DIETARY PATTERNS AND NUTRITIONAL STATUS OF ASYMPTOMATIC HIV-1 SEROPOSITIVE AND HIV - 1 SERONEGATIVE WOMEN IN NAIROBI-KENYA.

Submitted in partial fulfillment of requirements of Master of Science in Applied Human Nutrition at the University of Nairobi - Kenya.

by:

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DECLARATION

I, **Mbotela, W. N. Catherine** hereby declare that this is my original work which has not been presented for a degree in any other University.

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DEDICATION

This work is dedicated to my parents, **Hilary and Dorcas Wafula** for sacrificing so much for my education and for giving me the best foundation in life. To my husband **Francis A.N. Mbotela**, Son **Hillary Immanuel** for their support and patience with me for the time spent on my thesis that would otherwise have been spent with them.

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"Hope is within reach of us all"

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ABBREVIATIONS:

AAID	-	Australian Agency for International Development
AIDS	-	Acquired Immunodeficiency Syndrome
AIDSCAP	-	Aids Control and Prevention Project
ANP	-	Applied Human Nutrition Programme
BMI	-	Body Mass Index
CBR	-	Crude Birth Rate
CBS	-	Central Bureau of Statistics
CDC	-	Center for Disease Control
CDR	-	Crude Death Rate
EDTA	-	Ethylene Diamine Tetraacetic Acid
EIA	-	Enzyme Immunoassay(ELISA)
FHI	-	Family Health International
GDP	-	Gross Domestic Product
GIT	-	Gastrointestinal Tract
GMT	-	Greenwich Mean Time
GOK	-	Government of Kenya
HB	-	Haemoglobin Level
HIV	-	Human Immunodeficiency Virus
IHU	-	International Health Unit
IGA	-	Income Generating Activities
KAP	-	Knowledge, Attitude and Practices
KDHS	-	Kenya Demographic Health Survey
MBCMR	-	Macfarlane Burnet Centre for Medical Research
MCH	-	Maternal Child Health
MUAC	-	Mid Upper Arm Circumference
OTC	-	Over the counter drugs
NGO	-	Non-Governmental Organization
PEM	-	Protein Energy Malnutrition
RDA	-	Recommended Daily Allowance
SPSS	-	Statistical Package for Social Sciences
STD	-	Sexually Transmitted Diseases
SST	-	Subscapula Skinfold Thickness
TST	-	Triceps Skinfold Thickness
USAID	-	US Agency for International Development
WHO	-	World Health Organization

DEFINITION OF TERMS:

AIDS:

Acquired Immunodeficiency Syndrome, is the end stage of disease state following HIV infection. It is characterized by symptoms that take advantage of the damaged Immune system such as severe weight loss, Chronic, diarrhoea, fever, persistent cough etc.

ASYMPTOMATIC INFECTION:

This is the term used to describe an infected individual who has not developed clinical signs or symptoms. For the purpose of this investigation, an asymptomatic individual is one who does not meet the WHO clinical criteria for the diagnosis of AIDS. (Appendix 1 Table10.1:125).

BALANCED DIET:

A combination of the four major food groups namely carbohydrates, fats ,proteins and vitamins as stipulated in the daily food guide (Appendix 6:140).

CASES:

Arbitrary term used to refer to respondents who have tested positive for the HIV virus.

CONTROLS:

Arbitrary term used to refer to respondents who have tested negative for the HIV virus.

DIETARY PATTERNS:

For the purpose of this investigation, dietary patterns will refer to the type and relative combinations of foods frequently consumed by the individuals (respondents) expressed qualitatively in terms of nutrient intake, variety and quality. (Cameroon and Stavern 1988).

DIETARY ADEQUACY :

For the purpose of this investigation dietary adequacy will refer to combination of foods consumed by the individual (respondents), that will be used to develop

appropriate indices which will be compared to the daily food guide. In order to provide accurate interpretation of the recommended number of servings of various foods per day considered adequate. (Appendix 6:140).

FOCUS GROUP DISCUSSIONS:
A non-randomly selected group of people brought together to discuss and explore a limited number of defined topics.

HIV:
Human Immunodeficiency Virus is a retrovirus that targets cells of the body with CD^{+}_{4} receptors such as T helper cells, langerhans cells, macrophages and gradually cause immunosuppression. There are basically two types of HIV, Type 1 and Type 2.

HIV SEROPOSITIVE:
Refers to serum that has antibodies of HIV.

