PREVALENCE OF MALNUTRITION AND ITS ASSOCIATED FACTORS AMONG CHILDREN AGED 6-59 MONTHS LIVING IN KANGEMI AND GICHAGI SUB LOCATIONS. NAIROBI, KENYA.

BY

GOBANE D. CHORAMO

DISSERTATION, IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN APPLIED HUMAN NUTRITION, UNIVERSITY OF NAIROBI

December 2004

DECLARATION

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

Gobane   _December 17, 2004_

Gobane D. Choramo   **Date**

This dissertation has been submitted for examination with our approval as the university supervisors.
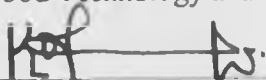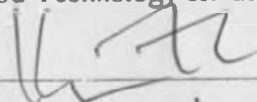
Dr. Wambui Kogi- Makau   Prof. E.G. Karuri

Dept of Food Technology and Nutrition   Dept. of Food Technology & Nutrition

Signed _____   Signed _____

Date   17TH. DEC. 2004   Date   17/12/04

ii

DEDICATION

I dedicate this dissertation to my Sponsor DAAD without whose support this study would

not have been possible and to the people of Kangemi.

ACKNOWLEDGEMENT

Table of Content

List of Tables

List of Figures

ABSTRACT

Malnutrition, which is a wide spread problem with devastating consequences, weakens immune system and worsens illness. It is a factor in about half of the deaths that occur among children under five years of age. Malnourished children who survive are more likely to have diminished learning capacity and lower productivity in adulthood. Children who are under five years of age are at higher risk of suffering from malnutrition than other sector of the population. In many of the underdeveloped countries, two thirds of all deaths occur among children under the age of five.

A cross-sectional survey that aimed at assessing nutritional status of children aged (6-59 months) and at identifying the associated household risk factors was conducted in Kangemi Location in Nairobi Kenya, between March and April 2003.

The main objective of the study was to determine the nutritional status and establish its associated factors in order to identify the risk factor for children aged 6-59 months old in Kangemi Location, Nairobi, Kenya.

Multistage Sampling was used to identify study households and four villages out of seven villages were selected randomly. A sample size of 330 households in which there had to be a child aged between 6-59 months was used. In households with more than one child in this age category, only one child (the younger one) was picked as the index child using purposive sampling.

A sub-sample of 66 households was randomly selected for the 24-hour dietary recall. The data was collected with the assistance of five field assistants. A structured questionnaire was used to collect quantitative data on sociodemographic and economic characteristics, food intake of the study children and anthropometric measurement (height and weight) were collected and used for generating indices of nutrition status. Data entry, cleaning and analysis was done using the statistical package for Social Sciences (SPSS version 10.0) and indices of nutritional status were computed using the EPI-Info (version 6.0) packages.

The study established that the prevalence of malnutrition in the study area was as follows; global acute malnutrition (wasting), 4.9%, global chronic malnutrition (stunting) 27.1% and global underweight (12.1%). This is in reference to World Health Organization, (WHO) that is <-3 Z-score for severe malnutrition and <-2 Z-score for global malnutrition. The analysis showed that moderate chronic malnutrition increases with age, especially after 24 months of age suggesting that when children stop breastfeeding their nutritional status is affected probably because of inadequate supplementary feeding.

All two thirds (60%) of the study children were reported to have been ill within the last seven days preceding the survey. Symptoms of upper respiratory tract infections were the most commonly reported condition. Level of household income, illness, amount of water used in a household and sex of household head were found to be associated factors with nutritional status of children under five. Socioeconomic status and education level of parents were found to be associated with dietary intake of children under five.

In conclusion, since it has been proved that level of household income influences the consumption frequency as well as the amounts consumed by children under five years of age, putting in place income generating activities in the community to increase the purchasing power of the head of households would improve the food intake of the children. Improvement of water system, health facilities, and waste disposal is recommended since they contribute to poor health.

The result of this study can be used to develop intervention programmes for the study group in Kangemi area and other Peri-urban communities

Operational Definitions

Malnutrition -   State of nutrition where height for age, weight for age and weight for height indices fall outside certain pre-determined cut-off points, i.e.,below –2 Z Scores of the NCHS reference.

Complementary feeding-Introduction of other foods or fluid to an infant in addition to breast milk

Respondent-   A person who answers the questionnaire, the mother.

24-hour Recall –   A method used for measuring food consumption (of a child). The respondents are asked to recall the exact food intake during the previous 24-hour period.

Recommended Dietary Allowance (RDA)- Recommended daily allowances of nutrients and energy intake for population groups according to age and sex, with defined weight and height as recommended by United States Standards (Williams, 1994).

EPI INFO -   Computer package used to convert anthropometric measurements into indices of nutritional status: height for age, weight-for age and weight for height.

Family size-   The total number of people living in a household during the study period.

Household- All the people who have lived together for at least three months and operate as a unit (by for example contributing to the household income, sharing facilities, eating from the same pot and live in the same homestead) including such members as unrelated workers and relatives who take meals together

Micronutrients- The vitamins and minerals that are required by the body in small amounts.

Safe drinking Water – Clean water that is free from microbial organisms

Access to safe drinking water –According to World Health Organisation, WHO, reasonable access to safe drinking water in an urban area was access to piped water or a public standpipe within 200 metres of a dwelling with recommendation of 80 litres in a household per day.

Household cash income- money regularly received by the head of the house from an employer for work done regular and casual gift in a form of cash from relatives and from business.

Socio-economic status- The category of the rate of income e g low income, middle income and high income

Slum - A district of a city marked by poverty and inferior living condition

Food diversity score - Number of different food groups consumed over a given reference period

Abbreviations

C BS –   Central Bureau of Statistics

DAAD-   German Academic Exchange Service

GOK –   Government of Kenya

KDHS –   Kenya Demographic and Health Survey.

Ksh. –   Kenyan Shilling

NCHS-   (U.S. National Centre for Health Statistics.) Standard, which is

recommended for use by the World Health Organisation (WHO)

RDA –   Recommended Daily allowance

SPSS-   Statistical packages for Social Sciences.

UNICEF-   United Nations Children's Fund

UNU –   United Nations University.

URTI –   Upper Respiratory Tract Infections

USAID –   United States Agency for International Development.

WHO-   World Health Organisation.

MI   -   Millilitres

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Malnutrition - State of nutrition where height for age, weight for age and weight for height indices fall outside certain pre-determined cut-off points, i.e., below –2 Z Scores of the NCHS reference.

'Children are the future of any nation.' If nations are to develop, they must take more care of their children. A child's health during the first five years of life is largely set by events occurring during prenatal, internatal and post-natal periods (Abdelgadir *et al.*, 1995).

The public health significance of malnutrition, local to worldwide in scope, continues to grow. Protein-energy malnutrition continues to rank first among nutritional deficiency disorders in the world. Observation and experience have brought deepened awareness of two important interrelated facts: (1) Having adequate food alone is not a complete answer, although it fulfils a fundamental need for all persons, and (2) a national high standard of living does not necessarily eliminate the problem of malnutrition (Williams, 1994).

Malnutrition, a wide spread problem with devastating consequences, weakens immune systems and worsens illnesses. While Good nutrition helps to protect natural immunity, which is particularly important for health, as resistance to drugs increases and new diseases emerge (WHO, 1999).

It is a factor in about half of the deaths that occur among children under five years of age. Malnourished children who survive are more likely to have diminished learning capacity and lower productivity in adulthood. Malnutrition reduces the quality of life and financially drains families, communities, and countries.

Malnutrition is one of the most important health and welfare problems among infants and children in Africa. It is an immediate result of both inadequate food intake and illness. Inadequate food intake is a consequence of insufficient food availability at the household level, improper feeding practices or both. Improper feeding practices include both in quality and quantity of food offered to young children as well as the timing of their introduction. Diarrhoea and acute respiratory infection are the top two causes of child morbidity and mortality in developing countries. Poor sanitation puts young children at increased risk of illness in particular diarrhoeal diseases, which adversely affects their nutritional status. Both inadequate food intake and poor environmental sanitation reflect underlying social and economic conditions.

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 lower level of cognitive development, which results in lower level of education attainment. In adulthood the accumulated effects of reduction in workers' productivity and increased absenteeism in the workplace. These may reduce a person's lifetime, earning potential and ability to contribute to the national economy. Furthermore, malnutrition can result in adverse pregnancy outcomes (USAID, 2001).

1.2. Statement of the Problem

Malnutrition is a state of nutrition where height for age, weight for age and weight for height indices fall outside certain pre-determined cut off points, i.e., below –2 Z scores of the NCHS reference.

According to USAID (1999) in Kenya, thirty three percent of children age 0 –59 months are chronically malnourished. In other words, they are too short for their age or stunted. The proportion of Kenyan children who are stunted is more than sixteen times the level expected in a healthy, well-nourished population. Six percent of children under five years are wasted. In Kenya, wasting is 3 times the level expected in a well-nourished population.

Twenty-two percent of children under five years are underweight for their age. This is 11 times the level expected in a healthy, well-nourished population. The same study has identified that stunting and wasting among children under five years in Kenya is linked to households source of drinking water which in turn is related to socio economic status of the households. Without an adequate supply of quality water, the risks of food contamination, diarrheal disease and malnutrition rise.

According to the KDHS (2003), 30 percent of children under five are too short for their age, or stunted. Stunting indicates chronic malnutrition. Almost six percent of Kenyan children are wasted, or thin for their height. Wasting is a sign of severe malnutrition. Overall, one in five children is underweight. Stunting, wasting and underweight are most common in rural areas and among families of lower socioeconomic status (CBS, 2004).

Low income (area) in Nairobi (urban)

Information on the nutritional status of children in urban areas in Kenya is limited to few studies on Nairobi and Mombassa The Nairobi survey was done in Kawangware (in Moslem and Gatina villages) and showed levels of stunting to be at 21.6 %. This was consistent with levels obtained in rural areas and in most recent national coverage surveys. By contrast, the level of wasting which was found to exist in Kwangware, 8.5 %, seemed high when compared to the figure obtained in the similar survey recently completed in Nairobi, Pumwani area 5.4 %. Unfortunately the general lack of information on urban nutrition makes it difficult to draw any firm conclusion from these few studies (GOK and UNICEF 1992).

The poor often pay more than other urban residents for a number of goods and services, In Nairobi's informal settlements, households pay about Ksh. 600 for water per month when middle income households pay Ksh 180 for their own water connections. They have to buy food and fuel in smaller quantities, for example, charcoal in 2kg tins costs Ksh. 15 while a sack (70 Kg) costs Ksh. 200 (Kanji, 1996).

1.3 Justification

This study was carried out to assess the nutritional status and to identify factors associate with malnutrition of children 6-59 months old in Kangemi Location. This can be used as platform from which intervention can be formulated. This study has contributed to knowledge of findings of the current nutritional status of children aged 6-59 months living in Kangemi

4

1.4 The Aim of the Study

The aim of the study was to assess the nutritional status of children in Kangemi Location to establish the factors that are associated with poor (nutritional status) secondly, it was to create awareness on preventable malnutrition and create valuable information for the community, well wishers and government bodies or policy makers for intervention purposes and prevention of malnutrition as well.

1.5 Objective of the Study

The main objective of the study was to determine the nutritional status and its associated factors of children aged 6 - 59 months in Kangemi Location. Nairobi, Kenya.

1.6 Specific Objectives

1. To determine the socio-demographic and socio-economic characters of the study population.

2. To determine the breastfeeding and complementary feeding practices of the mothers/caretakers of children.

3. To determine the morbidity status among children aged 6-59 months.

4. To assess the nutritional status of children aged 6 - 59 months.

5. To determine the dietary intake (calorie, protein, vitamin A, iron and zinc) of children aged - 59 months.

6. To determine the type of food and frequency of consumption by children aged 6 -59 months.

7. To determine the access to safe drinking water and sanitation

1.7 Hypotheses

1. The level of household income is related to the consumption frequency as well as the amounts consumed, of different food groups that are e g , cereals, livestock products, etc

2. There is an association between socio-economic status of the head of the household and the nutritional status of its pre-school children.

1.8 Expected Benefits

To enhance awareness or provide up to date information to the community in addition to information that already exists in the well being of children aged 6 - 59 months living in Kangemi slum concerning nutrition

This information is expected to be utilised by both the government and non-governmental organisations engaged in the promotion of the welfare of semi-urban population.

CHAPTER TWO: LITERATURE REVIEW

2.1 Effects of Nutrition on the Health of Children.

Nutrition has a very serious effect in children's health, activity and look (the expression on their face. For instance, a well-fed baby normally has a charming look whereas under fed baby has a miserable look). According to UNICEF (1998) in young children, malnutrition dulls motivation and curiosity and reduces play and the exploratory activities. These effects in return impair mental and cognitive developments by reducing the amount of interaction children have both with their environment and with those who provide care. Under nutrition exposes children to all kinds of diseases; because their bodies have got poor resistance. In fact, all illnesses are a threat to nutritional health.

2.2 Benefits of Exclusive Breastfeeding

According to UNICEF (1997) exactly how an infant is fed is crucial to growth in the early months of life. First of all, a child of 0-6 months old needs to be exclusively breastfed. Breast milk not only meets all a child's nutritional needs but also offers considerable protection against disease (both because of its inherent immunological properties and because it minimises the chances of infection through unclean water and contaminated food.

2.3 Supplementary Feeding

According to Bich et al., (2002) child malnutrition a major public health problem in developing countries is usually attributed to growth faltering, which is primarily a consequence of repeated infectious episodes and inadequate nutrient intakes. Infants are often fed diets that are low in nutrient quantity and quality and interventions have generally focused on improving complementary feeding diets that are appropriate to the stetting. World Health Organisation, WHO, recommends that solid foods be introduce to infants

7

around the age of 6 months (USAID, 1999). According to WHO optimal infant feeding practices include the introduction of complementary foods around 6 months age. The introduction of complementary feeding is necessary because breast milk is no longer sufficient to satisfy the developing infant's energy, protein and micronutrient needs.

2.4 Infections Associated with Malnutrition.

Sound nutrition can change children's lives, improve their physical and mental development, protect their health and lay a firm foundation for future productivity (UNICEF, 1998)

To bring up healthy children requires the real sacrifice of money, energy and time. As stated by (Tomkins, 2000) children who are zinc deficient have more episode of infection, particularly diarrhoea and respiratory disease. Zinc deficiency causes increased losses of intestinal fluid during diarrhoea and delayed recovery from acute or persistent diarrhoea.

The bioavailability in plant foods such as cereals is low. According to UNICEF (1998) Zinc deficiency in malnourished children contributes to growth failure and susceptibility to infections.

The functions of zinc are promotion of normal growth and development. It forms part of the molecular structure of eighty or more known enzymes that work with the red blood cells to move carbon dioxide from tissue to lungs. Zinc also helps maintain an effective immune system. Severe zinc deficiency causes growth retardation, diarrhoea, skin lesions, loss of appetite, hair loss and in boys, slow sexual development. Zinc has now been shown to have a therapeutic effect on diarrhoea causes.

