NUTRITIONAL KNOWLEDGE, DIETARY PRACTICES 
AND NUTRITIONAL ADEQUACY OF PEOPLE LIVING 
WITH HIV/AIDS IN NAIROBI, KENYA

By:

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HUMAN NUTRITION
DECLARATION

I, MUTHAMIA OLIVE GACHERI hereby declare that this dissertation is my original work and has not been presented in any other University.

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To my parents, Mr. Cornelius M. Kiaira and Mrs. Alice G. Muthamia. They are my source of inspiration and strength on the planet earth
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ACRONYMS

AED-Academy for Education Development.
AIDS- Acquired Immune Deficiency Syndrome
APHRC-African Population and Health Research Centre
ART- Anti-retro Viral Therapy
ARV- Antiretroviral.
FANTA- Food and Nutrition Technical Assistance
FAO-Food and Agriculture Organization.
FHI- Family Health International.
GDP-Gross Domestic Product
HIV- Human Immune Deficiency Virus.
KDHS- Kenya Demographic and Health Survey
MOH- Ministry of Health.
MTCT-Mother-to-Child Transmission
NASCOP- National AIDS/STD Control
NGO- Non-governmental Organizations.
PLWHA- People Living With HIV/AIDS
RNA-Ribonucleic acid.
RDA-Recommended Daily Allowances
SARA- Support for Analysis and Research in Africa.
STD- Sexually Transmitted Diseases.
UN- United Nations.
UNAIDS- Joint United Nations Programme on HIV/AIDS.
VCT- Voluntary Counseling and Testing.
WOFAK-Women Fighting AIDS in Kenya.
OPERATIONAL DEFINITIONS

AIDS- A combination of illnesses caused by human immunodeficiency virus that weakens the immune system.

Asymptomatic- Not having any symptoms even though infected with the disease.

Balanced diet- A meal containing all nutrients in adequate proportions to ensure nourishment of the body.

CD4 Cells- A subset of specialized lymphocytes that are key in fighting infections used as a marker for HIV progression.

Counseling- HIV/AIDS counseling is a dialogue between a client and a care provider aimed at enabling the client to cope with stress and take personal decisions relating to HIV/AIDS. This involves the evaluation of personal risk of HIV transmission and the facilitation of preventive behavior.

Food consumption patterns- They are the average number of meals consumed in a day, foods commonly consumed and intervals of food consumption.

Healthy and balanced diet- Consumption of adequate amount and variety of foods including staples, legumes, animal products, fruits, vegetables, nuts, fats and oils, and sugar/sugar-containing foods, sufficient to meet one’s energy and nutrient needs.

HIV- A retrovirus that cause the underlying damage to the human immune system which permits opportunistic infections to cause virulent and fatal diseases to the infected individuals.

Malnutrition- An abnormal physiological condition caused by deficiencies, excesses or imbalances in energy, protein and/or other nutrients.

Nutrition- The science of food and how it is used by our bodies to grow, work, play, maintain health and resist disease.

Nutrition education- Education directed to individuals, families or communities in order to encourage informed decision-making in the selection of foods to purchase and consume in order to achieve optimal health.

Nutrition knowledge- This is the practical aspect of nutrition concept which is evaluated by use of nutrition knowledge index rated as low, average and high.

Opportunistic conditions- Infections and disease that take advantage of HIV- weakened immune system.
People Living With HIV/AIDS- This refers to persons already infected by the HIV virus.

Positive living- An approach to life where PLWHA maintain a positive attitude towards themselves, take action to improve their situation, continue to work and lead a normal life and approach the future positively with hope and determination and not with despair, depression, guilt and self pity.

Progression rate- Time from HIV infection to development of full blown AIDS.

Signs- What the health practitioner finds when examining a sick person.

Staple foods- Foods that form the main part of the diet, usually cereals or root crops

Symptoms- The aches, pains and other problems a sick person describes to a health practitioner.

Vitamins- Nutrients whose main function is to protect the body against infection.
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ABSTRACT

HIV infection reduces the intake, absorption, and utilization of nutrients especially micronutrients. The cycle between malnutrition and HIV/AIDS is vicious. In addition HIV infected persons have increased macronutrient requirements and are commonly deficient in almost all key micronutrients including vitamin A, B-complex, C, E, zinc, magnesium, iron and selenium. These can only be achieved if they have adequate and appropriate nutritional information, coupled with sound dietary practices. The objective of the study therefore was to determine nutritional knowledge, dietary practices and nutritional adequacy of proteins, calories, iron, vitamin A and C among people living with HIV and AIDS.

A cross-sectional study of both descriptive and analytic design involving purposively sampled 153 persons living with HIV/AIDS from Women Fighting Aids in Kenya and the staff members of the organization was conducted in July and August 2005. Data collection tools included a pre-tested semi-structured questionnaire that included a food frequency questionnaire, 24-hour recall questionnaire, key informant and focus group discussion guides. Data were collected on demographic and socioeconomic status, respondents’ dietary practices and intake and nutritional knowledge including its sources. Two well-qualified and trained field enumerators assisted in data collection.

The data were analyzed using SPSS software package. The P-value for statistical significance test was set at <0.05. Results showed that the average meal frequency was three times per day (inclusive of snacks), which was below the recommended 5-6 times per day. Calorie and vitamin A intake of 96.9% and 87.5% respondents was below the Recommended Daily Allowances. 96.9% and 68.8% of the respondents respectively had vitamin C and protein levels above the Recommended Daily Allowances. The study population had adequate intake of iron. Most respondents (71.9%) had an average dietary diversity scores. There was a strong association between dietary diversity and dietary adequacy.

Nutritional knowledge among the respondents was inadequate because majority (61%) had average nutrition knowledge and none was ranked in the highest level. The quality of
nutrition information sources was questionable. Only 13% of the respondents were on nutrition supplements at the time of study. Multiple micronutrient supplementations for PLWHA should be greater than one RDA per day from the time they are diagnosed. Access to the supplements was limited. Nutrient adequacy significantly increased with dietary diversity at $P<0.05$ and the two were positively and strongly associated with per capita income spent on food.

Factors contributing to dietary adequacy included per capita income spent on food per day, dietary diversity, number of meals consumed in a day and size of the household all which had significant and positive association with the adequacy of nutrients.

Thus nutrition being the core of good health for PLWHA, the government should set up strategies to ensure that well trained nutrition educationist are deployed at the community levels. Nutrient supplements should also be accessible so as to compliment the food consumed and thus ensuring adequacy. Further, the government and NGOs should support households affected and infected by HIV/AIDS to become economically stable and nutritionally secure.
CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study
Over the last decade, HIV/AIDS has become the world’s most devastating epidemic, particularly in the developing countries where many governments have declared it an emergency (AIDSCAP/ FHI, 1996). In 2004, 39.4 million people around the world were living with HIV/AIDS. More than 64.9 million people have been affected since the pandemic began (MOH, 2001).

AIDS is a leading cause of death in Sub Saharan Africa, and fourth leading cause of death worldwide. Globally, 45% of adults living with HIV/AIDS are women. By region this percentage varies considerably with 57% in Sub Saharan Africa, 28% in East Asia and 17.6 million in the Pacific (NASCOP, 2004).

The first AIDS case in Kenya was observed in 1981. By 1995 more than 63,179 cases had been reported. In 1999 the president declared AIDS a national disaster. Subsequently the government mobilized additional resources and established a national AIDS Control Council to advocate, strengthen and co-ordinate the multi-sectoral response to contain the spread of the HIV and mitigate the impacts of AIDS (MOH, 2001).

The United Nations reports that every day 6000 people aged 15-24 years become infected with HIV. Economic, social and cultural factors contribute to the disparity of
HIV/AIDS between children and women (USAIDS. 2003). Decades of improvements in social welfare are likely to be undermined by the uninhibited progression of the epidemic. The imbalance of the household structure with women and children forming the majority of rural dwellers is likely to worsen (AIDSCAP/FHI, 1996).

Women in Africa, especially young women are disproportionately affected by HIV/AIDS than men in the same age group. Due to this, children are not an exemption from the direct and indirect effects of AIDS. High birth rates and high rates of HIV infection in African women contribute to the large numbers of infants infected with HIV and rapidly increasing infant and child mortality due to pediatric AIDS-related deaths (Piwoz and Preble, 2000).

Malnutrition is a serious danger of people living with HIV/AIDS. Even at the early stages of HIV infection when no symptoms are apparent, HIV makes demands on the body's nutritional status. The risk of malnutrition increases significantly during the course of infection. This is due to diets that are deficient in energy, proteins and other nutrients. During malnutrition the skin becomes thinner with less connective tissue and the absorptive microvilli of the mucous membrane become flattened (FANTA, 2004).

In Africa, where more than 25 million people are living with HIV/AIDS, malnutrition and food insecurity are endemic. Today nearly 40% of African children below 5 years old are stunted due to chronic nutritional deprivation. Underweight, an indicator of acute and chronic malnutrition was the leading cause of mortality worldwide, responsible for 3.7 million deaths in 2000. Nearly half of these deaths occurred in Sub-
Saharan Africa. The effect of malnutrition on the immune system includes decreases in CD4 t-cells, suppression or delayed hypersensitivity and abnormal B-cell responses (FANTA, 2004).

HIV infection compromises the nutritional status of infected individuals and in turn poor nutritional status can affect the progression of HIV infection. Of all the body’s systems, the immune system responds most sensitively to subtle changes in nutritional status. Impaired immunity increases disease risk, disease state reduces food intake and nutritional status suffers further (Piwoz and Preble, 2000). Hence PLWHA need to ensure quality adequate nutritional intake as a way of managing the infection.

1.2 Statement of the Problem

AIDS has become a tragedy of devastating proportions in Kenya. The lives of infected individuals, their families and communities, the communities they work for, and the country as a whole have been affected by the HIV/AIDS epidemic (NASCOP, 2004).

HIV/AIDS and nutrition are intimately linked. HIV weakens the immune system thus compromising the body’s ability to fight infections. As a result, due to repeated periods of prolonged illness, they reduce their appetite and interfere with the body’s absorption of nutrients. Infections also increase the body’s need for essential nutrients, (FAO, 2003). Although good nutrition is important for better health and quality of life of PLWHA, there is little evidence that it is adequately addressed in counseling and care of PLWHA. Nutrition education at early stages gives the person a chance to build up healthy eating
habits and to take action to improve food security in the home, particularly with regard to cultivation, storage and cooking of food. A person receiving treatment for the infections and combination therapy for HIV needs good nutrition to reinforce the effect of drugs taken (FAO, 2002). Hence the study sought to assess the sources and adequacy of the nutritional knowledge, and how this affects the dietary practices and nutritional adequacy of PLWHA.

1.3 Justification of the Study

HIV/AIDS is a global pandemic. The current status of the epidemic in Kenya is characterized by a high rate of infection and a growing number of illnesses and deaths among the country’s citizens. AIDS affected households are likely to suffer severe poverty. AIDS takes away income and production capacity of family members that are sick. On average AIDS care-related expenses can absorb one third of the household monthly income. Families use their savings, sell assets, borrow money or seek support from their extended family. They also reduce their spending on housing and clothing. Girls drop out of school to take care of sick parents or the younger siblings. Older women also take parental role for the orphaned children (UNAIDS, 2000).

In Kenya, AIDS has created a severe economic impact: it has caused reduction in the size and experience of the labor force, increased health care expenditure, raised cost of labour and reduced savings and investments. It’s different from other diseases because it is 100% fatal (MOH, 2001).
Though ARVs are available, until recently when they were made free, not everyone could access them due to low purchasing power. In addition, their interactions with nutrition have positive and negative outcomes. Thus one must have adequate and the right nutritional information to avoid detrimental side effects, reduce drug resistance and ensure the efficacy in medication.

With proper nutrition, the affected can live longer, progression and susceptibility to opportunistic infections can be reduced. This improves the quality of life of the infected individuals and their productivity in the society is maintained. Thus PLWHA need to be exposed to the right nutritional information so as to improve on their dietary practices.

1.4 Aim of the Study
The aim of this study is to improve of the health and nutritional status of PLWHA through proper management of diets.

1.5 Purpose of the Study
The purpose of this study is to identify whether people living with HIV/AIDS have access to adequate nutritional information, and how this is reflected in their dietary practices and nutritional adequacy.

1.6 Objectives
1.6.1 General objective
The main objective of the study was to determine the nutritional knowledge, dietary practices and nutritional adequacy of PLWHA.
1.6.2 Specific objectives

The specific objectives of the study were:

1. To determine the sources and accessibility of nutritional information available to PLWHA and whether it is appropriate.

2. To determine the level of nutrition knowledge

3. To determine the food consumption patterns of PLWHA.

4. Determine the access to nutritional supplements by PLWHA.

5. To assess the intake adequacy of energy, protein, iron, vitamin A and C PLWHA.

6. To determine factors influencing dietary adequacy of PLWHA.

1.7 Hypotheses of the Study

The following hypotheses were advanced:

1. People living with HIV/AIDS have access to adequate and appropriate nutrition knowledge

2. PLWHA with adequate nutrition knowledge meet their recommended nutrient daily allowances (RDA).

3. There is a relationship between dietary diversity and nutrition adequacy of PLWHA.

1.8 Research Questions

The study research questions included:

1. What are the sources of nutritional information for PLWHA?

2. Are PLWHA able to access this knowledge?

3. How appropriate is the nutrition information that is accessed?
4. What are the food consumption patterns of PLWHA and how do they influence dietary adequacy?