SERONEGATIVE:
Refers to serum that does not have antibodies of HIV.

HOUSEHOLD:
Will refer to one or a group of persons with or without a family relationship who live together under one roof , share from a common pot, share earnings and expenditures and take part in the management of the household and render services to it (includes children).

NUTRITIONAL COUNSELLING
Refers to counselling conducted in an interactive manner responsive to individual client needs. It focuses on providing accurate, consistent therapeutic information aimed at promoting informed decision making an issues related to nutrition.

NUTRITIONAL KNOWLEDGE INDEX:

For the purposes of this investigation nutritional knowledge will refer to verbalized or demonstrated ability to reproduce from memory facts and principles related to nutrition.

OPPORTUNISTIC INFECTION:

These are infections within organisms that do not usually cause disease in a healthy person, but are able to cause severe and potentially-life threatening illness among immunodeficient individuals such as patients with AIDS, cancers or on treatment with immunosuppressive drugs such as steriods, or chemotherapy. HIV infected individuals are also vulnerable to infections with common pathogens that cause disease in the immune competent host.

SEROCONVERSION:

This is the process where individuals develop antibodies to HIV, following HIV infection. The time period between infection and ability to detect antibodies is called the "Window period" and may last as long as six months.

FOOD SERVING:

Refers to an adequate quantity of food that contains required amount of nutrients to meet the recommended daily allowance (RDA).

SOCIO-ECONOMIC STATUS:

For the purpose of this investigation it will be limited to income levels, earned from employment or other sources in the last month prior to the study period. (Appendix 7.141).

T LYMPHOCYTES:

These are cells of the immune system that originate from the thymus gland. Subsets of T cells have a central role in the immune system, and affect both humoral and cell mediated immunity. $T_4(CD_4+)$ have a receptor site for HIV.

TOTAL SCORE:

The total number of correct scores as a percentage of all combined responses obtained from questions related to nutritional knowledge.

ABSTRACT:

A clinic based five months cross-sectional, but comparative study was carried out on 204, randomly selected asymptomatic HIV Seropositive (cases) and HIV Seronegative (controls) in a health facility in a Nairobi maternal child health clinic. The aim of the study was to establish dietary patterns among HIV seropositive and HIV seronegative women enrolled in a longitudinal cohort study. .

Data was collected using a structured questionnaire, focus group discussions, anthropometric measurements and analysis of blood for the determination of HIV status, haemoglobin levels and CD_4^+/CD_8^+ absolute cell counts and ratios respectively. Nutritional status was determined using Body mass index, Mid-upper arm circumference, Subscarpula skinfold thickness, Triceps skinfold thickness and haemoglobin levels. Nutrient adequacy of diets consumed by respondents was computed using food frequency method, where different combinations of responses were used to calculate indices of proteins, vitamins, carbohydrates, and fat consumption. These indices were then compared, to the recommended number of servings of various foods per day considered adequate as suggested by the daily food guide.

The results show that the study group was relatively young, mean age 30 years, with the mean age of index child 1.87 years (s.d 0.46). The majority, in both the cases and controls, about 48% and 60.8% respectively were married. About 57.8% cases and 52.9% controls had attained primary school education. In total about a third 30.4% of the respondents were self employed. This accounted for 28.4% cases and 32.4% controls . The type of activities the respondents were engaged in, were mainly petty businesses such as hawking or food vending. The majority in both cases and controls were in the middle income group according to the Government of Kenya income classification 1994 (earned less than Kshs. 2,500 per month equivalent to US $ 45).

The diets consumed for both cases and controls were deficient in proteins and carbohydrates but were relatively adequate in vitamins and fats. The differences in both cases and controls were however not statistically significant .The morbidity prevalence was also quite high among the cases and controls with cough being the most prevalent condition, this was found to be significantly related to the nutritional status for both study groups ($p<0.001$).

Apart from Body mass index, all other nutritional status indices showed statistically significant differences with HIV status. Using Mid-upper arm circumference(cut off-point <28.5 cm- 90% standard),about 7.7% cases and 2.0% controls were malnourished while using Subsarpula skinfold thickness (cut off- point <13.7mm -90% standard),a higher proportion 39.2% and 30.4% of cases and controls respectively were malnourished. Approximately 30.4% and 26.5% of cases and control respectively fell below the Triceps skinfold thickness(cut off-point <16.5mm). A high proportion of cases also 52.0% fell below the Haemoglobin (cut off- point <12 g/dl for anaemia) as compared to 48% for controls. In each of the stated instances, the differences were statistically significant for cases and controls. The results show that HIV status is likely to affect nutritional status even at an early phase of the disease.