2.5 Sources of Micronutrients

In words of Williams (1994) micronutrients are the two classes of small non-energy yielding elements and compounds: Minerals and vitamins, essential in very small amounts for regulation and control functions in cell metabolism and building certain body structures

Dark green leafy vegetables, yellow fruits, orange roots - mainly carrots and the

Oils of palms are the main sources of pro-vitamin A. Among leaves only those that are dark green are really good sources. This is because their carotenoids content in chloroplast is roughly proportional to the concentration of chlorophyll with which they are associated for photosynthesis. Examples of common Vegetable/fruit carotenoid sources are Mango, papaya, red palm oil, carrots, dark-green leafy vegetable, Tomato, etc.

Animal sources of vitamin A are: butter, Margarine (vitaminized) eggs, milk, cheese (fatty type), liver of sheep, and ox, beef, mutton and pork. These animal sources of vitamin A are expensive.

The function of Foliate, one of the B – vitamins is to enhance growth in children It also helps in formation of red blood cells. The food sources of foliate are green leafy vegetables, liver, legumes, and a few fruits However, household preparation plus food processing and storage may destroy as much as 50 % of the foliate (Williams, 1994). To prevent children from malnutrition needs improved knowledge and practices. The link between malnutrition and the risk of developing infections needs to be better known. Health workers and parents must work together to improve the nutrition of adults and children to break the infection /malnutrition cycle in the community (Tomkins, 2000).

2.6 Determinants of Food Consumption

There are many determinants of food consumption. The economic situation as one of the determinants influences what kind of food will be available and how much. In developing countries, income is considered to be a very important factor determining nutrition

Income is a mirror image of a household's resources and presides an index of its purchasing capacity. Food that cannot be purchased is never consumed. Positive relationship between income and dietary intake is dietary adequacy of a household Inadequate nutrient intake in the first years of life may seriously impair physical and mental development. Malnourished individuals with a lower energy level will not be able to put enough effort in current activities to raise their period income.

The relationship between parental education and the dietary intake of a household is complicated. On the one hand, greater education is associated with greater awareness of the importance of nutrition, the nutrient purchase or from home. Better-educated parents should be able to provide more nutritious diets at any income level due to their ability to identify the nutritional value of food (UNU, 1986).

2.7 Access to Water, Sanitation and Household Fuel

In South Africa, infrastructure provision per capita spending levels are amongst the highest in the world. However, low spending levels for black urban and Peri-urban settlement results in worse facilities than other developing countries with similar per capita incomes.

According to Kanji (1996) lack of water and sanitation, overcrowding, poor nutritional levels are increasing susceptibility to ARI, acute respiratory infection cholera, typhoid and

diarrhoea In Zambia, access to services in many urban areas has been quickly sinking to the levels in rural areas, so the recent decline in social indicators has been most severe in urban centres (Kanji, 1996). Less than half of urban residents have access to safe sanitation. In the shantytowns there has been no public provision of sewerage infrastructure. Sanitation facilities are organised by the residents and mainly limited to pit latrines, buckets or holes in the ground. Toilets are sometimes dangerously sited next to wells for drinking water. Less than 10% of garbage collected in Lusaka, the remainder is left in heaps by the roadside Since 1990, there has been a repeated, serious urban epidemic of cholera and dysentery in the rain season. Only 11.7% of households in informal settlements in Nairobi have water connections. In one survey 80% complained about water shortages and pipes running dry. In Mombassa, the second largest city in Kenya, 63% of informal settlement dwellers do not have access to safe water. Studies in Kenya suggest that around 95% of residents in informal settlements have inadequate sanitation facilities. Not only is this in terms of access to poor facilities (in some cases up to 50 people using the same latrine) but also in absolute terms 36% of the slum population in Mombassa and 56% in Nairobi have no access to or appropriate means of excreta disposal. The flying toilet is a recognised method for many households, to defecate in the house, warp in paper and throw it to drains and streams (Kanji, 1996). Sample surveys in low-income areas of Nairobi conducted in 1990 –1992 found significant intra-area variation in the incidence of morbidity (two week period) in children under five. It ranged from 63% to 76% mostly acute respiratory infections and diarrhoea which are influenced by overcrowded conditions and poor sanitation (Kanji, 1996) In Zambia's urban shantytowns, households buy buckets of water (which is likely to be contaminated) from street vendors, at K 100 per bucket in mind 1994 ($0.15) (Kanji, 1996).

11

In low-income settlements in Dar-Es-Salaam, fuel, charcoal and Kerosene, constitutes up to 20 percent of household expenditure (Kanji, 1996). Low-income households in Kenya spend the same proportion compared to 6 percent and 4 percent for middle and high-income groups respectively (Kanji, 1996). The same study indicated that, the lack of suitable cooking fuel also has implication for poor households' diet, for example not being able to afford to cook beans and opting for vegetables, which uses less fuel.

2.8 Acceptable Hygiene

More than half of all illnesses and deaths among young children are caused by germs that get into their mouths through food or water or dirty hands. Many of these germs come from human and animal faeces. Many illnesses, especially diarrhoea, can be prevented by good hygiene practices." (UNICEF et al., 2002). The same study reported the following as acceptable hygiene.

- All faeces should be disposed of safely. Using toilet or latrine is the best way.

- All family members including the children need to wash their hands thoroughly with soap and water or ash and water after contact with faeces, before touching food, and before feeding children.

- Washing the face with soap and water every day helps to prevent eye infection. In some parts of the world, eye infections can lead to trachoma, which can cause blindness.

- Only use water that is from a safe source or is purified. Water containers need to be kept covered to keep the water clean.

- Raw or left over food can be dangerous. Raw food should be washed and cooked Cooked food should be eaten with out delay or thoroughly reheated.

- Food, utensils and food preparation surfaces should be kept clean. Food should be stored in covered containers.

- Safe disposal of all household refuses help to prevent illness.

2.9 Urbanisation and Nutrition in Low-Income Countries

Unlike urbanisation in the higher- income countries of the world, which is associated with major advances in science, technology, and social organisation as well as absorption of large populations, urbanisation in low-income countries has not been accompanied by the same level of "economic and cultural progress and has become a source of major concern.

The accelerated growth of urban populations in low-income countries has tremendous social, economic, nutritional, health and environmental consequences, as increasing number of urban poor live in crowded slums and squatter settlements with limited access to the basic resources necessary for a healthy and productive existence.

In general, urban households have greater access to safe and adequate water supplies and appropriate sanitation facilities than rural households. For the urban poor, however, lack of adequate water and sanitation facilities appears to be the rule. Poor water and sanitation may present a more serious problem in cities, because of the disease risks it brings. But it is also more intractable one in many cases because the high population densities of urban areas often render rustic (simple, low-cost) forms of technology (such as pit latrine) useless or even dangerous. In adequate water supply presents an additional economic dilemma for the

poor in many cities. The expenditure on water for the urban poor was much greater than that for higher-income groups in Nairobi

Conversely the time costs of obtaining water from scarce public water taps or well may be considerable. Another urban problem is environmental pollution. It affects the poor "most severely, since most of them live at the periphery where manufacturing, processing and distilling plants are often built, and where environmental protection is frequently weakest"(Popkin and Bisgrove 1998).

2.10 Child Malnutrition World-wide

In 1991, China had 21.3% low weight for height of children aged 0-59 months. In the same year in Sub-Saharan Africa there were 30.9% underweight or low weight for age

(UNICEF, 1993).

Nutritional deprivation and illness during infancy and the second year of life, and their negative interaction, clearly results in long-term growth failure of Kenyan children. In Kenya, 63 infants out of every 1,000 born, die before their first birthday. While another 30 die before their fifth birthday (USAID, 1996).

2.11 Nutritional Status of the Urban Children in Kenya in the Years 1980 to 1999

Nutritional status of children below five years of age in Nairobi, according to urban nutrition survey of 1983 was as follows: about 52 percent were stunted, 3.5 percent were severely wasted, 10.9 percent were moderately wasted, 16.9 percent were underweight compared to

14

the national urban average percentages of 56.9, 19, 82 and 167 were stunted, severely

wasted, moderately wasted, and underweight respectively (GOK and UNICEF, 1990)

2.12 Summary of Literature Review

Malnutrition, in its many forms, is a worldwide problem, more so in the developing

countries, particularly in Africa.

The variability and amount of food consumed by a child is influenced by some factors such

as amount of food available in the household and the purchasing power of the head of the

household.

Gap in knowledge

Nutritional status studies were carried out in Kangemi but without considering associated

factors or contributing factors to malnutrition of children under five. Therefore, this study

intends to fill the gap in Knowledge by identifying factors contributing to child malnutrition

in Kangemi (study area).

CHAPTER THREE: STUDY SETTING AND METHODOLOGY

3.1 Study Setting

Nairobi, which is the capital city of Kenya, is situated about 5,500 feet above sea level. It has eight divisions. Kangemi and Gichagi, the study sites are sub locations of Kangemi Location of Westlands Division of Nairobi. The study was conducted in Westlands division, Kangemi location

Kangemi location where the study was conducted has an estimated population of 59,288 people (GOK, 2001). Kangemi, which is one of the urban slums in Nairobi, is located in western suburbs of Nairobi, about 10 km. from Nairobi City Centre and lies two sides, left and right of Waiyaki Way.

Kangemi was traditionally a rural agricultural area inhabited by four Kikuyu families and one Masaai family (Mukuria, 1999). Over the years, through the sub-division of the land inherited by the sons of the families, most plots became too small to be agriculturally viable Many residents built single-room, row houses for rent to a growing number of people who migrated from other parts of Kenya in search of work.

3.1.1 Infrastructure

There were 10 nursery schools. There were five primary schools of which three of them were public and two were private. There were two secondary schools one of them belongs to public and the other one is a private school that is run by a church Organisation. The road

infrastructure is poor with a network of small roads. In this unplanned settlement area, even the major roads are often impassable by vehicles during the rainy seasons.

At the entrance of Kangemi is a mile-long circular bus route, to transport passengers to and from Nairobi City Centre (Mukuria, 1999). Almost all the households (99.4%) get water from a communal tap, the rest (0.6%) get their water from river

3.1.2 Health services

There are two main health facilities serving the community: a Nairobi City Council health centre and a Catholic Mission health centre. There are also private doctors, and chemists; who sell over-the-counter drugs and traditional healers who provide curative, preventive and promotive care. The City Council Health centre services are basically free but (residents have to bring syringes if they require injections for curative care or immunisations for their children. Drugs are often in short supply or are unavailable from the City Council health service. The Catholic Mission health service is well equipped but charges a small fee for clinic visits (Mukuria, 1999). The City Council health centre offers the following services: Voluntary Counselling and Testing Centre (VCT) for HIV/AIDS patients, Tuberculoses treatment for the TB patients, Mother and Child Health and Family Planning (MCH/FP) services, Curative treatment or general sickness e.g. malaria and smallpox prevention of mother to child transmission of HIV (PMTCT).

17

3.2 The Study Design

The study was designed as a cross sectional study in which fieldwork was conducted between March and April 2003. The survey focused on demographic and socio-economic characteristics, 7 days food frequency, food intake (calorie, protein, vitamin A, iron and zinc), assessment of nutritional status and morbidity status of children aged between 6 and 59 months.

3.2.1 Sample size determination

According to GOK (1999) the prevalence of malnutrition (stunting) is 30%; based on this a sample size of 330 households was obtained using the statistical formula recommended by Daniel (1991).

The formula employed to arrive at the sample size was, $n = \dfrac{z^2 \,(pq)}{d^2}$

Where,

- $n =$ Desired sample size
- $z =$ The standard normal deviation, set at 1.96 which corresponds to 95% confidence level.
- $p =$ Expected prevalence of malnutrition in the population which was 30 or 0.3
- $q = 1 - p$, expected proportion of children not presenting malnutrition. $1 - 0.3 = 0.7$
- $d =$ the test difference in food intake between well nourished and malnourished which. $5\% = 0.05$.
- $n = \dfrac{1.96^2 \times 0.3 \times 0.7}{(0.05)^2}$
- $n = 322.56$ or 322 was the sample size but to make it convenient to collect data 330 was used as the study sample size.

3.2.2 Sampling procedure

Sub locations of the study area

From the three sub locations of Kangemi Location, purposive sampling of two out of three sub locations that comprise Kangemi Location was done. The survey was carried out in Kangemi sub location and Gichagi sub location. The third sub location, Mountain View, was omitted because it is high class and therefore different from the other two.

Kangemi sub location has five villages from which three villages were selected randomly. Gichagi sub location has two villages from which one village was selected randomly and data was collected by identifying study households using multistage sampling. The number of households per sub locations was selected proportionately. Out of the 330 study households 264 were from Kangemi sub location, this was because Kangemi sub location has more villages than Gichagi sub location, hence larger population and the remaining 66 households were from Gichagi sub location, the reason for the variation of the number of households being the number of under five children in Kangemi sub location were three times more than the number of children under five in Gichagi sub location (7,569) and (2,021) in Kangemi sub location and Gichagi sub location respectively. Sixty-six 24-hour recall food consumption data was collected by picking 18 twenty four-hour recalls each from the three villages of Kangemi sub location and 12 twenty four-hour recall from the one village of Gichagi sub location.

Sampling technique

Multistage Sampling was used to identify the study households. At stage one Nairobi District was selected using purposive sampling which was followed by selection of Westlands division. At the third stage Kangemi Location was selected using the same method, (purposive sampling). Purposive sampling was used to select two sub locations Kangemi sub location and Gichagi sub location from the three sub locations of Kangemi Location omitting the third sub location, Mountain View, because it is different from the other two. At the fifth stage four villages were selected from seven villages randomly, three villages from Kangemi sub location from the five villages and one village from Gichagi sub location from the two villages were selected. At the sixth stage 330 households were selected following the set selection criteria, which was the presence of children aged 6-59 months that have lived in the area for at least three months.

A systematic cluster sampling procedure was used in selection of the households to participate in the survey as following: The group collecting data including the Principal Investigator went to the centre of the village. After choosing a direction in a random way, that is, by spinning a bottle on the ground and choosing the direction the bottleneck indicated walked in the chosen direction, the data was collected from every third household. If the boundary of the village was reached before the number of children expected from that village was not weighed and measured the group returned to the centre of the village and walked in the opposite direction and continued to select the households randomly and interviewed the mothers and weighed and measured the children. If no body was found in a chosen household the next nearest household was visited.

20

The number of divisions in Nairobi district is eight. Westlands where this study was conducted has six locations. The purpose of selecting Westlands division was because it includes Kangemi Location, which is slum where I was interested to know the nutritional status of children under five and the associated factors of it. The sampling technique used in selecting study samples is shown in figure 3. 1 (in the next page).