5. What factors determine their dietary practices?

6. Which nutritional supplements are accessible to PLWHA?

7. Do PLWHA meet the required daily nutritional allowances (RDA)?

8. Is nutritional knowledge of PLWHA translated into their dietary practices and adequacy?

1.9 Challenges of the Study

Getting the sample size was difficult. This is because many PLWHA are afraid of exposing their status due to stigmatization. In the past discrimination has spread rapidly fueling anxiety and prejudice against the groups living with HIV/AIDS. On the other hand, many studies are being carried out on them by organizations that 'bribe' them so as to get any information from them. Thus a social worker from WOFAK had to convince the respondents on confidentiality a day before the interview.
CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

HIV belongs to a class of viruses called retroviruses. It attacks white blood cells by attaching itself to cells with the help of the specific surface protein called CD4. This protein is present in white blood cells known as T-helper lymphocytes and macrophages. As a result HIV mainly infects the cells. The T-helper cells can help stimulate the production of antibodies and multiplication of other white blood cells. The macrophages help destroy infected body cells.

When HIV binds itself to the cell surface, its particles enter the cytoplasm of the attached cell. Then with the help of a virus-specific enzyme called reverse transcriptase, the RNA of the HIV is incorporated into the attached cell's DNA. The attached cell then makes more copies of the viral RNA, which may function as a messenger for producing viral proteins or become material for new viral particles that leave the cell by budding off the cell surface. This impairs the functioning of the attacked cell and as more cells are attacked the body's immunity is gradually weakened. The infected person becomes vulnerable to a variety of life threatening illnesses and is said to have AIDS, which is characterized by signs and symptoms of severe immune deficiency (WHO, 2003).

2.1.1 Global overview of the epidemic

In 2003, almost five million people became newly infected with HIV; the greatest number in any one-year since the beginning of the epidemic. At the global level the number of people living with HIV continues to grow; from 35 million in 2000 to 38 million in 2003.
In the same year, AIDS killed almost 3 million while over 20 million people have died since the epidemic began in 1981 (NASCOP, 2004).

In Asia an estimated 7.4 million people are living with HIV and 1.1 million people became infected in 2003 alone. In Latin America, around 1.6 million people were living with HIV by 2003. The epidemic is concentrated among populations at high risk of HIV infection—injecting drug users and homosexuals. In Central America, HIV spread is predominantly through sex (UNAIDS, 2002). During 2004 around five million adults and children became infected with HIV. By the end of the year, an estimated 40.3 million people worldwide were living with HIV/AIDS. The year also saw more than three million deaths from AIDS, despite recent improvements in access to antiretroviral treatment (UNAIDS/WHO, 2005).

2.1.2 AIDS in Sub-Saharan Africa and Kenya.

Africa is the global epicenter of AIDS. Despite significant gains in the fight against HIV/AIDS in the last ten years, the epidemic in Africa has remained extremely dynamic, growing and changing in character as the virus exploits new opportunities for transmission. An estimation of 83% of all the world’s AIDS deaths since the start of the epidemic has occurred in Africa. Countries in Southern and Eastern parts of Africa are particularly affected (WHO, 2003).

Out of the 36 million people infected with HIV globally by 2004, approximately 70% live in Sub-Saharan Africa. There appears to be a stabilization of HIV prevalence rates, but this is mainly due to a rise in AIDS deaths and a continued increase in new infections. Sub-
Saharan Africa is home to just over 10% of the world’s population and almost two thirds of all people living with HIV. In 2003, an estimated 3 million people became infected and 2.2 million died (75% of the 3 million AIDS deaths globally that year) (NASCOP, 2004).

The epidemic’s impact is particularly hard on women and girls, as the burden of care usually falls on them. Older women often take on the burden of caring for ailing adult children, and later, when they die, adopt the orphaned children. Older women caring for orphans and sick children may be isolated socially because of AIDS-related stigma and discrimination. Stigma also means that family support is not a certainty when women become HIV-positive (MOH, 2001).

African women are at a greater risk of being infected at an earlier age than men. In 2003, on average there were 13 infected women for every 10 infected men in the Sub-Saharan Africa. This difference is even more pronounced among 15-24 year olds (UNAIDS, 2002). Rates of prevalence in pregnant women in Africa closely approximate the rates of HIV infection in the general adult population aged 15-49 years. Sentinel surveillance in antenatal clinics has been used to estimate the prevalence and trends of HIV infection in the adult population (MOH, 2001).

Women in Africa, especially young women are disproportionately affected by HIV/AIDS. Recent studies show that women 15-19 years of age are five to six times more likely to be HIV infected than men in the same age group (WHO, 2002). But older men have higher rates of infection than older women. In urban areas, prevalence is estimated to be 17-18%.
which is 470,000 HIV infected adults. HIV prevalence in rural areas is increasing rapidly. In 2000 it was estimated to be 12-13% in Kenya. Though prevalence is higher in urban areas, the absolute number of people infected in rural areas is larger because 80% of the population lives in rural areas: thus an estimated 72% of the infected adults live in rural areas (MOH, 2001).

In 2001 it was estimated that about 2.2 million Kenyans were infected with HIV/AIDS, while 1.7 million Kenyans had already died from the virus. About 1.5 million children were orphaned due to AIDS. It was also estimated that 500 Kenyans died daily of AIDS-related illness. HIV/AIDS was the highest single cause of mortality among Kenyan adults (MOH, 2001).

Most HIV transmission in Sub-Saharan Africa occurs through sexual intercourse while unsafe blood transfusions and infections account for a small fraction. Sexual behavior is the most important factor influencing the spread of HIV in Africa. This varies across cultures, age groups, socioeconomic class and gender (UNAIDS, 2002; Barlet and Finkbeiner, 1998).

2.1.2.1 Pattern of infection by age and sex
Since most new HIV infections are transmitted by heterosexual contact, people are at risk of being infected immediately they become sexually active. The pattern of infection is similar everywhere in Kenya. Infection levels are extremely high for girls and young women. The highest infection levels for women are in the 20-24 years age group, while for men the highest infection levels are found in the 30-39 years age group. Research suggests
that high proportion of Kenya’s teenagers is sexually active and this puts many of them at risk of HIV infection (MOH, 2001).

2.1.2.2 The social and economic impact of AIDS
AIDS affects all aspects of social and economic life in Kenya. It causes a reduction in the size and experience of the labour force, increased health care expenditure, high cost of labour and reduced savings and investments. It strikes people in the most productive age groups and is 100% fatal. The economic effects of AIDS are felt by individuals and families, and then ripple outwards to firms and businesses and the macro-economy (MOH, 2001). Therefore the government should put up strategies of ensuring that nutrition information and counseling is available in all sectors. This will help the infected people to live positively and make the right decisions on the foods to consume, thus reducing diseases and opportunistic infections, increasing their productivity and prolonging survival.

2.2 HIV/AIDS and Nutrition
Good nutrition is the cornerstone of every human existence and a pre-requisite for good health and quality life of every individual. In order to achieve and maintain good health, all people, regardless of their HIV status need to obtain adequate nutrition through consumption of healthy, balanced diets (FANTA, 2004).

Food and nutrition is the priority of people affected by HIV/AIDS. This is because without the right foods in terms of quality and quantity, their health status is compromised due to the weakening of the immune system. Studies have therefore shown that clinical outcome of HIV is poorer for individuals with compromised nutrition (Piwoz and Preble, 2000). The relationship between good nutrition and HIV/AIDS is shown in figure 2.1.
HIV/AIDS affects nutrition in four sometimes-overlapping ways:

- **Reduction of food intake**: This may be due to painful sores in the mouth, pharynx and or aesophagus. Fatigue, depression and changes in mental state play a role by affecting appetite and interest in food. Economic factors affect food availability and the nutritional quality of the diet. Side effects from medications like nausea, vomiting, metallic taste, diarrhoea, abdominal cramps and anorexia also result in lower dietary intakes that can cause weight loss. Reductions in food intake are believed to be the most important cause of the slow and progressive weight loss experienced by PLWHA (Macallan, 1999).

- **Nutrient mal-absorption**: This accompanies frequent bouts of diarrhoea due to giardia, cytosporidium and other pathogens that affect persons with compromised immune systems. Some HIV infected individuals have increased intestinal permeability and other intestinal defects even when asymptomatic (Keating et al., 1995). It is possible that HIV infection itself, particularly of the
intestinal cells may cause epithelial damage and nutrient mal-absorption (Babamento and Kotler, 1997; Ullrich et al., 1989). Mal-absorption of fats and carbohydrates is common at all stages of HIV infection in adults and children (Semba and Tang, 1999). This further affects absorption and utilization of fat-soluble vitamins further compromising nutrition and immune status.

- **Metabolic alterations**: The infection has an impact on protein, fat and carbohydrate metabolism. Infection results in increased energy and protein requirements as well as inefficient utilization and loss of nutrients (Macallan, 1999). These changes occur during infection from severe reductions in food intake as well as from immune system response to infection. When food is restricted the body responds by altering insulin and glucagon production, which regulate the flow of sugar and other nutrients in the intestines, blood, liver and body tissues. Over time the body uses up its carbohydrate stores from muscle and liver tissue and it begins to break down body protein to produce glucose. Thus causing protein loss and muscle wasting (Babamento and Kotler, 1997).

- **Chronic Infections and Illnesses**: HIV/AIDS is usually accompanied by fevers and repeated infections, which lead to higher nutrient requirements and poor use of the nutrient by the body. Common illnesses caused by HIV infection such as diarrhea, vomiting, constipation, mouth ulcers, thrush, anorexia, pneumonia and fever have serious nutritional consequences that manifest as wasting and micronutrient deficiencies.
The HIV virus attacks the immune system. In early stages of infection a person shows no visible signs of illness but later many of the signs of AIDS are apparent. These include weight loss, fever, diarrhea and opportunistic infections. Nutritional status is very important from the time a person is infected with HIV. Nutrition education at this early stage gives a person a chance to build up healthy eating habits (FAO, 2002).

Inclusion of nutrition as a core part of any HIV-care package is essential. The current focus on increased access to antiretroviral drugs in low and middle income should not obscure the fact that for much of the world’s population living with HIV, need for food remains an overwhelming priority (UNAIDS, 2002).

Several vitamins and minerals are critical in fighting HIV because they are required by the immune system and major organs to fight infectious pathogens. Nutritional interventions to increase protein and energy intakes of PLWHA may help to build the reserves and reduce the vulnerability to weight loss and wasting that accompanies diarrhea and other opportunistic infections (FAO, 2002).

2.2.1 Nutritional Requirements for PLWHA

The nutritional requirements for PLWHA differ from that of non-infected people of the same age, sex, physiological status and physical activity (FANTA, 2004). Many ART drugs have dietary requirements (not on an empty or full stomach) and most have side effects like nausea, vomiting, abdominal pain, and diarrhea. all which must be managed
nutritionally. Some drugs affect the production of red blood cells and increase the risk of anaemia (CDC, 1998).

Nutrition priorities vary according to individual symptoms and energy and nutrient needs, which depend on the stage of the disease (Lwanga, 2001). During the early phase the main objective is to stay healthy by building stores of essential nutrients, maintaining weight, preserving lean body mass and understanding and following food safety guidelines through proper nutrition education and counseling. During the middle phase a person who has or who has had an infection accompanied by weight loss should primarily minimize consequences by:

- Maintaining food intake during infection.
- Increasing energy nutrient intake and meeting requirements for proteins, iron, vitamins A, B, C and E for recovery and weight gain.
- Continuing as much physical activity as possible to preserve lean body mass.

Late phase involves provision of comfort and palliative care, treating infection, modifying the diet according to symptoms and encouraging eating (Piwoz and Preble, 2000).

2.2.1.1 Protein and energy requirement
HIV infection affects nutrition through increases in resting energy expenditure, reductions in food intake, nutrient mal-absorption and loss and complex metabolic alterations that culminate in weight loss and wasting common in AIDS (Babamoto and Kotler, 1997; Macallan, 1999). HIV infected asymptomatic and symptomatic people do not require additional protein beyond the intake level recommended for healthy non-infected people of the same age, sex, physiological status and physical activity level. The onset of
opportunistic infection leads to nitrogen losses, and studies have shown that increased protein intake by HIV infected people improves clinical outcomes. Thus they require up to 50% more protein than the required daily allowances. If carbohydrates intake is insufficient, protein is used to provide the body with energy making it unavailable to maintain muscle and strengthen the immune system. This can lead to muscle wasting and increased susceptibility to infection of an already weakened immune system. The diet should therefore contain foods that are sufficient in both energy and protein (Seumo-Fosso and Cogill, 2003).

Asymptomatic HIV-positive individuals require 10% more energy while the symptomatic individuals require 20-30% more energy than HIV negative individuals of the same age, sex physiological status and physical activity level (Seumo-Fosso and Cogill, 2003).

2.2.2 Food and nutrient absorption

HIV infection interferes with the body’s ability to absorb nutrients, an effect that occurs with many infections. Poor absorption of fats and carbohydrates can occur at any stage of HIV infection in both adults and children and leads to excess nutrient loss. Poor absorption is due to:

- HIV infection of the intestinal cells which may damage the gut, even with people with no other symptoms of infection.
- Increased incidence of opportunistic infections like diarrhea, a common cause of weight loss in PLWHA.
• Poor absorption of fat reduces the absorption and use of fat-soluble vitamins. This further compromises nutrition and immune status (Seumo-Fosso and Cogill, 2003).

