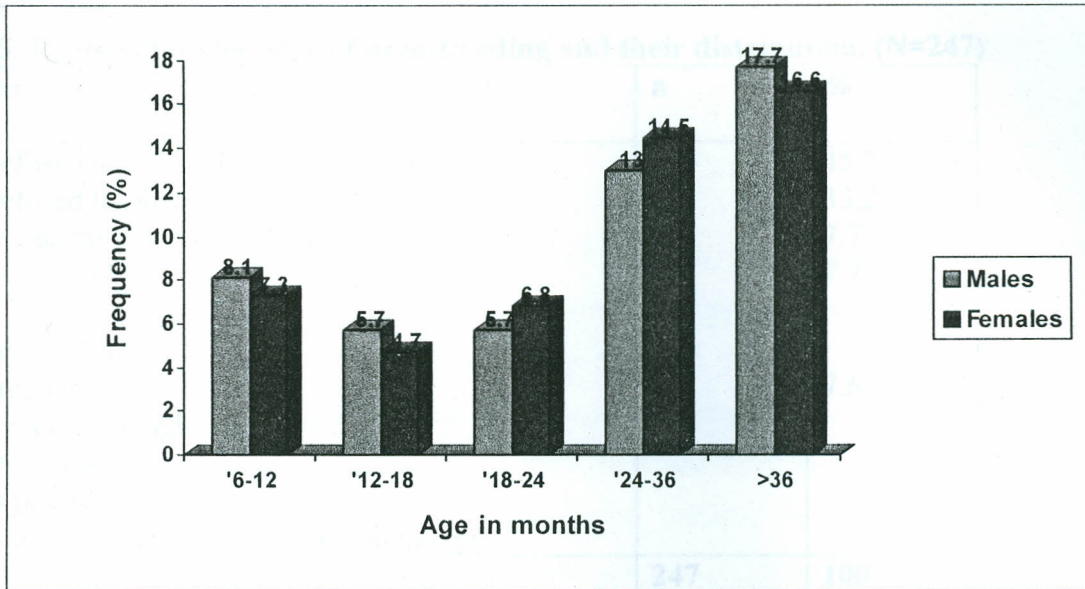
Fig. 7 Distribution of Index children by age and sex

5.5   Child Care Practices

5.5.1   Breastfeeding

At the time of the study 35.1% of the mothers were still breastfeeding their children. Out of those who were breastfeeding 85.2% breastfed on demand while 14.8% did it on scheduled time. About 40% of the mothers reportedly breastfed their children between 6 to 8 times in a day, 35.3% between 3 to 5 times, 12.6% breastfed for over 8 times in a day while only 9.6% breastfed for between 1 to 2 times in a day.

The age range of stoppage of breastfeeding was between 1 and 36 months with an average age of 18 months. The reasons given for stoppage of breastfeeding were that the child refused other foods (45.7%), child refused to breastfeed (33.2%), mother was busy at work and mother was sick at 7.7% each. The other reasons that accounted for 7.6% included next pregnancy, child was old enough, child was sick, and that the child was a twin and hence breast milk was not enough (Table 5).

Table 5. Reasons for stoppage of breastfeeding and their distribution. (N=247)

Reasons	n	%
Child refused other foods	113	45.7
Child refused to breastfeed	82	33.2
Mother was busy at work	19	7.7
Mother was sick	19	7.7
Others;		
Next pregnancy	14	7.6
Child was old enough		
Child was sick		
Mother just wanted to stop		
Child was a twin and hence milk not enough		
Total	**247**	**100**

The FGD participants and key informants reported that breastfeeding is common in the area. However it was noted that breastfeeding is moderately practised in the area since mothers have to work as casual labourers and as such have limited time with their children. There was a general consensus among the participants that breastfeeding was initiated immediately after birth.

Exclusive breastfeeding was said to be very rare, with majority of mothers exclusively breastfeeding for a period ranging between 2 days to 7 days. One key informant said, *"Only few mothers breastfeed exclusively in the area for up to 4 months. The number is actually negligible. Since the early 1990 's, I have only seen about 3 to 4 mothers who have breastfed exclusively for up to 4 months."* However one FGD participant reported breastfeeding her child exclusively for a period of 6 months.

The stoppage of breastfeeding was said to be done when the child was between 12 months to 24 months with majority stopping breastfeeding at 18 months. Just as the quantitative results show, the FGDs participants were in general agreement that the age of stoppage of breastfeeding was between 1 to 2 years with majority stopping at 1.5 years. The reasons given by the participants were the same as those that were reported in the quantitative data. Of breastfeeding during pregnancy, one FGD participant said, *"The breast milk from a pregnant mother contains pregnancy chemicals that may harm the baby who is breastfeeding. These chemicals retards the growth of the breastfeeding baby. They also cause harm to the baby growing in the womb. Thus*

breastfeeding should be stopped due to next pregnancy." The mothers reported that such information was obtained from the health workers.

5.5.2 Complementary feeding practices

By the time of the study all the study children (100%) had been introduced to other foods or fluids other than breast milk. The age at which complementary feeding was introduced ranged between 1 day to 5 months while the mean age was 1.5 months (sd 1.3). Over 65% of the mothers reported that the main reason for complementary feeding was that the child was crying, 22.1% said that breast milk was not enough, 7.8% said that child was old enough while the rest (4.5%) gave reasons such as, child being overweight, advised by health workers, advised by other mothers, and that it was the tradition or the practice to give complementary feeds at that age.

Table 6. Complementary foods/fluids and distribution of children fed on them (N=385)

Fluids	n	Percentages (%)
Water with sugar and/or glucose	256	66.5
Plain water	68	17.8
Cows milk	39	10.4
Tea	19	5.0
Soapy water	1	0.3
Foods/Semi-Solids		
Enriched uji	200	52.1
Mashed fruits	91	23.7
Mashed food	82	21.4
Plain uji .	10	2.6
Weetabix	1	0.3

The fluids used for complementary feeding included water with sugar and/or glucose, plain water, cows milk, tea, and soapy water. The semi-solids used for complimentary feeding were enriched uji, mashed food (bananas and potatoes), mashed fruits, plain uji and weetabix. The distribution of complementary food introduced to children by proportion of study children fed is as shown in Table 6.

The methods used for feeding the children included using cup and spoon at 67%, use of nursing bottle (31.4%), cup at 1.0% and hand at 0.5%. Most mothers (63.9%) reported feeding their children at least thrice in a day excluding the breast feeds. About 25% fed their children four times in a day while 2.6%, 8.3%, and 0.5% fed five times, two times and one time respectively. Only 3.4% of the children shared the plate with others while the rest (96.6%) were fed individually. About 60% of the mothers reported preparing special meals for their children while the rest did not. Out of those who prepared special meals for the children, over 62% did it at every meal while the rest did it occasionally.

The results of the focused group discussion and those of key informant interview strongly support the fact that babies are weaned as early as in the first week of their lives. The focused group discussion participants reported that, babies are given the first fluids between the age of 1 day to 7 days. They reported that water is given in the first day of a baby's life. '*At birth the baby's stomach is usually so dirty and produces black substances. Hence plain water is given to the baby to clean off the dirt*'.

Water with glucose and/or sugar usually referred to as 'tasty water' is usually given between the second day and one week. The mothers reported that the babies cry a lot by the second day indicating that they are hungry and hence 'tasty water' is given. One participant of the FGD said '*Tasty water is given to make the breast milk thinner so that the digestion can be improved and baby can pass light stool*' Other fluids that were reported to be introduced within the first week included, cows milk, tea, fruit juices such as mango juice which were said to be readily available from a local fruit plantation.

The participants of the FGD agreed that, fruits such as ripe bananas, pawpaw, and avocado were introduced at around one week while at one month of age solid foods such as potatoes and mashed bananas were introduced . "*Fruits are introduced at one week because the baby doesn't get satisfied on breast milk and water and they cry a lot. Sometimes babies vomit because their stomachs reject the 'light food' (water and breast milk). But when something thicker is introduced, the babies become more comfortable and do not vomit nor cry a lot*"

It is worthwhile noting that mothers in the FGD did not regard giving fluids such as plain water, water with glucose and/or sugar as complimentary feeding. To them complimentary feeding is done when semi-solids such as porridge and solids such as mashed bananas are fed to the babies.

5.5.3 Dietary Care during Illness and Recovery

Most mothers (74.3%) reported feeding their children less times during illness compared to when the child was well (most children were fed at least three times in a day when well). Only 12.7% reported feeding their children more times than usual while the rest fed them as usual or gave special foods. The FGD participants report that sick children should be fed between 5 to 6 times in a day contrasted the practice in the area. They were in general agreement that when a child is sick, they should be fed many times in a day, since they only manage to eat small quantities at a time.

Over 85% of mothers continued breastfeeding their children during diarrhoeal episodes while 14.5% did not. Of those who discontinued breastfeeding during diarrhoea, 68.6% said that it was because breastfeeding would lead to continued dirrhoea, 23.5% said breastfeeding would cause dehydration, while 7.8% reported that children refuse to breast feed during such times. Majority (90%) of mothers continued feeding their children with other foods other than breast milk during diarrhoea. Over 60% reported giving special foods during diarrhoea while 39.5% did not give any special foods. The foods that were considered special included fruits (41.5%), bananas (37.2%) and rice (11.1%). Others included ugali, enriched porridge, green grams, plain porridge, potatoes, bread, pumpkin, soup, and weetabix.

There was a general consensus during FGDs participants that mothers normally continue breastfeeding their children during diarrhoea. In addition to breastfeeding, mothers give water or oral rehydration salts (ORS) obtained from the health facilities. Foods considered special and given to children during illnesses, included, rice, bananas, tomatoes, carrots, green grams, and porridge made from millet. One key informant reported that porridge is given to children during diarrhoea because there is a general belief that it helps reduce the diarrhoeal episodes

About 30% of the mothers were for the opinion that some types of foods should not be given to children during illness for various reasons as shown in Table 7.

Table 7. Types of food that should not be given to children and reasons

Type of food	Reasons
Potatoes, meat, vegetables	Causes indigestion
Beans, potatoes, milk, rice, Meat, fatty foods, ugali, eggs,	Worsens diarrhoea either due to Too much proteins or fat
Eggs, avocado, pawpaw, ripe bananas	Causes pneumonia
Mangoes, pawpaw, fatty foods, fermented porridge	Causes malaria
Eggs, milk, meat	Leads to allergy
Milk	Causes cough
Tea, ugali	Have no nutritional value

Qualitative data indicated that some foods such as green vegetables, maize products, cows milk, fatty foods were said to worsen diarrhoea and thus should be withdrawn during diarrhoea. One key informant also reported that foods such as potatoes, "ugali", rice and some varieties of bananas such as "kiganda" are considered "light foods" and thus are not fed to children with diarrhoea. *"Only boiled food which is salted should be given to a child suffering from diarrhoea. Wheat products (such as bread) as opposed to maize products should be given since they help harden the stool"*.

5.5.4 Alternate Child Care Givers

Over 78% of mothers reported leaving their children in the care of other people while they went to work especially in the farms. The average number of days per week in which the mothers left their children in the care of others was 3, with a range of 1 to 7 days in a week and a modal of 3 days. Most mothers (33.3%) left their children for at least 5 hours in a day, with a range of 1 to 24 hours and an average of 4.35 hours (Sd-2.28).