Figure 3.1: Flow Chart Showing Sampling Procedure
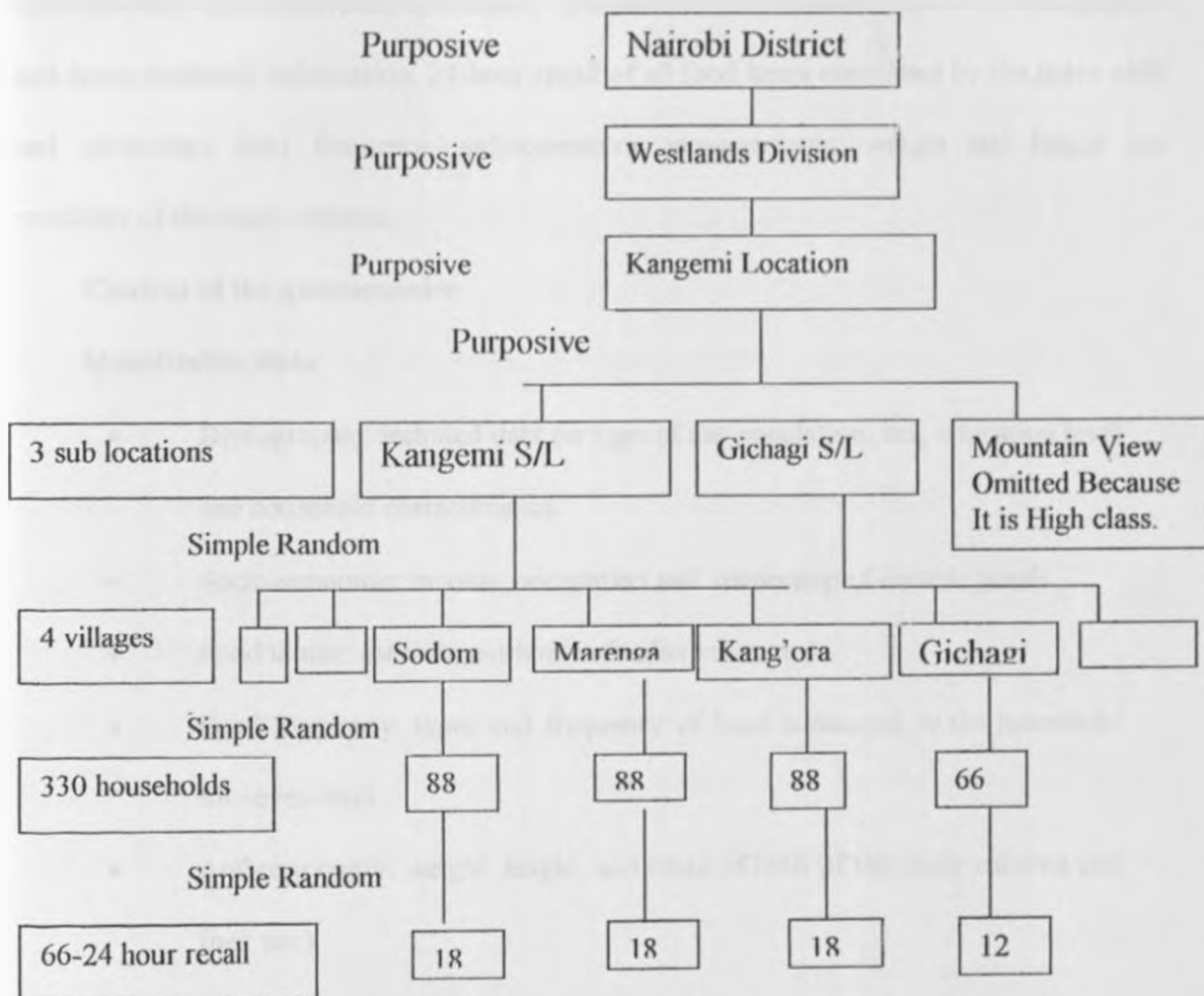
Blank rectangles stand for villages, which were left out
because they were not selected

3.3 Study Instruments Used for the Survey

A pre tested structured questionnaire was used for the survey. The questionnaire was divided into two parts: Quantitative and qualitative. Quantitative data collected included demographic and socio-economic information, 24-hour recall of all food items consumed by the index child and seven-days food frequency, anthropometric measurements, weight and height and morbidity of the study children.

Content of the questionnaire

Quantitative data

- Demographic: included data on ages of the population, sex, education level and household characteristics

- Socio-economic: income, occupation and ownership of durable goods

- Food intake: estimate nutrient in the diet consumed

- Food frequency: types and frequency of food consumed in the household for seven-days

- Anthropometry: weight, height, and (date of birth of the study children and their sex).

- Morbidity

Qualitative data

Focus group discussion

❖ The demographic and socio-economic parts included demographic, household characteristics, occupation, income and ownership of durable goods.

24

❖ The food intake part used to collect data on food intake using the 24-hour recall food consumption method. The 24-hour recall provided information used to estimate nutrient in the diet consumed and compare it with recommended daily allowance for different age groups. (Robert et al., 1996).

❖ A 7-day food consumption frequency questionnaire was administered on the extent to which children consume diversified diet as recommended (David et al., 1994).

❖ Anthropometric measurements-weight and height of the study children were taken.

❖ The qualitative information was made of in depth interview schedules. The content of questions is shown in Appendix 1.

❖ Using interview guidelines, in depth interviews were conducted by the investigator with the help of five field assistants. Two focus group meetings with men and with women (two meetings) for each group, each consisting of 10 persons was conducted in each study population.

❖ Although the questionnaires were all in English, in some cases they were administered in the language the respondents understood best (Kiswahili and English).

3.3.1 Recruitment and training of field assistants

The Principal investigator requested the Chief for the area to identify people of good character who had completed form (iv) level of education that she could interview for the positions of field assistants. The chief then requested people who were interested in the positions to apply and the principal investigator interviewed the 10 who applied.

Five field assistants were recruited according to the following criteria

- That they had secondary school, form (iv) level of education.

- They had a good command of the local languages, English, and Kiswahili.

The principal investigator trained the assistants for two days. The training covered the study objectives, the use of survey instruments, the interviewing techniques and also how to take anthorpomeric measurements. Training was also done on how to complete the questionnaires, how to address the respondents in a polite and acceptable manner. As far as respondents' rights were concerned the purpose, objectives and data collection methods were explained to the Kangemi Area chief and the people. It was their informed choice to be interviewed and allow the anthropometric measurements of the children to be taken.

3.3.2 Pre-testing

The structured questionnaire was pre tested in 20 households in a setting similar to the study site. It was used to pre-test the appropriateness of the study instruments. The exercise was also aimed at evaluating the skills, efficiency and the performance of the research assistants. Minor changes on the structure of the questionnaire were made after pre-testing where necessary. The 20 questionnaires were not included in the final analysis. The pre-testing was also taken as an opportunity to enhance hands on experience of the field assistants. After pre-testing necessary guidance and counselling were given to research assistants as necessary.

26

3.4 Data Collection

As a prerequisite, a research permit was obtained from Ministry of Education and Health Permission was also sought from the District Officer and the chief of Kangemi Location. Demographic, social- economic, anthrometric, dietary intake and morbidity data were collected from the selected households.

Steps in collection of data on 24 hour recall

During the 24-hour recall all foods in the meals consumed by the child during the 24-hour period preceding the interview were recorded. The respondents were asked to indicate the amount of all the ingredients that were used to prepare the meals. This was done using household measures, detailed description of all meals and the ingredients were recorded on a form designed for this purpose.

Household measures of each ingredient were converted into grams and or millilitres Exacta Kitchen scale with a maximum capacity of five kg, and fluid measuring cylinders graduated in millilitres of capacity 1000 millilitres, 500 millilitres and 100 millilitres were used to weigh and measure cooked and raw food items. Volumes were converted into grams using the food conversion factors produced by (Savage et al., 1993). See **Appendix 4**

Steps of collection of data in food frequency

The seven- day food frequency recall was administered to the households by asking a question, "What food has your child consumed within the last seven days before the interview". The answers were, ugali, kale, rice, milk, meat, etc. and how many times the child consumed this food items. This data was collected by listing the types of food and

the frequency of consumption daily by the child in the last seven days preceding the survey

The focus group discussion was undertaken at the end of the survey. Throughout the data collection, other qualitative information was used to complement the discussion on the study findings presented in chapter 4.

3.4.1 Child age determination

Ages of the children, in most of the cases were obtained from clinic cards or child health cards. For those without written evidence direct recall of the date of birth by the mother or respondent was applied.

3.4.2 Anthropometric measurements

Anthropometric measurements were obtained following the measuring techniques described by WHO, (1983) and Cogil (2001) and the conversion of the anthropometric values used EPI – NUT in EPI-INFO.

Weight: Salter weighing Scale that could weigh up to 25 kilograms with accuracy of 100 grams, together with a plastic pant were used.

The Salter Scale, with the pant hang on it was adjusted to ensure that the needlepoint was at zero before placing the child on, while the Salter Scale was hang on to a pole or tree. Then, the child left with minimal light clothing and without shoes, hanging freely, the weight was recorded to the nearest 0.1 kilogram. The weight was taken twice and the

28

average was recorded. However, if the difference between the two readings was more than 0.5 kg, weighing was repeated

Length: for children who were less than 24 months of age, length was taken using a wooden length board. The child was laid on the board, which was itself placed on a flat surface. The head was positioned against the fixed head board, with eyes looking vertically. The knees were extended and the feet were flexed at right angle to the lower legs. The up-right sliding foot piece was then moved to obtain firm contact with the bottom of the feet and the length read and recorded to the nearest 0.1 cm

Height: For children two years and above a vertical measuring board was used. After removing shoes, the child stood on a flat surface with feet parallel and with heels, buttocks, shoulders and the back of the head touching the upright, the head was held straight looking ahead, the arms hung loosely at the sides, then the head – piece was gently lowered, crushing the hair and making contact with the top of the head, and the height was then read and recorded to the nearest 0.1cm. The length/height measurement was taken twice and the average calculated for each child. However, the exercise of height/length measurement was repeated where the difference between the two readings was more than 0.1 cm.

3.4.3 Qualitative data

Four focus group discussion sessions, with men and women separately each consisting of 10 persons was conducted in the four study villages in such away that participants from two villages were combined for the purpose of group discussion.

The women and men were identified through community leaders in the study area according to selection criteria, which was having children below five years old. The identified individuals were notified of the focus group discussion time and venue by the researcher. The group discussion was to get qualitative information on complementary feeding, the age when complementary feeding started to a child and with what kind of food they start with. The discussion also included who takes care of the child in the absence of the mother, about latrine and garbage disposal. The focus group discussion was facilitated by the researcher assisted by the research assistants as translators and recorders of the needed information

3.4.4 Data quality control

There were some factors, which contributed to quality data collection as expected. As mentioned earlier, the fact that the research assistants were from the same area, contributed to better understanding between them and the interviewed mothers, hence better recording of the information, pre-testing of research tools, reviewing of questionnaires at the end of each day. If a questionnaire was incomplete or the measurements or responses looked suspicious the household was revisited. The presence of the researcher throughout the course of the study, supervising the activities, and participating in some of the exercises like anthropometric measurement and good training of field assistants contributed to the collection of quality data. In addition, Calibration of the weighing scales was done by zeroing them and then a two Kg packet of sugar was used to confirm the scale every morning. All the weights and heights were taken twice. Immunisation cards were used to confirm the date the child was born. Data quality control

at the entry and nutritional conversion stage were assured through the Epi-info software in built mechanism of check file and Epi-nut flagging. Once the data was collected and entered to the computer, frequencies were done to check for errors that may have occurred during data entry and to check for consistency of response between questions. Close supervision by university lecturers from questionnaire preparation to completion of the study has also contributed to quality data control.

3.5 Problems Encountered

Language barrier was the main problem encountered by the principal investigator, as she had to rely on the assistants for translation of Kiswahili into English.

3.6 Data Processing and Analysis

3.6.1 Data entry and cleaning

Data were entered, cleaned, processed and analysed using the SPSS (Software Package for Social Sciences). Anthropometric data were converted in to indices of nutritional status using the EPI-INFO software. Graphs on descriptive information were done using Microsoft Excel. Both descriptive and analytical methods were used in generation of the results of this study.

3.6.2 Plan of data analysis

❖ The amounts of nutrients of each food ingredients were calculated based on the Kenyan Food Composition Table (Sehmi, 1993). The total nutrient consumed by the index

31

child during the previous 24 hours was computed by adding the amount of the nutrients derived from each of the ingredient that was ingested. The level of consumption was expressed using recommended daily allowance (RDA), which were established by comparing the total consumed with in, 24-hour, and recommended daily allowance (RDA) by Sehmi (1993).

Steps in converting measuring or estimating of food quantity into estimated consumed grams

- The respondents were asked to recall the time the food was eaten, the name of the dish and the ingredients that were used.

- The respondents were asked to estimate the total volume of the dish and the amount of the food the child took including the leftovers.

- Detailed descriptions of all meals eaten within the period and ingredients were recorded in a table designed for this purpose (Appendix I)

- Graduated measuring cylinders were used to obtain the actual food volumes.

- Kitchen scales were used to obtain the actual food weights.

- The actual amount of the food consumed by the child plus total amount of the dish was used to compute the amount of ingredients consumed by the child. For instance, 50 grams of sugar was used to prepare 500 grams of tea in which the child took 250 grams, the actual intake of sugar by the child was 25 grams.

Steps in converting these to nutrient

- Prepare template that is entering the names of all types of food listed when collecting data in SPSS software and the quantity in grams.

- Prepare syntax in SPSS by getting from the food consumption table, how much of each food item makes 100 grams.

- Open the two files, template file and syntax file and run programme.

- Compare these to Sehmi (1993) recommended daily allowance for different age and sex of children.

Methods used in food frequency

The data was entered into the computer as the way it was collected e.g frequency of maize grain 3 times, frequency of rice 2 times etc. to SPSS software.

The frequency is obtained by summing up the frequency of seven days consumption.

The food items were categorised into food groups. e.g cereals, legumes, vegetables, etc.

The total of each food group used in a household was calculated using syntax in SPSS software.

Based on the sum of food items to make food group, the score of each food group was decided.E.g.If a food group is not consumed at all the score is zero. If a food group was consumed one to nine times in the last seven days it was scored as 1 and when the food group was consumed 10 to 35 times in a seven day it was scored as 2.

The score of each food group is summed up to judge whether the child had varied diet or not in the last seven days before the survey.

33

According to McCroy et al., (1999) if 10 food groups were consumed per seven days it is considered as the diet is diverse and below ten food groups is considered as not varied diet.

The last step is to run the frequency of score to know the proportion of children who consumed varied diet and not consumed varied diet.

❖ Descriptive statistics such as mean, proportions, cross-tabulations, frequency tables and graphs were generated and used to describe the health and nutrition conditions of the study children.

❖ Epi Info software was used to convert anthropometric measurements (height and weight) into indices of nutritional status of height-for-age, weight-for-age and weight-for height.

❖ Chi-square test was employed to test proportionality difference in the distribution of demographic and socio-economic characteristics.

❖ The National Centre for Health Statistics (NCHS) reference figures and cut-off points were used to translate recorded age, weight and height (anthropometric measurements) of study children in to weight-for-age, height-for-age and weight- for-height percentages, and Z-scores. These were compared to the NCHS standard.

❖ Confidence interval, and odds ratio were used to identify lower and upper limit in difference, to identify the risk group respectively.

❖ Charts and tables were employed to describe general characteristics of the study population and households.

Nutritional status of study children was established comparing anthropometric measurements using the cut off points recommended by WHO, (1983) and Cogil (2001)

Income level of households was computed by the following methods

✓ Sum of the income if generated by more than one person in a household was generated.

✓ Then divide by number of members of the household and divide the quotient by 30 days of a month to find out how much each household member gets per day.

3.7 Morbidity Status

The morbidity of the study children was established using a question asked to recall what disease condition the child had experienced with in the last seven days.