2.2.3. Relationship between HIV/AIDS and malnutrition

Nutrition and AIDS operate in tandem both at the individual and societal level. Nutrition deficits make people with HIV more susceptible to disease and infections of all sorts (UNAIDS, 2002). The importance of good nutrition in the fight against HIV/AIDS is gaining force. It's increasingly being recognized that good nutrition improves the quality of life of PLWHA, achieves and maintains optimal body weight and strength, prolongs survival, increases productivity, reduces severity of diseases, prevents opportunistic infections, prevents malnutrition and wasting and reduces the progression of HIV to AIDS (Mochegani and Muzzioli, 2001). People with HIV are precipitated into AIDS if faced with poor nutrition and stress shortening their life expectancy and diminishing their quality of life. Such people are also likely to be the most vulnerable to food shortages (SAFAIDS, 2002).

Improving the nutrition situation in Africa has been a challenge for decades and complicated by the emergence of AIDS amongst other factors (Tang et al., 1997b). Malnutrition takes many forms; PEM measured in terms of body size and micronutrient malnutrition, which in its mild and moderate forms is not always recognized and is often referred to as "hidden hunger" (UNICEF, 1998). This relationship is presented by a 'Vicious Cycle' in figure 2.2 (Semba and Tang, 1999). Results of the vicious cycle include:
• Weight loss, the most common and often disturbing symptom of HIV reported in
  93% and 100% of all patients with advanced disease.
• Loss of muscle tissue and body fat.
• Vitamin and mineral deficiencies.
• Reduced immune function and competence.
• Increased susceptibility to secondary infections.
• Increased nutritional needs because of reduced food intake and increased loss of
  nutrients leading to rapid HIV disease progression.

Infections result in the release of pro-oxidant cytokines and other related oxygen species.
This leads to increased utilization of "antioxidant" vitamins as well as sequestration of
several minerals like zinc, selenium, manganese and copper that are used to form
antioxidant enzymes (Friis and Michaelson, 1998). Oxidative stress occurs when there is an
imbalance between the pro-oxidant and antioxidants causing further damage to cells,
proteins and enzymes (Schwarz, 1996).
Nutrition deficiency affects immune function in ways that may influence viral
expression and replication; further effecting HIV disease progression and mortality
(Semba and Tang, 1999).
Insufficient dietary intake, mal-absorption, diarrhoea, altered metabolism and nutrient storage.

Increased HIV replication, hastened disease progression and increased morbidity

Nutritional deficiencies

Increased oxidative stress and immune suppression

Source: Semba and Tang, 1999

**Figure 2.2: The vicious cycle of malnutrition and HIV pathogenesis**

HIV infection also affects the production of hormones like glucagon, insulin, epinephrine and cortisol, which are involved in metabolism of carbohydrates, proteins and fats. Elevated levels of these hormones contribute to weight loss and the wasting syndrome seen in most adults with AIDS (Young, 1997).

HIV/AIDS and malnutrition are inextricably inter-related. Research suggests that malnutrition increases the risk of HIV transmission from mothers to babies and the progression of HIV infection. HIV infection exacerbates malnutrition through its attack on the immune system and its impact on nutrient intake, absorption and utilization (Piwoz and Preble, 2000).
2.2.3.1 Micronutrient deficiency and disease progression
Clinical outcome is poor and risk of death is higher in HIV positive adults with compromised micronutrient intake or status (Baum et al., 1995; Tang et al., 1997a). Deficiency in vitamins and minerals like vitamin A, B Complex, C, E, selenium, magnesium and zinc, which are needed by the immune system to fight infection, are common in PLWHA (Banki et al., 1998). Deficiency of these antioxidant vitamin and minerals contribute to oxidative stress a condition that may accelerate immune cell death and increase the rate of HIV replication (Romero-Alvira and Roche, 1998).

Studies have shown that daily micronutrient (antioxidant) supplementation improved body weight and body cell mass, reduced HIV RNA levels, improved CD4 cell counts and reduced the incidence of opportunistic infections (Shabert et al., 1999; Muller et al., 2000). Micronutrients are important for cellular differentiation, enzymatic processes and immune system reactions. Micronutrient supplementation increases survival of adults with low CD4 counts and reduces Mother- To- Child- Transmission (MTCT) (Fawzi and Hunter, 1998).

2.2.3.2 Synergistic effects of malnutrition and HIV
Changes in the immune function resulting from malnutrition are similar to those caused by HIV/AIDS. These changes involve CD4 T- lymphocyte number, CD8 T-lymphocyte number, delayed coetaneous hypersensitivity, CD4/CD8 ratio, serologic response after immunizations and bacteria killings (Scrimshaw and San Giovanni, 1997). Both malnutrition and HIV affect the body in similar ways. Both conditions affect the capacity of the immune system to fight infection and keep the body healthy. Before AIDS the impairment of immune system caused by malnutrition was called Nutritionally Acquired
Immune Deficiency Syndrome (NAIDS) (SAFAIDS, 2002), which indicates similarity to AIDS (Acquired Immune Deficiency Syndrome).

2.2.3.3 **Weight loss and wasting in HIV/AIDS**
Nutrition plays a role in weight, lean body mass, body cell mass and the functioning of the immune system. In populations where malnutrition is endemic, body size and composition changes associated with protein energy malnutrition are nearly always associated with deficiencies in vitamins and minerals, which are important for the functioning of the immune system. The wasting syndrome typically found in adult AIDS patients in Africa is a severe nutritional manifestation of the disease. Wasting is preceded by changes in appetite, repeated infections, weight fluctuations and subtler changes in body mass composition (Babameto and Kotler, 1997).

2.3 **Food Consumption Patterns and Trends**
Diets evolve over time, being influenced by many factors and complex interactions. Income, prices, individual preferences and beliefs, cultural traditions, as well as geographical, environmental, social and economic factors all interact in a complex manner to shape dietary consumption patterns. National availability of the main food commodities provides a valuable insight into diets and their evolution over time. Actual food availability may vary by region, socioeconomic level and season (Drewnowski and Popkin, 1997).

Nutritional knowledge plays a great role in shaping the consumption patterns of healthy people and those infected by HIV/AIDS. It influences the choice of food for consumption: the appropriate cooking method for each type of food; the right combination of foods to...
increase bioavailability and provision of essential nutrients: frequency of food consumption and the quantities to be consumed so as to meet the required daily allowances levels.

2.4 Dietary diversity
Dietary diversity refers to the different food groups consumed over a given reference period of time. Dietary Diversity Score is thus often used as a proxy measure of the nutritional quality of an individual's diet. This is a more meaningful indicator than knowing that households consume four different foods, which might all be cereals." The following set of 12 food groups is used to calculate the Dietary Diversity Score: cereals, fish and seafood, root and tubers, pulses/legumes/nuts, vegetables, milk and milk products, eggs, fruits, oil/fats, meat/poultry/offal, sugar/honey, and miscellaneous (FANTA 2006).

All people need a variety of foods to meet requirements for essential nutrients, and the value of a diverse diet has long been recognized. Lack of diversity is particularly a severe problem among poor populations in the developing world, where diets are based predominantly on starchy staples, minimal animal products and rare fruits and vegetables. For vulnerable populations, the problem is particularly critical since they need energy and nutrient-dense foods to develop physically and mentally and live a healthy life (Kant, 1996; Hoddinott and Yohannes 2002).

Dietary diversification is relevant among PLWHA: this especially involves the inclusion of a variety of fruits and vegetables in the different meals. These being the major sources of vitamins and minerals required to boost the immune system and major organs so as to fight
infectious pathogens. Vitamins C, E and beta-carotene (anti-oxidant vitamins) are utilized during infections whereas some minerals (iron, zinc, selenium, iron and manganese) that form antioxidant enzymes are sequestered. Thus there is need for PLWHA to consume a varied diet to provide for the mentioned nutrients adequately.

2.5 Intra-household Food Allocation and Behavior
The way food is allocated and distributed within the household can limit the capacity of PLWHA to access the quantity and diversity of foods needed for effective nutritional care and support. This is especially the case when poor households choose to allocate lower quantities or poor quality food to PLWHA as a result of stigma, their poor productivity or the perception that spending resources on a person who will die soon is wasteful. Thus nutrition knowledge is of paramount importance in such situations. Adequate nutrition and positive living improves the quality of life and levels of productivity of the infected individuals.

Simple adjustment to household food practices can enhance the capacity for nutritional care and support. This includes changing meal practices and schedules to accommodate more frequent feeding for people living with HIV/AIDS (USAID, 2002; Gillespie and Allen, 2001). This is possible if household members have adequate knowledge on the dietary requirements of the infected person and the positive impact of adequate nutrition on their health status and productivity.
2.6 Nutrition and HIV/AIDS Information Communication

The success of nutritional care and support depends on how efficiently and effectively the nutrition information reaches PLWHA in ways that will encourage adoption and compliance. The discussion of nutrition’s role in the health of PLWHA should be integrated into messaging on HIV and AIDS. On a broader level, when discussing HIV with donors, governments or journalists, nutrition must be an integral part of the message. Besides health providers, community and public at large, nutrition information must be shared with many people in many sectors, decision makers at policy level and programme managers. Children being the caregivers of PLWHA at home and responsible for the preparation of food need to be included in the package. Sound understanding of the importance of nutrition will lead to a healthier population (MOH. 2007).

2.7 Gaps in Knowledge.

In the past, many campaigns have been carried out to sensitize people on the modes of HIV transmission and the preventive measures. Much research has also been carried out to determine the effect of different nutrients on the immune system especially among PLWHA. More also, it is not until January 2006 that the first Kenyan national guidelines on nutrition and HIV/AIDS was published. This guideline was compiled to enhance the knowledge and skills of health providers, community and the public at large. But little has been done to find out whether PLWHA have adequate knowledge on the right foods and appropriate combination of foods for enhancement of bioavailability.
CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was conducted in Kayole sub location, Kayole location, Embakasi division of Nairobi—the capital city of Kenya during the months of July and August 2005. The main administrative divisions of Nairobi are Central, Dagoretti, Embakasi, Kasarani, Kibera, Makadara, Pumwani and Westlands. These divisions in turn are divided into 49 locations, which are further divided into sub-locations. The Chief heads each location while Assistant Chiefs are in charge of the sub-locations and work with village elders appointed by the community (CBS, 2001).

3.1.1 Demographic characteristics

Nairobi has a total population of 2,143,254, of which 1,153,828 are males and 989,426 are females. The total population of Kayole sub location (study area) is 6,801:395 males and 3,649 females with the prevalence of HIV/AIDS being 10% (CBS, 2001).

3.1.2 Population growth and settlement patterns

Out of Nairobi’s total land area of 1,696 km², 17% is covered by the Nairobi National Park and people inhabit the rest of the area. Nairobi’s population growth rate is about 7% and is one of the fastest city growth rates in Africa. Most of the growth of the city is as a result of rural-urban migration. Densities vary by type of settlement. The population density is 3,079 persons per km², while wealthier parts are much less dense, inhabited by about 300 persons per km². Informal settlements cover only 5% of the total residential land area (APHRC, 2002).
3.1.3 Study site

The study was conducted in an area where the organization Women Fighting AIDS in Kenya (WOFAK) operates. WOFAK is located in Kayole sub location of Embakasi division, east of the city’s Central Business District (CBD). It is about 30 kilometers from the city center. Kayole being a low-income area, most of its residents earn less than a dollar per day and it is densely populated. This was below the gazetted minimum wages ($3.5 per day) of Nairobi in 1995 (CBS, 2004). Sub locations next to Kayole sub location are Tena, Umoja, Dólnholm, Dandora and Komarock whose residents are of middle class. Komarock sub location is also in Kayole division.

Around 200 HIV-positive women founded WOFAK in 1993. WOFAK’s initial mission was to support individual members who were being discriminated against or outwardly rejected by their communities because of their HIV status. In addition, most of them were widowed, barely coping with the burden of supporting their families single-handedly. The organization also includes male members.

Other structures in the division that are addressing HIV/AIDS include Beacon of hope sponsored by the Catholic Church, Kenya Network of Women with HIV/AIDS (KENWA) and Kayole Health Centre.
3.2 Study Population
The study comprised of people living with HIV/AIDS and participating in the WOFAK activities. For one to be included in the study population, he/she had to be HIV positive, above 18 years of age and not school going. These also had to be residents of Kayole area.

3.3 Study Design
The study design was cross-sectional, descriptive and analytic in nature.

3.4 Sampling
3.4.1 Determination of the sample size

From the reports on the epidemic, the prevalence of HIV in Nairobi district was 10% (KDHS 2004). Assuming a standard error of 5% at 95% confidence Interval, the minimum size required for the study was determined by the Fishers formula (Fisher et al., 1991).

\[ n = \frac{z^2pq}{d^2} \]

\( n \) = sample size
\( z \) = is the normal deviate (confident limit) taken at 95% Confident Interval.
\( p \) = is the proportion of HIV infected individuals in the study population.
\( q \) = is the proportion of HIV negative individuals in the population.
\( d \) = is the acceptable degree of accuracy desired
\[
\frac{1.96^2 \times 10 \times (100-10)}{0.05^2} = \frac{3.8416 \times 10 \times 90}{0.025} = 138
\]

With 10% allowance for attrition

\[
\frac{n}{1-r} = \frac{138}{1-0.1} = \frac{138}{0.9} = 153
\]

The sample consisted of 153 persons

### 3.4.2 Sampling procedures

Since the study involved only individuals living with HIV/AIDS, purposeful sampling was first used for the selection of the study population. A simple random sampling from the sampling frame was planned to identify the individuals who would participate in the study. However, WOFAK’s list of clients was not up to date. Many of the members in the sample frame had migrated to other estates or could simply not be traced at the time the research was being conducted. Kayole being a slow-income area, its residents keep on moving from one area to another due to the inability to pay rent. Hence households were visited until the sample size was obtained. In total 297 house holds were visited to obtain the 153 eligible households. A sub sample of 20% (32) of the respondents was systematically selected for the 24-hour recall dietary assessment. This assessment was carried out on every 5th respondent.