The main alternate childcare givers included grandmothers (42.2%), older siblings (29.7%), and neighbours (18.2%). Others (10%) included house helps, fathers, aunts, and grandfathers. (Fig 8)
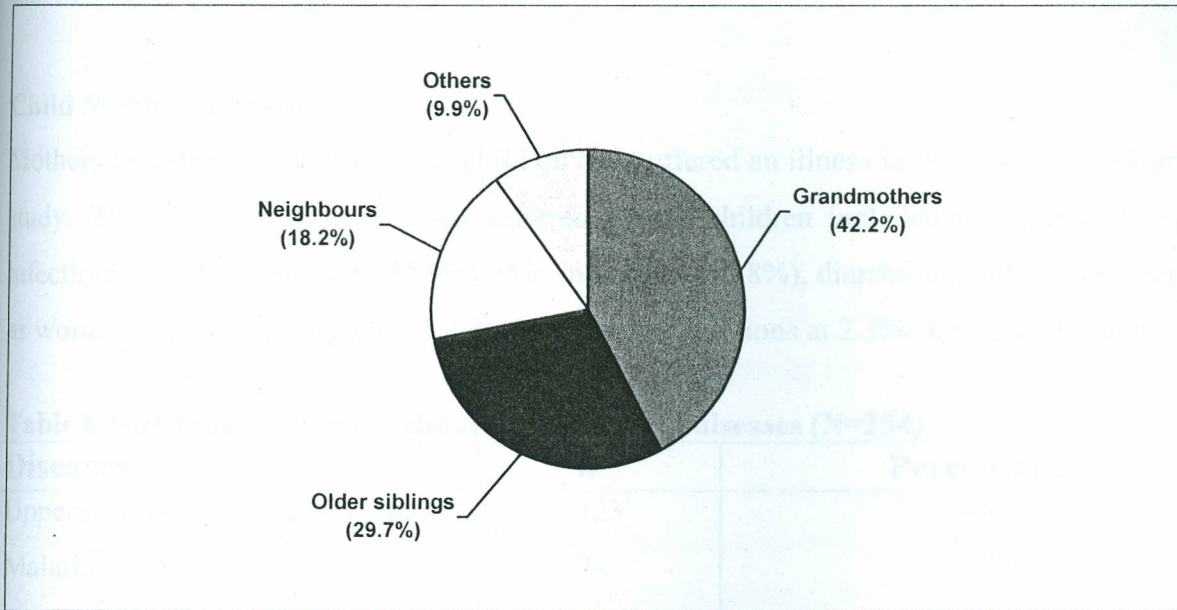
Fig 8: Types of Substitute Child Care Givers

The FGD participants and the key informants reported that though the main child care giver in Makuyu was the mother, they did leave their children with other care givers since they had to work. *"Mothers have to work in large plantation farms or in other peoples farms as casual labourers. They also have to work in their farms and as such have to leave the children behind."* The participants were in general agreement that it was the mothers who usually prepared the meals for their children although some were reported to give instructions to the older siblings on the food preparation. *"Before going to work, mothers do ensure that they prepare food for the children especially if there is no one responsible enough to do so. In case a mother has a child who is about 10 years old, they do give them instructions on how to prepare food for the younger children while the mother is away."*

5.6 Infants and Child Health Information

5.6.1 Immunization and Child Morbidity Status

The information on the index child immunization status was obtained from the child immunization card or from the mother's reports where such cards were not available. Over 97% of the children were fully immunized for their age. The reasons given for the 2.9% who were not

fully immunized for their age were that mother was busy, child was sick, mothers advised by other mothers against immunization, lack of vaccines in health facilities, mother was sick and that mother forgot about the immunization.

Child Morbidity Status

Mothers reported that 64.9% of the children had suffered an illness in the two weeks prior to the study. The most common illnesses suffered by the children included upper respiratory tract infections (48.4%), malaria* (28.9%) skin infections (10.8%), diarrhoea (9.1%), and others such as worm infestations, headache, eye disease and ear infections at 2.3% as seen in Table 8.

Table 8 Distribution of index children by common diseases (N=254)

Diseases	n	Percentage
Upper respiratory tract infections	123	48.4
Malaria	74	28.9
Skin infections	28	10.8
Diarrhoea	23	9.1
Worm infestations		
Headache	6	2.3
Eye disease		
Ear infections		
Total	**254**	**100**

The study also established that 10.9% of the index children were suffering from one or more persistent illness. These persistent illnesses included, upper respiratory tract infections, malaria, skin diseases, diarrhoea, ear infections, eye infections, epilepsy, asthma, and tuberculosis.

Qualitative data also confirmed that the diseases presented in table 8 were the most common among children. The participants of the focused group discussions reported the most common illnesses among children in order of priority as, pneumonia, malaria, diarrhoea and vomiting, and skin diseases. The key informants reported malaria with convulsions, upper respiratory tract infections, intestinal worms, and skin diseases in order of priority as the most important diseases

(Malaria was as reported by the mothers but not as clinically proven or tested.),

affecting children in the region. One key informant said "*Malaria with intestinal worms led to anaemia in children and such children often presented in the health facilities with malnutrition*".

Although there was a difference in the order in which the diseases were prioritized between the quantitative data and the qualitative report, there was a general consensus on the most common illnesses.

5.6.2 Health Seeking Behaviour

Of the children who were reported ill in the two weeks prior to the study, 67% were taken to health facilities for medical attention, over 20% were bought for drugs, while 8.5% and 3.7% stayed at home and used drugs respectively.

Most respondents (78.7%) reported that their families sought health care from health centres, 16.1% from dispensaries, 1.8% from district hospitals, while 3.4% bought drugs from the local pharmacies. The time taken to the nearest health facility in minutes ranged between 5 to 120 minutes with an average of 44.5 minutes.
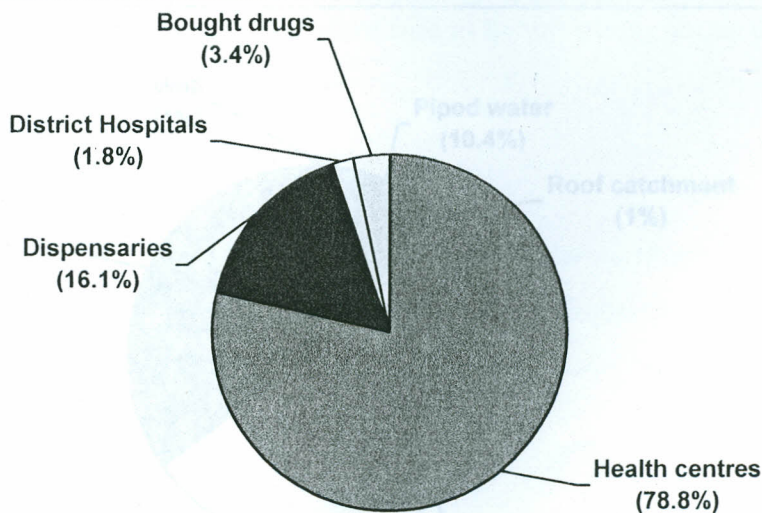
Fig 9. Various areas where health care was sought (N=385)

The FGD participants and key informants reported that health care was mainly sought from health facilities by majority of the households since drugs were readily available in such facilities. However some reported that some people are treated at home and are only taken to the health facilities if their condition deteriorates. There was also a report of some people resorting to prayers when sick instead of seeking treatment from health facilities while some sort treatment from traditional healers. *"Members of some religious sects such as the "Akorino" do not seek treatment from health facilities and usually resort to prayers when sick. Some people also visit "andu ago" (traditional healers) when unwell while others visit a specialist in "miti shamba "(herbal medicine)."*

5.7   Housing, Water and Sanitation

Over 67% of the households lived in semi-permanent houses, 24% in permanent houses and 8.6% in temporary houses. The houses visited had rooms ranging from 1 to 9 rooms with an average of 3 rooms. This gives an average of 2 persons per room.

The main sources of water were boreholes (53%), piped water (35%) and streams (10%). Other sources were wells and roof catchment from rain water. The various sources reported are as shown in Figure 10

Well (1%)
Piped water (10.4%)
Roof catchment (1%)
Stream (35.1%)
Boreholes (52.5%)
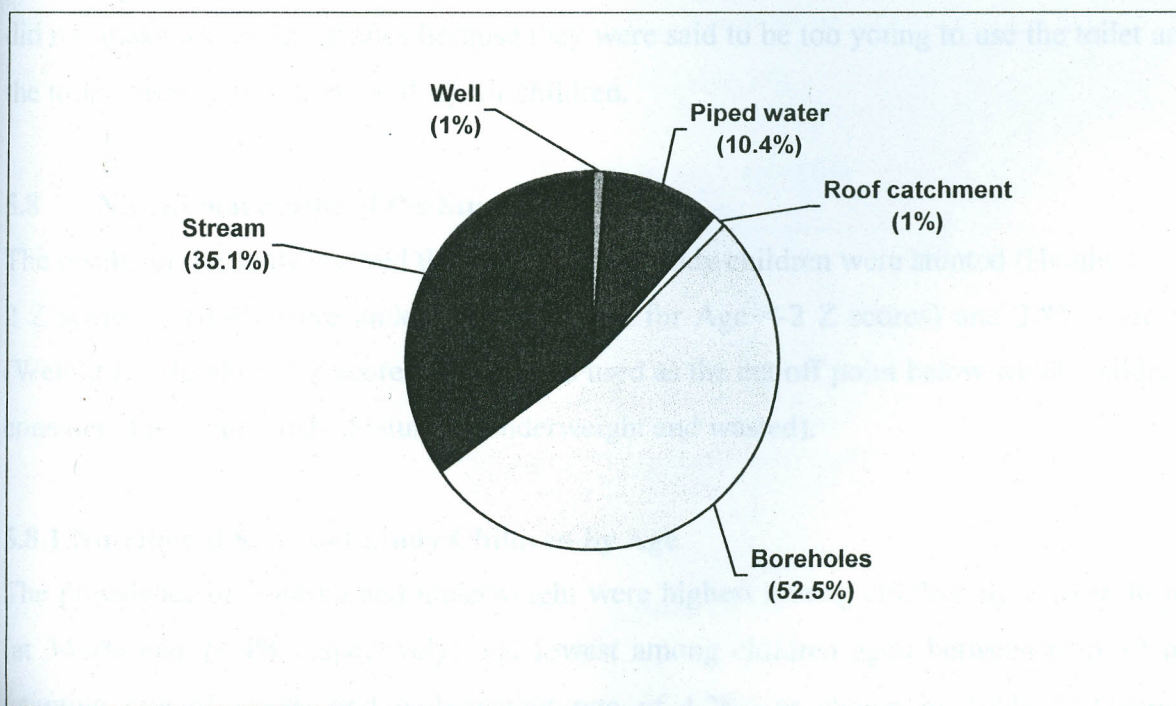
Fig 10. Sources of water for the households (N=385)

The amount of water used per household ranged between 20 litres and 220 litres with an average of 100 litres. This amount translates into an average of 16 litres of water per person per day. The recommended amount of water is 20 to 30 litres per person per day. [73]

Over 57% of the respondents said that the water they used was safe for drinking direct from the source without doing anything further to make it safer. Of those who thought that the water was unsafe for drinking straight from the source, 40.8% used methods such as boiling, filtering, or use of chemicals to make it safe. Almost all the households had a separate container for storage of drinking water of which 52.5% fetched water from the container by pouring from it, 43.9% by dipping into it and 1.3% by use of tap.

The general sanitation of the households and their surrounding was found to be poor with 31.4% of the households having human and animal waste littered all over the compound. About 54% of the households heaped rubbish in one place, 21% dumped the rubbish indiscriminately while the rest either burned or buried it.

Majority of the households (98.7%) had latrines in their compounds. Only 34.8% of the children did not make use of the latrines because they were said to be too young to use the toilet and also the toilets were considered too dirty for children.

5.8   Nutritional Status of the Study Children

The results of the study showed that 30.5% of the study children were stunted (Height for Age <-2 Z scores) , 10.9% were underweight (Weight for Age <-2 Z scores) and 2.8% were wasted (Weight for Height <-2 Z scores). -2SD was used as the cut off point below which children were considered as malnourished (stunted, underweight and wasted).

5.8.1 Nutritional Status of Study Children by Age

The prevalence of stunting and underweight were highest among children aged over 36 months (at 34.6% and 14.4% respectively) and lowest among children aged between 6 to 12 months (stunting rate of 19.3% and underweight rate of 4.2%) as shown in Table 9. Overall, the prevalence of stunting and underweight increased with increase in age . Although the prevalence

of wasting was highest among children aged between 18 to 24 months (4.7%), it was higher among younger children (especially those below two years) than among older children. There was however no significant association between nutritional status of the study children and age of the children (p>0.05).

Table 9. Nutritional status of study children by age (in months) (N=166)

Nutritional Status indicators	Age in months										P-value
	6-12		12-18		18-24		24-36		>36		
	n	%	n	%	n	%	n	%	n	%	
Stunting (N=114)	11	19.3	12	32.4	15	31.9	31	30.1	45	34.6	0.080
Underweight (N=42)	4	4.2	5	12.5	2	6.8	12	11.4	19	14.4	0.114
Wasting (N=10)	2	4.0	1	3.4	2	4.7	1	1.0	4	3.1	0.562

5.8.2 Nutritional Status of Study Children by Sex

The prevalence of wasting and underweight were higher among males than among female children. However prevalence of stunting was slightly higher among the females than among the males (30.8% and 30.2% respectively). There was however no statistical significance between nutritional status and sex of the children (P<0.05) (Table 10).

Table 10. Nutritional status of study children by sex   (N=166)

Nutritional Status Indicators	Sex of Index Children						P. Value
	Male		Female		Total		
	n	%	n	%	N	%	
Stunting	57	30.2	57	30.8	114	30.5	0.490
Wasting	7	3.8	3	1.8	10	2.8	0.195
Underweight	23	12	19	9.9	42	10.9	0.312

5.8.3 Nutritional Status of Study Children by Birth Order

The birth order of the study children ranged from 1 to 10 with a modal birth order of 1 and a mean of 3. There were more children from the lower birth orders with over 85% being of the birth order 1 to 5. In general stunting and underweight rates increased with the birth order while

wasting level was higher among children of lower birth orders as shown in Table 11. There was a highly significant association (P=0.00) (P<0.05) between prevalence of underweight and child's birth order.