The factors associated with poor nutritional status ($p< 0.05$) **were Subscarpuar skinfold thickness, Mid-upper . arm circumference, Triceps skinfold thickness, Haemoglobin levels(Anaemia), education in years, lack of nutritional counselling and constraints in dietary planning.** Nutritional knowledge and the dietary patterns between the two groups generally compared well and there were no statistical significant differences noted in the two study groups.

This study has established that **poor nutritional status, lack of nutritional counselling, low education levels, low social economic capability** among other factors are associated with malnutrition in asymptomatic HIV seropositive and

HIV seronegative women. The recommendations are that aggressive nutritional intervention in form of adequate nutritional counselling at the asymptomatic phase with support of income generating activities would be key strategies to achieve early dietary intervention, to counteract disease related malnutritional manifestations that may, compromise on the nutritional status and increase the cost of healthcare which is a limiting factor among the low income group hence reduce maternal morbidity and mortality.

CHAPTER 1:

1.0 INTRODUCTION:

The Human immunodeficiency virus /Acquired immunodeficiency syndrome (HIV /AIDS) is a public health problem worldwide. The global picture on the HIV statistics is grim. According to UNAIDS (1997), about 30 million people were infected with HIV by the end of 1997. UNAIDS and WHO estimate that one in every 100 adult in the sexually active age of 15-49 years worldwide is infected. Included in the 30 million figure are 1.1 million children under the age of 15 years. The overwhelming majority of the HIV infected people live in the developing world.

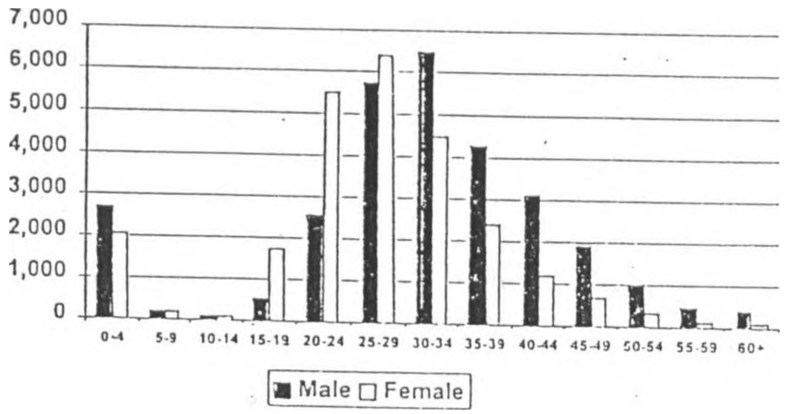
Sub-Saharan Africa accounts for an estimated 7.4% adult prevalence rate, of these 50% account for women. The worst affected countries are South Africa which by early 1997 had an estimated 2.4 million people infected with HIV (UNAIDS, 1997). East Africa is also one of the areas that has suffered a massive epidemic, particularly Uganda. However, 1997 data currently shows that infection levels are between 5-9% representing a decrease of about one-fifth compared to the 1996 data (UNAIDS, 1997).

In Kenya an estimated 700,000 people are infected with the virus that is, one in eighteen adults is infected with the virus. Projected estimates by the Kenya National STD/AIDS Control Programme (1997), the National Council for population and Development (1997), predicts that adult prevalence of HIV in Nairobi which was 14% in 1992 will rise to 24% by the year 2000. Projections for the whole country are estimated at a prevalence of 5.6% to 9% during the same period. All these projections are based on the conservative assumption that HIV prevalence will level off and remain relatively constant by the year 2000 (USAID, AIDSCAP, FHI, 1997). The prevalence data shows a steady increase in infection rates especially among pregnant women attending antenatal clinics.

Women have tended to become infected at younger ages than men, this reflects the biological and social vulnerability of teenage women between ages 15 – 20years. (USAID, AIDSCAP, FHI, 1997).

Figure 2.1: Gives a summary of the age and sex distribution of reported cases of HIV/AIDS in Kenya.

FIG 2.1: AGE AND SEX DISTRIBUTION OF HIV/AIDS CASES IN KENYA 1986-1996:



Used by permission SOURCE: AIDS IN KENYA (1997): (USAID, AIDSCAP, FHI).