Simple random sampling was used to select the Focus group discussion participants (20) from those who had participated in the interview. Key informants included the clinical
officer and the three staff members based at Kayole WOFAK center and who work closely with HIV/AIDS persons.

3.5 Data Collection
3.5.1 Data collection tools

The study applied both quantitative and qualitative research tools. These included a pre-tested structured questionnaire (Appendix I), focus group discussion guide (Appendix II) and key informant guide (Appendix III).

3.5.2 Hiring and training of field assistants

Field assistants were recruited from the area of study through the assistance of WOFAK clinical officer. They were social workers by profession with a good command of English and Kiswahili. Two males who had participated in other studies before were recruited for the exercise. The purpose, general procedure of the study and duration were explained.

The principal investigator did the training of the field assistants for two days. The training covered the following topics; interpretation of the questionnaire, administration of the questionnaire, interview techniques and 24-hour recall method. Afterwards the assistants administered the questionnaire to each other (role play) and any problems were addressed. Areas not clear were also clarified. As part of the training seven questionnaires were administered to HIV clients visiting the center as a demonstration. These were excluded from the study.
The methods of teaching used included lecture method, demonstration and return demonstration and role-play. The materials and equipments used for the session included; masking tape, flip charts, markers, notebooks, pens and pencils, weighing scales, measuring cups, spoons and jars, and plates.

3.5.3 Pre-testing

The questionnaire was pre-tested by applying it on twelve PLWHA from the metro-politan center in Buruburu. Buruburu is an estate located in Embakasi location. The questionnaire was then modified for use in the actual survey. The pre-testing process was also used to give the assistants hands on experience.

3.5.4 Data collection procedures

These were structured questionnaire, focus group discussion and key informant.

Structured Questionnaire

With the help of the trained field assistants, the pre-tested structured questionnaire was administered to the 153 HIV positive respondents in the WOFAK programme at the household level. Information was collected on:

- Demographic and socioeconomic characteristics

This included information on age, education status, and occupation status of the respondent, household composition and income.
• **Nutritional knowledge**

Knowledge on nutrition, vitamin A, B-Complex and C and zinc, iron and selenium was sought. Questions on basic nutrition for a good living were administered. Good nutritional practices were sought in consideration of the status of the respondents.

• **Food intake and dietary diversity**

Data was collected on food intake and the dietary diversity. Food intake was collected by use of a food frequency questionnaire (Appendix i). The food frequency table contained various types of food items consumed in the area of study. Data was collected on the respondent's usual frequency of consumption of the food items. For each food item, the respondent was asked to recall the usual frequency the food was consumed through the month in the household or by the respondent. For the food diversity the number food groups during the 24 hours preceding the study (regardless of the frequency) were recorded for each respondent. Food groups are shown in Table 3.1.

The 24-hour recall dietary assessment was done on the selected sub-sample (20% of the sample) for determination of nutrient intake and adequacy in comparison with the required daily requirements (Appendix vi). This method is regarded as suitable for estimating current food intakes (Hartog et al., 1995). Respondents were asked to recall and state all the meals consumed during the preceding 24 hours. The respondents were also asked to recall the time the food was eaten and the name of the dish. They also estimated and showed amounts similar to the amount consumed, leftover and the ingredients used to prepare the meal. These were then measured either in volume or weight by the interviewer to get an estimate of the amount of food consumed by the respondent. A detailed
description of all meals eaten within the 24-hour period was then recorded in a table designed for the purpose (Appendix 1). Any respondent on supplements was also noted.

Focus Group Discussions

This is a qualitative method of data collection. Two groups of 10 persons living with HIV/AIDS were sampled randomly from the 153 persons in the study. 20 respondents were selected randomly and then divided into two so as to have 10 persons in each group. All the selected respondents attended. However, some uninvited respondents (PLWHA from WOFAK) who came along with their friends but had not been sampled for the discussion also participated, as it would not have been prudent to send them away. Thus the groups had 15 and 17 participants respectively. The discussions were carried out in two sessions: morning session and afternoon session. Each session took approximately 90 minutes. A focus group discussion guide was used to generate information on nutrition knowledge sources, use of food supplements, dietary patterns and perception in nutrition. This information was used to strengthen the information obtained during the interviews.

The principal investigator explained the purpose of the meeting to the participants and confidentiality of information was also assured verbally during the invitation. The principal investigator facilitated the meeting. On arrival at the venue (WOFAK’S hall- Kayole) the participants registered with the recorder. Each session began with introduction from every member. Probing technique was used to elicit details of the subject matter from the respondents.
The facilitator controlled all the sessions of the meetings. The recorder took notes and no expert in the subject matter was required. The facilitator and the recorder did not contribute to the subject matter.

**Key informant Interview**

A special guide (Appendix iii) was used to interview the key informants to collect information on food supplementation, nutrition education and dissemination, nutrition educators and their qualifications and food preparation demonstrations. The key informants were invited for the interview a week before the interview was administered. These included the clinical officer in-charge of the center and three staff members who work closely with the PLWHA in WOFAK. The principal investigator carried out the interview and confidentiality to any information given was assured. The investigator also took short notes during the interview. These were later expanded to enhance the results from the semi-structured questionnaire.

**3.6 Data Quality Control and Analysis**

**3.6.1 Data quality control**

Data quality was controlled through close supervision of field assistants by the principal investigator throughout the period of study. The field assistants were also advised on taking adequate time in filling the questionnaire so as not to commit errors. The respondents too were informed as to why the research was being conducted so as to give the correct information. They were assured of confidentiality of any information given out.
The principal investigator met with the field assistants every evening after data collection to discuss any challenges encountered during the day and the way forward. All the questionnaires were screened to ensure that they were correctly filled and any incompleteness was addressed the following morning by revisiting the respondent.

3.6.2 Data management and analysis

The data (responses) were coded and entered into the computer as variables for analysis using the Statistical Program for Social Sciences (SPSS). The data was then cleaned before analysis began. To ensure that all the information had been correctly entered (to avoid omissions), frequencies for all the variables were generated before carrying out the statistical analysis. Quantitative data was explored so as to check for outliers. These were then eliminated in the final analysis. Qualitative information (key informant and focus group discussion information) was expanded to enhance the discussion of quantitative data results.

The main package used for analysis was the Statistical Program for Social Sciences (SPSS), version 10.0. A descriptive analysis was done to provide general information on the characteristics of the study population. This was done by running frequencies, means, cross tabulations and ranges. Bivariate analysis was carried out to determine the association between variables. Multivariate analysis was carried out to determine the two-way interaction between the variables. Chi-Square and t-test were used to compare the independent variables. Bivariate correlations and linear regression tests were used to
determine the strength of relationship between various variables. In all the analysis, level of significance was set at p<0.05.

**Determination of knowledge index**

Knowledge was assessed by use of knowledge questions where a grading method was used to develop a nutritional knowledge index. A section of questions in the questionnaire were used for scoring. These were marked and marks awarded depending on how they responded to the questions (Appendix IV). The main aspects studied included the respondents overall nutrition knowledge which was then rated on the scale of “0-100”, and the respondent graded using four cut-off points as below:-

- No nutritional knowledge at all “0”.
- Low nutritional knowledge “<40”
- Average nutritional knowledge “40-69”.
- High nutritional knowledge “>70”.

**Respondent dietary diversity and nutrient intake**

Respondents dietary diversity was assessed by grouping the foods into twelve groups so as to have a 12-point dietary diversity score (cereals, fish and seafood, root and tubers, pulses/legumes/nuts, vegetables, milk and milk products, eggs, fruits, oil/fats, meat/poultry/offal, sugar/honey, and miscellaneous) as shown in Table 3.1. Dietary diversity was calculated as the percentage of different food types consumed from each food group within 24 hours preceding the study, regardless of the frequency with which they were consumed (Megan *et al.*, 1999). This was done by giving one point to the respondent if he or she had consumed any food within the group. The total points were then divided by...
twelve and then converted into percentages. The respondents graded as either low (>33%), average (34-67%) or high (68 and above) diversity score by use of terciles.

For the 24-hour recall, the recorded volumes of food and ingredients were converted to grams by use of conversion table that was locally developed (Appendix v). The conversion table was developed by the chief investigator following a market survey that was carried out in the area of study. The total individual nutrient intake was then calculated with the help of the Kenya Food Composition Tables (Sehmi. 1993). This was then compared with the individual’s daily nutrient requirement (M.O.H. 2007) (Appendix vi) to determine their nutritional adequacy.
### Table 3.1: Food group descriptions

<table>
<thead>
<tr>
<th>Food group</th>
<th>points</th>
<th>Food types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat and meat</td>
<td>1</td>
<td>Meat, poultry and offal</td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td>eggs</td>
</tr>
<tr>
<td>Fish and Sea food</td>
<td>1</td>
<td>Dried and fresh fish, oysters</td>
</tr>
<tr>
<td>Cereals</td>
<td>1</td>
<td>Rice, ugali, mandazi, pearl millet, chapatti, bread, sorghum, finger millet.</td>
</tr>
<tr>
<td>Legumes and nuts</td>
<td>1</td>
<td>Ndengu, soybeans, lentils, peas, beans, githeri, groundnuts.</td>
</tr>
<tr>
<td>Milk and milk</td>
<td>1</td>
<td>Fresh milk, sour milk and yogurt</td>
</tr>
<tr>
<td>Fruits and fruit</td>
<td>1</td>
<td>Pineapples, passion fruits, guavas, lemon, oranges, ripe banana, fresh juice, watermelon, mangoes, paw paw.</td>
</tr>
<tr>
<td>Vegetables and vegetable juices</td>
<td>1</td>
<td>Kales, cowpea leaves, French beans, cabbage, tomato, carrots, amaranthus, green pepper, cassava leaves, mushrooms, pumpkin, pumpkin leaves, spinach, onion, coriander leaves.</td>
</tr>
<tr>
<td>Roots and tubers</td>
<td>1</td>
<td>Irish potatoes, sweet potatoes, arrowroot, yams, cassava, matoke.</td>
</tr>
<tr>
<td>Oils and fats</td>
<td>1</td>
<td>Margarine, cooking oil, sesame, avocados, butter, groundnuts, cheese.</td>
</tr>
<tr>
<td>Sugar and honey</td>
<td>1</td>
<td>Condiments, tea and coffee</td>
</tr>
</tbody>
</table>

*Source: FANTA/AED 2006*
CHAPTER FOUR

4.0 RESULTS

This chapter presents data on the following sections:

- Demographic and social-economic characteristics of study households.
- Food availability and adequacy.
- Nutritional knowledge of PLWHA
- Dietary diversity and adequacy.

Though 153 respondents were interviewed, the data analyzed was from 149 respondents. This is because the data from the other five was incomplete and the respondents could not be traced after the interview for corrections. Nevertheless, this was catered for by the 10% allowance for attrition since the required sample size was 138 respondents.

4.1 Demographic and Socio-economic Characteristics of the Households.

The socio-economic and nutritional status of individuals is affected by demographic variables such as household size, sex of household head, marital status, and education and occupation levels.

4.1.1 Household size

The 149 households interviewed had a total population of 607 individuals. The household size ranged between one and nine with an average of four members. The majority (33%) of households visited had four members.
4.1.2 Sex and age of the household members

Majority of the household members were females comprising 53.4% of the total population (figure 4.1). There was no significant difference between the number of males and the females at P<0.05.

![Pie chart showing sex distribution](image)

\[ \chi^2 = 57.530 \quad P = 0.567 \]

**Figure 4.1: Distribution of household members by sex**

As the figure 4.2 below shows, more than half of household members were aged between 16-49 years; the highest proportion of the whole population. Those between 0-15 years comprised more than one third of the population while the upper extremes of age (50 years and above) comprised only 1.4 percent. The differences between the age groups were highly significance at P<0.05.
4.1.3 Dependency ratio

Dependency ratio was defined as the total number of persons aged fifteen years and below plus those aged sixty five years and above divided by the total number of persons aged between sixteen and sixty four years. The total number of persons aged fifteen years and below and above sixty-five years was 250. Those aged between sixteen and sixty four years was 357. Thus the proportion of those in the productive age group was greater than those in the non-productive age groups, giving a dependency ratio of 1: 0.7.

4.1.4 Distribution of household heads by Sex and marital status

Almost half of the households were female-headed (figure 4.3). Majority of the household heads were from monogamous families with both spouses living (figure 4.4). Only a very small proportion of the household heads were polygamous while the majority (58%) were either single, widowed, separated or divorced in that order.
4.1.5 Education level of the household heads

The distribution of household heads by education level is shown in figure 4.5. Half of household heads attained secondary level of education, more than one-third attained post secondary education while 15% attained primary education.
4.1.6 Family income and amount spent on food

The average monthly family income was approximately 127±68.8 US dollars ($) with the highest being $ 357 and the lowest being $14.3 (1 $=70 Kenya shillings). Figure 4.6 shows the categories of family income per month. More than half of the households earned between $71.4 and $142, about one fifth earned between $14.3 and $71.4, while only about one quarter earned over $142.9 per month.