3.8 Matrix of Reference Values to Show Cut-off Points for Various Indicators (Tables 3.1 –3.5)

Table 3.1 Cut off points for nutritional status

Nutrition status	Severe	Moderate	Mild	Normal
Stunting	<-3 z score	<-2 z score	<-1 z score	>-1 z score
Underweight	<-3 z score	<-2 z score	<-1 z score	>-1 z score
Wasting	<-3 z score	<-2 z score	<-1 z score	>-1 z score

Table 3.2 Cut off points for nutrient intake of children aged 6-59 months

Nutrients	Less than recommended daily intake	Recommended daily intake
Calories	<1350 Kcal	≥1350 Kcal
Proteins	<13.5 g	≥13.5 g
Iron	< 5-10 mg	≥ 5-10 mg
Vitamin A	< 300 Iu	≥300 Iu
Zinc	<5-6 mg	≥5-6 mg

Table 3.3 Cut off points for food frequency

Less than adequate	Adequate
≤ 10 food groups eaten per week. e.g Cereals, vegetables, fruits, etc.	≥10 food groups eaten per week e.g, Cereals, Vegetables, e.t.c

Table 3.4 Cut off points of poverty line

Below poverty line	Above poverty line
<Ksh 76/person /day	≥Ksh 76/person /day

Table 3.5 Statistical significance level

Significant	Not significant
P value less than 0.05	P value greater than 0.05

CHAPTER FOUR: RESULTS

4.1 Social Demographic and Social-Economic Characteristics of Study Population

4.1.1. Demographic characteristics

4.1.1.1 Population size and structure

Three hundred and thirty households were included in the study of which there had to be a child aged 6-59 months. The observed household size ranged between two and ten and the mean number of people in a household was 3.7±. 99 persons. The minimum and maximum number of people in a household was 2 and 10 respectively.

There were total of 1217 persons in the 330 study households. The population comprised 49.6% males and 50.4% females with the approximate male to female ratio of 1:1.2.

The proportion of male and female children under five was 52.2% and 49.9% respectively with the male to female ratio of approximately 1:1.The distribution of the population by age according to gender is shown in (**Figure 4.1**).
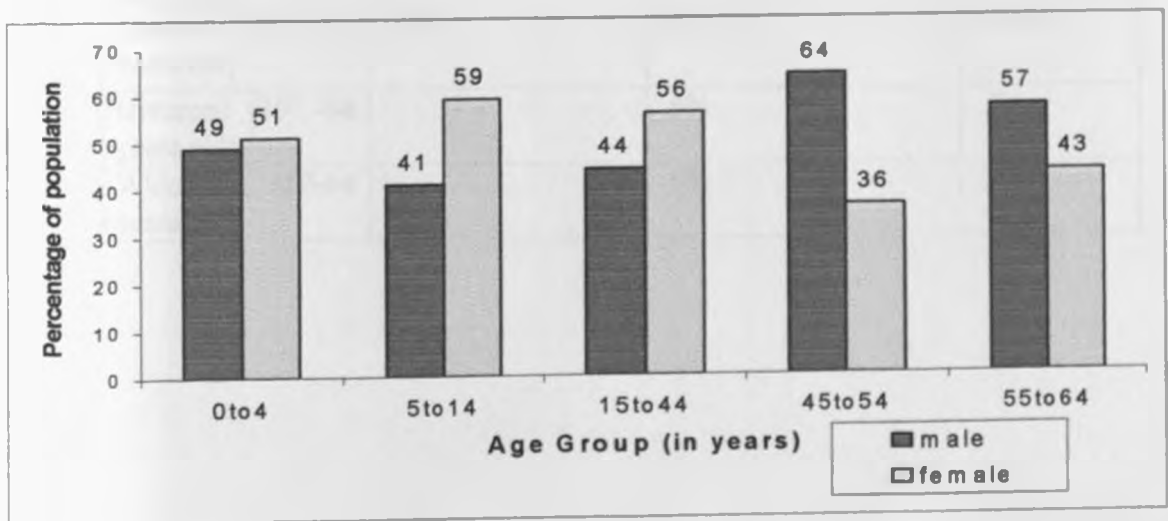
Figure 4. 1 Distribution of the study population by age group and gender

37

The young people, those aged below 15 years, in the study population was 43.4%. The economically productive age or 15 to 64 years of age were 56.6%. The dependency ratio being 1:1.3. The study did not identify any persons aged above 64 years.

4.1.1.2 Distribution of adults by marital status

More than three quarters 90.4% of the adult in the study population was married while the single population was 9%. Those who married at age below (17 to 18 years old) were 2.7%. The mean age of the married males was 31.4 ±7.2 years, while the mean age of married females was 26.5± 6. Table 4.1 shows the marital status of the study population.

Table 4. 1 Marital status of adult study population

Marital status	Male N= 300	Female N= 334	N=634
Single (19-64 years old)	3.3%	14.1%	9%
Married (16 –18 years old)	.7%	4.5%	2.7%
Married (19 –64 years old)	96%	80.2%	87.7%
Divorced (19 –64 years old)		.6%	.3%
Widowed (19-64 years old)		.6%	.3%

4.1.1.3 Education level of the study households

The education level of male and female was observed. In lower primary, upper primary and secondary education level more female were enrolled than male. Female school enrolment was 61%, 67.4%, and 57.4% respectively whereas male school enrolment at the same level was 39%, 32.6% and 42.6% respectively. On the contrary, Secondary education level or those who did national examination and tertiary levels of education, more males' were enrolled than females'. Males' enrolment rate was 54.8% and 81% respectively whereas female enrolment rate was 45.2% and 19% respectively at the same levels of education. This study showed that there was a significant difference in level of education of males and females (p=0.000). The test carried out was Chi square.

4.1.1.4 Age distribution of children 6-59 months

The 330 study children (6-59 months of age) constituted 27% of the total study population, with a mean age of 26.8 ±14.6 months. The proportion of male and female was 52.2% and 47.9% respectively, with an approximate male to female ratio of 1:1. **Figure 4.2** shows the distribution of the study children by age and gender. The proportion of males in the age group 13 to 35 months is higher than that of females but the reverse is true of females' in age group 36 to 47 months.

39
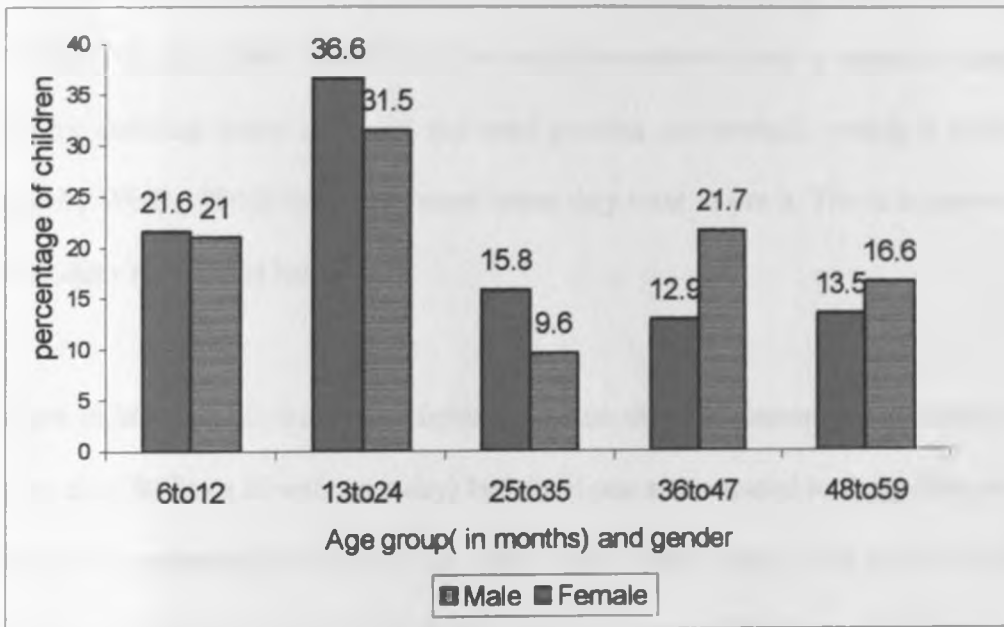
Figure 4. 2: Distribution of the study children: by age group and gender

4.1.1.5 Child rearing environment

Majority of the households, (97.6%), used piped water with an average daily consumption of 64.8 ±16 litres. When the amount of water used by households was assessed, more than two thirds of the households (72.4%) used less than 80 litres of water per day, while slightly less than one third households (27.6%) used 80 litres and above per day. According to WHO (2002), households using 80 or more litres of water per day are considered to be within acceptable level of hygiene while those who use less are considered to be below the safe level of hygiene.

Slightly more than two thirds of the study households (67.9%) reported that they treat drinking water, by boiling, which is a recommended way of treating water; WHO (2002).

The remaining households (31.8%) did not treat their drinking water. More than half (67%) and about half (50.8%) of the study households used a separate container for storing drinking water and used and used pouring out method, which is recommended way by WHO (2002) to remove water when they want to use it. This is to prevent contact with dirty fingers and hands.

More children (71%) from households using less than the recommended amount of water (less than 80 litres of water per day) had diarrhoea as compared to those from households using the recommended amount of water from which only (29%) of the children had diarrhoea. However, there is possibility of other causes of diarrhoea other than amount of water available for use e.g. contaminated food. Chi-square test showed that there was a highly significant difference between the number of children who had diarrhoea in households using less amount of water than recommended and households that used the recommended amount of water (P=0.000). Children in households using less than recommended amount of water had higher cases of diarrhoea (71%) than children in households using recommended amount of water (29%).

4.1.1.6 Garbage disposal

As reported most households (78.5%) dispose refuse into composite pit. The rest reported that they throw the refuse in to a garden, a trench, a stream and others reported they burn the refuses. Most of the latrines used were shared (89.7%) or communal and 10.3% of the households use private latrine.

4.1.2 Social economic characteristics

4.1.2.1 Occupation status of study households

The study clearly indicates that there was high level of unemployment of females'
(21.3%) compared to males' unemployment level (5.5%). In both formal and casual
employment, more males were employed than females'. Closer to half of females'
(45.1%) were engaged in business. Table 4.2 shows occupation status of male and female
population of the study community. Chi square test has shown that there is a significant
difference of occupation status between male and female headed households. χ^2 =115.6 df
=10 and p=. 000

Table 4. 2 Occupational status of study households

Occupation	Male N =275	Female N =122	N =397
Formal employment	50.9%	29.5%	44.3%
Casual employment	20.4%	4.1%	15.4%
Business	23.3%	45.1%	30%
Unemployment	5.5%	21.3%	10.3%

4.1.2.2 Household income level

This study has revealed that out of the 330-study households, 63.9% households were
below poverty line and 36.1% households were above it. This was established by finding
out the income of households in comparison to the size of households. Where the daily
income was greater or equal to Ksh. 76.00 ($1) for each member of household, that
household was considered as being above poverty line.

42

Where the mean daily income was computed using the total number of members as the denominator, the household whose mean daily income was less than (KSh. 76.00 ($1) were below poverty line according to World Bank (2000) **Figure 4.3** shows the income level of the study households.
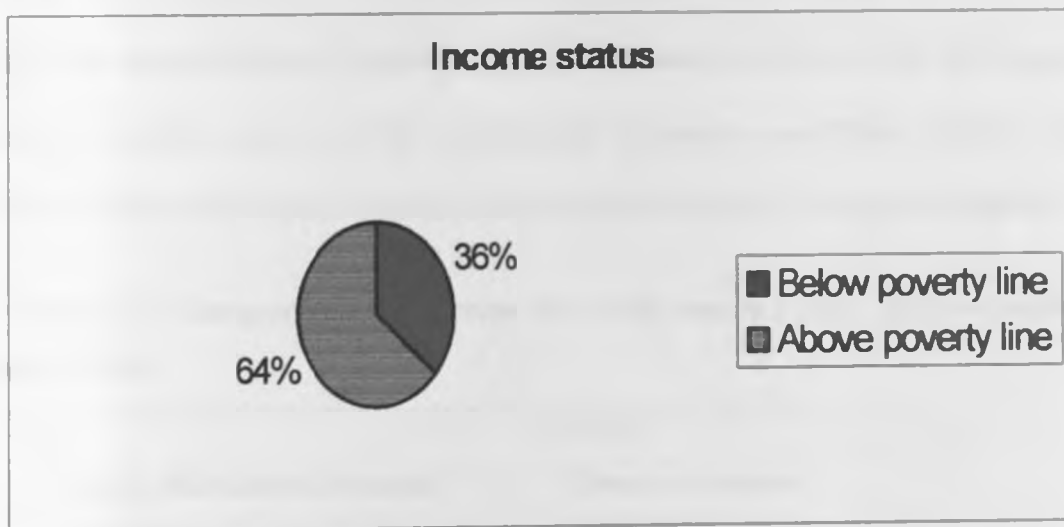
Figure 4. 3 Income level of the study households

The mean monthly income of the study households was KShs. 7400.7 ±35 with the minimum and maximum household income of Ksh.1, 000.00 and KShs. 16,000.00 respectively (95% CI=6980 – 7821).

4.1.2.3. Income level of male and female headed households

In this study, out of the 330 study households male headed households are more than female headed (88.5% and 11.5%) respectively. Out of 330 study households 89% of male headed households disclosed their income while 65% of female headed households

disclosed their income. There was a significant difference in the level of income in between male and female headed households. χ^2 = 72 df. =35 and p= .000. The mean income for female headed households was higher than that of male headed households

4.1.2.4 Monthly income of households headed by males' and females'

The mean monthly income of the male-headed households was KShs. 7369. ±35 whereas the mean monthly income of the female-headed households was KShs. 7,900.00 ±32. The comparison of income in male and female-headed households is shown in **Table 4.3**

Table 4. 3 Comparison of income for male headed with female-headed households

N =330	
Households headed by males'	Details of income
Mean monthly income of household	7369 ±35
95% confidence interval	6920.9 – 7817.5
Minimum household income	1,000.00
Maximum household income	16,000,00
Range of household income	15,000
Household headed by females'	Details of income
Mean monthly income of household	7,900.00 ±32
95% confidence interval	6386 –9413.9.
Minimum household income	2,000.00
Maximum household income	15,000.00 .
Range of the household income	13,000 00

4.1.2.5 Residential status

The majority of the households 86.6% lived in rented houses. Only 13.3% of the households lived in their own houses. The study finding showed that 72.1% of the households lived in one- roomed house, 15.5% in two-room house and the rest (12.4%) in three to nine roomed houses.

4.1.2.6 Fuel used for cooking and lighting at night

Most households (72.1%) used paraffin for cooking. The rest, (16.1%), (2.8%) and (8.2%) used charcoal, electricity and gas respectively. For lighting, (40%) of the households used electricity, (31.2%) hurricane while (17.9%) used candles, tinlamps or pressure lamps.