Table 11. Nutritional Status of the Study Children by Birth Order (N=166)

variable	nutritional status indicators					
	stunting		underweight		wasting	
	%	p-value	%	p-value	%	p-value
Birth order						
1-3	29		10		10.3	
4-6	33	0.360	12	*0.00	8.0	0.614
7-10	38		22			

* significant at $\propto$ = 0.05

5.9 Nutritional Status of Study Children by Household Characteristics

5.9.1 Household Size and Household Income

The proportion of stunting and underweight were higher among children from larger households than among those from smaller households. Proportion of wasting was the same in large as well as in smaller households. For example stunting level was at 33% among children from households that had over 6 members while it was 29.4% among those who had between 1 to 5 persons. However there was no statistical significance between household size and the nutritional status of the children (P<0.05).

Stunting rate was higher (37.5%) among children from households that had between 3 to 4 children under 5 years of age than among children from households that had between 1 to 2 children under 5 years of age (30.3%). Underweight and wasting were only present among children from households that had 1 to 2 children below 5 years of age. There was however no statistical significance between the number of children under 5 years old per household and the nutritional status of the study children.

Household Income

The proportion of stunting was highest (33.3%) among children from household whose main source of livelihood was cash crop production. There were high rates of underweight among children from households whose main source of income was food crop production and casual labour (12.9% and 12.3% respectively) while wasting was highest (6.3%) among households whose main source of income was self employment as indicated in table 12.

Table 12. Distribution of childhood malnutrition by main source of livelihood (N=385)

Source of Livelihood	Nutritional Status					
	Stunting		Wasting		Underweight	
	n	%	n	%	n	%
Cash Crop production	1	33.3	-	-	-	-
Food Crop production	32	28.6	4	3.6	15	12.9
Salaried Employment	19	30.6	2	3.3	5	7.8
Self Employment	15	27.8	3	6.3	4	7.4
Casual Labour	47	32.9	1	0.8	18	12.3
Total	**114**	**30.5**	**10**	**2.8**	**42**	**10.9**

5.9.2 Household Food Security

The rate of acute malnutrition (wasting) was higher among children from households that bought food (30%) than the prevalence among children from households that grew their food(2.7%). However stunting and underweight were higher (32.1% and 13.4% respectively) among children from households that grew their own food than the rate of 28.7% and 8.2% respectively among children from households that bought food.

In general stunting rates seemed to increase with increase of the amount of money spent by the households on food per month. A stunting rate of 37.8% was found among children whose households used over Kshs 5,000 on food per month compared to a rate of 24.2% among children from households that use less than Kshs 1,000 per month on food. Underweight was more marked (22.9%) among children from the households that spent less than Kshs 1000 on food per month. Wasting rates decreased with increase on the amount of money spent on food. For example 9.4% of children from households that spent less than up to Kshs 1,000 per month on food were wasted compared to only 2.9% of children from households that spent over Kshs 5,000 on food per month. However there was no statistical significance between the amount of money spent on food and nutritional status of the study children.

5.10 Child Nutritional Status by Maternal Factors

5.10.1 Maternal Age and Maternal Marital Status

There was higher proportion of stunting among children of older mothers than those of younger mothers while wasting levels was higher among children of younger mothers. The highest proportion of underweight(18.2%) was among children of mothers of 40-44 years age group. Maternal age was not related to the nutritional status of the children (Table 13).

Maternal Marital Status

The highest proportion of stunting (37.5%) was among children whose mothers were divorced while 33.3% and 30.2% were among children of single mothers and married monogamous respectively. 3.6% of children of single mothers and 2.8% of children of married monogamous mothers were wasted while 33.3% 11.95%,and 11.85% of children of widowed, single and married monogamous mothers respectively were underweight. However maternal marital status did not show any statistical significance with any of the three nutritional indices (Table 13).

5.10.2 Maternal Education and Maternal Occupation

Stunting and underweight levels were higher among children whose mothers had no education at all, those with primary education, and those who had not completed secondary education. Wasting levels seemed to increase with increase in education levels. However there was no significant association between maternal education and the children's nutritional status (Table 13).

The highest proportion of stunting (50%) was among children of salaried employed mothers, while that of underweight was among children whose mothers were subsistence farmers. Wasting was more among children of self-employed mothers and those of subsistence farmers. There was a high statistical significance between underweight and maternal occupation. (P=0.043) (Table 13).

Table 13 Distribution of child nutritional status by some selected maternal factors. (N=385)

Variable	%	stunting		underweight		wasting	
		%	p-value	%	p-value	%	p-value
Mother's age in years							
<19	2.7	10.0		9.1		-	
20-24	25.9	28.9		12.9		5.3	
25-29	34.0	29.1		10.8		1.7	
30-34	18.7	34.3	0.711	9.6		3.1	0.743
35-39	13.4	32.0		8.2		2.2	
40-44	2.9	36.4		18.2		-	
>45	2.4	44.4		11.1		-	
Mother's marital status							
Married monogamous							
Married polygamous	79.7	30.2		11.8		2.8	
Single (never married)	0.8	-		-		-	
Divorced	16.6	33.3	0.621	7.8	0.441	3.6	0.977
Widowed	2.1	37.5		-		-	
	0.8	-		33.3		-	
Education							
Lower primary, Std.1-4	7.3	42.9		14.8		-	
Upper primary,5-7/8	66.0	32.0		11.4		3.0	
Secondary incomplete	6.0	30.4		17.4		-	
Secondary completed	16.6	19.0	0.092	6.3	0.232	3.2	0.548
College/University	2.3	22.2		-		11.1	
No formal education	1.6	33.3		16.7		-	
Adult literacy education	0.3	100		-		-	
Occupation							
Cash crop farming	2.9	27.3		-		-	
Subsistence farming	30.9	37.9		18.5		4.4	
Casual laborer	25.2	26.6		7.2		1.2	
Self-employed	9.6	30.6	0.069	8.3	0.043*	5.7	
Housewife	29.4	13.5		8.8		2.0	
Salaried employment	2.1	50.0-		-		-	

* significant at ∝ =0.05

5.10.3 Maternal Health Factors

Among the children whose mothers reportedly suffered an illness in the two weeks prior to the study, 31.6% were stunted, 13.4%, 3.8% were underweight and wasted respectively while 28.8%, 7.3% and 1.4% of children whose mothers were reportedly well were stunted, underweight and wasted respectively. Thus in general, there was a higher prevalence of malnutrition among children whose mothers were reportedly ill than among those whose mothers were reportedly well. There was a highly statistical significance between underweight and mothers morbidity status (($p=0.041$) $p<0.05$)) (Table 14). .

Table 14. Nutritional status of study children in relation to maternal health factors (N=385)

Variables		Nutritional Status								
		Stunting			Wasting			Underweight		
	n	n	%	p-value	n	%	p-value	n	%	p-value
Morbidity status										
Sick	152	71	31.6		8	3.8		31	13.4	
Not sick	233	43	28.9	0.331	2	1.4	0.165	11	7.2	*0.041
Attended ANC										
Yes	373	110	30.9		10	2.9		40	11.3	
No	12	4	16.7	0.237	-	-	0.747	1	0.1	0.244
Commencement of ANC										
1st trimester	67	22	33.8		6	9.0		1	1.7	
2nd trimester	238	6	28.4		27	11.3		6	2.7	
3rd trimester	68	24	36.4		9	13.4	0.244	3	4.9	0.747
Use of family planning methods										
Yes	191	55	29.0		4	1.7		20	11	
No	139	40	30.4	0.445	3	3.3	0.305	14	9.4	0.393

* significant at $\alpha = 0.05$ ($p<0.05$)

In general there was a higher prevalence of malnutrition as reflected by the three nutritional indices among children whose mothers started attending antenatal clinic in the third trimester compared to the levels among children whose mothers commenced antenatal clinic during the first or the second trimester. There was however no significant association between child nutritional status and the timing of commencement of antenatal clinic attendance.

5.11   Nutritional Status of Study Children by Selected Child Care Practices

5.11.1 Breastfeeding Practices

The prevalence of wasting and underweight was higher among the children who were breastfeeding at the time of the study (4.3% and 11.9% respectively), than the prevalence of wasting and underweight among those children who had stopped breastfeeding (2.1% and 10.4% respectively). The prevalence of stunting (30.5%) was however the same in the two groups of children.

Despite the fact that there was no statistically significant difference between the nutritional status of children who were breastfed on demand and those who were breastfed on scheduled time, there was a higher prevalence of underweight (15.8%) among children breastfed on scheduled time than among those who were breastfed on demand (11.3%). However stunting levels were slightly higher among those children who were breastfed on demand than among those who were breastfed on scheduled times (30.6% and 30.0% respectively) while wasting was only found among the children who were breastfed on demand.

The highest rate of stunting (45.5%) was found among children who were breastfed for 1 to 2 times in a day. In general the rates of stunting decreased with increase in the frequency of breastfeeding. There was however a notable high rate of stunting (37.5%) among the children who were breastfed for over 8 times in a day. Generally the levels of underweight decreased with increase in the rates of breastfeeding with the lowest rate of 11.8% being among children who were breastfed for over 8 times in a day while none of these children (those breastfed for over 8 times in a day) were wasted.

The prevalence of the three nutritional indicators (stunting, wasting and underweight) was higher among children who were breastfed for less than 24 months than among those who had breastfed for over 24 months. There was a highly statistical significant association between stunting and duration of breastfeeding ((p=0.046) (p<0.05)) (Table 15).

Table 15 Nutritional status of study children by breastfeeding variables (N=385)

Variables	n	Stunting			Wasting			Underweight		
		n	%	p-value	n	%	p-value	n	%	p-value
Breastfeeding status										
Breastfeeding	135	39	30.5	0.547	5	4.3	0.201	16	11.9	0.382
Not breastfeeding	250	75	30.5		5	2.1		26	10.4	
Frequency of breastfeeding										
1-2 times	13	5	45.5		-	-		2	16.7	
3-5 times	49	13	27.7	0.842	2	4.7		3	16.1	
6-8 times	56	15	27.8		3	5.9	0.968	9	16.1	0.586
>8 times	17	6	37.5		-	-		2	11.8	
Timing of breastfeeding										
On demand	115	33	30.6	0.594	5	5	0.469	13	11.3	0.403
On scheduled times	20	6	30.0		-	-		3	15.8	
Duration of breastfeeding										
<24 months	228	21	41.2	*0.046	2	3.9	0.387	9	16.7	0.101
>24 months	157	53	27.6		4	2.2		18	9.3	

* significant at ∝ =0.05 (p<0.05)

5.11.2 Complementary Feeding Practices

Of the children who were given complementary feeds before 4 months, 30.2% were stunted, 11.4% were underweight and 3% were wasted. There was no statistical significance between period of commencement complementary feeding and the nutritional status of the children. There was no significant association between frequency of the feeds and the nutritional status of the children. In general, proportions of wasting decreased with increase of the feeding frequency while stunting and underweight rates increased with increase of the feeding frequency. However, children who were fed for over 5 times in a day were not malnourished.

There was also a higher proportion of malnutrition among children who shared a plate with others while feeding than among those who were individually fed. For example the proportion of wasting was *16.7% among children who shared a plate with others as compared to 2.3% among*

those who were fed individually. There was a highly significant association between sharing of food during meal time among the children and wasting (P=0.041).

5.11.3 Dietary Care During Illness and Recovery

The prevalence of malnutrition (as indicated by wasting, underweight and stunting levels) was higher among children whose mothers reportedly withdrew breastfeeding during diarrhoeal illness (Table 16). The levels of malnutrition were also higher among those children who were reportedly not fed on special foods during illness. Notably the prevalence of malnutrition was lowest among children who were fed for more times than usual during illness. Acute malnutrition was present only among children who were fed less times than usual and those who were fed as usual during illness. Those children who were fed more times than usual during illness were not wasted.