The average amount spent on food in a month was $55.5±121.7. This represented about half (44%) of the household income.
4.1.7 Household sources of income.

Household income sources varied from household to household as shown in figure 4.7. The two major sources of income were self-employment and formal employment. The rest of the households obtained income either from providing casual labour, pension or relatives, friends and well-wishers.

![Figure 4.7: Distribution of household heads by occupation](image)

4.1.8 Age and sex of the respondents

The study results showed that majority of the respondents were aged between 31-45 years. The rest were aged 18-30 and above respectively as shown in figure 4.8 below. Majority of these respondents were females (75%) while the rest being males as shown in figure 4.9.
Majority of the respondents had attained secondary education (53.1%). The rest had primary and post secondary education with 31.3% and 15.6% respectively. The study further showed that majority of the respondents were married in a monogamous family. The rest were single, separated divorced and widowed as shown in figure 4.10.
4.2 Food Availability, Adequacy and Consumption Behavioral Changes

Over half (59.7%) of the households reported that they did not have adequate food for consumption compared to 40.3% who had adequate food. Some of the households (6.7%) had inadequate food throughout the year, while about half (50.3%) of the households were food inadequate either for one week, two weeks or three weeks in a month throughout the year. The rest (2.7%) could not give the time of food shortage because they depended on well wishers for food supply. However, various food consumption changes were reported to be taken during food shortage. More than half (65%) of the households reduced the frequency of their meals, while about one fifth (16.9%) reduced the size of their meals, 12.4% reduced the size or frequency of their meals and a very small proportion of the households (2.2%) reduced the size of the meal, frequency of the meal and sold some assets to purchase food.

Foods consumed during shortages were ugali, sukumawiki, porridge, vegetables, tea, sweet potatoes, githeri, beans and rice as shown in table 4.1.
<table>
<thead>
<tr>
<th>Foods consumed</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ugali and sukumawiki</td>
<td>55</td>
</tr>
<tr>
<td>Porridge</td>
<td>28.2</td>
</tr>
<tr>
<td>Tea and sweet potatoes</td>
<td>5.6</td>
</tr>
<tr>
<td>Beans and vegetables</td>
<td>3.4</td>
</tr>
<tr>
<td>Rice</td>
<td>3.4</td>
</tr>
<tr>
<td>Ugali</td>
<td>2.3</td>
</tr>
<tr>
<td>Githeri</td>
<td>2.3</td>
</tr>
</tbody>
</table>

### 4.3 Food Consumption Patterns

This refers to the feeding frequency, dietary diversity and dietary adequacy of PLWHA

#### 4.3.1 Factors determining food consumption choices

There was a wide range of factors determining the food to be consumed by the respondent as shown in figure 4.11. Majority of the respondents’ decisions on what to consume depended on the affordability of the food (economic power). Over one third of the respondents aimed at having a balanced diet, while the rest either consumed foods that were in season, considered the time available for preparation, wanted to have a variety of foods or chose only those foods allowed by their religion for consumption.

![Figure 4.11: Distribution of respondents by factors determining food choice in the household.](image-url)
4.3.2 Number of meals in a day and foods commonly consumed

More than half of the respondents consumed three meals in a day. 46% consumed two meals while small proportions of the respondents consumed one or four meals daily (figure 4.12). The average number of meals consumed in a day was 2.6±0.6.

![Figure 4.12: Distribution of respondents by the number of meals consumed in a day](image)

4.3.3 Food distribution in households with PLWHA in terms of quantity

It was noted that in more than half of the households' surveyed food was distributed depending with the sex and age of the household member. In over one third (35%) of the households, children were given food to their satisfaction while in 3.4% of the household it was ensured that the respondent (PLWHA) got enough food. However, in 0.7% of the households, wives regardless of their status ate the remainders after everyone else in the family had eaten.

4.3.4 Frequency of food consumption by respondents

A variety of vegetables were consumed by the respondents. These included spinach, green pepper, carrots, tomato, cabbage, cowpea leaves and kales among others. Almost all
respondents consumed tomatoes on a daily basis. The other highly consumed vegetable was the kale. Other vegetables were consumed by some respondents daily though majority of the households consumed them up to three times in a week (Table 4.2).

Some of the fruits consumed were mangoes, ripe bananas, oranges, passion fruits and pineapples. The most widely consumed fruit was the banana with about a third of the respondents consuming it 2-3 times in a week. Fruits were not consumed daily, though they were consumed at least 3 times in a week. Most fruits were consumed when in season.

Generally the main staple food was ugali with almost all respondents consuming it daily. The next was rice with about half of the respondents consuming it 2-3 times in a week. The main sources of protein were beans, fish, meat and eggs. Most respondents consumed beans weekly while more than one third consumed beans 2-3 times a week. Fish was consumed by more than half of the respondents once in a week while 35.9% consumed meat once in a week. Cooking fat was consumed by almost all respondents on a daily basis.

4.4 Nutrition Knowledge of PLWHA

4.4.1 Sources of nutrition knowledge

There were diverse sources of nutrition information among the respondents (PLWHA). These included WOFAK staff, group discussions/seminars, reading of nutrition literature, health facility staff and the media. The distribution of respondents by source of nutrition information is shown in figure 4.13. The results show that few respondents obtained nutrition information from WOFAK though they were members of the organization.
Table 4.2: Frequency of consumption of some foods by respondents

Frequencies in percentages

<table>
<thead>
<tr>
<th>Food type</th>
<th>Daily</th>
<th>Once a week</th>
<th>2-3 times a week</th>
<th>Occasionally</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach</td>
<td>10.7</td>
<td>50.5</td>
<td>26.2</td>
<td>4.9</td>
</tr>
<tr>
<td>Green pepper</td>
<td>4.9</td>
<td>43.7</td>
<td>21.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Carrots</td>
<td>15.5</td>
<td>49.5</td>
<td>17.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Tomato</td>
<td>99</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cabbage</td>
<td>4.9</td>
<td>36.9</td>
<td>48.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Cowpea leaves</td>
<td>6.8</td>
<td>54.4</td>
<td>6.8</td>
<td>13.6</td>
</tr>
<tr>
<td>Kales</td>
<td>54</td>
<td>16.5</td>
<td>29.1</td>
<td>-</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mango</td>
<td>1.9</td>
<td>14.6</td>
<td>11.7</td>
<td>48.5</td>
</tr>
<tr>
<td>Ripe banana</td>
<td>31.1</td>
<td>18.4</td>
<td>29.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Oranges</td>
<td>18.4</td>
<td>33</td>
<td>24.3</td>
<td>11.7</td>
</tr>
<tr>
<td>Passion fruit</td>
<td>1</td>
<td>2.9</td>
<td>3.9</td>
<td>76.7</td>
</tr>
<tr>
<td>Pineapple</td>
<td>3.9</td>
<td>24.3</td>
<td>14.6</td>
<td>29</td>
</tr>
<tr>
<td><strong>Legumes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>1.9</td>
<td>41.7</td>
<td>37.9</td>
<td>4.9</td>
</tr>
<tr>
<td><strong>Animal products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat</td>
<td>1.9</td>
<td>35.9</td>
<td>19.4</td>
<td>15.5</td>
</tr>
<tr>
<td>Fish</td>
<td>2.9</td>
<td>59.2</td>
<td>9.7</td>
<td>7.8</td>
</tr>
<tr>
<td>Egg</td>
<td>14.6</td>
<td>23.3</td>
<td>30.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Milk</td>
<td>30</td>
<td>10.6</td>
<td>48.2</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Cereals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>1.9</td>
<td>51.5</td>
<td>42.7</td>
<td>-</td>
</tr>
<tr>
<td>Ugali</td>
<td>96.1</td>
<td>1</td>
<td>2.9</td>
<td>-</td>
</tr>
<tr>
<td>Mandazi</td>
<td>32</td>
<td>37.9</td>
<td>17.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Bread</td>
<td>25.2</td>
<td>34</td>
<td>20.4</td>
<td>7.8</td>
</tr>
<tr>
<td><strong>Roots</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irish potato</td>
<td>7.8</td>
<td>32</td>
<td>37.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>1.9</td>
<td>19.4</td>
<td>11.7</td>
<td>24.3</td>
</tr>
<tr>
<td><strong>Fats and oils</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margarine</td>
<td>19.4</td>
<td>16.5</td>
<td>21.4</td>
<td>26.2</td>
</tr>
<tr>
<td>Cooking fat</td>
<td>98.1</td>
<td>1.0</td>
<td>1.0</td>
<td>-</td>
</tr>
</tbody>
</table>

N=149
4.4.2 Nutrition knowledge levels of the respondents

The nutrition knowledge score was established through a nutrition knowledge test based on respondents' knowledge and actual dietary practices. Results showed that about two thirds (61%) of all the respondents had an average nutrition knowledge level (between 40-69%), while the rest had a low level (<40 and >0%) of nutrition knowledge (figure 4.14). None of the respondents had a high level (>70%) of nutrition knowledge. The average mark was 44.3±9.8, which was on the lower side of the average nutrition knowledge range. There was a positive significant association between the number of meals consumed in a day and the nutritional knowledge index of the respondent at P<0.05 (p=0.000, Correlation coefficient =0.428 Pearson's test).
4.4.3 Nutrition knowledge levels of the respondents

More than half (56.8% males and 62.5% females) of all respondents had an average level of nutrition knowledge. The rest had low level of nutrition knowledge. There was no significant relationship between the level of nutrition knowledge and the sex of the respondents at P<0.05 ($\chi^2 = 0.386$ and p=0.534).

4.4.4 Knowledge on the sources of various nutrients.

The knowledge of food sources for various nutrients was varied. Questions on foods rich in various nutrients of paramount importance to the health status of PLWHA showed that almost all the respondents were aware (gave at least one source) of the main sources of energy, vitamin A, and protein. Two thirds of the respondents had knowledge on the sources of vitamin C and one-quarter had knowledge of the main sources of iron. Very few respondents had knowledge on the sources of B complex, zinc, and selenium (figure 4.15).
4.4.5 Understanding of a balanced diet

A balanced diet is a diet that has all the food groups: proteins, carbohydrates, fats, vitamins and minerals. More than a half (56%) of the respondents did not understand what a balanced diet was. Majority (70%) of those who did not understand said that a balanced diet consisted of proteins, carbohydrates and vitamins, while one-tenth (10%) said that a balanced diet had to be adequate in amount (quantity) in order to give satisfaction. There was a positive correlation between the respondents’ knowledge of a balanced diet and factors determining the choice of food at P<0.05 (p=0.024, correlation coefficient=0.158: Spearman’s rho).

4.5 Nutrition Supplements Intake

From the focus group discussions with the 32 participants, it was found that most felt that an increase in vitamin and mineral supplement intake was necessary for boosting their immune system. They also felt that these nutrients were essential to help protect the body from minor recurrent infections. The household survey indicated that 13% of all respondents (PLWHA) were on vitamin and mineral supplementation. The rest (87%)
reported that they were not on supplementation (at the time of study) but had taken them at
one time or another on prescription. Those on supplementation reputed that they were
following the clinical officer’s prescription.

4.6 Dietary Intake of PLWHA

4.6.1 Dietary adequacy

Dietary adequacy was determined by comparing the actual foods consumed with the Required Daily Allowances (RDA) shown in Appendix vi. The units used for each nutrient were as follows; energy (Kilocalories), protein (grams), iron (milligrams) Vitamin C (milligrams) and Vitamin A (Retinol Equivalents). The sex of the respondents was also put into consideration when determining their levels of nutrient adequacy. As shown in figure 4.16 almost all respondents’ energy and vitamin intake levels were below the RDA. One-third (31.2%) of the respondents’ protein intake levels were below the RDA. Almost the whole population had Vitamin C intake levels above the required RDA, while none of the respondents’ iron intake levels was inadequate. Iron adequacy levels however did not account for bioavailability.

4.6.2 Mean dietary intakes

The mean intake of nutrients showed that the calories, protein and Vitamin A intakes were below the RDA for each nutrient respectively. However, there were high standard deviations indicated great differences in the nutrient intake among the individuals due to the high disparity between the highest and the lowest. But the iron and Vitamin C consumed were within the RDA range for both men and women (table 4.3).
Figure 4.16: Distribution of respondents by nutrient adequacy.

Table 4.3: Mean dietary intakes of the respondents by sex.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Overall mean</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (Kcal)</td>
<td>2072.04±420.86</td>
<td>2090.66±443.7</td>
<td>2065.8±422.7</td>
</tr>
<tr>
<td>Minimum</td>
<td>1310.6</td>
<td>1337.2</td>
<td>1310.6</td>
</tr>
<tr>
<td>maximum</td>
<td>2811.55</td>
<td>2663.5</td>
<td>2811.55</td>
</tr>
<tr>
<td>Proteins (gm)</td>
<td>62.69±21.8</td>
<td>60.9±15.5</td>
<td>63.27±23.8</td>
</tr>
<tr>
<td>Minimum</td>
<td>21.3</td>
<td>32.73</td>
<td>21.3</td>
</tr>
<tr>
<td>maximum</td>
<td>118.81</td>
<td>82.33</td>
<td>118.8</td>
</tr>
<tr>
<td>Vitamin A (RE)</td>
<td>573.09±715.29</td>
<td>485.61±509.43</td>
<td>602.26±779.15</td>
</tr>
<tr>
<td>Minimum</td>
<td>6.51</td>
<td>118.37</td>
<td>6.51</td>
</tr>
<tr>
<td>maximum</td>
<td>3943.51</td>
<td>1680.64</td>
<td>3943.51</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>25.15±16.741</td>
<td>20.49±6.673</td>
<td>26.70±18.81</td>
</tr>
<tr>
<td>Minimum</td>
<td>11.18</td>
<td>106.75</td>
<td>11.18</td>
</tr>
<tr>
<td>maximum</td>
<td>934.75</td>
<td>337.52</td>
<td>934.75</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>25.8±8.05</td>
<td>25.6±8</td>
<td>25.9±8.2</td>
</tr>
<tr>
<td>Minimum</td>
<td>13.92</td>
<td>13.92</td>
<td>14.77</td>
</tr>
<tr>
<td>maximum</td>
<td>43.11</td>
<td>42.55</td>
<td>43.11</td>
</tr>
</tbody>
</table>
4.6.3 Dietary diversity score

Foods were grouped and summed into a twelve point dietary diversity score. Consumption of any food within a group (regardless of the frequency) during the previous 24 hours earned the respondent one point. Terciles of dietary diversity were used to classify respondents into low, average and high diversity scores. Majority of the respondents had average dietary diversity score as shown in the figure 4.17.