4.1.2.7 Durable goods

From the selected seven durable goods: radio, bicycle, sofa set, television, motor vehicle, mobile phone and Water tank, as a way of economic class identification, 57.6% of the households were categorised as low economic class as they owned less than two of the selected durable goods, 35.2% as middle economic class as they owned three to four of the selected durable goods while 7.2% households were categorised as high economic class since they owned five to seven selected durable goods. **Figure 4.4** shows distribution of households according to economic class categorisation based on durable household goods.
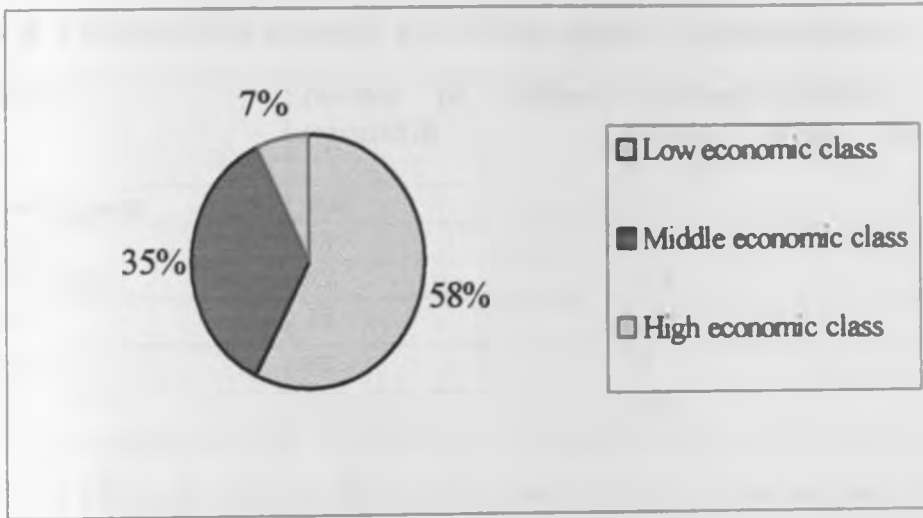
Figure 4.4 Distribution of households according to categorization based on durable goods

4.2 Morbidity Patterns among Children

Distribution of children by type of illness

Most study children (99.7%) were fully immunised for their age. Only 0.3% was not immunised.

Slightly higher than a half (60%) of the study children were reported ill within the last seven days preceding the survey.

Symptoms of upper respiratory tract infections (URTI), which include cough and running nose, were reported in a higher proportion of households (50.6%) than other types of illnesses. See **Table 4.4**.

Table 4. 4 Distribution of study children by type of reported illness

Disease	Number of children reported ill	Percentage of children suffering from illness N=330
Running nose	108	33
Cough	58	17.6
Diarrhoea	45	13.6
Fever	37	11.2
Normal	82	25
N	330	100

Out of the 330 study children 25% of them were not sick in the last week before the survey. The children who were suffering from a combination of cough and running nose were 11.8% whereas those who were suffering from diarrhoea and running nose were 4.5%. Very small proportions of children were suffering from fever and diarrhoea (3.3%) and cough and fever (1.8%).

The proportion of children who live in one-roomed households who were reported ill within the last seven days was 76.3% whereas 0.5 % of children in nine roomed households were reported ill within the last seven days. This difference in percentage of sick children in one-roomed households and nine roomed households (75.8%) indicates that there is an association between number of rooms in households and morbidity. Congestion enhances transmission of diseases. Eight out of every 10 homesteads, that is 81.5%, were clean while 18.5% were dirty.

4.3 Nutritional Status of the Study Children Aged (6-59 Months)

4.3.1 Nutritional status of the study children

The prevalence of malnutrition by different indices of nutritional status based on height for age, weight for age, and weight for height are shown in **Figure 4.5** and **Table 4.5**. These are represented using nutritional indicators stunting, wasting and underweight respectively. Those whose Z-score values were less than –2 Z-score were considered to be moderate and Z score value less than –3 is considered to be severe malnutrition.

The values flagged from the anthropometric measurement was 18 and the reasons being they were out liers for instance the height recorded in the field was below normal or above normal; for instance a 10 months old having 55 cm. height or 20 moths old having 20 kg weight. The flagged figures were excluded from data analysis. The study findings showed that stunting was the highest form of malnutrition recorded in this study (27.1%) as shown in **Table 4.5.**

Table 4. 5 Prevalence of malnutrition

N = 330		
Indices of malnutrition	Normal >-2 Z-score	Global malnutrition <-2 Z-score
Stunting (HFA)	72.9	27.1
Underweight (WFA)	87.8	12.1
Wasting (WFH)	95.1	4.9

48

As shown in **Table 4.5,** the proportion of male children who were stunted (30 8%) was higher than that of the female children, which stood at (23 1%) Wasting levels however were high in female children (5.7%) as compared to male children (3.5%).
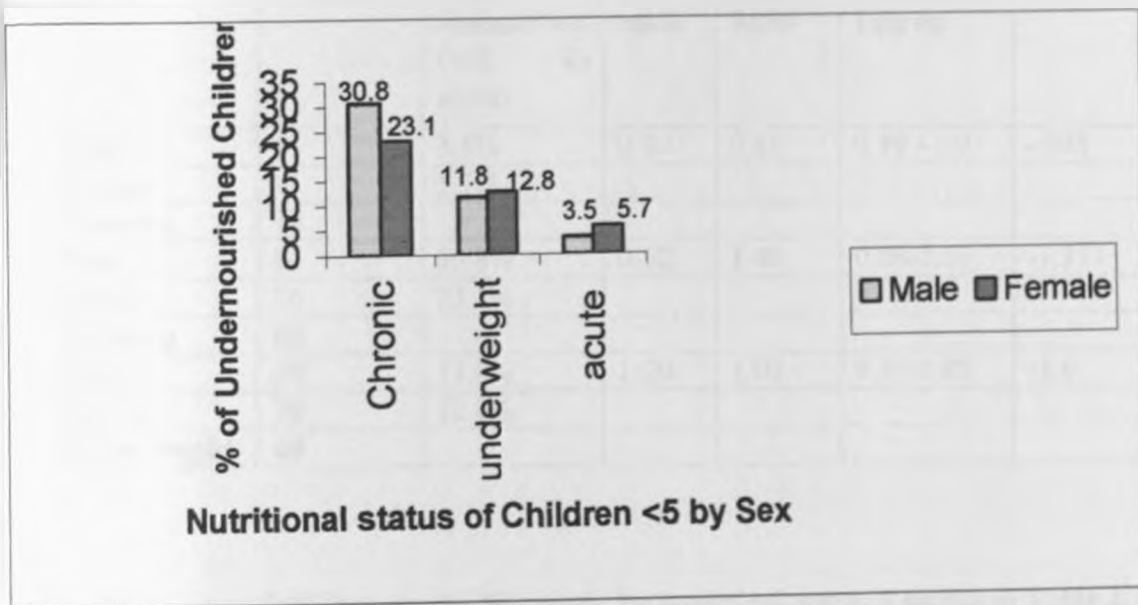
Figure 4. 5 Prevalence of malnutrition, by sex of study children

The proportion of stunted male children (30.8%) was higher than the female children (23.1%) whereas wasting level was higher in female children (5.7%) than the wasting level of the male children (3.5%). **Table 4.6** shows the prevalence of malnutrition of the children aged 6-59 months

Table 4. 6 Prevalence of malnutrition by sex of children 6-59 months

N =143						
Sex	Frequency	Global Malnutrition (<-2 Z-score)	P-value	Odds Ratio	Confidence Interval	T- test
Male	6	3.5%	0 3	0 61	0 19 –1.9	-.035
Female	9	5.7%				
Wasting	**15**					
Male	52	30 8%	0.12	1 48	0.88-2.51	-1.317
Female	36	23.1%				
Stunting	**88**					
Male	20	11.8%	1.00	1.00	0 45-1.85	-1.6
Female	20	12.8%				
Underweight	**40**					

The distribution of children aged 6-59 months by nutritional status is shown in Table 4.7. Stunting was the highest form of malnutrition identified. The proportions of male children stunted are higher (52%) than female children (48%).

Table 4. 7 Distribution of children by nutritional status

	Male N =169	Female N =156	
Distribution by chronic malnutrition	Male 52%	Female 48%	N=325
Global Chronic malnutrition <-2 Z-score	30 8%	23.1%	27.1%
Moderate chronic	16.6%	14.1%	15.4%
Severe chronic	14.2%	9%	11.7%
Distribution by underweight	Total N=329		
Global underweight < -2 Z-score	11.8%	12.8%	12 2%
Moderate underweight	8.9%	10.9%	9.7%
Severe underweight < -3 Z –score	3.1%	1.9%	2.4%
Distribution by acute malnutrition N =307			
Global acute malnutrition	3.6%	5.8%	4 8%
Moderate acute malnutrition	2.4%	3.8%	3.3%
Severe acute malnutrition	1.2%	1.9%	1 6%

Figure **4.6** Shows the comparison of prevalence of malnutrition of Kenya (at national level) robi and Kangemi (2003)
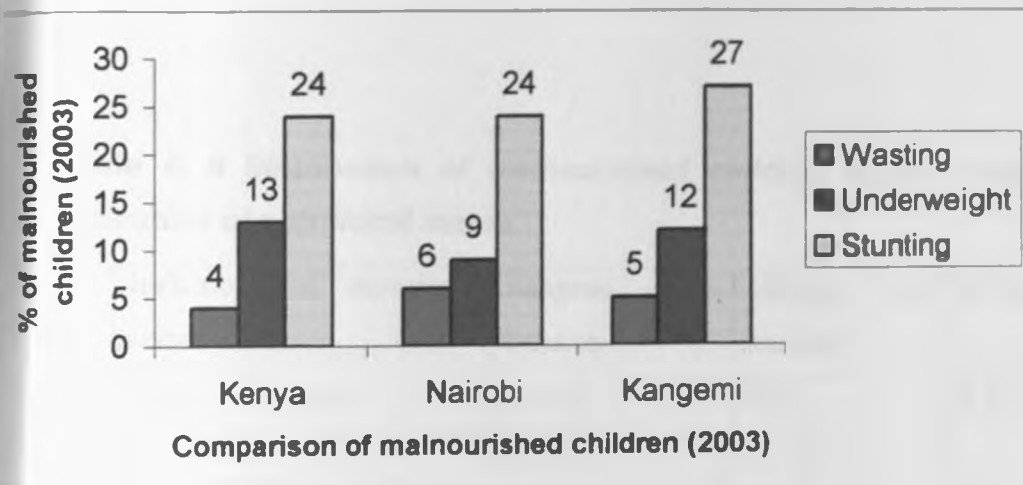
Figure 4.6 Comparison of prevalence of malnutrition

Source: KDHS 2003 preliminary report and CBS 2004 Key findings

As illustrated in **Figure 4.6** the prevalence of malnutrition looks almost at the same level in Kenya (National), Nairobi and Kangemi. The prevalence of chronic malnutrition was exactly at the same level in Kenya (national) and Nairobi (24%) (CBS, 2004).

4.3.2 Nutrition status of study children in the study sub locations

The children who comprised the study sample were drawn from Kangemi and Gichagi sub locations. Most of the children, 80%, were from Kangemi sub location while only 20% were from Gichagi sub location. Chronic Malnutrition was high in both sub locations. Kangemi sub location however was slightly more affected by malnutrition as compared to

Gichagi sub location. **Table 4.8** shows the distribution of malnourished children by sub location. **Table 4.8** shows the distribution of malnourished children by place of residence (sub locations). There was a significant difference of height for age. (**Table 4. 8**)

Table 4. 8 Distribution of malnourished children by sub locations and indicators of nutritional status

Indicators of nutritional status	Kangemi sub location	Gichagi sub location	P- value *
HAZ < −2 Z-score N =325	(27.6) n= 261	(25) n = 64	0.021
WAZ <-2 Z-score N =329	(12.5) n = 264	(10 8) n = 65	0.263

N = Total sample size   n = sample size with in sub location

* = The test carried out was χ^2 In parentheses are percentages

The number of wasted children was too low to be subjected to significance testing

4.3.3 Nutrition status of children under five in male and female headed households

This study revealed that the prevalence of malnutrition was higher in male headed households as compared to female headed ones. Children from male headed households were at a higher risk of being malnourished than the children from the households headed by female but the differences were not significant. The proportion of children with chronic malnutrition (low height for age) was reported 28% and 15.6% of children, underweight, (low weight for age) was reported among 12.8% and 6.5% of the children while acute

53

malnutrition was reported among 5.2%, and 3.2% children from male headed and female headed households respectively.

4.4 Nutritional Status of Study Children in Relation to Household Size

Majority of the households (95.2%) had less than five household members while only 4.8% had more than five household members. This study established more children from households with less than five members were malnourished (5.1%, 12.4% and 27.4% for wasting, underweight and stunting respectively) as compared to those from households more than five members in the (6.3%, 20% and 0% underweight, stunting and wasting respectively). This difference could be explained by the fact that the proportion of household with members greater than or equal to five in this study were very few. Since the households having greater or equal to five members are very few the analysis has shown that the prevalence of malnutrition among the children was not higher than that of in households having less than five members in an a households.

Correlation of household size and nutritional status of children shows that height for age was inversely related to household size whereas wasting and underweight are positively related to household size. The correlations however were very week, with significance level of stunting or height for age P=.88, Wasting and underweight p=.26 and P=.92 respectively. No association was found between household size and nutritional status of children (Weight-for-height Pearson chi-square test value =.87 p=.65, weight-for-age, Pearson chi-square test value=2.11 p=.26, and height-for-age, Pearson chi-square test

54

value =. 49,p=. 78). This could be explained by the fact that more than three-quarters of the households, 95% had household size of five or less **(section 4.4)**

4. 5 Infant or Child Feeding Patterns

4. 5.1 Breastfeeding status of study children and reasons for stopping breastfeeding.

As shown in **Table 4.9**, 43% of the 330 study children were still breastfeeding at the time of the study. There was no significant difference between the breastfeeding status of male and female study children as the Chi-square test shows by p > 0.05.

Table 4. 9 Breastfeeding status of the study children at the time of study

N = 142					
Age in months	Still breastfeeding			N	P-value
	%	male	female		χ^2
6-12	46.5	35	31	66	0.906
13-18	15.5	22	21	43	0.097
19-24	16.9	11	13	24	0.219
>24	6.3	5	4	9	0.684
Total	85.2	73	69	142	

Out of the 330 study children 56 8% had stopped breastfeeding. Reasons for stopping breastfeeding are listed in Table 4 10.

Table 4. 10 Reasons for stopping breastfeeding

Reasons for stopping breastfeeding	Percentage N=188
To wean	33.3
Child refused	12.7
Pregnancy	4.2
Mother ill	3
No milk in breast	2.1
Child ill	1.5

55

4.5.2 Food consumption patterns

4.5.2.1 The seven day recall food frequency

The 7-day recall food frequency was used to collect data on the food and how often an index child in a household consumed specific foods. According to (McCroy et al., 1999) if 10 food groups were consumed per seven days it is considered as the diet is diverse and below 10 food groups is considered as not varied diet

The proportion of the study children consumed varied diet is 12.1% while 87.8% of the children did not consume varied diet in the last seven days before the survey.

4.5.2.2 Food groups consumed by index child within 7-days (Table 4.11)

Table 4.11 Food groups consumed

Score	%of children consumed cereal	%of children consumed legumes	%of children consumed animal product	%of children consumed fruits	%of children consumed cooking fat	%of children consumed vegetable	%of children consumed starch roots &tubers
1(0-9) times/7 day	73.6	97.9	75.1	95.2	83.4	27.2	99.3
2 (10-35) times/7 day	26.4	2.1	24.8	4.8	16.7	72.4	.6

Table 4.12 shows the mean daily and mean weekly frequency of consumption of food groups by children under five.