Table 16: Distribution of Malnourished Children by Practices of feeding during illness (N=385)

Feeding Practices		Nutritional Status						
Variables		Stunting			Wasting		Underweight	
	n	n	%	n	%	n	%	
Breastfeeding during diarrhoea								
Yes	329	97	30.4	9	2.0	36	10.7	
No	56	17	30.9	1	3.0	6	11.0	
Frequency of feeding during illness								
As usual	50	4	30.8	1	9.1	1	8.1	
Less times	286	85	31.9	9	3.4	33	10.2	
More times	49	15	28.6	-	-	5	7.7	
Child fed on special foods								
Yes	229	69	30.4	9	4.0	28	12	
No	156	45	30.6	1	0.8	14	9.3	

5.11.4: Alternative Child Care Givers

The prevalence of wasting was higher (3.2%) among children who were left under the care of other caregivers compared to a rate of 1.3% among those children who were reportedly cared for by their mothers. However the prevalence of stunting was almost the same in the two groups (30.5% and 30.4% among those children who were left under the care of other caregivers and those who were cared for by their mothers.) Table 17.

Table 17: Nutritional Status of Study Children by average number of hours that child was left under care of others.

Average number of hours	Nutritional Status					
	Stunting		Wasting		Underweight	
	n	%	n	%	n	%
1-4	48	32.7	7	4.9	20	13.2
5-8	41	29.7	2	1.6	10	7.2
>9	1	9.1	-	-	-	-

The prevalence of malnutrition decreased with increase in number of hours that a child was left under the care of other caregivers.

5.12 Nutritional Status of the Study Children by Health Status and Health Seeking Behaviour

5.12.1 Immunization

Although there was no statistical significance between immunization and the nutritional status of the children, proportions of wasting and underweight were higher among those who were not fully immunized for age than among those who were fully immunized. Stunting levels were however higher among the children who were fully immunized for age than among those who were not fully immunized, the levels being 31.1% and 9.1 % respectively (Table 18).

5.12.2 Child Morbidity Status

Of the children who were reported ill two weeks prior to the study, 29.1%, 11.6%, and 2.6% were stunted, underweight and wasted respectively. The prevalence of underweight (11.6%) was higher among children who were reported ill than the prevalence (9.6%) among those who were

reported to have been well 2 weeks prior to the study. However wasting and stunting levels were higher among children who were reportedly well than among those who were reportedly sick 2 weeks prior to the study (Table 18).

Of the children who were reported to have suffered from upper respiratory infection two weeks prior to the study, 28.6 % were stunted, 20.1% were underweight, and 1.8% were wasted. Of those who were suffering from diarrhoea, 37.1% were stunted, 9.1% were underweight, while none were wasted. Among those who had suffered from malaria, 25% were stunted, 7.8% were underweight, and 3.9% were wasted.

Table 18. Nutritional status of the study children by child health factors

Variables		Nutritional status								
	n	Stunting			Underweight			Wasting		
Morbidity		n	%	p-value	n	%	p-value	n	%	p-value
Sick	250	71	29.1	0.248	29	11.6	0.337	6	2.6	0.482
Not sick	135	43	33.1		13	9.6		4	3.3	
Persistent illness										
Yes	43	13	32.5	0.448	2	4.9	0.144	-	-	0.347
No	343	101	30.2		40	11.7		10	3.1	
Immunization										
Yes	374	113	31.1	0.098	40	10.7	0.746	10	2.9	0.726
No	11	1	9.1		2	18.2		11	3.2	

There was a higher prevalence of stunting (32.5%) among children who reportedly had a persistent illness than the prevalence (30.2%) among those who reportedly had no persistent illness. However the prevalence of underweight and wasting was higher among those children who reportedly did not have a persistent illness than among those who were reported to have a persistent illness. There was no statistical significant relationship between child nutritional status and child morbidity status.

5.13   Housing, Water and Sanitation and the Nutritional Status of the Children

There was no statistical significance between nutritional status of the study children and the type of housing. However, there was a significantly higher rate of wasting (3,8%) among children who lived in semi-permanent houses compared to the rate of wasting (1.1%) among children who lived in permanent houses. Stunting levels were highest among children who lived in temporary houses (41.9%) compared to rates of 31.2% and 28.8% among children who lived in semi-permanent and permanent houses respectively. The prevalence of underweight was almost the same among children from temporary and semi-permanent houses, (12.1% and 12.4% respectively) and lowest among children from permanent houses (6.5%). Overall children from permanent houses were better nourished than children from temporary and semi-permanent houses.

There was a higher prevalence of underweight (20%) among children from households without latrines compared to a rate of 10.8% among children from households with latrines. However stunting level (30.6%) was surprisingly higher among children from households with latrines compared to a rate of 20% among children from households without latrines. Stunting and underweight levels were higher among children who made use of the latrines (32.1% and 13.2% respectively) than the levels of stunting and underweight among those children who did not make use of latrines (27.5% and 6.7% respectively). However wasting level (5%) was higher among children who did not use latrines than the rate among those who made use of the latrines(1.7%). There was a highly statistical significance between underweight and use of latrines by the study children ($P=0.035$) ($P<0.05$).

The prevalence of malnutrition was higher among households whose compounds were not littered with human and/or animal waste than among households whose compounds were littered with human and/or animal waste. Stunting, wasting and underweight levels were 30.9%, 3.2%, 11.7% respectively among households that were not littered compared to levels of 29.6%, 1.9%, and 9.2% of stunting, wasting and underweight among households whose compounds were littered with human and/or animal waste.

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Proportions of wasting (7.3%) and underweight (11.2%) were higher among children from households that used 20-100 litres (1-5, twenty litres Jerycans) of water per day or about 16 litres per person per day than in those that used 120 litres or more per day. Stunting rates were almost the same in the two groups. There was however no statistical significance between amount of water used and the nutritional status of the children.

5.14   Correlation of Child Nutritional Status with Selected Independent Variables

To determine the correlates of nutritional status of the study children and some independent variable, pearson correlation was carried out. Table 19 shows the independent variables that were correlated with the three nutritional indices (Height for Age, Weight for Age, Weight for Height)

As shown in table 19, underweight correlated negatively and significantly (P<0.05) with variables such as age of the index child, household income and frequency of feeds. Underweight was also negatively but not significantly (P>0.05) correlated with maternal education, duration of breastfeeding; frequency of breastfeeding, age of introduction of complimentary feeds and frequency of feeding the index child with special meals. Variables such as birth spacing, maternal age, age of household head, household head education level, household monthly food expenditure, and the distance to the nearest health facility, were positively but not significantly (P>0.05) associated with weight for age. Underweight correlated positively and significantly (P<0.05) with size of the farm, number of hours that child was left under care of others and the amount of water used in the households.

Stunting correlated negatively and significantly (P<0.05) with maternal age while it correlated negatively but not significantly with (P>0.05) with age of index child, birth spacing, age of the household head, household monthly expenditure on food, frequency of breast feeding, age of introduction to complimentary feeds, frequency of feeds, and with the distance to the nearest health facility. The level of stunting was positively and significantly (P<0.05) associated with household head education level, and with maternal education. It was positively but not

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significantly (P>0.05) associated with household income, size of the farm (acreage), duration of breastfeeding, frequency of special feeds and with the number of hours that child was left under care of others.

Wasting was negatively and significantly (P<0.05) associated with maternal education and the frequency of special feeds. Variables such as index child age, household income, duration and frequency of breastfeeding, age at introduction of complimentary feeds, frequency of feeds were negatively but not significantly (P>0.05) associated with weight for height. Maternal age, and the amount of water used in the household were positively and significantly (P<0.05) associated with weight for height. Wasting was also positively but not significantly (P>0.05) associated with birth spacing, age of the head of household, household head education level, household monthly food expenditure, size of the farm, the number of hours that index child was left under the care of others and the distance to the nearest health facility.

Table 19: Correlation of Child Nutritional status with specific independent variables N=385)

Variables	n	WAZ		HAZ		WHZ	
		r	p	r	p	r	p
Child factors							
Age of child	375	-0.162*	0.002	-0.043	0.423	0.050	0.352
Birth spacing	275	0.032	0.297	-0.064	0.157	0.057	0.182
Maternal factors							
Maternal age	375	0.008	0.444	-0.090*	0.047	0.094*	0.038
Maternal education	375	-0.042	0.210	0.123*	0.011	-0.089*	0.047
Household factor							
Age of household head	375	0.066	0.102	-0.013	0.406	0.058	0.140
HHH education level	375	0.022	0.334	0.123*	0.011	0.010	0.423
HH income	375	-0.119*	0.022	0.075	0.163	-0.094	0.078
HH monthly food expenditure	375	0.069	0.181	-0.008	0.878	0.084	0.117
Size of farm (Acreage)	375	-0.117*	0.024	0.012	0.822	0.085	0.111
Breastfeeding variables							
Duration of B/F	244	-0.013	0.423	0.029	0.333	-0.039	0.278
Frequency of B/F	128	-0.007	0.470	-0.107	0.120	-0.119	0.10
Complimentary feeding							
Age at introduction of complimentary feeds	375	-0.057	0.274	-0.047	0.390	-0.007	0.895
Child feed practices							
Frequency of feeds	375	-0.116*	0.013	-0.049	0.182	-0.010	0.424
Frequency of special feeds	229	-0.069	0.148	0.052	0.225	-0.116*	0.44
Number of hours child is left under care of others	297	0.106*	0.034	0.077	0.101	0.067	0.134
Amount of water	375	0.162**	0.002	0.087	0.106	0.129	0.015 +
Distance to health facility	375	0.073	0.080	-0.029	0.293	0.085	0.054

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level.

CHAPTER 6

6.0   DISCUSSION

6.1   The Study Population

The study set out to determine the main risk factors of childhood malnutrition in Makuyu Division of Maragua District. The study population depicted a typical rural population in a developing country, which is characterized by low levels of employment, low levels of income, low levels of education. The average household size of 6 persons reflects a large household size. This household size is even higher than the National average household size of 4.4 persons and the rural Kenyan household size of 4.7 persons. [5]

The fact that most mothers (over 60%) were between the age of 20-29 years reflects a relatively young population structure. The education levels of the study population was relatively low. Only 4.9% of households heads and 2.3% of the study mothers had attained college/university education. The proportion of 2.3% of mothers who reportedly had attained post-secondary education was even lower than the rural Kenyan level where 3.1% of mothers are said to have attained post secondary education. [5]

The income levels were also low as reflected by the per capita income of only Kshs. 870 per person per month. The low income levels were also reflected by poor employment levels with majority of people being engaged as casual labourers and only 15.1% of household heads and 2.1% of study mothers being engaged in salaried employment.

6.2   Nutritional Status of the Study Children

The prevalence of stunting was found to be high in the study population. The level of stunting at 30.5% is about 15 times the level of stunting expected in a healthy well nourished population, while the proportion of underweight (10.9%) is about 5 times more. The level of wasting (2.8%) was however low since it compares to the levels of 2-3% of malnutrition acceptable in a healthy well nourished population. The high level of stunting and low level of wasting in the study population reflects the situation as found in non-emergency situation. [74]

The prevalence of stunting in the current study (30.5%) is as high as the current National prevalence of stunting in Kenya (30.6%) while the proportion of underweight (10.9%) and that of wasting (2.8%) were lower than the National levels of underweight and wasting in Kenya, (19.1% and 4.8% respectively).[5] This level of stunting is also lower than the level of 35% registered in the rural Kenya population while the prevalence of wasting is far much lower in the study population (2.8%) compared to a prevalence of 6% in the rural Kenya.[5] Stunting is generally associated with prolonged poor dietary intake and recurrent episodes of infection due to low socio-economic status.[74] Thus, the high levels of stunting in the study area could be explained by the fact that the socio-economic status in the area is low as reflected by low education levels, low income levels, low employment status, poor housing conditions with only 24% of households having permanent houses.

Other studies conducted earlier in Kenya have revealed high prevalence of stunting among older children than among younger ones. For example, in Vihiga Division of Kakamega District, malnutrition was found to be more advanced in older children than in younger children while in a study done in Lower Nyakach Kisumu, older children were found to be significantly more underweight and stunted than younger children.[19, 47] The fact that the prevalence of stunting and underweight was lowest among children aged below 12 months could be associated with the fact that younger children were probably still getting adequate nutrients from the breast milk. The observation of the proportion of wastage being the highest (4.7%) at the age group of 18-24 months could be associated with the age of ceasation of breastfeeding, which was mainly at about 18 months of age in the study population.

The current study also revealed that more boys than girls were malnourished. Prevalence of wasting and underweight was higher among male children than among female children. Such findings were also found in studies done in Lower Nyakach, Kisumu and in Kathiani Division of Machakos District.[19, 75]

The fact that the proportion of stunting and underweight increased with the birth order and the fact that there was a significant association between underweight and birth order could be explained by the fact that the family pot is shared among a large number of people in the households, leading to inadequate dietary intake and hence malnutrition. It could also be due to by the fact that the child may be receiving inadequate care from the caregivers because the caregivers have to share their time among other household members.