Figure 4.17: Distribution of respondents by dietary diversity score

4.7 The Relationship Between Dietary Intakes and Respondent Characteristics

Correlation analysis indicated a significant positive association between the dietary intake of the respondents and the family monthly income. However, relationship between per capita food expenditure on a daily basis and caloric, protein, vitamin A and vitamin C intakes of the respondents were positive and highly significant. There was a negative and significant relationship between the number of members in the household and the caloric, protein and vitamin C intakes of the respondents as shown in Table 4.4.
### Table 4.4: Correlation between dietary intake and individual characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Calories</th>
<th>Protein</th>
<th>Iron</th>
<th>Vitamin A</th>
<th>Vitamin C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of respondent</td>
<td>0.058 (-0.339)</td>
<td>0.179 (-0.244)</td>
<td>0.390 (-0.157)</td>
<td>0.489 (-0.127)</td>
<td>0.079 (-0.316)</td>
</tr>
<tr>
<td>Education level</td>
<td>0.957 (-0.010)</td>
<td>0.705 (-0.070)</td>
<td>0.580 (-0.102)</td>
<td>0.186 (-0.240)</td>
<td>0.083 (-0.311)</td>
</tr>
<tr>
<td>Income</td>
<td>0.164 (0.195)</td>
<td>0.048* (0.051)</td>
<td>0.194 (0.033)</td>
<td>0.306 (0.021)</td>
<td>0.195 (-0.302)</td>
</tr>
<tr>
<td>Per capita food expenditure per day/</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of members in the household</td>
<td>0.007** (-0.470)</td>
<td>0.025* (-0.396)</td>
<td>0.201 (-0.232)</td>
<td>0.147 (-0.262)</td>
<td>0.005** (-0.485)</td>
</tr>
</tbody>
</table>

Spearman’s rho *Significant at P<0.05  ** Significant at P<0.001

Figures in parentheses are the correlation coefficient. Others are significant levels

4.7.1 Association of nutrition knowledge with dietary diversity, dietary intake, food frequency and number of meals consumed per day.

Dietary diversity refers to the consumption of foods from different food groups regardless of the frequency within a specific period of time. The association between nutritional knowledge and dietary diversity was positive and highly significant at P<0.05.

There was a weak, positive and non significant relationship between nutrition knowledge of the respondents and their dietary and supplement intakes. The relationship between nutrition knowledge and the number of meals consumed in a day was positive and highly significant. The survey further showed that there was a significant and positive association between the nutrition knowledge of the respondents and the frequency at which they consumed fruits, legumes, animal products and cereals in a week. The relationship between nutrition knowledge and the rest of the food groups (roots and tubers and vegetables) was positive though not significant except for the fats and oils which had a negative relationship as shown in Table 4.5.
Table 4.5: Correlation between nutrition knowledge and the dietary diversity, dietary adequacy, meals consumed per day, supplement intake and food consumption frequency of the respondents.

<table>
<thead>
<tr>
<th>Nutritional Knowledge</th>
<th>Dietary diversity scores</th>
<th>Meals per day</th>
<th>Supplement intake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.008 (0.764)</td>
<td>0.000** (0.326)</td>
<td>0.314 (0.184)</td>
</tr>
</tbody>
</table>

**Dietary adequacy**

<table>
<thead>
<tr>
<th>Calories</th>
<th>Protein</th>
<th>Vitamin A</th>
<th>Vitamin C</th>
<th>Iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.111 (0.287)</td>
<td>0.330 (0.178)</td>
<td>0.887 (0.026)</td>
<td>0.111 (0.287)</td>
<td>0.106 (0.450)</td>
</tr>
</tbody>
</table>

**Frequency of food consumption per week**

<table>
<thead>
<tr>
<th>Fruits</th>
<th>Vegetables</th>
<th>Legumes</th>
<th>Animal products</th>
<th>Cereals</th>
<th>Roots &amp; tubers</th>
<th>Oils &amp; fats</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001** (0.274)</td>
<td>0.173 (0.112)</td>
<td>0.003** (0.243)</td>
<td>0.001** (0.268)</td>
<td>0.020* (0.191)</td>
<td>0.121 (0.127)</td>
<td>0.293 (-0.087)</td>
</tr>
</tbody>
</table>

N-nutrition  Spearman’s rho  *Significant at P<0.05  **Significant at P<0.001

Figures in parentheses are the correlation coefficient. Others are significant levels.

4.7.2. Relationship between dietary diversity and nutrition adequacy of the PLWHA

From the survey results, it was clear that the association between dietary diversity and the nutrient adequacy was positive and statistically significant. This association was very strong especially for protein, vitamin C and vitamin A as shown in table 4.6

Table 4.6: Correlation between dietary diversity score and nutrition adequacy of PLWHA.

<table>
<thead>
<tr>
<th>Dietary Adequacy</th>
<th>Protein</th>
<th>Calories</th>
<th>Vitamin C</th>
<th>Vitamin A</th>
<th>Iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary score</td>
<td>0.004**</td>
<td>0.010*</td>
<td>0.001**</td>
<td>0.007**</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>(0.834)</td>
<td>(0.561)</td>
<td>(0.932)</td>
<td>(0.813)</td>
<td>(0.735)</td>
</tr>
</tbody>
</table>

Spearman’s rho  * Correlation is significant at 0.05 level.  **Correlation is significant at 0.01 level.

Figures in parentheses are the correlation coefficient. Others are significant levels.
4.8 Factors Affecting Adequacy of PLWHA.
Multiple regression was employed to measure the effect of each of the variables in the model on dietary adequacy. It identifies the effect of each variable in the equation while holding other factors constant. A multiple regression was employed to measure the effect of various variables on the dietary adequacy. The results showed that amount spent on food, number of people in a family, dietary diversity and total number of meals consumed in a day contributed to the dietary adequacy of PLWHA. The results showed that the independent variables stated above statistically significantly contributed to the dietary adequacy. The results further showed that model fit is linear though not perfect as shown in table 4.7.

Table 4.7: Multiple Regression to test dependency of nutrients adequacy on independent factors for PLWHA

<table>
<thead>
<tr>
<th>Independent factors</th>
<th>Calories</th>
<th>Protein</th>
<th>Vitamin A</th>
<th>Vitamin C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary diversity score</td>
<td>0.120</td>
<td>0.499</td>
<td>0.112</td>
<td>0.176</td>
</tr>
<tr>
<td>Amount spent on food</td>
<td>0.063</td>
<td>0.164</td>
<td>0.107</td>
<td>0.076</td>
</tr>
<tr>
<td>Number of Meals consumed</td>
<td>0.005</td>
<td>1.583</td>
<td>0.080</td>
<td>0.129</td>
</tr>
<tr>
<td>Individuals in a household</td>
<td>0.049</td>
<td>0.070</td>
<td>0.013</td>
<td>0.091</td>
</tr>
<tr>
<td>Significance</td>
<td>0.004**</td>
<td>0.062</td>
<td>0.011*</td>
<td>0.000**</td>
</tr>
<tr>
<td>R Square</td>
<td>0.021</td>
<td>0.274</td>
<td>0.027</td>
<td>0.069</td>
</tr>
<tr>
<td>Constant Model</td>
<td>0.978X</td>
<td>0.127X</td>
<td>0.586YX</td>
<td>0.301</td>
</tr>
</tbody>
</table>

**Significant at the .001 level   *Significant at the .05 level
5.0 DISCUSSION
5.1 General Characteristics of Study Population
Increased family size adversely affects the nutrition adequacy of every member of the household including those with HIV/AIDS. The negative association is an indication that as the family size increases the dietary adequacy is jeopardized. This could be as a result of decreased allocation of food per person and acceptance of food of lower quality so as to provide for all members of the family.

The dependency ratio is less than one (1:0.7) in the study population. This means that on average there are seven dependants for every ten working age people. It indicates that the economic responsibility of those economically active to those that are not is low. However, one should bear in mind that there is a large number of people who are unemployed or underemployed and who are counted amongst the working population. Due to this the household income, which determines the amount spent on food is low. This is further reflected in the nutrient inadequacies among the respondents.

The study population under 15 years of age is slightly lower than the national population (45%). Those between the ages 15-64 are higher in percentage than the Kenyan population, which is 58.9% and 52% respectively. There is a similarity between the country’s and the study area population in that the age group 15-64 years is the highest, (CBS, 2004). This is an indication that the Kenyan population is aging, most probably because of the decline in fertility. This could be as a result of the fact that PLWHA discourage child bearing to avoid Mother-To-Child-Transmission. This could also be as a result of high mortality rates of
Expenditure on food is a mirror image of a household’s income. On the other hand income is said to be perhaps the most single determinant of diet and nutritional status (Caliendo, 1979). The mean monthly household income is higher than $111.4 estimated for the nation urban settings (CBS, 2002). The mean expenditure on food is $55.5 per household, approximately 50% of the income. The poor in most third world countries spend 60 percent to 80 percent of their income on food. Though the area of study is situated in a low-income area, the percentage of income spent on food shows that the study group is living a better life than the poor in developing countries. Per capita food expenditure is positively and significantly correlated to the calorie, protein, vitamin A and vitamin C intake of the respondent. The positive relationship implies that with increase in per capita food expenditure also increases the nutrient intake. The reason for using per capita expenditure on food instead of per capita income is the non-linear relationship between income and nutrients intake.

5.2 Food Availability, Adequacy and Consumption Behavioral Changes

Majority of the households (59.7%) do not have enough food for consumption at one point or another throughout the month or year. The time of inadequacy varies from household to household depending on their purchasing power and food aid supply. This is because food availability for those who depend on friends, relatives and organizations for food aid is dependent on whether they have provided promptly. Any delays lead to food shortage in the household. This can also be explained by the fact that most respondents are self-
employed and about one fifth are casual laborers. This means that during periods when the opportunistic infections suppress their productivity, the income is also affected and this leads to food shortage in the households. Though some are permanently employed they still experience food shortages towards the end of the month. This could be because the amount earned is not adequate to cater for food and other needs (house rent, transport and medical bills) throughout the month without shortages. Due to this the dietary intake is compromised thus affecting the adequacy. This further affects the health status and quality of life of the affected persons whose dietary requirements are higher than those of non-infected persons.

During food shortage the consumption behavioral changes employed include reduction of size of the meals and frequency of meals, which compromise the nutritional adequacy of PLWHA since what is consumed is less than the daily requirements. Assets are also sold as a coping strategy. This further increases their vulnerability and with time it reduces their coping capacity and progressively leads them to destitution. According to Piwoz and Preble (2000) PLWHA require an increment in dietary intake compared to non-infected persons of the same age, sex, physiological status and physical activity. This ensures that they stay healthy by building stores of essential nutrients, maintain weight and preserve lean body mass.

All people, regardless of their HIV status need to obtain adequate nutrition through consumption of healthy balanced diets (FANTA, 2004). A balanced diet should contain proteins, carbohydrates, vitamins and minerals in the right quantities. The main foods
consumed during food shortage among the study population include *sukumawiki*, *ugali*, porridge, *githeri* (mixture of beans and maize), sweet potatoes, rice, beans and black tea. These are low calorie foods except for *ugali*. Though porridge is a source of calories, it has a low energy density due to the high content of water used in the preparation against the amount of flour. Further it can be argued that the respondents who encounter food shortage do not meet their daily requirements since none of them consumed a balanced diet. The black tea consumed does not have any nutrients. Since black tea is consumed together with sweet potatoes, it in fact can inhibit the absorption of iron due to the presence of the anti-nutrients.

5.3 Food Consumption Patterns
Dietary practices play an important role in maintaining a healthy lifestyle of a person living with HIV/AIDS and who already has a weakened immune system. Persons with HIV/AIDS may experience difficulties with food intake due to illnesses. To ensure that they receive sufficient nutrients, it is necessary that they eat smaller amounts and more frequently throughout the day (FANTA, 2001). The average number of meals consumed in a day by the study population is 2.6±0.6 and is below the required five to six times (inclusive snacks). This could have a great negative impact on the nutrition status of PLWHA especially if they eat small amounts for each meal. The positive association between the number of meals consumed in a day and the dietary adequacy shows that the number of meals consumed has a positive influence on the nutrition adequacy. Thus, the more the number of meals consumed, the greater the dietary intake levels.