Table 4.12 Daily and weekly frequency of consumption

N = 330				
Food group	Mean daily	Mean weekly	Minimum	Maximum
Starchy roots	0.24	1.7	0	56
Fruits	8.276E-02	0.58	0	21
Fats and oils	0.29	2.1	0	35
Other starches (sugar, cake,)	0.26	1.8	0	35
Cereals	0.31	2.2	0	38
Animal product	0.36	2.5	0	42
Legumes	7.85E-02	0.55	0	42
Vegetables	0.65	4.6	0	51

4.6 Dietary Intake of the Study Children

The 24-hour recall method was used for estimating current food intake of the study children aged 6-59 months old in the household. Sixty-six households were interviewed. The study findings showed that caloric intake for 34.8% of the children was below the recommended daily allowance while that of 65.2% of the children was adequate. Protein intake on the other hand was below the recommended daily allowance for 12.1% of the children and adequate for 87.9% of the children. Iron was below the recommended daily intake for 21.2% of the children and adequate for the majority (78.8%) of the children. The majority of the children, 78.8%, consumed adequate Vitamin A with only 21.2% consuming below the recommended daily allowance. The Proportion of children whose Zinc intake was below the recommended daily allowance was 80.3% with only 19.7%

consuming adequate amounts of Zinc   **Figure 4.7** shows the percentage of children by consumption of different types of food groups
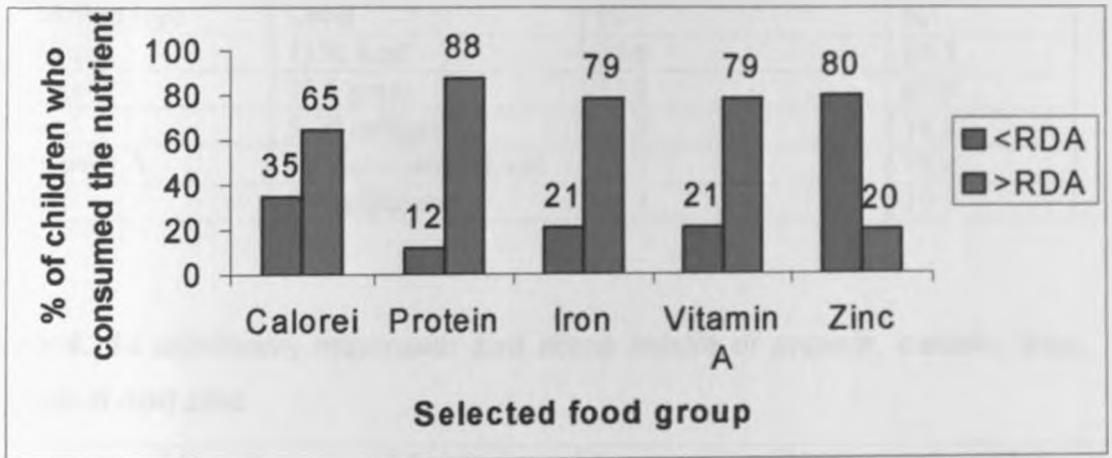
Figure 4. 7 Distribution of children by percentage of consumption as per 24 hour recall

4.6.1 Proportion of households whose dietary intake were below and above recommended daily intake

As shown in Table 4.13 protein foods was the most consumed nutrient. The study findings showed that, 88% of the study children consumed adequate Zinc foods on the other hand was least consumed nutrient with 80% of the children consuming less than the recommended daily allowance **Table 4.13** Shows the households' whose children consumed less than recommended daily allowance and those who met recommended daily allowance. **Table 4.14** is about minimum, maximum and mean intake of selected food groups.

58

Table 4. 13 Daily nutrient intake of the children aged 6-59 months in households

N =66	RDA	Consumed less than recommended	Consumed adequate
Nutrient type	Level	%	%
Calorie	1350 kcal	34.8	65.2
Protein	13.5 gram	12.1	87.9
Iron	5-10 milligram	21.2	78.8
Vitamin A	300 international unit	21.2	78.8
Zinc	5-6 milligram	80.3	19.7

Table 4. 14 Minimum, maximum and mean intake of protein, calorie, iron, vitamin A and zinc

Nutrient	N = 66	Minimum	Maximum	Mean	Std. deviation
Calorie (Kcal)	66	122.5	2983	1486.8	734.9
Protein (gm)	66	1.91	185.5	62	47
Iron (mg)	66	0.9	347.9	89	82.6
Vitamin A (Iu)	66	37.7	2564.7	833.5	681
Zinc (mg)	66	0.1	9.2	3.4	2.2

The upper out liers were removed because they do not represent the true situation. There were no lower out liers identified 4.6.2 Distribution of children under five by nutrients intake daily (Table 4.15)

Table 4. 15 Nutrient intake by children under five

Nutrients	Male N = 35		Female N=31	
	<RDA %	≥RDA %	<RDA %	≥RDA %
Calorie	65.2	46 5	34.8	53.5
Protein	75	50	25	50
Iron	55.6	52.6	44.4	47.4
Vitamin A	50	53.8	50	46.2
Zinc	54.7	46 2	45.3	53.8

Table 4. 16 Nutrient intake of children under five in relation to socio economic status (below and above poverty line)

Nutrients	χ^2 test	Odds ratio	Confidence interval	P -value N = 66
Calorie	1.69	2.00	0 63 –6.58	0.19
Protein	2.79	5.33	1.15 - 2.7	0.09
Iron	3.77	6.5	1.73 –2 47	0.025
Vitamin A	4.86	5	1 24-2 43	0.027
Zinc	3.15	2.04	0.99 –1 94	0.076

The test carried out was χ^2

More children from households above poverty line consumed adequate nutrients as compared to those from households below poverty line. There was a significant difference in the consumption of Iron and vitamin A between the two groups. Children from households below poverty line consumed iron, 6.5 times less than recommended daily intake as compared to children from households above poverty line.

4.6.2.1 Regular and casual employment and nutrient consumption by the study children

Table 4.17 shows the consumption difference of some nutrients by children of households with regular employment and casual employment

Table 4. 17 Difference in consumption of nutrients between regular and casual employment

Nutrients	χ^2 - Test	Odds ratio	Confidence Interval	P-value
	N =66			
Calorie	1.73	2.49	0.93 –2.26	0.19
Vitamin A	2.79	5.33	1.15 –2.57	0.095
Zinc	10.69	5.81	1.40 –2.5	0.001

The study findings showed that there was significant difference in the consumption of zinc by children from households with regular employment and those from households with casual employment. Zinc was 5.8 times more likely to be consumed by children from households with regular employment compared to those children from households with casual employment. Children from households with regular employment consumed calories 2.5 times more and consumed Vitamin A five times more than those from households with casual employment.

4.6.2.2 Consumption of calories, protein, iron, vitamin A and zinc by the education level of mother and father

Table 4.18 shows the education level of fathers and mothers and consumption of nutrients.

Table 4.18 Education level of mothers and fathers and nutrient intake of their children

Nutrients		χ^2 - Test	Odds ratio	Confidence interval	P-value
Calorie	Fathers	11.67	2.00	0.13 –28.031	0.0006
	Mothers	9.41	0.16	0.10 –0.85	0.0021
Protein	Fathers	0.15	0.74	0.35 –2.04	0.696
	Mothers	2.14	0.31	0.14 – 1.62	0.143
Iron	Fathers	1.37	0.38	0.17- 1.82	2.242
	Mothers	2.81	5.36	1.15 - 2.59	0.093
Vitamin A	Fathers	0.90	0.54	0.32 –1.58	0.342
	Mothers	3.79	6.56	1.25 –2.57	0.0514
Zinc	Fathers	6.42	0.36	0.36 –0.93	0.0112
	Mothers	4.67	0.25	0.14 –1.13	0.030

The study findings showed that there was a significant difference in the consumption of calories and zinc between children whose parents had only attained primary education level and those whose parents had attained tertiary level of education. Caloric intake was two times more for children whose parents were educated as compared to those children whose parents have no formal education.

4.7 Association of Nutritional Status of Children Aged 6-59 Months and Other Related Factors in Kangemi

4.7.1 Households income level (below or above poverty line) and nutritional status of children. As shown in Table 4.19, there was no association between nutritional status and the income level of the households (p>0.05).

Table 4. 19 Below and above poverty line and nutritional status

N =330	Wasting	Underweight	Stunting
Odds ratio	0.77	0.63	0.85
Chi —square test	0.14	1.01	0.24
P value	0.709	0.314	0.622

As shown in Table 4.20, nutritional status of children (wasting, underweight and stunting) was inversely related to the income level of the households. This implies that when income decreases the nutrition status deteriorates or malnutrition level increases and when the income level increases malnutrition of children decreases.

Table 4. 20 Association between below and above poverty line and nutritional status

N =330		t	Significance
Wasting		42.002	0.000
	Income in Ksh	-.717	0.074
Underweight		29.122	0.000
	Income in Ksh.	-.766	0.445
Stunting		19.025	0.000
	Income in Ksh.	-.166	0.868

The test in **Table 4.20** shows that the nutritional status of children (wasting, underweight and stunting) are inversely related to income level (i.e.,) when income decreases the nutrition status deteriorates or malnutrition level increases and when the income level increases malnutrition of children decreases.

Pearson Correlation coefficient with nutritional indicators for children (6-59 months old) and income. **Table 4.21** shows the details of the correlation.

Table 4. 21 Correlation of nutritional status of children and income

N = 330					
Income in Ksh.		Income in Ksh.	Wasting	Underweig ht	Stunting
	Pearson Correlation	1.000	-.056	-.058	-.013
	Significance		.474	.445	.868
Wasting	Pearson correlation	-.056	1.000	.180*	-.087
	Significance	.474		.013	.235
Underw eight	Pearson Correlation	-.058	180*	1.000	.373**
	Significance	.445	.013		.000
Stunting	Pearson Correlation	-.013	-.087	.373	1.000
	Significance	.868	.235	.000	

*Correlation is significant at 0.05 level (2-tailed)

** Correlation is significant at 0.01 level (2-tailed)

4.7.2 Nutritional status of children in relation to amount of water used per day in litres in a household.

Table 4. 22 Amount of water used and nutritional status of children

N = 330	Wasting	Underweight	Stunting
Odds ratio	1.26	0.91	1.71
Chi-square	0.12	0.05	2.67
P value	0.73	0.83	0.102

The study findings indicated that the risk of wasting was 1.3 times more and that of stunting 1.7 times more among children from households that used less than the recommended amount of water (<80 litres) per day. Among the underweight children 11.7% were from households who used the recommended amount of water per day while 13.3% were from households who used less water than the recommended amount of water per day.

The proportion of stunted children was high among the households who used less than the recommended amount of water per day as shown in Table 4.22. This was however different when it came to wasting as a high proportion of children from households who used the recommended amount of water per day were more wasted as compared to those from households who used less than the recommended water per day.

4.7.3 Nutritional status of study children in relation to amount of water used by households

Nutritional status of study children in relation to recommended amount of water and below recommended amount of water used by households per day was assessed for the purpose of level of hygiene. The recommended amount of water per day per household according to World Health Organisation, (WHO, 2002) is 80 or more litres. The nutritional status of children from households using less than recommended amount of water and those households which use water within recommended amount and more than recommended amount of water were assessed. The proportion of stunted children was 29.5% and 20.4% in households using less than 80 litres and ≥ 80 respectively. Slightly less than one third (11.8%) of the children from households using less than recommended amount of water in households were underweight.

Thirteen percent of underweight children were observed from the households used recommended amount of water. A small percent (4.9% and 1.2%) of households with wasted children used less than 80 litres and ≥80 respectively. This study has revealed that the proportion of children malnourished (stunted, underweight and wasted) from households using less than recommended amount of water were more than the proportion of children malnourished from households using recommended amount of water daily. It has also shown that there were children who were malnourished from households using recommended or more than recommended amount of water. This indicates possibility of causes of malnutrition other than amount of water available for use e.g. diseases like

diarrhoea and fever and low intake of nutrients **Table 4.23** shows nutrition status of study children in relation to availability of water.

Table 4. 23 Nutritional status of study children in relation to availability of water (Table 23)

N = 330			
Indicators of nutritional status	<80 litres of water used	≥80 litres of water used	P-value *
HAZ <-2 Z-score N =325	29.5% n =237	20.4% n =88	0.181
WAZ <-2 Z- score N =329	11.8% n =239	13% n =90	0.801

n = sample size with in amount of water used daily in households

The test carried out was χ^2

Wasting was not tested because it has frequency less than 5 in a cell

The least amount of water used per day was reported as 40 litres while the highest amount used per day was 100 litres. The mean number of litres used daily was 64.8 ±16. Most households (67.9%) reported that they treat drinking water by boiling it while (31.8%) households reported that they do not treat their drinking water. Over half of the households (67%) reported that they have separate container for drinking water and about half of the households (50.8%) use pouring out method to remove water when they want to use it.

4.7.4 Morbidity and nutritional status

Table 4. 24 Distribution of children by morbidity and nutritional status

N = 330	Chronic malnutrition N=325	Underweight N =329
Running nose χ^2 test	8.3% Value =0.444 p =0.801	4% Value =0 262 p = 0.877
Cough χ^2 test	3.4% Value=2.138 p =0.343	2 4% Value =2.285 p =0.319
Diarrhoea χ^2 test	3.4 Value =1.111 p =0.892	2.1 Value =0.902 p = 0.924

χ^2 stands for chi-square test

Wasting is excluded from Table 4.24 because the frequencies were less than five, which cannot be used for any statistical test.

No significant difference was observed between nutritional status of children and morbidity using Chi-Square Test (Table 4.24) p >0.05).

4.7.5 Factors that are associated with nutritional status, dietary intake and illness of study children

Factors associated with nutritional status

Place of residence (Kangemi, Gichagi)

Sex of household head (more prevalence in male headed)

Amount of water used in a household

Income level (below and above poverty line)

Factors associated with dietary intake

Socioeconomic status

Education level of parents

Regular and casual employment

Diarrhoea is associated with <80 litres of water in a household

4.8 Focus Group Discussion

Four focus group meetings of men and women each consisting of 10 persons was conducted in the four study villages. The findings indicated that:

- Cough, running nose, diarrhoea and vomiting were the commonest diseases among children in the study area.

- Majority of the mothers treated diseases by buying drugs from drug stores or borrowing from the neighbours.

- The drugs bought were often the wrong ones as a qualified doctor, prior to purchase, did no prescription.

- Mothers took their children to the dispensary only when they suffered from serious diseases like pneumonia, diarrhoea, malaria, and high fever.

- In the absence of the mother, children were taken care of by grandmothers, house girls, neighbours, houseboys and bigger children.

- Most mothers started giving supplementary food to their children at the age of three weeks to one month because they felt breast milk alone could not satisfy the children and that's why the children would cried a lot.

- 20 to 30 households were using one latrine.

- Households used tapped water or bought water from water vendors. About an average of 50 litres of water was used pre day per household.

- The city council has not made any arrangement for refuse collection and disposal in the area.

CHAPTER FIVE: DISCUSSION
5.1 General Characteristics of the Study Population

5.2 Household Size

The mean household size (3.7±. 99) persons found in this study is almost the same with the one reported for Nairobi (3.5) (GOK, 1999). This is probably because the household comprised young couples, or families still in the expansion phase It also reflects type of families, in urban settings, nuclear rather than extended families.

The study did not identify any persons aged above 64 years. This was probably because the people who were migrating to urban area for search of job were mostly young people and when they reach retirement age, when they can not actively participate in economic generating activities they return back to their rural homes (Kangl, 1996). The same study has found out that the older people are less likely to migrate to urban areas and more likely to return to rural areas of origin after periods of work in towns and cities.