6.3   Factors Influencing Child Nutritional Status

6.3.1   Household Factors

Household Size

The household size of between 1 to 16 persons with an average of 6 persons per household in the study population can be termed as large. The mean household size of 6 persons per household is higher than the mean size of a Kenyan household of 4.4 persons, the Central Kenya Province mean household size of 3.8 persons, and the rural Kenyan mean household size of 4.7 persons.[5] Such large household size had also been found in another study carried out in Sengerama District of Tanzania where the mean size of the household was 6.9 persons. [43]

In the current study, stunting and underweight rates were found to be higher among children from larger households than those from smaller households. This is in support of previous study findings whereby it was revealed that children form larger households were significantly shorter for their age [51]. For example in a study carried out in Siaya District, Kenya; and in another one done in Mwea Irrigation Scheme.[45,46] However the findings are in contrast to those of a study done in Uganda where higher malnutrition levels were found among children from smaller households than among those from larger households.[34]

These findings could be attributed to the fact that children from large households may lack access to enough food since food is shared among many households members and are thus said to eat nutritionally poorer quality and quantity foods than children from

smaller households. Large family size is said to limit the amount of food per capita in the household.[53] Children from such large households are deprived off enough time for care especially from their mothers since the mother has to attend to all of them. The attention given to individual children is lowered in large families as compared to smaller households.[52]

Although there was no statistical significance between nutritional status and the number of children under 5 years of age in the households, the proportion of stunting (37.5%) was higher among children from households that had 3 to 4 children under 5 years of age compared to a rate of 30.3% among children from households that had between one to two children under 5 years of age. The finding of lack of statistical significance between nutritional status and the number of children under 5 years old support the findings of a study carried out in Kibera slums of Nairobi.[28]

The high proportion of stunting among households with more children under 5 years of age could be explained by the fact that when children under 5 years of age are more in a household, they get divided attention from the mother and hence many not receive adequate care. The per capita food consumption for such children may also be less since they have to share the food available.

Household Income

The majority of households in the study population (68%) had the main source of livelihood as casual work (38%) in agricultural plantations and food crop production (30%). This is not surprising since Makuyu is in a rural set-up where the backbone of activities is agriculture. The situation also reflects the National situation, whereby the Kenyan economy is said to be predominantly agricultural. Nationally 61.9% of rural women and 54.8% of rural men are said to obtain livelihood through agricultural activities.[5]

The average total monthly income of Kshs. 5221 can be termed as low. This amount would translate into 870 Kshs. per person per month (considering that the average household size is 6 persons per household). This in effect means that about 65.8% of

households in Makuyu (those earning below Kshs. 5000 can be termed as living below the poverty line. It is recommended that households in the rural areas that spends below Kshs. 978 per person per month lives below the poverty line.[61] Indeed the FGD participants reported that the main source of livelihood in Makuyu is casual labour and that the amount earned from such labour is not enough *"Most of the people in Makuyu are casual labourers in the large coffee and fruits plantations such as "Kakuzi". They only earn about Kshs. 62 per person per earn. This money is not enough for the needs of the family"*.

The 95.8% ownership of radio in households in Makuyu is far much higher than the 71% ownership of radio in rural Kenya households. Nationally radio, bicycle and television are said to be the most commonly owned durable goods among Kenyan households.[5] However in Makuyu ownership of T.V. sets is really low at only 15.8%. This implies that the socio-economic status of the study population is low.

The high prevalence of underweight among children from households whose main source of income was food crop production (12.9%) and casual labour (12.3%) could be attributed to the fact that food grown in the region is never enough as reported and that amount earned from casual labour is too little as earlier reported. These findings are in support of a study done in Philippines where malnutrition was associated with low incomes.[55] The FGD participants confirmed that the households that mainly rely on food crop production do not harvest enough and have to purchase food. *"The food grown is never enough to last households from one harvesting season to the next and people have to buy food inorder to feed their families"* As reported earlier the amount obtained from casual labour was said to be to little to cater for the entire family.

The high rate of stunting (33.3%) among children from households whose main source of income was cash crop production could be explained by the fact that such households did not have readily available foods and had to sell their cash crop inorder to purchase food. It's likely that the food purchased after sale of cash crop was not enough for the household members.

Household Food Security

The fact that 95% of the households that grew their own food (52%) resorted to purchasing food to compensate for the food deficit and the fact that almost half of the households (47.8%) in Makuyu relied on food from purchase, points towards food insecurity in the region. The FGD participants and the key informers confirmed that there is usually shortage of food in Makuyu. *"Even those who grow their own food do not get enough from the farms. The food can not feed the families from one harvesting season to the next"* The farms in Makuyu can also be termed as small with an average of 2 acres. The following report by one key informants highlights the situation of food insecurity in the region. *"Families in Makuyu do not have enough food. The farms in the area are too small and the soil is very sandy and not productive at all. There is usually a problem of lack of enough rainfall throughout the year. This place is like a semi-desert"* Access to food in the area does not seem to be consistent and sustainable.

The high rate of wasting (30%) from households that bought food could be explained by the fact that food bought may have been inadequate. The families do not have a lot of purchasing power since their earnings are low with an average amount of Kshs. 870 per person per month. The high prevalence of stunting (32.1%) and underweight (13.4%) among households that grew their own food could be due to the fact that, the food grown by these families was never enough as reported earlier. These study findings are in support of a study done in Embu where families were not able to meet their daily calorie requirement from both purchased and produced sources of food. [63]

The prevalence of stunting increased with the increase in the amount of money spent on food, could be attributed to the fact that such households that spent a lot of money on food may not have had other source of food (eg from the farms) and hence spending more. The food purchased may not have been enough for the household members; considering the low incomes in the area. Household that spent less amount of money for purchase of food could have had food from other sources (eg from the farms) and hence ensuring food availability to the household members which could explain the lower levels of stunting in such households. The finding that wasting was higher among families that spent less amount of money on food is in support of findings of a study done in Uganda. [16]

Maternal Factors

Maternal Age

Most of the study mothers were young with over 60% of mothers belonging to the 14-29 years age group. This kind of age distribution was expected since only mothers with children aged between 6-59 months were included in the study. Age specific fertility rates have been found to be highest within the age range of 20-29 years in most parts of the world.[76] It is thus possible that most mothers in the current study had their young children in this age range and hence were the majority. The fertility in rural Kenya is said to peak at the age 20-24 years falling sharply after 39 years. This scenario is reflected with the distribution of mother in the various age-groups in the current study.

The finding that there was no significant association between maternal age and the nutritional status of the children is in support of previous studies done in Uganda, Ethiopia and in Nairobi.[16,27,35] The fact that there was a higher proportion of stunting among children of older mothers than those of their younger counterparts contrasts those of a previous study done in Mbarara Uganda.[34] However maternal age seemed to be protective of wasting. There were higher rates of wasting among children of younger mothers than among children of older mothers. Children whose mothers were above 40 years of age were not wasted. This finding agrees with findings of a study conducted in Uganda where wasting was found to be more prevalent among children of young mothers than those of older mothers.[16] This could be attributed to the fact that older mothers have more experience in child care compared to younger mothers. Younger mothers also lack the basic resources which older mothers have.

Maternal Marital Status

There was a high percentage of married mothers (80.5%) in the study population which is 20% more than the National level of 60%. The 16% of women who were single (never married at all) in the current study was slightly higher than half of the National level of 30%.[5]

In the current study no association was found between maternal marital status and the children nutritional status. This is in support of findings of a study carried out in Kenya.[35] However children whose mothers were either singles, divorced, widowed or separated showed higher rates of malnutrition than children whose mothers were in a marriage relationship. The observation that the highest rate of stunting (37%) was among children of divorced mothers and 33% among those of single mothers and that wasting and underweight were highest among children of single and widowed mothers respectively could be attributed to the fact that children of single parents are at higher risk of poor care as compared to their counterparts whose father and mother are spouses. This may be due to better quality of child care in households where both parents live, and can jointly monitor the development of he child. Its more likely that children of married mothers are more likely to be well nourished than those of single parents.[63]

The above study findings are in support of several previous studies conducted elsewhere. For example in Uganda, a study showed that childhood malnutrition was higher among children of single mothers than among those of married mothers.[34] Such findings were also found in studies done in Tanzania, in Mwea Irrigation Scheme - Kenya, and in Broke Bond Tea Estate of Limuru. [43,45,58]

Maternal Education

The maternal education levels in the study area can be said to be relatively low with only 2.3% of mothers attaining post-secondary education. The level of education can be said to be lower than that reflected in Kenya whereby 5.9% of mothers are said to have at least post-primary education while it is almost the same with the rural situation where by 3.1% of the mothers have attained post-secondary education.[5] Maternal education is said to increase the mothers ability to earn income.[14] The low levels of maternal education in the area could explain why most mothers are either housewives, subsistence farmers or casual labourers.

Although the results of the current study show no statistical significance between maternal education and the nutritional status of children, the prevalence of stunting and

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underweight was higher among children of mothers who had no formal education at all and those who had attained lower primary education. These findings compares well with the situation in Kenya, whereby education is said to have an inverse relationship with the nutritional status of the children. The prevalence of stunting and underweight in Kenya is higher among children whose mothers have no education (36% and 33% respectively) compared to children of mothers with secondary education (19 and 11% respectively)[5]. The findings also agree with those of previous studies conducted in Kenya whereby children of less educated mothers were said to be at a higher risk of malnutrition than those of more educated mothers.[6, 35] The results of a study conducted in Mwea where it was found that increase in number of years of schooling of women was expected to improve the nutritional status of children are also supported by the findings of the current study.[45] However the results contrast those of a study carried out in lower Nyakach region in Kisumu. [19]

The above results could be explained by the fact that more educated mothers have the ability to earn income and the ability to appreciate the importance of child care. Better educated mothers are said to have economic abilities and good knowledge of childcare and hence their children are said to be at a lower risk of malnutrition. Better educated mothers have a better interaction with their children than those mothers with little or no education.[14]

The current study findings that the prevalence of wasting seemed to increase with increase in level of maternal education could be explained by the fact that educated mothers are more likely to be in employment and hence have less time for child care activities. This in effect means that their children are at a higher risk of malnutrition than children of less educated mothers. This finding however contrasts the situation in Kenya where wasting levels are said to be higher among children whose mothers have no education at all.[5]

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Maternal Occupation

The low levels of mothers who are engaged in salaried employment (2.1%) in the current study, could be explained by the fact that maternal education levels were quite low with only 2.3% of mothers having attained post secondary education. This low level of education could explain why most mothers in the study are either housewives (29.4%), subsistence farmers (30.9%), or casual labourers (25.2%) The high percentage (58%) of women involved in agricultural activities (30.9% as subsistence farmers, 25.5% as casual labourers in large agricultural plantations, and 2.9% as cash crop farmers) in the study area compares well with the 56.1% of women involved in agricultural activities in Central Province.[5] Just as in the study area, agricultural activity is the commonest form of occupation for women in Kenya with 42% of Kenyan women being involved in such activities. The current study was done in a rural setting and its therefore not surprising that a high percentage of women are involved in agricultural activities. According to the Kenya demographic health survey 2003, 61% rural women in Kenya are involved in agricultural activities.[5] The FGD participants reported that women were mainly involved in agricultural activities in the study area. *"Women here mainly involve themselves in small scale farming of food crops and rearing of domestic animals such as goats, and sheep. There are many women also who work as "casuals" in large fruit and coffee farms of Kakuzi".*

The current study findings showed that children whose mothers were engaged in salaried employments had the highest proportion of stunting (50%) followed by those of subsistence farmers at 37.9%. Underweight and wasting were highest among children of subsistence farmers and those of self employed mothers respectively. These results show that children whose mothers worked outside the homes whether in the farms or in employment were more malnourished than those whose mothers remained at home.

The current study findings are in support of the findings of a study done in rural Iran where the nutritional status of children of mothers working outside the home was found to be poorer than that of children of non working mothers.[20] Also supported are the findings of a study carried out in Uganda where prevalence of childhood malnutrition was found to be higher in households of salaried employed mothers than in households of

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housewives.[34] The finding in the current study of a significant association between underweight and maternal occupation contrasts those of a study carried out in Nairobi where no relationship was found between maternal employment and children nutritional status.[69] The findings also support those of a study done in Tanzania where maternal ownership of income was found to be significantly and negatively associated with child nutritional status.[43]

The fact that there was a higher prevalence of malnutrition among those the children whose mothers worked outside the home than among those whose mothers remained at home could be attributed to a relationship between poverty and the consequent necessity of working outside the home. This leaves the mother with inadequate time for child care. It could also be attributed to the quality of alternative care. The alternative child care givers many not be competent enough in child care activities.