Various factors found to determine the choice of food for consumption by the respondents include the purchasing power (economic power), consciousness to have a balanced diet,
seasonality of the foodstuff, time available for food preparation, need to consume a variety of food and religious restrictions. The purchasing power is the main factor considered when making choice of foods to be consumed in the household. It also determines the number of meals to be consumed per day. Seasonality also adversely affects the choice of food as reflected in frequency of consumption of fruits, with the highest percentage consuming various fruits when they are in season. The reason could be because they are cheap and affordable when in season. Some factors (economic power, seasonality and religion of the respondent) can thus cause PLWHA to make wrong choices of food for consumption thus affecting their health and nutrition status. The need to have a variety of foods can have a positive impact on the nutrition status in that a diverse of nutrients are sourced from these foods thus improving its quality. The other factor that can have a positive impact on the nutrition status is the consciousness to have a balanced diet. This is because a balanced diet provides food in the right amounts and combinations that are safe and free from disease and harmful substances. This is dependent on whether the respondents are fully aware of the components of a balanced diet. The study shows that more than half of the respondents do not understand what a balanced diet is.

Households have different ways of distributing food to its members. In the study population food distribution in some households depends on the age and sex of the members. Other households ensure that either children have enough food first or that respondents (PLWHA) have enough before other members of the household are served. In some households wives eat the remainders after everyone else has enough regardless of their status. These ways indicate that PLWHA eat all meals together with other family
members. These further suggest that no special considerations are made to ensure that they meet the additional dietary requirements as compared to a non-infected person. This can further be argued to be due to stigma that the infected people have against being treated differently. This can adversely affect the nutrition status and thus the health status by weakening the immune status. According to Gillepsie and Allen (2001), meal practices and schedules should be changed to accommodate more frequent feeding for PLWHA.

The consumption of vegetables by the respondents is very high. The vegetables commonly consumed include tomatoes, sukumawiki, spinach, green pepper, and cowpea leaves. This could be because they are available throughout the year and cheap. The other reason could be due to knowledge the respondents had on the sources of vitamins and C. Vegetables are good sources of vitamins and minerals. These boost the immune system and protect the body from infection and aid in recovery.

The frequency of consumption of fruits is very low. This could be because they are expensive when out of season and cannot fit in the food budget or because of the cultural importance attached to consuming them due to inadequate nutrition knowledge. The other reason could be due to the fact that culturally fruits are not given a central place in diets.

The frequency of consumption of the staples is very high. The main staple consumed is ugali (a product of maize) with almost every household consuming it daily. According to the focus group discussion, ugali is the cheapest food respondents can afford for the whole family on a regular basis. Though the staples contribute to as much as 70 to 80 percent of
the calories in the diets of the population. Majority of respondents have their caloric levels below the required daily allowances. The reason to this could be that the quantities consumed are very small and/or the other foods consumed along with the staple are of very low caloric value and thus not complementing the staples to meet the caloric RDA.

The main pulse consumed is the bean with more than one third of the respondents consuming it as compared to other pulses that are consumed occasionally (table 4.3). The reason to this is because beans are available from the street food vendors in the estate. According to focus group discussion, most people preferred to buy the already prepared foods such as beans, mandazi, chapatti and deep fried fish on account of their low cost and convenience. It is thus uneconomical to prepare beans for only one meal.

The flesh foods consumed in the study population include fish and meat. Fish is highly consumed with more than half of the population consuming once a week. The reason for this is that it is cheaper than beef, which is consumed by about one third of the population in a week. The type of fish mostly consumed is the “omena” which is sold for as little as ten shillings. The Nile perch and tilapia are also sold. Most of the times they are cooked, cut into pieces of different sizes and then sold at varying prices. Thus families with little money have access to fish depending on the amount of money they have. Fish supply good quality proteins, vitamins and minerals. and when consumed by PLWHA they help strengthen muscles and the immune system (FAO, 2002).
5.4 Nutrition Knowledge
There are many sources of nutrition knowledge among the respondents. These include WOFAK staff, group discussions, health facility staff, reading nutrition literature and media. The quality of the information received by the respondents (PLWHA) is questionable. According to the information received from the key informants (WOFAK staff), there is no special training on nutrition to the home-based care workers and counselors who are in direct contact with PLWHA at WOFAK. This is clearly reflected in the respondents' knowledge on the sources of different nutrients that are vital to their health. The reason to this is that only general knowledge on foods that boost the immunity is provided.

Other sources where the information received was questionable are the Group discussions. This is because the respondents discuss on the opportunistic infections common to them and foods consumed to improve their health status during the infections. According to the information received from the focus group discussions, it shows that the respondents value this information and in case of similar infections, the same remedies (if positive) are taken which sometimes give positive or negative effects to the other respondents on trial. The attendance to the group discussions held after a fortnight is also not persistent.

Majority of the respondents also received nutrition information from the health facility staff, media and reading nutrition literature. The quality of information from these depends on whether the people concerned have a background on nutrition education. Focus group discussions also revealed a contradiction between the information received from various sources. This is because some foods are discouraged by some sources and at the same time
encouraged by other sources. This leaves the respondents confused on whether to consume or not consume these foods.

The association between the nutrition knowledge and diet diversity is significantly high. This can be argued by the fact that with increase of knowledge on the sources of different nutrients increases the consumption of a diversified diet so as to obtain the specific nutrients. This in turn improves the dietary intake of the respondent, thus raising the chances of meeting the RDA for every nutrient. From the focus groups responses, most respondents are aware of sources of vitamin A, C, energy and protein since this is taught in primary school of which all respondents attended.

Lactic fermentation is one of the tools that can be used to improve the nutritional quality of porridge. During the focus group discussion it was noted that porridge is main food for PLWHA especially when they have the opportunistic infections. It is also a common food in households during food shortages. Food aid provided by WOFAK is in the form of porridge flour. Despite the fact that there is high consumption of porridge, knowledge of the benefits of lactic fermentation on the nutritional value is not known. A few who consume the fermented porridge like it because of the taste thus increasing the consumption. According to Mbugua (1986), lactic fermentation improves the taste and palatability of porridge. The sweet sour taste in sweetened fermented porridge is reminiscent to fruit juices and is bound to improve intake.
5.5 Nutrient Adequacy
This refers to the achievement of recommended intakes of energy and essential nutrients. Measurement tools to assess nutrient adequacy are dietary diversity and 24-hour dietary recall methods.

The 24-hour recall is used to determine whether the nutrients consumed by the respondents meet the required daily allowances. The additional nutrient requirements (energy and protein) were put into consideration. A deficiency in macronutrient manifests itself in weight loss and wasting that is typical of AIDS patients (FANTA, 2001). Majority of the respondents have their total calories below the required daily allowances. Though energy rich foods are the highest consumed foods in every household, the inadequacy could be due to the quantities consumed being small or other foods consumed being of low caloric value. The positive association between the total calories consumed and per capita expenditure on food per day is an indication that with increased per capita expenditure on food the consumption of caloric foods will increase. The negative association between the caloric intake and the household composition means that with the increase of the number of members in a family, the size of the calorie rich foods consumed decreases.

The positive association between the protein intake and per capita expenditure on food per day is an indication that as food expenditure increases the intake of protein rich food also raises. There is also a positive association between protein intake and nutrition knowledge. The explanation to this could be that the higher the levels of nutrition knowledge, the more the protein rich foods are consumed. Thus nutrition knowledge and the amount spent on
food have a positive effect on the protein intake. The other explanation to this can be that the presence of one without the other can adversely affect the protein intake. The negative association between the protein intake and the number of individuals in a household is an indication that as the size of the family increases, the quantity of protein foods consumed decreases.

In general there is a positive association between the nutritional knowledge and the overall dietary intake. The explanation to this is that as the levels of nutritional knowledge increases the dietary intake improves. The reason to this could be because decisions on the right foods, quantities and frequencies of consumption are made. This further improves their nutritional status and reduces the opportunistic infections that are common to PLWHA.

Lack of dietary diversity is particularly a severe problem among poor population from the developing world because their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables (Popkin, 1994). This agrees with the study population where majority of the respondents have an average dietary diversity score. This is reflected in the high significance association between dietary diversity and nutrition knowledge levels. The positive association is an indication that as the respondents’ nutrition knowledge increases the diversification of foods also improves. This could be because they tend to understand the benefits of the different foods to their health and thus include them in their meals.
5.5.1 Dietary diversity and nutrient adequacy

The study results clearly show that there is a significant and positive association between nutrient adequacy and dietary diversity. This agrees with a study carried out in Mali, which validated the association of dietary diversity against nutrient adequacy. It documented a significant association between nutrient adequacy and dietary diversity (Kant, 1996).

The positive and highly significance association between dietary diversity and dietary adequacy is a clear indication that diversification of foods is a strong determinant of nutrient adequacy. This can be explained by the fact that as an individual consumes food from different food groups, a variety of nutrients are obtained and thus nutrient adequacy is attained provided the right quantities are consumed.

5.6. Nutrition Supplements

At the time of study only 13% of the study population was on supplements. This is a very small percent considering that nutrient supplements are important in ensuring that nutrients not adequate in form of food are catered for. According to the information obtained from the focus group discussions, it reveals that clinicians prescribe supplements only when PLWHA have opportunistic infections. According to MOH (2007), multiple micronutrient supplements for PLWHA and the populations vulnerable to micronutrient deficiency should be greater than one RDA per day.

Very little knowledge on supplements is revealed. The only supplement known is the multivitamin, which has been prescribed at one point or another. Otherwise there is no knowledge of specific nutrients supplements available in the health facilities. The
accessibility is limited in that unless one has opportunistic infections, the physician cannot prescribe them.

According to information got from WOFAK's clinical officer, supplements are prescribed to those patients who have opportunistic infections that affect food consumption. This is not always the case since there are some times when there is a shortage in supply. This is because they rely on well-wishers who sometimes delay the supply or the funding. At such times nothing is provided regardless of cases that require attention.

The positive association between the supplement intake and the nutritional knowledge though not significant is an indication that nutrition knowledge has a positive impact on the supplements intake.

5.7 Factors Affecting Dietary Adequacy of PLWHA
Regression analysis identified the effect of each contributory variable while holding other factors constant. The results show that dietary diversity, per capital amount spent on food per day, number of meals consumed in a day and number of individuals in the household contributes significantly to the nutrition adequacy. The explanation to this is that the amount of money spent on food determines the quantity of the food to be bought whereas the level of nutrition knowledge determines the choice of quality and right foods. Through dietary diversity foods rich in different nutrients are consumed and this thus affects the nutrition adequacy.
The number of meals consumed in a day also affects the nutritional adequacy in that the more the number of meals the higher the nutrient consumption. The other factor that affects nutrition adequacy significantly is the number of members in a household. This can be explained by the fact that an increase in the number of members in a household decreases the quantity share of food of the respondent, thus affecting their nutrient adequacy.

Nutrition adequacy is thus an outcome of many factors as discussed above, which are interdependent to each other. Thus with increase in dietary diversity, number of meals consumed per day, per capita food expenditure will improve dietary intake and thus the nutrition status of PLWHA.
6.0. CONCLUSIONS AND RECOMMENDATIONS
6.1. Conclusions
From the study results the following conclusions are made:

1. PLWHA in Nairobi do not have adequate nutrition knowledge.

2. Sources of nutrition information received by PLWHA in Nairobi are questionable.

3. Dietary intake by PLWHA in Nairobi is inadequate for proteins, calories and Vitamin A.

4. There is a positive relationship between dietary diversity and nutrition adequacy of PLWHA.

5. Dietary adequacy of PLWHA is dependent on dietary diversity, number of meals consumed in a day, number of persons in the family and per capita amount spent on food.

6. Change in any of the above components will change the dietary adequacy of PLWHA.

6.2 Recommendations
The following recommendations are suggested:

1. All health service providers working with PLWHA should be trained on appropriate nutrition for PLWHA.

2. Nutrition information should be disseminated to all people in all sectors regardless of their HIV status.

3. Supplementation Policies should be formulated to regulate use of supplements by PLWHA from the time they are diagnosed.
4. The government should set up strategies that empower PLWHA economically.

5. Further research should be carried out to assess the effect of nutrition education on the dietary diversity and nutrition status of PLWHA.
REFERENCES


APPENDIX I: QUESTIONNAIRE


Name of the interviewer ..................................................
Name of respondent ..................................................

A: SOCIO-ECONOMIC AND DEMOGRAPHIC DATA

[Use the codes provided at the bottom of the page to fill in the table. For ‘others’, specify in the space below the codes].