5.3 Household Characteristics

According to CBS (2004) almost one in three households in Kenya are headed by a woman. Female headed households are more common in rural areas (34%) than in urban areas (26%). In this study, female headed households account for (11.5%), (section 4.1.2.3) of the total households. This is lower than what has been reported for Nairobi (20%) (CBS, 2004). Regardless of sex, the mean age of household head was 31 ± 7 years. Income is a mirror image of a household's resources and presides an index of its purchasing capacity UNU (1986), (section 2.6). The mean nominal income per month of

a male headed households in this study was Ksh. 7369 ± 35 (section 4.1.2.4, Table 4.3). This is higher than what was reported about Kangemi (Ksh. 2, 060) by Ministry of planning (MOP, 1990). In contrast, the mean monthly nominal income of female-headed households (Ksh. 7, 900 ± 32) (sections 4.1.2.5. Table 4. 3). This is more than Ksh. 1, 672 indicated in (MOP, 1990) report. However despite the difference in income from male-headed households, the nutritional status of children from female-headed households was better off than those of children in male-headed households. This finding therefore suggests that income generated in female-headed households is likely to be used for the nutritional well being of its family members.

Secondary education level or those who did national examination and tertiary levels of education, more males' were enrolled than females'. Males' enrolment rate was 54.8% and 81% respectively whereas female enrolment rate was 45.2% and 19% respectively at the same levels of education. This is in agreement with CBS (2004) which states that Kenyan men tend to complete higher levels of education than women. Almost 40% of men have at least some secondary education compared with only 29% of women.

5.4 Improving Young Child Feeding

Proper infant and child feeding practices include exclusive breastfeeding in the first 6 months of life followed by gradual introduction of supplementary foods starting with liquids and progressing to solids, as the child grows older. Since supplementary feeding

72

given in the weaning phase gradually replaces breast milk, they should be nutritionally adequate, safe, and free from contamination. These foods must be of a consistency and quality that an infant or young child would be able to consume, enjoy and benefit from (GOK, 1994).

Out of the 330 study children 43% (section 4.5.1, Table 4. 9) were breastfeeding at the time of the survey that is lower than reported in Kibera (58.2%) (Ibtisam, 1997) which shows that breastfeeding practices appear to vary from one low-income area to another. Good nutrition, in the early months of life, is more usually determined by feeding practices, whether the right food is given at the right time, in the right way and the right frequency, severity, and duration of disease. Disease depresses appetite and inhibits the absorption of nutrients. Disease like fever makes the body to consume a lot of calories as it tries to fight off infection. It drains away nutrients through vomiting and diarrhoea, and it alters the body's metabolism, in ways that are still not entirely understood, such that the benefits of the available nutrients are lowered (UNICEF, 1997).

Food consumption
Protein food was the most consumed of the selected groups of food for 24 hour recall and this is probably because protein foods can be obtained from plant food sources like beans, green gram, etc. in addition to animal sources like meat, milk, cheese, etc. Zinc food was the least consumed by the index children. This is probably because zinc is strictly obtained from animal source and foods of animal sources are too expensive to most households to

consume frequently. According to Tomkins (2000) zinc deficiency is common because the best sources of zinc are fish and meat, which are often too expensive for many families. The bioavailability of zinc in plant foods such as cereals is low (section 2.4).

According to Hoddnott *et al.*, (2002) dietary diversity is a good measure of household food access. The same study has indicated that a more varied diet is associated with a number of improved outcomes in areas such as birth weight and child anthropometric status.

5.5 Access to Safe Drinking Water and Sanitation

Lack of water (including safe drinking water) and inadequate hygiene and sanitation contribute in several ways to the incidences of diseases and malnutrition. Good hygiene is necessary to prevent diseases. Good hygiene is unimaginable without adequate clean water at household level. Cooking, bathing, washing and other household chores all require clean water. When dirty unsafe water is used for drinking and bathing it contributes to the spread of diarrhoea, dysentery and other water borne diseases (UNICEF 1992).

According to UNICEF (2002) Safe disposal of all household refuses help to prevent illness (section 2 8). For most households, refuse is usually left scattered indiscriminately around the houses. Only a few people reported they burned or dumped refuse at a communal dumping ground or used private companies collect it. The city council has not made any arrangement for refuse collection and disposal in the area (section 4 8 and

4.1.1.6). This would be the reason why there is no proper dumping of refuse in the study area.

The majority of the houses in the study area (72.1%) were single roomed. Even though most of the compounds (81.5%) were clean, congestion of the rooms leads to increased person-to-person contact, a situation that may lead to and enhance transmission of disease and therefore negatively affect the nutritional status. However, no association was noted between number of rooms and nutritional status of the study children. Most of the households (98.7%) (section 4.8) shared pit latrines, which may result in overuse and create favourable environment for transmission of diarrhoeal diseases, thus, affecting the nutritional status of the children. Whether connected to the household or being brought from watering points most houses obtain water from a tap within Kangemi. Absence of association between nutritional status of the study children and any of the following factors, treating drinking water, method of treating water, and method of removing water from the containers could be attributed to the fact that Kangemi has been provided with tap water.

5.6 Prevalence of Malnutrition and Some Associated Factors

The nutritional status of infants and children under five years of age is of particular concern. Since the early years of life are crucial for future growth and development. Their nutritional well being reflects household, community and national investments in family health thereby contributing both directly and indirectly in overall country development (GOK, 1999). The nutritional status of under fives has been used as a proxy under which

statements about the nutritional situation in developing countries is made leading to its use as a basis for nutritional planning. Undernutrition exposes children to all kinds of diseases; because their bodies have got poor resistance. In fact, all illnesses are a threat to nutritional health (UNICEF, 1998) (section 2.1).

The established level of stunting (27.1%) is slightly higher (section 4.3.1, Table 4.5) than the reported 22% stunting level of Kibera (Ibtisam, 1997). The proportion of male children who were stunted were higher (30.8%) than that of female children (23.1%) (Figure 4.5). In the words of Wood (1998), malnutrition means bad feeding, wrong feeding or not enough feeding. Malnutrition is a sickness. The right medicine to give for malnutrition is good food.

5.7 Morbidity Status

The high prevalence of total morbidity (75.4%) (Section 4.2, Table 4.4) found in the study area, could be as a result of over crowded environment and poor sanitation (section 2.8) in this low-income community. According to preliminary report of KDHS (2003) malnutrition places children at increased risk of morbidity and mortality and has also been shown to be related to impaired mental development .No association was found between morbidity and nutritional status of the index children in this study. The prevalence of diarrhoeal disease, (13.6%), among the index children, is less than expected bearing in mind that Kangemi is a slum area characterised by poor sanitation and lack of proper waste disposal facilities (section 2.9).

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. The results of this study indicate that malnutrition in the study community among the children under five is high

2. Level of household income, illness, sex of household head and amount of water used in a household are factors that affect the nutritional status of children in the study area.

3. Dietary intake is affected by household income, education level of parents and condition of employment.

4. The study area has small household sizes.

5. Mothers in the study area don't practice exclusive breastfeeding

6. The most common infection in the study area is likely to be upper respiratory infection.

7. Stunting is the highest form of malnutrition followed by underweight and wasting.

8. Caloric, protein, vitamin A and iron consumption is adequate

9. Zinc consumption in the study area is inadequate.

10. Diarrhoea is associated with <80 litres of water in a household

11. There is less than enough construction of pit latrine in the area.

6.2 Recommendations

Since it has been proved that level of household income influences the consumption frequency as well as the amounts consumed by children under five, putting in place

income generating activities in the community and improvement of the environmental sanitation is important.

1. Environmental sanitation to avoid health problems like running nose and diarrhoea

2. Improve sanitation, the City commission should try as much as possible to supply households with cheaper access to safe drinking water and encourage and help the community put in place the essential facilities for waste and refuse disposal. There is a great need of more constructions of pit latrines because as reported by respondents about 20 to 30 households share the same latrine (section 4 8).

3. Nutrition education in order to diversify food when possible and affordable

4. Buying of drugs without prescription and self-medication should be discouraged by making available free medication or affordable medical price

5. It has been reported that there is only one city council clinic and the rest are private health centres which indicates that the community needs more city council clinics because most people can not afford to pay for private health centre services.

6. It has been reported that there is overcrowding, mushrooming and unplanned buildings which is health hazardous. As the result the community needs assistance from the relevant authorities or well wishers to make a better environment and planned buildings.

7. The community needs sewage and drainage systems that carries away sewage or other unwanted liquid to improve the health and nutrition status of the children.

REFERENCES

Abdelgadir, M. H., AbdelRhaman, E.T., Zein, E.k. and liham, S.A (1995). Identifying At-Risk Children under Five in the Sudan. A Recommendation Paper, volume 1, Issue No. 1, p.41

Andrew, A, F., John, E.L., John, E.S., John, W.T (1991). Handbook for Family Planning Operations Research Design. U.S.A. New York Library of Congress. Second Edition. Chapter 8 p.42

Bich P, Bentley M, Pachon H, Sripaipan T, Caulfield L, Marsch,D and Schroeder D (2002). Caregiver Styles of Feeding and Child Acceptance of Food in Rural Vietnam. Food and Nutrition Bulletin. Published by the United Nations University Press, Tokyo, Japan. volume 23, No. 4 p.95

Central Bureau of statistics (CBS) |Kenya|, Ministry of Health (MOH) [Kenya| and ORC Macro, 2004. Kenya Demographic and Health Survey 2003: Key Findings. Calverton, Maryland, USA: CBS, MOH and ORC Macro. Pp 2, 10, 20

Cogill, Bruce (2001) Anthropometric Indicators Measurements Guide. Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington DC, U.S.A. Part 6 p. 41

Daniel, Wayne (1991). Biostatistics A Foundation for Analysis in the Health Science. John Wiley and Sons, Inc., New York, Chichester, Brisbane, Toronto, Singapore Fifth Edition. Chapter 5 p.157

GOK (1994). National Plan of Action for Nutrition. Ministry of Planning and National Development. Nairobi, Kenya. Theme 7. p. 40

GOK (1999). A Popular Version of First Report on Poverty in Kenya. Office of the vice president / Ministry of Planning and National Development. Nairobi, Kenya. Chapter 4 Pp. 18, 23

GOK (2001). Population and Housing Census. Population Distribution by Administrative Areas and Urban Centres. volume 1.1, p. 1-3

GOK (1999). Kenya Demographic and Health Survey (KDHS). Office of the vice president and Ministry of Planning and National Development. Macro International Inc. Calverton, Maryland. U.S.A. p. 120

GOK/ UNICEF/ Ministry of planning and National Development (1990). Socio Economic Profiles. Published by the Ministry of Planning and National Development. Republic of Kenya. Nairobi Kenya. Kenya Country Office. Reata Printers Ltd. Chapter 8 Pp. 181,183,192.

GOK/UNICEF (1992). Children and Women in Kenya. A Situation Analysis of Children and Women in Kenya, UNICEF Kenya Country Office Nairobi, Kenya Regal Press Limited, Nairobi. Kenya. Chapter 1 p.10, Chapter 2 p. 85.

Hoddinott, J.Yohannes Y. (2002). Dietary Diversity as a Food Security Indicator. Food and Nutrition Technical Assistance Project, Academy for Educational Development. Washington, D. C p. ii

Ibtisam, Elamass (1997). The Prevalence of Malnutrition and Some Associated Factors among Pre-school Children in an Urban Slum, Kibera. Nairobi, Kenya. MSc.Thesis, Department of Food Technology and Nutrition, University of Nairobi/ANP, Nairobi, Kenya. Chapter 5 Pp. 48 and 56.

Kanji, Nazarene (1996). Review of Urbanisation Issues Affecting Children and Women in the Eastern Africa Region. Published by Eastern and Southern Africa Region. Nairobi, Kenya. Chapter 2 Pp 5-18, Chapter 3 Pp 19-21

KDHS (2003). Kenya Demographic and Health Survey 2003. Preliminary Report. Central Bureau of Statistics/ Ministry of Health. Calverton, Maryland, U.S.A. Chapter 3 Pp 22-24

McCroy, A., Fuss, J., Vinken, G., Robert, B. (1999). Dietary Variety Within Food Groups. American Medical Journal in Clinical Nutrition. American Society For Clinical Nutrition.U.S.A.p.440

Mukuria, N. (1999). Exclusive Breastfeeding and the Role of Social Support and Social Networks in A Low Income Urban Community, Kangemi, Nairobi, Kenya Chapter 4 Pp 67 –74

Popkin B and Bisgrove E (1998). Urbanisation and Nutrition in Low Income Countries (online) Press available at [http: www.unu.edu unupress/food/8f101E02.Accessed 16 November, 2004.

Robert, D.Lee and David, C.Nieman (1996). Nutritional Assessment: Anthropometric, Biometrics, Clinical and Dietary. Second edition. Mosby yearbook Inc. New York, Singapore, Toronto, Chicago, Mexico City, London, Madrid, Boston. Chapter 3 .p 97.

Savage, Felicity King and Burgess, Ann (1993). Nutrition for Developing Countries. Second edition. Oxford Medical Publications. Oxford University Press Inc. New York. Appendix 4 P.441 Fifth Edition. Published in the United States by Oxford University Press Inc., New York. P.441 Appendix 4

Sehmi, Jaswant Kaur. (1993). National Food Composition Tables and the Planning of Satisfactory Diet in Kenya. Ministry of Health/National Public Health. Government Printer. Nairobi, Kenya. Chapter 2 Pp 51 –150

Tomkins, Andrew (2000). Nutrition and Immunity. The International Newsletter on Child Health and Disease Prevention.Child Health Dialogue. Published by Healthlinc Worldwide. Issue 19 April –June 2000. P.5

UNICEF (1993) United Nations Children's Fund. Child Malnutrition. Progress Toward the Summit for Children Goal. New York, U.S.A. p.17

UNICEF (1997). Malnutrition in South Asia: A Regional Profile. ROSA Publication No..5, Edited by Stuart Gillespie Pp. 14 and 15

UNICEF (1998). United Nations Children's Fund. The State of World's Children 1998. Carol Belay Executive Director, Oxford University Press. U.S.A. Pp. 6, 10,11,77

UNICEF/WHO/UNFPA/UNESCO/UNDP/UNAIDS/WFP/World Bank (2002). Facts for Life. Second Edition. New York, U.S.A. Pp. 96, 97

UNU (1986). United Nation University.Food and Nutrition Bulletin, volume 8 No 4 Kathmandu, Nepal.p.4

USAID (1996) U.S. Agency for International Development. Nutritional and Health Status of Young Children and their Mother in Kenya. Macro International Inc. Calverton, MD University of Nairobi Kenya. p. XI.

USAID (1996) U.S. Agency for International Development. Nutritional and Health Status of Young Children and their Mother in Kenya. Macro International Inc. Calverton, U.S.A. p. 12.

USAID, (1999) U.S. Agency for International Development Nutrition of young children and their mothers in Kenya, 1998. Africa Nutrition Chartbooks. Findings from the 1998 Kenya DHS survey. Macro International Inc.Calverto, Maryland, U.S.A p. 2

USAID, (2001). U.S.Agency for International development. Nutrition of young children and mothers in Tanzania. Africa Nutrition Chartbooks. Findings from the 1999 Tanzania Reproductive and Child Health Survey Calverton, Maryland, U.S.A. p.1.