Maternal Health

The percentage (96.9%) of mothers in the study area who reportedly attended ante-natal clinic is higher than the reported National rate of 88% of women in Kenya who receive antenatal care. The percentage of mothers (85%) in the current study who were at least aware of a family planning method is lower than the reported National rate of 94%. The most common methods of family planning which were reportedly used by the mothers in the study area; injections and pills, are the same as the methods that are said to be widely known and used by women in Kenya. At least 57.9% of the mothers in the current study were reportedly using a family planning method which is a rate higher than the reported national rate of 39% (i.e. 39% of women in Kenya are said to be using a method of family planning).[5]

The fact that the prevalence of malnutrition was higher among children whose mothers reportedly suffered an illness than among those whose mothers were reportedly well, could be attributed to the fact that the mothers ability to give appropriate care to their children is affected by ill health. The capacity to provide care at the household level

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largely depend on the health of the mother.[9] Poor physical and mental health of mothers are major constraint to providing care in the households.[18]

6.3.3 Child Care Practices

Breastfeeding

The study findings of high levels of initiation of breastfeeding but hardly any practice of exclusive breastfeeding is not surprising. The FGD participants reported that initiation of breastfeeding is very high in the area and is usually done immediately after birth. The participants confirmed that exclusive breastfeeding was very rare. *"Only few mothers breastfeed exclusively in the area for upto four months. The number is actually negligible. Since the early 1990's, I have only seen about 3 to 4 mothers who have breastfeed exclusively for upto 4 months".*

This finding reflects the situation in Kenya where breast feeding is almost universal with 97% of children being breastfed but only 13% of children under 6 months being exclusively breastfed and the median of exclusive breastfeeding being less than one month.[5] These findings also support previous study findings which showed that in many countries initiation of breastfeeding is high (well above 90%) but exclusive breastfeeding is seldom.[26] Such findings were also found in a study done in Kibera slums of Nairobi and another one carried out in Kathonzweni division of Makueni Distrct.[18,28] The findings however contrasts those of a study carried out in Kirinyaga District where the rate of breastfeeding was found to be very low (about 40%).[30]

The frequency of breastfeeding in the study area can be said to be average with only 52.2% of mothers breastfeeding their children for over 6 times in a day. This is far much lower than the Kenyan situation where frequency of breastfeeding is a common occurrence with 92% of infants under 6 months of age breastfeeding for 6 or more times in a day.[5] The FGD participants confirmed that mothers have to leave their children to go and work in the farms and hence cannot breastfeed many times in a day. *"I work as a casual labourer at "Kakuzi farm" and I have to leave my baby at home. I only manage to breastfeed her for about 5 times in a day".*

The age of stoppage of breastfeeding (12-24 months) with an average age of 18 months in the current study is comparable to findings of studies done in Kathonzweni, Machakos District and in Kirinyaga District.[18,30] These findings are also comparable to the situation in Kenya, and the rural Kenya situation where the median duration of breastfeeding among Kenyan and rural Kenyan children is 20 months.[5]

The high prevalence of stunting found among children who were breastfed for 1-2 times in a day and among those children who were breastfed for less than 24 months could be associated with lack of adequate energy and nutrients since such children were fed less frequently and for a shorter duration respectively. Breastfeeding is said to be an unequaled way of providing ideal food for the healthy growth of infants and children.[11] Breastfeeding is ideal for harmonious physical and psychosocial development of the child. [21] The finding that prevalence of stunting was higher among children breastfed for less than 24 months contrasts the finding of a study done in Uganda where stunting was highest among children breastfed for over two years.[16]

Complementary Feeding Practices

Children who are given complimentary feeds too late, may be at a disadvantage of becoming malnourished than those who are given the complimentary feeds too early as the former are deprived off nutrients while the latter's major risk is mainly exposure to infections.[16] In the current study children were given complimentary feeds too early (age range of 1 day to 5 months with an average of 1 ½ months. This practice of early complimentary feeding is well documented as a practice in Kenya. By the age of 2 to 3 months almost half of the children are given complimentary feeds.[5] The findings are also comparable to findings of other studies such as the one carried out in Makueni District, in Kirinyaga District and in Uganda.[18, 30, 34]

The FGD participants gave an insight to the reasons behind early complimentary feeding practice. *"At birth, the baby's stomach is usually dirty and produces black substances. Hence plain water is given to the baby to clean the dirt. "Tasty water" (Water with glucose and/or sugar) is given to make the breast milk thinner so that digestion can be*

improved and the baby can pass light stool". Semi solids were also introduced early in the current study. *"Fruits are introduced at one week because the baby does not get satisfied on breast milk and water and they cry a lot. Sometimes babies vomit because their stomachs reject the "light food" (water and breast milk). But when something thicker like fruits is introduced, the babies become more comfortable and do not vomit nor cry a lot"*.

Although there was no statistical significance between the period at which complimentary feeding was commenced and the nutritional status of study children, prevalence of stunting was high (30.2%) among those children who were introduced to complimentary feeds before 4 months of age. Malnutrition in those children who were introduced to complimentary feeds early could be explained by the fact that such children are at increased danger/risk of infections which in turn increases the risk of malnutrition or worsens malnutrition. However the above findings contradicts those of a study done in Uganda whereby stunting rate was found to be higher among those children who were introduced to complimentary feeds late. [34]

The high proportion of wasting (16.7%) among children who shared a plate with others as compared to a rate of 2.3% among those children who were fed individually could be due to the fact that the former could have been getting inadequate food due to sharing. Such children are at an increased risk of malnutrition since inadequate dietary intake is one of the direct causes of malnutrition. The high rate of wasting among children who were fed less frequently could also be explained by inadequate dietary intake leading to wasting.

Dietary Care During Illness and Recovery

The study findings that most mothers (74.3%) reportedly fed their children less times than usual during illness contrasts the recommendation that a sick child requires to be given small frequent meals since infections affect appetite. [31] However in the current study majority (85%) of mothers continued breastfeeding their children during diarrhoel episodes. These findings compared with those of a study done in Thailand where only

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16.4% of mothers were found to withdraw breastfeeding during diarrhoeal episodes.[34] The finding also that most of the mothers continued giving other food to their children during diarrhoea supports the findings of studies done in Kibera slums of Nairobi and one carried out in Makueni District.[18,35]

It is not surprising that in the current study, the proportions of malnutrition as indicated by stunting, wasting and underweight was higher among children whose mothers reportedly withdrew breastfeeding during diarrhoeal, among those who were not fed on special foods during illness and among those who were fed less times than usual during illness. A sick child requires food to fight infections without using up the nutrients reserves in the body.[31] Children need to continue to eat regularly during illness and they require one extra meal each day for a week following an illness.[36] Breastfeeding should continue almost always even if a child has diarrhoea and that the child should receive adequate fluid intake. Sick children should be given small frequent meals since infections affect appetite.[31]

Alternate Child Care

The principal child care giver in the study area was reported to be the mother. However 78% of mothers reportedly left their children under the care of other people while they went to work especially in the farms. The FGD participants and the key informants reported that, although the main child care giver in the study area was the mother, the children were usually left under the care of other caregivers since mothers had to work. *"Mothers have to work in large plantation farms or in other people's farms as casual labourers. They also have to work in their own farms and thus have to leave children behind".*

The main alternate care givers included the grandmothers (42.2%) older siblings (29.7%) and neighbours (18.2%). These findings are in support of findings of a study done in Kathonzweni Division of Makueni District.[18] The finding that the primary alternate child care givers in the study area were the grandmothers contrasts findings of studies done in Tororo, Uganda and in Kisumu where the main alternate child care give was found to be elder siblings. [16,19]

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The fact that the study was carried out in a rural set-up where extended families live in the same compounds could explain the fact that grandmothers were the main alternate child care givers. It is also worth noting that there was a high involvement of neighbours as alternate child care givers. This was mainly noted among households where mothers were working (as casual labourers) and housed in the large coffee and fruit plantations in the area. Participation of fathers as alternate child care givers was minimal just like indicated in findings of previous studies. [16, 17]

The higher prevalence of wasting (3.2%) among children who were reportedly left under the care of other people compared to 1.3% among children who were reportedly not left under the care of other people could be attributed to the fact that the alternate child care giver may not be competent enough in child care (e.g. in feeding and other child care tasks.) These findings supports the findings of a study carried out in rural Iran whereby nutritional status of children of mothers working outside the home was found to be poorer than that of children of non-working women who did not leave their children under the care of others.[20]

6.3.4 Health and Health Seeking Practices

Immunization

The current study findings depict a high percentage of immunization since 97% of the study children were fully immunized for age against the common childhood diseases. This high proportion of immunization is higher than the reported National rate of 57%, the Central Province rate of 79% and the rural Kenya rate of 56%. Just like in the current study, a high immunization rate among children had been reported in a study done in Kathonzweni division of Makueni District.[18]

Proportions of wasting and underweight were higher among those children who were not fully immunized for age compared to the proportion among those who were fully immunized for age. This finding is in support of findings of studies done previously in Uganda and Tanzania.[34,44] Children who are not fully immunized for age are at a higher

risk of childhood illnesses which in turn has great impact on the nutritional status of children. Despite the high levels of immunization in he study area, the proportion of stunting (30.5%) is still high. This finding of high levels malnutrition despite high immunization rate is in support of findings of a study done in Gambia whereby nutritional status of children under 5 years of age was found to be poor despite high rates of immunization.[45] High levels of immunization may be of limited benefit, if other factors that contribute to the risk of malnutrition are not addressed.

Morbidity Satus of the Children

Close to 65% of the study children were reported to have suffered at least an illness in the two weeks prior to the study. The most common illnesses reported included, upper respiratory tract infections (such as pneumonia), malaria, skin infections and diarhoea. Apart from high presence of skin infections among children in the study area, the other childhood illnesses reported compares well with illnesses said to be particularly important as a cause of poor growth among children.[40] These illnesses are the same as those said to be major childhood illnesses in Kenya.[5] Similar childhood illnesses, were documented in the results of studies done in Kibera slums of Nairobi and in Kirinyaga District.[35,41] The high presence of skin infections (10.8%) among the study children could be associated with inadequate water in the households. The average amount of water used by one person per day was 16 litres; amount which is lower than the recommended amount of 20 to 30 litres per person per day.

Although there was no statistical significance between child morbidity status and the nutritional status, the prevalence of underweight was found to be higher (11.6%) among those children who were reportedly ill two weeks prior to the study as compared to a proportion of 9.6% among those children who were reportedly well 2 weeks prior to the study. The prevalence of stunting (32.5%) was also higher among children who suffered persistent illness compared to a rate of 30.2% among those who had no persistent illness. This could be due to the fact that infectious diseases have been found to have negative effects on child nutritional status.[77] Malnourished children are more vulnerable to infections and have more episodes of disease than well nourished children and vice versa.

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Child morbidity leads to depletion of body nutrient stores through increased metabolism such as fever, loss of appetite and hence reduced nutrient intake, coupled by increased demand for nutrients, and direct loss through vomiting and diarrhoea. The key informants confirmed that some children who presented to health facilities with infections, such as malaria, were usually found to be malnourished. *"Malaria with intestinal worms leads to anaemia in children and such children often presents in the health facilities with malnutrition".*

Health Seeking Behavior

Majority (95.5%) of households sought health care from established health care providers in the region. Most (67%) of the children who were reported sick were taken to the health facilities for medical attention. Those findings concur with those of study done in Uganda and another one carried out in Siaya District, Kenya where it was found that households mainly sought health care from health facilities.[34,46]

The average time taken (44.5 minutes) to reach the nearest health facility, confirmed that these health facilities were within easy reach (at least a distance of less than 5 kms.) This could explain why most people sought health care from those facilities. UNICEF recommends that families should have a health center within a reasonable distance. The distance of 5 kms to the nearest health facility is within reasonable reach. Qualitative data also confirmed that health care was mainly sought from health facilities since the facilities were within easy reach and that drugs were readily available.