<table>
<thead>
<tr>
<th>No.</th>
<th>Names of HH members</th>
<th>Relation to HHH</th>
<th>Age in Years</th>
<th>Sex</th>
<th>Education</th>
<th>Occupation</th>
<th>Religion</th>
<th>Marital Status</th>
</tr>
</thead>
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</tbody>
</table>

Relationship to HHH
HHH=1
Single=2
Spouse=3
Child=4
N/A=5
Worker=6
N/A=7

Education
Post secondary=1
Secondary=2
Primary=3
No Formal Education=4
Other (Specify)=6

Marital Status
Polygamous =2
Monogamous=3
Divorced=4
Separated=5
Widowed=6
Other (Specify)=7
Grandchild=5

Occupation
None=1
Self-employed=2
Formal Employment=3
Other (Specify)=4

Religion
Christian=1
Muslim=2

Sex
Male=1
Female=2

Monthly Income of the household ..............................................................
Proportion of income spent on food

Source of fuel for cooking

11. Amount spent on fuel per month

12. When were you first diagnosed with HIV?

B. DIETARY HISTORY

Food Frequency

16. Below is a list of foods. Please indicate the number of times the food is consumed by the PLWHA.

<table>
<thead>
<tr>
<th>Type of food</th>
<th>Everyday</th>
<th>Once a week</th>
<th>Twice/Thrice a week</th>
<th>Once/Twice per month</th>
<th>Seasonally</th>
<th>Never consume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits and Vegetables</td>
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<td>Spinach</td>
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<td>Pumpkin</td>
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<td>Mushrooms</td>
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<td>Cassava leaves</td>
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<td>Green peppers</td>
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<td>Terere</td>
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<td>Carrots</td>
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<td>Tomatoes</td>
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<td>Paw paw</td>
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<td>Cabbage</td>
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<td>Broccoli</td>
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<td>Mangoes</td>
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<td>Water melon</td>
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<td>Squash</td>
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<td>Ripe bananas</td>
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<td>Oranges</td>
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<td>Lemons</td>
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<td>Guavas</td>
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<td>Passion fruits</td>
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<td>Pineapples</td>
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<td>French beans</td>
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<td>Kunde</td>
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<td>Sukuma</td>
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<td>Legumes</td>
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<td>Beans</td>
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<td>Peas</td>
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<td>Ndengu</td>
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</tbody>
</table>

Type of food: Everyday, Once a week, Twice/Thrice a week, Once/Twice per month, Seasonally, Never.
<table>
<thead>
<tr>
<th>Groundnuts</th>
<th>Soybeans</th>
<th>Animal products</th>
<th>Meat</th>
<th>Poultry</th>
<th>Fish</th>
<th>Eggs</th>
<th>Sour milk</th>
<th>Yoghurt</th>
<th>Insects</th>
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<tr>
<th>Cereals</th>
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<th>Roots and tubers</th>
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| Sugars           |          |                |      |         |     |      |          |        |        |
| Cakes            |          |                |      |         |     |      |          |        |        |
| Water            |          |                |      |         |     |      |          |        |        |
| Honey            |          |                |      |         |     |      |          |        |        |
| Jam              |          |                |      |         |     |      |          |        |        |
| Biscuits         |          |                |      |         |     |      |          |        |        |

| Others           |          |                |      |         |     |      |          |        |        |
| Githeri         |          |                |      |         |     |      |          |        |        |

| 84 |
17. 24-Hour Recall Food Intake Record.

Fill the Table below the foods you ate from the time you woke up yesterday to the time you woke up today. (For the PLWHA).

<table>
<thead>
<tr>
<th>Meal</th>
<th>Name of Dish</th>
<th>Ingredients</th>
<th>Amount in pot in ml</th>
<th>Total Amount of dish</th>
<th>Amount consumed by respondent</th>
<th>Amount left over by respo.</th>
<th>Amount consumed by respo. (gm/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
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<td>Other</td>
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</tr>
</tbody>
</table>

18. Who makes decision on what is to be consumed in the household?

19. What are your major sources of food in order of importance? [Please rank]
   - Own production
   - Purchase
   - Food aid
   - Other (specify)
20. How many meals do you consume in a day?
   1 = One   2 = Two   3 = Three   4 = Other (specify).

21. Do you always have enough for consumption? [If yes go to number 25]
   1 = Yes   2 = No

22. If number 21 is No, when do you experience food shortage?

23. What measures do you take to cope with food shortage? [Indicate in the order of importance]
   □ Sale of assets   □ Reduce meal size
   □ Reduce the frequency of meals   □ Other (specify)

24. Which foods do you consume during shortages?

25. How is food distributed in the family in terms of quantity?
   1 = Husband gets the most   2 = Children get to satisfaction
   3 = Wife eats the remainder   4 = Food is equally distributed in proportion to age
   5 = Others (specify)

26. What do you consider when choosing food for consumption?
   1 = To have a balanced diet   2 = Foods allowed by our religion
   3 = Foods affordable   4 = Foods in season
   5 = Foods consumed by our ethnic group
   6 = Foods available   7 = To have a variety
   8 = Other (specify)

C. Nutrition Knowledge

27. Do you attend any nutritional training sessions? [If no go to number 32]
   1 = Yes   2 = No

28. If yes, where do you attend them?

29. How frequent do you attend
   1 = Weekly   2 = Once a fortnight   3 = Once a month
   4 = Occasionally   5 = Other (specify)

30. What have you learnt from these sessions?

31. What has changed from the time you started attending to these sessions?

32. What factors do you consider before beginning the preparation of any meal?
   1 = Nutrients in the ingredients
   2 = Best cooking method for the food
   3 = Ways to avoid nutrient loss
   4 = Time available
33. Indicate any changes in your feeding habits ever since you knew your status in the table below (respondent).

<table>
<thead>
<tr>
<th>Change</th>
<th>Before</th>
<th>Current</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>

34. Are there some foods that you were consuming before you knew your status but you no longer consume them? [If no go to number 36]
   1=Yes  2=No

35. If number 34 is yes, which food are they?.........................

36. Which food groups do you ensure that they are in your diet every meal?
   1=Vegetables, fruits, Carbohydrates and proteins, nuts
   2=Carbohydrates and proteins
   3= Carbohydrates and vegetables
   4=Vegetables, fruits and carbohydrates.
   5=Other (Specify)

37. Which foods improve the immunity?
   .................................................................................................
   .................................................................................................

38. Which foods deplete the immunity?
   .................................................................................................
   .................................................................................................

39. Which foods provide the following nutrients to the body?
   a. Vitamins A............................................................
   b. Vitamin B............................................................
   c. Vitamin C............................................................
   d. Zinc..........................................................................
   e. Selenium................................................................
   f. Iron..........................................................................
   g. Proteins...................................................................
   h. Energy.....................................................................
40. Do you smoke?
   1=Yes       2=No
41. Do you take alcohol?
   1=Yes       2=No
42. If number 41 is Yes, how often do you take
   1=Everyday   2=Twice a week   3=Once a week
   4=Once a month 5=Occasionally  6=Others (specify)
43. Which method of cooking do you use for vegetables? [Please rank]
   ☐ Boiling    ☐ Steaming    ☐ Frying    ☐ Eat raw
   ☐ Other (Specify)
44. How do you prepare your vegetables before cooking?
   [Number in the order of the steps followed]
   ☐ Cut        ☐ Sort       ☐ Wash       ☐ Cook       ☐ Other(Specify)
45. Are there some foods that you avoid eating? [If no go to number 48]
   1= Yes       2= No
46. If number 45 is yes, which foods are they?

47. Why do you avoid eating them?
   1=Allergy    2=Constipation  3=Not tasty   4=Our clan forbids them
   5=dislike    6=Other(Specify)
48. Do you ferment any food for consumption?
   1=Yes        2= No
49. If number 46 is Yes, which foods do you ferment?

50. Why do you ferment them?
   1=Improves appetite
   2=To improve the nutritional value
   3=Because it tastes better than non-fermented
   4=Because my friends ferment
   5=Other (Specify)

51. What do you understand by balanced diet?

THANK YOU
APPENDIX II: FOCUS GROUP DISCUSSION GUIDE

❖ What are your main sources of income?
❖ What factors influence the choice of foods consumed?
❖ What benefits do you get from WOFAK?
❖ Is nutrition Education provided in the organization and how frequent is it delivered.
❖ What are the benefits of participating in the nutrition education sessions?
❖ Is the nutrition education provided adequate or you feel that there are some issues that need to be addressed?
❖ What herbal medications do you take and what are their benefits?
❖ What factors do you consider when choosing the food to consume and the preparation method?
❖ What do you know about food supplements?
❖ Which food supplements are currently the most important and how should they be taken?
❖ What do you know about fermentation?
❖ What do you understand by a balanced diet?
APPENDIX III: KEY INFORMANT INTERVIEW GUIDE

❖ How do you identify yourselves with PLWHA?
❖ What services do you provide to PLWHA?
❖ What are the challenges that face in making the program a success?
❖ Are the counselors provided with any training before they take up the job? Who trains them? What is the duration of the training?
❖ What food supplements do you advice PLWHA to take? Who prescribes and from where do they get them?
❖ What changes have you noted among the WOFAK members from the time of registration to date?
❖ How do you ensure that PLWHA participate in the nutritional education sessions and other activities in the program?
❖ What issues do the counselors emphasize on during the nutrition education sessions?
❖ What factors influence the type of foods consumed?
❖ What criteria do use when recruiting counselors?
❖ Do you have any food preparation demonstrations and who does them?
APPENDIX IV: NUTRITION KNOWLEDGE TEST MARKING GUIDE

Questions

Maximum marks for the correct responses

1. Do you attend any nutritional training sessions? 1

2. What have you learnt from these sessions? 3

3. What has changed from the time you started attending to these sessions? 3

4. What do you consider when choosing food for consumption? 4

5. What factors do you consider before beginning the preparation of any meal? 5

6. Indicate any changes in your feeding habits ever since you knew your status (respondent). 3

7. Which foods improve the immunity? 4

8. Which foods deplete the immunity? 4

9. Which foods provide the following nutrients to the body? 16
   a. Vitamins A
   b. Vitamin B
   c. Vitamin C
   d. Zinc
   e. Selenium
   f. Iron
   g. Proteins
   h. Energy

10. How do you prepare your vegetables before cooking? 2
11. Which method of cooking do you use for vegetables?  

12. Do you ferment any food for consumption?  

13. Which foods do you ferment?  

14. Why do you ferment them?  

15. What do you understand by balanced diet?
# APPENDIX V: FOOD CONVERSION TABLE

<table>
<thead>
<tr>
<th>Food type</th>
<th>Description</th>
<th>Amount in Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>1 cup</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>1 packet</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>1 slice</td>
<td>25</td>
</tr>
<tr>
<td>Cooking fat</td>
<td>Table spoon heaped</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Table spoon level</td>
<td>19</td>
</tr>
<tr>
<td>Omena</td>
<td>1 tin</td>
<td>100</td>
</tr>
<tr>
<td>Egg</td>
<td>1 piece</td>
<td>50</td>
</tr>
<tr>
<td>Sukuma wiki</td>
<td>5 shillings</td>
<td>200</td>
</tr>
<tr>
<td>Cabbage</td>
<td>5 shillings</td>
<td>250</td>
</tr>
<tr>
<td>Spinach</td>
<td>5 shillings</td>
<td>150</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>10 shillings</td>
<td>350</td>
</tr>
<tr>
<td>Carrots</td>
<td>10 shillings</td>
<td>400</td>
</tr>
<tr>
<td>Onions</td>
<td>Medium</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>45</td>
</tr>
<tr>
<td>Green cooking bananas</td>
<td>20 shillings</td>
<td>900</td>
</tr>
<tr>
<td>French beans</td>
<td>10 shillings</td>
<td>250</td>
</tr>
<tr>
<td>Peas</td>
<td>180 ml cup</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>220 ml glass</td>
<td>80</td>
</tr>
<tr>
<td>Dhania</td>
<td>3 shillings</td>
<td>10</td>
</tr>
<tr>
<td>Irish potato</td>
<td>10 shillings</td>
<td>950</td>
</tr>
<tr>
<td>Tomato</td>
<td>Large</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>45</td>
</tr>
<tr>
<td>Rice</td>
<td>180 ml cup</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>220 ml cup</td>
<td>210</td>
</tr>
<tr>
<td>Orange</td>
<td>Large</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>110</td>
</tr>
<tr>
<td>Avocado</td>
<td>Large</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>140</td>
</tr>
<tr>
<td>Beans</td>
<td>250 ml cup</td>
<td>235</td>
</tr>
<tr>
<td>Maize</td>
<td>250 ml cup</td>
<td>220</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>10 shillings</td>
<td>12</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>1 piece (medium)</td>
<td>310</td>
</tr>
<tr>
<td>Pawpaw</td>
<td>10 shillings</td>
<td>120</td>
</tr>
<tr>
<td>Water melon</td>
<td>1 slice</td>
<td>200</td>
</tr>
<tr>
<td>Ripe banana</td>
<td>1 small</td>
<td>100</td>
</tr>
<tr>
<td>Pineapple</td>
<td>1 piece</td>
<td>85</td>
</tr>
<tr>
<td>Mango</td>
<td>10 shillings</td>
<td>350</td>
</tr>
<tr>
<td>Mandazi</td>
<td>1 piece</td>
<td>30</td>
</tr>
<tr>
<td>Chapati</td>
<td>1 piece</td>
<td>100</td>
</tr>
<tr>
<td>Arrowroot</td>
<td>1 piece (medium)</td>
<td>300</td>
</tr>
<tr>
<td>Kunde</td>
<td>5 shillings</td>
<td>200</td>
</tr>
<tr>
<td>Chips</td>
<td>5 shillings</td>
<td>100</td>
</tr>
<tr>
<td>Porridge flour: wimbi</td>
<td>1 table spoon heaped</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>: Sorghum</td>
<td>40</td>
</tr>
<tr>
<td>Fish</td>
<td>10 shillings piece</td>
<td>80</td>
</tr>
</tbody>
</table>
APPENDIX VI: RECOMMENDED DAILY ALLOWANCES FOR THE RESPONDENTS

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>RDA (males)</th>
<th>RDA (females)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilocalories</td>
<td>3600</td>
<td>2700</td>
</tr>
<tr>
<td>Protein</td>
<td>59</td>
<td>45</td>
</tr>
<tr>
<td>Vitamin A (R.E)</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Iron</td>
<td>5-9</td>
<td>14-28</td>
</tr>
</tbody>
</table>

NB: Additional nutritional requirements are included (20% more for protein and kilocalories Source M.O.H 2007)