WHO (1983). Measuring Change in Nutritional Status. Guidelines for Assessing the Nutritional Impact of Supplementary Feeding Programmes for Vulnerable Groups. Geneva. Chapter 4 Pp12-14

WHO (1999). World Health Organisation. Nutrition Essentials A guide for Health Managers. New York Chapter 1Pp.2, 3

WHO (2002). Healthy Villages A guide for Communities Health and Community Health Workers. World Health Organization.Geneva. Chapter 2 p 9, Chapter 3 Pp 31,32, Chapter 8 63,70.

Williams, Sue Rodwell (1994). Essentials of Nutrition and Diet Therapy. Mosby yearbook, Inc. St. Louise, Baltimore Boston, Chicago. Chapter 1 Pp.5, 9, Chapter 7 p.124, Chapter 9 p.170.

Wood E. (1998). Community Health Worker's Manual Nairobi, Kenya Second Edition Chapter 6 Pp. 96,97.

World Bank (2000). Indicators for the Intentional Development Goals (online) Press available at <http: www.development goals org> Accessed June 21.2004.

Appendices
Appendix 1 Questionnaire
General Information. [Fill in accordingly].

The respondents are the mothers or substitutes of mother of the children aged 6 to 59 months.

Date of interview _____ Name of interviewer_____

Questionnaire No._____ Name of respondent _____

Name of Head of household_____Household No._____

Number of cluster_____

Division _____ Location _____Sub location _____Village _____

Demographic and socio-economic characteristics

Q1a. How many people live in this household? _____

Q1b. List the house hold members in the table below and [Fill in the appropriate codes].

Seria l No.	Name	Sex	Age in yrs. (months)	Marital status	Residential status	Relation to HH head	Education	Occupation	Income (Ksh.)

arital status   **CODES**
= Single
Married
onogamous
Married
ygamous
=Divorced
= Widowed
= Cohabiting
Other(Specify)

Sex
1 = Male
2 = Female

Relationship to HHHH
1 house hold head
2 = spouse
3 = son
4 = daughter
5= Brother/Sister
6 = Other relatives
7 = Non-family members

Education
1 = No formal education
2 = Lower primary 1-4
3 = upper primary 5-8
4 Secondary incomplete
5= Completed secondary
6 = Post-secondary
7= not applicable

Occupation.
1= Housewife
2 = Business/Trading
3 = Without employment
4 = Formal employment
5 = Casual employment

Residential status
1 = Owned
2 = Rented

84

Q2. What fuel do you use for cooking in this household? [Rank according to the level of usage starting from mostly used to least used].

1= fire wood 2= paraffin 3= electricity 4= charcoal 5= gas 6= other (specify)

3. What do you use for lighting in this household? [Rank according to the level of usage starting from mostly used to least used].

1= Tin lamp 2= Pressure lamp 3= Electricity 4= Hurricane lamp 5= gas lamp

city   7= candle   8= Other (specify)_____

. What type of roof is the house? [Circle] 1= grass thatched 2= Tiles 3= Corrugated iron sheets 4= Other (specify)_____

5. What type of floor does this house have? [Circle] 1= mud 2= Cement   3= wooden   4= Other (specify)_____

6. Do you own the following items?[Circle] 1= radio 2=Bicycle   3= Sofa set 4= Television   5= motor vehicle 6= Mobile phone 7= Water tank

24-HOUR RECALL

[Please use the sheet on the next page]

Q7. Using the 24-hour recall food intake record sheet, ask these questions and fill in the required details in the table

Name of the child _____ sexism/F_____

Date of birth_____ Age_____(in months)

1. Starting from yesterday morning, what did you feed your child?

2. Did you prepare for the child alone or including other family members?

3. What did the dish consist of (ingredients)?

4. How much of each ingredient mentioned did you include?

5. What volume was the whole dish after preparation?

6. How much did you give the child ?[volume]

7. How much was left?[volume]

Note: Ask to see and specify measure used under household measure column: [then take volume and try to estimate levels as much as possible]

24 Hour recall Intake Record Sheet

Time	Dish	Dish Prepared 1 = Child alone 2 = family dish	Name of ingredients used for preparation	Household measure used	Amount in h/h measure	Amount of ingredient in the dish (weight)	Complete dish prepared (ml/gm)	Amou served child (

Note: Taking measures: use sufurias, utensils in the household to show the exact amounts, sizes and units used in preparation of foods. Using this, translate the measures into volumes using measuring jugs. Request to see and weigh the used levels 1 = Teaspoon, 2 = Tablespoon, 3 = Cup, 4 = Bowl, 5 = 250g tin, 6 = 500g tin, 7 = 1 Kg tin, 8 = 2 Kg tin (gorogoro) 9 = litre 10= 1kg 11=Other (specify)_____

Q8. What food has your child consumed within the last 7 days before the day of interview?

7-Day Food Frequency

Food Item	Frequency of consumption

Frequency, number of times food item consumed in the past 7 days before the day of interview

BREASTFEEDING AND WEANING PRACTICES

[Circle and fill in accordingly where necessary]

9.Are you breastfeeding your youngest child now?1 = Yes   2 = No

10. When do you breastfeed your child? 1 = On demand   2 = Scheduled time. 3= Others (specify)

IF THE MOTHER IS NOT BREASTFEEDING THE CHILD, [ASK!,

11. How old was your child when you stopped breastfeeding? _____ months.

12. Why did you stop breastfeeding? 1 = Next pregnancy   2 = No milk 3 = Mother ill

4 = Child refused   5 = Child ill   6 =To wean   7= Others (specify)_____

3.How did you stop breastfeeding? 1 = Abruptly   2 = Gradually   3= Others

(specify)_____ .

SANITATION AND ENVIRONMENTAL INFORMATION.

[Circle and fill in accordingly]

14. How many rooms are there in this house? _____ Rooms

15.[Observe] the condition of the compound with respect to cleanness 1 = Clean   2   =

Dirty

16. [Observe] the condition of the children with respect to cleanliness] 1= clean 2= dirty

17. How do you dispose of refuse from your compound? [Circle] 1= Composite pit 2=

Burn 3= bury 4= Throw in garden 5= Other (specify)_____

18. Does this household have a latrine? 1 = Yes   2 = No

19. [If yes] What type of latrine? Private for the household or common for many?

    1 = Private   2 = Communal

20. Where do you obtain your water? 1= River 2 = Tap 3 = Pond 4 = Borehole 5 = Spring

    6 = Well 7 = Others specify_____

21. How much water do you use per day _____{litres}

22. How much of this water is used for domestic purposes_____(litres) and how

much of this water is used for drinking?_____(litres).

23. Is the water purchased? [Circle]   1 = Yes 2 = No 3= paid with rent   4= other

(specify)

24. Is the water source protected?   1 = Yes   2 = No [Circle]

25. Do you treat your drinking water? 1 = Yes   2 = No

26.If Yes, by what method?

    1. Boiling   3 = Chlorination   5 = (Specify)_____

    2. Filtering   4 = No treatment

27. Do you have a separate container for drinking water?[Circle]

    1 = Yes   2 = No

28 If yes, what is the method of removing water from the container?[Circle]

    1 = By dipping into it   2 = By pouring out   3 = By tap

29. Is the water container covered? 1= yes 2= no

30. Can I see the container please? 1= the container is seen 2= the container is not seen

Morbidity. 7 - day recall and Immunization

The following information refers to the young child in the age bracket of 6 - 59 months

31. Has.....................had any of the following illness within in the last seven days? 1= Yes 2 =no 32..(If yes) ask the mother the kind of sickness the child was suffering from ? [Circle appropriately] 1 = Diarrhoea = DD   2 = Fever =FV

3 = Running Nose = RN 4 = Cough = CO   5 = Vomiting=VO 6 = Others (specify)_____

33. Has your child been fully immunised?[Circle] 1= yes   2= no

[Confirm from the vaccine cards]

Vaccinations	[Please tick Appropriately]		Confirm from vaccine card [tick]	Dose complete for age [tick]	
	yes	no		yes	no
BCG vaccine(left fore arm)					
DPT vaccine(Outer right thigh)					
HEP.B &HIB (outer right thigh)					
OPV					
Measles (right upper arm)					

ANTHROPOMETRIC MEASUREMENT

OF CHILDREN AGED (6-59 MONTHS)

34. Weight (Tolerance +/- 0.1 kg)

Name	Sex	Age	1st	2nd	Average
1					

35. Height (Tolerance +/- 0.1cm)

Name	Sex	Age	1st	2nd	Average

1. _____ _____ _____ _____ ____ _____

Appendix 2   Focus Group Discussion

Date. _____   Respondents age ....

 Group no. ....

1. When you cook porridge for children what do you add apart from flour?

2.   According to the information I have gathered in the last four weeks most people in

    Kangemi use sukuma wiki mostly. Is it because,

        1. Takes less time to cook.

        3. Cheapest

        4. Traditional

3. Do you have a garden? ....

4. If yes what do you harvest from it? ....

5. The harvest from your garden is it sold or used at home? ....

6. Do you keep livestock's? ....

7. If yes, which of the following do you keep?

        1. Goats

        2. Sheep

        3. Chicken

        4. Cows

        5. Others (specify) ....

8. How is the livestock used?

        1. Sold

2. Used at home in form of meat, milk, egg, etc.

9. About how much water do you use per day? .... liters.

10. According to the information I have gathered in the last four weeks 35% of people responded they get water free or not purchased is that true?

11. How do you dispose off refuse from your compound? ....

12. How many households share one latrine? ....

13. What are the main activities of mothers in Kangemi?

14. Who takes care of the children when the mother is away?

15. How is a child treated when he/she gets sick? Always taken to hospital or any other way may be like buying drugs with out professional diagnoses

16. In general how many times the under five children served food daily?17. How long do most mothers breastfeed their children?

18. What kind of food are the children given at the beginning when start weaning?

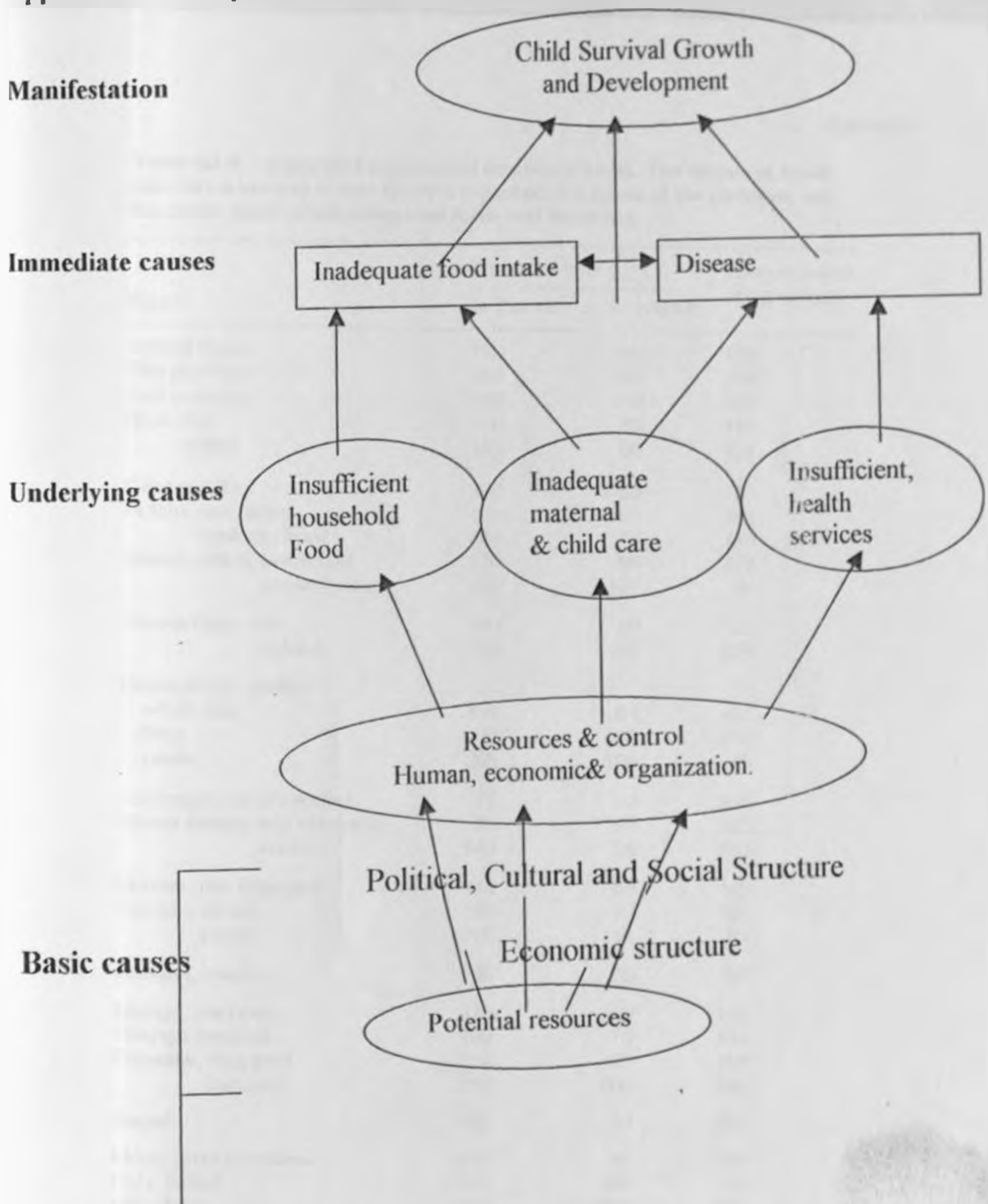**Appendix 3: Conceptual Framework of Nutrition (UNICEF 1992)**

Table A4.4. Equivalent weights and volumes of foods. The volume of foods can vary according to how tightly it is packed, the shape of the container, etc. So check these values using local foods and measures.

Food	Weight of food (g)		Volume (ml) of 100 g of food
	In 250 ml	In 100 ml	
Cereal flours	150	59	169
Stiff porridge	100	100	100
Soft porridge	100	100	100
Rice, raw	210	85	118
boiled	165	66	152
Cassava flour	130	53	189
Potato, raw diced	160	63	158
cooked diced	180	71	140
Sweet potato, raw diced	140	56	178
cooked mashed	265	107	94
Beans/Peas, raw	200	80	125
cooked	180	72	139
Groundnuts, shelled			
whole raw	160	64	157
flour	120	48	210
paste	265	106	95
Cabbage, raw shredded	75	30	338
Green leaves, raw chopped	75	31	329
cooked	140	55	183
Onions, raw chopped	170	68	148
Tomato, sliced	190	77	131
paste	275	111	91
Banana, mashed	235	95	106
Mango, chopped	170	69	146
Orange sections	190	75	134
Pawpaw, chopped	150	59	169
mashed	250	100	100
Sugar	205	83	121
Meat, ground/minced	240	95	105
Fish, flaked	295	102	99
Milk, fresh	250	100	100
dried skimmed	105	43	236
dried whole	140	55	183
evaporated	265	106	95
condensed sweetened	350	139	72
Margarine	235	95	106
Oil	220	88	114

From FAO (in press) Calculated from values in *Home Economics Research Report*, no. 41, Agricultural Research Service, US Department of Agriculture (1969) and unpublished estimations.

Appendix 5 Map of Kangemi, Nairobi