6.3.5 Housing, Water and Sanitation

The housing situation is comparable to the rural Kenyan housing situation. About 67% of the households in the study population lived in semi-permanent houses which is comparable to the 69% of the Kenyan households who live in semi-permanent houses. The average number of persons per room (2 persons per room) is also comparable to the Kenya National level of 2.6 persons per room.[5]

At least over 60% of the households had access to safe drinking water, with over 50% obtaining water from boreholes while 1% had piped water. This reflects the Kenya National level where about 50% of rural population have access to safe drinking water.[5] The amount of water per capita was however low (16 litres of water per person per day) compared to the recommended amount of 20 to 30 liters of water per person per day. This could explain the high presence of skin infections among children in the study area. The high presence of latrines (98.7%) in the study households is comparable to the Kenyan National situation where over 80% of rural households are said to have some type of sanitary facility.[5]

The study findings that stunting level was highest (41.9%) among children who lived in temporary houses is in support of findings of a study done in India where stunting and wasting levels were found to be significantly higher among children from households with mud and dung floors. Poor housing and poor sanitary conditions adversely affect the nutritional status of children.[49] Poor housing also reflects low socio-economic status, hence poor access to food, health and poor care. This together with poor sanitation adversely affects the nutritional status of children. the current study also the prevalence of underweight (20%) was higher among children from households without latrines as compared to a rate of 10.8% among children from households with latrines. These findings are in agreement with those of a study done in Botswana.[50]

Poor sanitary conditions are said to affect the nutritional status of children. This could be due to the fact that poor sanitary conditions predispose children to illness especially diarrhoea which in turn has direct or indirect influence on the nutritional status of children. Higher level of stunting (30.6%) were observed in the current study among children from households with latrines compared to a rate of 20% among children from households without latrines. Similar findings were reported from a study carried out in Tanzania[43]. Good sanitary conditions could be of limited benefit towards nutritional status of children if other factors are not taken into consideration.

CHAPTER 7

7.0 CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The study set out to determine the main risk factors of childhood malnutrition in Makuyu Division of Maragua District. The study sought to establish the prevalence of childhood malnutrition among children aged 6-59 months and the main risk factors associated with childhood malnutrition in the study area.

The study found high prevalence of chronic malnutrition (30.5%) and underweight (10.9%) and low prevalence of wasting (2.8%) among children aged 6–59 months old in Makuyu Division. This proportion of chronic malnutrition (30.5%) is 15 times more than the levels expected in a normal, well-fed population. The prevalence of underweight (10.9%) is 5 times more the levels expected in a normal well fed population while wasting level of 2.8% can be said to be low. The main risk factors found to be associated with childhood malnutrition in the study area were, age and sex of the child, the birth order, household income, maternal characteristics, child feeding practices, morbidity and environmental sanitation.

Generally the prevalence of stunting and underweight increased with increase in age of the study children with the highest proportions being among children aged over 36 months (34.6% and 14.4% respectively) and lowest levels being among children aged between 6 to 12 months (stunting level of 19.3% and underweight level of 4.2%). The proportions of wasting and underweight were higher among male children than among the female children (3.8% and 12% among the males respectively and at 1.8% and 9.9% among the females respectively). There was a highly significant association (P = 0.000)(P<0.05) between the prevalence of underweight and the birth order of the index child. Generally stunting and underweight levels increased with the birth order while wasting was higher among children of lower birth orders.

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The household size in the study area was high (household size range of 1-16 persons with an average of 6 persons per household). Stunting and underweight levels were found to be higher among children from larger households than those from smaller households. The levels of income in the study population is low with the income per person per month being Kshs. 870. The low-income level is also reflected by the poor employment levels with majority of the people being engaged as casual labourers. Underweight correlated negatively but significantly ($P<0.05$) with household income.

The study mothers were young with over 60% being in the 14-29 years age group. The proportion of stunting was higher among children of older mothers than among those of their younger counterparts while the wasting levels was higher among children of younger mothers. Generally, there was a higher prevalence of malnutrition among children, whose mothers were either single, divorced, widowed or separated than among children whose mothers were in a marriage relationship. The maternal education level in the study area was low with only 2.3% of mothers attaining post-secondary education.

The prevalence of stunting and underweight was higher among children whose mothers had no form of formal education at all and among those who had attained only lower primary education as opposed to the levels among children whose mothers had achieved higher levels of education. Children whose mothers worked outside the homes whether in the farms or in employment were more malnourished than those whose mother remained at home.

Underweight was significantly ($P=0.043$) ($P<0.05$) associated with maternal occupation. The prevalence of malnutrition was generally higher among children whose mothers reportedly suffered an illness than among those whose mothers were reportedly well. Underweight was significantly ($P=0.041$) ($P<0.05$) associated with maternal morbidity status. The level of utilization of family planning services was moderate (at 57.9%) while the level of knowledge of existing methods of family planning was high (at 88%). However the family size despite this was found to be high.

There were high levels of initiation of breastfeeding but hardly any practice of exclusive breastfeeding. The frequency of breastfeeding in the study area can be said to be moderate with only 52.2% of mothers breastfeeding their children for over 6 times in a day. Chronic malnutrition was significantly associated with the duration of breastfeeding (P=0.046) (P<0.05). The prevalence of chromic malnutrition was higher among children who were breastfed for 1-2 times a day and among those who were breastfed for less than 24 months.

Complementary feeding was generally commenced too early with children receiving complementary feeds as early as in the first day of life and with an average age of 1 ½ months. The proportion of stunting was higher (30.2%) among those children who were introduced to complementary feeds before 4 months of age. The proportion of wasting (16.7%) was higher among those children who shared a plate with others than the rate of 2.3% among those who were fed individually. Wasting was significantly (P=0.041) (P<0.05) associated with whether the children were fed individually or whether they shared a plate with others. The frequency of feeding children during illness in the study area was low. Most (74.3%) of the mothers reportedly fed their children less times than usual during illness contrasting the recommendation that sick children require to be given small frequent meals since infection affect appetite [31]. The practice of breastfeeding during diarrhoeal episodes was however high. At least 85% of mothers continued breastfeeding their children during diarrhoeal episodes. Although the principle child-care giver in the study area was the mother, 78% of mothers reportedly left their children under the care of other people.

The immunization levels are high as depicted by the proportion of 97% of the study children who were fully immunized for age against the common childhood diseases. Stunting was found to be higher among those children who were fully immunized for age (31.1%) compared to 9.1% among those not fully immunized for age.

The common childhood illnesses reported in the area include upper respiratory tract infections, malaria, skin infections and diarrhoea. The high rate of skin infections among children in the study area is probably associated with inadequate water in the households. The prevalence of underweight was higher (11.6%) among those children who reportedly suffered an illness two weeks prior to the study. The proportion of chronic malnutrition (32.5%) was higher among children who suffered persistent illness compared to a rate of 30.2% among those who reportedly had no persistent illness. Majority of households (95.5%) sought health care from established health care providers in the region. The health care facilities were within easy reach.

The general sanitation of the households and the surrounding was also found to be poor with some households having human and animal waste littered all over the compound. There was however a high presence of latrines (at least 98.7% of households had latrines. Stunting levels were highest among those children who lived in temporary houses though not statistically significant. The amount of water per capita, (16 litres per person per day) is low.

7.2   Recommendations

1. Health education and nutrition education programmes should be initiated in the community. This can be done by the ministry of health in collaboration with the ministry of education. These programmes should be initiated in an integrated approach involving the health workers in the region, the community leaders, the community members and more so the mothers. Nutrition education for example should be introduced in the health facilities through the already existing maternal child health/family planning clinics (MCH/FP Clinics). Micro-teaching on infant and young children feeding can be done through such facilities. In the community the programs can be introduced through barazas through organized women groups and also through the community owned resource persons (CORPS).

Nutrition education programs should especially target the promotion of infant and young child feeding practices such as;

i) Promotion of proper breastfeeding practices such as exclusive breastfeeding during the first six months of a baby's life and breastfeeding on demand rather than on scheduled times.

ii) Promotion of appropriate complementary feeding beginning 6 months with continued breastfeeding to two years and beyond.

iii) Promotion of feeding of children during and after illness.

iv) Mothers with young children should be encouraged to prepare nutrition energy rich/dense foods for children especially for those children between ages of 0-36 months using locally available foods.

The health education programs should target on issues such as promotion of proper hygiene practices; proper health seeking practices, good health practices, especially for children. Through clinics such as MCH/FP clinics emphasis on good health practices for the mothers should be encouraged e.g. use of FP methods.

2. The community should be encouraged on achieving higher education levels. This can be achieved through the initiative by the ministry of education and all other stakeholders in education in the region eg the NGOs. This is by encouraging young people in school to attain high levels of education. Emphasis here should be placed in promotion of education for the girl child. Such girls in future would be better placed for better employment opportunities, and also be able to make independent decisions on health and nutrition of their children.

3. Through existing channels such as chiefs barazas; organized women groups; health facilities; corps, the community should be sensitized on proper sanitation and hygiene practices by the ministry of health through the already existing public health personnel in the area.. For example simple methods of treatment of water such as boiling should be encouraged, importance of use of latrines etc. Concerted efforts by both the health personnel, local chiefs, community members in improving housing and sanitation of the community.

4. Community should be enabled to have increased access to micro-credit facilities. This can be done through the initiative of the ministry of finance and the existing financial institutions in the study area. Mothers especially should be encouraged to access such facilities which would in effect help them establish income generating activities in order to boost their income. Such income generating activities would go a long way in supplementing the low income levels in the study area and also increase employment opportunities.

5. Emphasis should be laid on community based health care services. For example the Ministry of Health should be involved in sensitizing the community on basic integrated management of childhood illness (CIMCI.).

6. Intersectoral collaboration should be encouraged so as to bring essential services to the community. For example the Ministry of Water should collaborate with other ministries such as that of Agriculture in provision of adequate water to the community. Efforts should be made by local authorities, and the community to improve the housing and sanitation of the community.

APPENDIX 1

THE STUDY QUESTIONAIRE

The respondents throughout the questionnaire are the mothers of children aged 6 to 59 months old.

Name of the interviewer _____ Household number_____

Date of the interview (dd____ / mm____ / yy 20___)

Location _____

Village _____

SOCIAL-DEMOGRAPHIC INFORMATION

1. Name of the respondent _____

2. Name of the household head _____

3. Age of the mother (in completed years) _____

4. Maternal marital status
      1= Married monogamous   [   ]
      2=Married polygamous
      3= Single (Never married)
      4= Divorced/Separated
      5= Widowed
      6=Others (Specify) _____

5. Age of the head of the household if a member of the household.
      _____years (in completed years)
      88= Not a member of the household   [   ]

6. Number or children (Living) _____

7. Religion
      1 = Catholic   [   ]
      2=Protestant
      3=Muslim
      4=Others (specify) _____

8. Mothers education level   [   ]
      1= Lower primary education (standard 1 to 4)
      2= Upper primary education (standard 5 to7or 8)
      3= Secondary - not completed
      4- Secondary education- completed
      5- College/University education
      6= Others(Specify) _____

9. The head of the household education level   [   ]
      1= Lower primary education (standard 1 to 4)
      2= Upper primary education (standard 5 to7or 8)
      3= Secondary - not completed
      4- Secondary education- completed

5- College/University education
6= Others(Specify) _____

10. Maternal occupation   [   ]
        1=Cash crop farming
        2=Subsistence farming
        3=Casual labourer
        4=Self employed
        5=House wife
        6=Others (Specify) _____

11. Occupation of the head of the household   [   ]
        1=Cash crop farming
        2=Subsistence farming
        3=Casual labourer
        4=Self employed
        5=Others (Specify) _____
        88=No employment

12. How many people are living in this household? (Include the father, mother, children and all those living in this household at least for the past 3 months)_____

13. How many of these are children under 5 years of age? _____

INFORMATION ON THE INDEX CHILD

14. Date of Birth (dd _____/mm _____/yy_____)

15. Sex   1=Male   [   ]
             2= Female

16. Birth order of index child._____ born

17. What is the age difference between this child and the next one ____Months?

CHILD CARE
A. INFANT AND YOUNG CHILD FEEDING PRACTICES

18. Is this child currently breastfeeding?   [   ]
        1=Yes
        2=No

19. When do you breastfeed the child?   [   ]
        1= on demand
        2= scheduled time

20. How often do you breastfeed the child in a day?   [   ]
        1=1 to 2 times a day.
        2=3 to 5 times a day.
        3=6 to 8 times a day.
        4.=> 8 times a day

21. Have you introduced this child to other foods/fluids apart from breast milk?
                                         [   ]
        1= yes
        2= No

22. At what age did you introduce this child to other foods apart from breast milk?
_____ Months.

23. What made you introduce these other foods to the child at that time?
          1= Breast milk was not enough   [   ]
          2= Child was old enough
          3= Child was crying
          4= Advised by a health worker
          5= Advised by other mothers
          6= Others (specify) _____

24. What kind of food/fluids did you first introduce to this child and what method of feeding was used?.

FLUIDS	AGE (Months)	SEMI-SOLIDS	AGE (Months)	Method of feeding

FLUIDS	SEMI SOLIDS	METHOD OF FEEDING
1 =Plain water	1=Plain uji	1=Hand
2=Water with sugar/glucose	2=Enriched uji	
3=Tea		2=Cup
4=Cows milk	3=Mashed food	3=Cup and spoon
5=Others (Specify)	4=Mashed fruits	4=Nursing bottle
	5=Others (Specify)	5=Others (Specify)

_____   _____   _____

If the mother is not breast feeding the child, -ask,

25. How long did you breastfeed this child? _____ months.

26. What were the reasons for stopping breastfeeding?   [   ]
             1= Child refused to breastfeed.
             2= Child refused to eat other foods
             3=Mother was busy at work
             4= Mother was sick
             5= Next pregnancy
             6= Others (specify)_____

27. Do you prepare special meals for the index child?   [   ]
      1 =Yes
      2 = No

28.1f yes, how often do you prepare special meals for this child?   [   ]
1= Every meal
2= Occasionally
3= Others (Specify)

29. How many times is this child fed in a day? (Do not include the breast feeds for those who are breastfeeding)
    1- Once
    2- Twice

3- Thrice
4- Four times
5- > Five times
30. How is this, child fed?   [   ]
      1 =Individually
      2=Shares the same plate with the others
      3=Others (Specify) _____
31. What is your source of information on feeding of young children?
      1 = From other mothers.   [   ]
      2= From health workers
      3= Read from books
      4= Others (Specify) _____
32. 1n your own opinion, how long do you think an infant can thrive on breast milk alone?
33. How do you feed your child during illness?
      1= As usual
      2=Give special foods
      3=Feed the child less times than usual
      4=Feed the child more times than usual
      5= Other (Specify) _____
34. If this child has diarrhoea, do you continue breastfeeding?
      1=Yes   [   ]
      2=No   Reason _____
35. Do you continue giving your child other food apart from breast milk during diarrhoea?
                                              [   ]
      1=Yes
      2=No
36. Do you give your child any special food during -diarrhoea?
                                              [   ]
      1 =Yes
      2= No
37. If yes, what foods?
      1. _____
      2. _____
      3. _____
38. In your own opinion, are there any foods/drinks that should-not be given to children at any time for any reason?
      1= Yes   [   ]
      2= No

39. (If yes) What foods/drinks should not be given and why?

FOOD	REASON FOR WITHHOLDING
1	
2	
3.	
4.	

B.   INFANT AND CHILD HEALTH INFORMATION

40.   Does the child have an immunization card?   [   ]
          1=Yes
          2= No
41. Ask for the card and check the primary vaccinations. Is this child fully immunized for age?
          1= Yes   [   ]
          2= No
42. If no, why?
          1=Mother is too busy   [   ]
          2= Clinic is far
          3= Mother does not know that the child should be immunized.
          4=Others (Specify)_____
43. Has the child suffered from any illnesses within the last fourteen days?
          1=Yes   [   ]
          2=No
44. If yes, which illnesses? Tick all that apply.
          1= Diarrhoea   [   ]
          2=Cough   [   ]
          3=Runny nose   [   ]
          4=Fever   [   ]
          5=Skin disease   [   ]
          6=Others (Specify) _____
45. Has the child had any persistent illness?
          1=Yes   [   ]
          2=No
46. If yes, which one? _____
47. If the child has had any of the illnesses mentioned above, what was done?
          1= Stayed at home   [   ]
          2= Used herbs to treat
          3= Bought and used drugs
          4=Child taken to hospital
          5= Others (Specify) _____

48. Where does this household mainly seek health care from?   [   ]
        1=Local pharmacies
        2= Dispensaries
        3=Health centers
        4=District hospital
        5=Others (Specify) _____
49. How long does it take to get to this health facility? _____ Minutes.
50. Do you leave this child in the care of others?   [   ]
        1=Yes
        2= No
51. If yes, how often do you leave the child in a week? ._____days
52. How long on average do you leave the child on such days? _____ hours,
53 Who mainly takes care of this child while you are away?
        1= Older siblings
        2= Grandmother
        3= Neighbours
        4= House help
        5= Father
        6= Others (Specify) _____

MATERNAL HEALTH FACTORS
54. Have you suffered from any illness in the last 14 days?   [   ]
        1=Yes
        2=No
55. If yes, which illness(es)?   Tick all that apply
        1=Malaria   [   ]
        2=Back pain   [   ]
        3= Anaemia   [   ]
        4=Cough   [   ]
        5= Others (specify) _____
56.Have you had any persistent illness?
        1=Yes
        2=No
57. If yes, which one? _____

58. Did you attend antenatal clinic when you were expecting this child?
        1=Yes
        2=No
59. If yes, at what stage of the pregnancy did you start attending the clinic?
        1= First trimester (First three months of pregnancy)
        2=Second trimester (second three months of pregnancy)
        3=Third trimester (The last three months of pregnancy)
60.1f no, what were the reasons?
        1=Mother is too busy
        2=The health facility is far
        3=Mother is not aware of antenatal clinic

4=Others(Specify)_____

61. Are you aware of any family planning method?
    1=Yes   [   ]
    2=No

62. Are you currently using any family planning method?   [   ]
    1=Yes
    2=No

63. If yes, which method are you currently using?   [   ]
    1=Pills
    2=Injection
    3=Barrier methods e.g. Condoms
    4=Others (Specify)_____

64. If no, what are the reasons?   [   ]
    1=Religious beliefs
    2=Not available
    3=Too expensive
    4= I do not want
    5=Others(Specify)_____

HOUSING AND SANITATION

65. Observe and record the type of house that this family lives in.
    1=Permanent (Stone walled, cemented floors and iron-sheets or bricks roofing)
    2=Semi-permanent (mud/plastered walls with iron sheets-roofing)
    3=Temporary (mud/cartons/tin walls and grass thatched)

66. Observe the house and record the type of material used for the:
Floor_____ [ ]
Walls_____ [ ]
Roof _____ [ ]
    1= Mud
    2=Wood
    3=Cement
    4=Iron sheets
    5=Tin
    6=Others(Specify)   Floor_____
                                  Walls_____
                                  Roof_____

67. How many rooms does this house have? _____ Rooms

68. Is there human or animal waste littered in the house or within the compound? (Observe and record)   [ ]
    1=Yes
    2=No

69. Does the household have a latrine?   [ ]
    1=Yes
    2=No

70. Do the children in this household use the latrine?   [   ]

    1=Yes

    2=No

71. If no, what prevents them from using the latrine?

_____

_____

_____

72. About how many jerry cans of water do you use-per day in this household?

    _____ 20 litre jerry cans.

73. Where do you get water for this household?   [   ]

    1= Borehole

    2=Stream

    3=Roof catchments

    4=protected springs

    5=piped water

    6= Others (Specify)

74. Do you think the water you use is safe for drinking?   [   ]

    1=Yes

    2= No

75. If no, do you do anything to make it safe?   [   ]

76, If yes, how do you make it safe?   [   ]

    1= Boiling

    2= Filtering

    3=Use of chemicals

    4= Others (specify)

77. Do you have a separate container for storage of drinking water?

    1=Yes   [   ]

    2=No

78. What method is used for fetching water from the storage container?

    1= By dipping into it   [   ]

    2= By pouring from it

    3= By tap

79. How do you dispose the refuse in this household?

    1= Burning   [   ]

    2=Burrying it

    3= Rubbish pit

    4=Indiscriminate dumping

    5=Others (Specify) _____

HOUSEHOLD INCOME AND HOUSEHOLD FOOD SECURITY

80. What is the main source of livelihood for this household?

    1=Food crop production

    2=Cash crop production

    3=Salaried employment

    4=Self employment

    5=Casual work

6=Others (Specify) _____

81. What was the last months total income from me main source of livelihood?

82.Do you have any other source of income?

      1=Yes   [   ]

      2= No

83 If yes, from where?   [   ]

      1=Friends

      2=Relatives

      3=Others(Specify) _____

84.How much did you receive from these other sources last month?

_____ksh

85. What is the total acreage of the farm? _____ acres.

86.Does your household own any of the following? If so, how many?

      1=Yes   [   ]

      2=No

Livestock	Yes/No	Number
Cows	[ ]	_____
Goats	[ ]	_____
Sheep	[ ]	_____
Chicken	[ ]	_____
Donkeys	[ ]	_____

87.Does your household own any of the following?

      1=Yes

      2=No

Item Yes/No

Bicycle	[ ]
Wheelbarrow	[ ]
Radio	[ ]
Television set	[ ]
Sofa set	[ ]
Sewing machine	[ ]

88. Where does the food for this household mainly come from?

      1=From the farm   [   ]

      2= From friends

      3= From relatives

      4= Buying

      5=Others (Specify) _____

89. If the household grows it's own food, is the food grown enough to feed the household members?   [   ]

      1=Yes

      2= No

90. If no, how does the family meet the deficit? [   ]
   1= Purchase
   2= From relatives
   3= Friends
   4-Others (Specify) _____

91. Approximately how much money did you spend on food last month? _____ksh.

92. Below is a list of different foods. Please tell me their source, how often they are consumed in the household and how often this child is fed on them.

Food	Frequency of consumption in the household	Frequency of consumption by the index child	Source
Maize. Rice, Chapati			
potatoes, sweet-potatoes, Arrow roots, cassava			
Fats, oils, margarine			
Milk			
Eggs			
Meat, Chicken			
Beans, peas, green grams			
Traditional vegetables, Sukuma wiki, spinach			
Carrots			
Fruits			
Others (specify)			

CODES

FREQUENCY
1=Once daily
2=2-3 times a week
3=>3times a week
4= Once a week
5= Once every two weeks
6= Once per month
7= Never

SOURCE
1= From the farm
2=Purchased
3=Gifts/donations
4=Others (Specify)

ANTHROPOMETRIC MEASUREMENTS OF CHILDREN AGED 6 TO 59 MONTHS OLD

Name of interviewer _____ Household number _____

Date of interview _____ Year 2002

Location _____ Village _____

1. Weight measurements
   Weight (+/-0.1 kg)

Name	Sex	Age (Months)	1st	2nd	Average
_____	_____	_____	___	___	_____

2. Height Measurements
   Height (+/-0.5 cm)

Name	Sex	Age (Months)	1st	2nd	Average
_____	_____	_____	___	___	_____

APPENDIX 2

FOCUS GROUP DISCUSSION GUIDE

1. What are the major health problems facing children in Makuyu? Prioritize these problems.

2. What do mothers in Makuyu practice in terms of infants and young child feeding? Probe on breastfeeding and weaning practices.
   a. What are the common practices on breastfeeding in Makuyu?
   b. What advice are mothers given about feeding young children?
   c. How many times in a day do mothers breastfeed their children?
   d. At about what age do children stop breastfeeding?
   e. Why do mothers stop breastfeeding their children then?
   f. At about what age are children introduced to other foods apart from breast milk and why?

3. Who are the main child care givers in Makuyu?
   a. If a mother has to go back to work or to regular activities, who do they usually leave their children with?
   b. What arrangements do mothers make about feeding their children when they are away?
   c. Who mainly prepares the food for children?

4. What is the normal practice in Makuyu if a child suffered from any illness? Probe on the management especially of diarrhoea.
   a. Do mothers continue breastfeeding their children when they have diarrhoea?
   b. Are children given any special foods when they are ill? e.g. when they have diarrhoea?
   c. How often are children fed in a day when they are sick?
   d. Do mothers withhold any foods from their babies when they are suffering from diarrhoea? If so, which foods and what are the reasons for withholding?
   e. Where do you seek help from when a child is ill?

5. Where do mothers get information on general childcare from?

6. Do they usually practice what they are taught?

7. What are the major household income sources?

8. Do you think the families in Makuyu are food secure?
   a. What problems do they face in terms of access to food?
   b. What are the main sources of food in Makuyu?
   c. Is the food grown enough to feed the family throughout one season to the next harvesting season?

APPENDIX 3

KEY INFORMANT INTERVIEW GUIDE

1. What are the major health problems affecting children in Makuyu? Which of these do you think are the most important?

2. How would you describe the childcare practices in Makuyu?
   a. How often do mothers breastfeed their babies?
   b. Is exclusive breastfeeding practiced in Makuyu?
   c. On average, when do mothers stop breastfeeding their children and why?
   d. At about what age do mothers introduce other foods/ fluids to their babies apart from breast milk? What foods do they usually introduce first and why?
   e. What is the common practice in Makuyu when a child is sick? How often is such a child fed? Are they given any special kind of foods/fluids? Is there any of foods /fluids that are withheld from such children and why?
   f. Where do they seek treatment for the sick children and. why these places?
   g. What factors in your opinion do you think interferes, with the mothers' ability to take care of their children?
   h. Where do mothers obtain information on child care from? Do you think they usually follow what they are taught?

3. What are the general income generating activities in Makuyu?

4. Do you think families in Makuyu are food secure?
   a. Are there any problems faced by the families in terms of access to food?
   b. Which problems and how do people overcome such problems?

5. What are the main sources of food?