The chart shows the number of HIV/AIDS cases reported since 1986 by age group and sex. There are several observations illustrated by this chart. About 75% of the HIV/AIDS cases occur among adult's aged 20-45 years, which is the most economically productive part of the population. HIV related deaths constitute an important economic burden, and have also had important consequences for children, since most people in this age group are raising young children. There is, almost an equal number of male and female reported cases, however women become, infected at a younger age than men do. Young women

in the age group 15 – 24 years are twice as likely to be infected than males. The peak ages for infection are ages 20-29 years for females and 30-39 years for males. A significant number of HIV cases have been reported among young children, who have acquired infection from their mothers during pregnancy, birth or through breastfeeding. (USAID, AIDSCAP, FHI, 1997).

HIV prevalence among adults in the general population has risen from 3.5% in 1990 to 7.7% in 1995 based on the surveillance by the National AIDS/STD Control Programme (NASCOP) Kenya. At least one in every eight adults is infected with HIV in Nairobi. HIV prevalence in Nairobi in the 15 years and above age bracket totals to approximately 167,997. The prevalence of AIDS in Nairobi by September 1997 of all reported cases from sentinel surveillance clinics accounts for 3,884 people at 5.1% of the total population (NASCOP (K), 1997).

Women become infected with HIV through all known routes of transmission. AIDS has become the major cause of death for women of reproductive age in major cities in the world especially sub-Saharan Africa. There are certain factors known to be risk factors in transmission of HIV/AIDS among women, these are in general: socio-sexual factors, age, migration, travel, social disruption and social class. Socio-sexual factors such as the vulnerability of women are one of the important factors. Women as unequal sexual partners have difficulty in negotiating safe sex with their partners. Biologically, women are more vulnerable to infection than men, the larger surface area of the genital tract, anatomical variation such as cervical ectopy, the asymptomatic nature of STD's in women contribute to this vulnerability (Heisel et al,1994) . Therefore since men tend to have more sexual partners than women, more women will be exposed to HIV (Berer, 1993).

The age factor often overlooked, has shown that women are getting HIV infection at a younger age than men all over the world, whether inside or outside

of marriage women tend to have sexual relationships with men at least a few years older than themselves. In some cultures, men marry women up to ten years younger than themselves for child bearing and other patriarchal reasons. Married men often have extra-marital relations with younger women. In polygamous marriages, second and third wives are often much younger than the husband (Berer, 1993). In each of such relationships, the men have had higher exposure to HIV infection because they are older and they are more likely to have had more than one partner (World Bank,1993B).

Early child bearing and unwanted pregnancy also pose a risk where blood transfusions in cases of maternal complications at delivery or abortion are necessitated, comparable risks do not however exist for men. As a result, most women are most likely to have been infected in adolescence or their early twenties.

The extent and pattern of migration and travel whether international, inter-urban, urban to rural or rural to rural - combined with sexual behaviour, other risk-related conditions and prevalence of infection, determine how quickly HIV will spread. In many countries, infection has been identified or reported first in urban areas, but may or may not have started spreading in or been confined to urban areas. Many from rural areas go to cities and return home periodically. Although in many developing countries, HIV/AIDS is an urban problem, it may as well be a rural one as in Thailand, Uganda, Kenya, Zambia and Zimbabwe (Berer, 1993).

In Mozambique, people affected by war, migration of internal refugee's disruption of society and break-up of families have had almost three times more HIV infection than those not affected (Berer, 1993). Rates of infection in urban Zaire are high compared to the rural province of Nicaragua, where the prevalence is low because poor roads and lack of transport discourage travel (Berer, 1993).

Lastly, HIV has affected all social classes, although not equally, it is considered another disease of poverty. In USA, affected women and their partners are more likely to be poor, from ethnic minority groups and from drug-using communities (Berer, 1993). Women's economic and social situation themselves may increase vulnerability and therefore risk of infection. Women, in some studies have been shown to be three times higher at risk of infection with HIV if earning less than US$ 25 per month than women earning more than US$ 200 . Infection was found to be 6.5 times higher in single women, 9 times higher in divorced women, and 23 times higher in women sex workers than in married women (Berer, 1993).

Infection with HIV results in a progressive and profound immunosuppression that renders the body increasingly susceptible to life threatening opportunistic infections and tumours. The infection itself and associated clinical complications frequently have a tremendous effect on the nutritional status of an individual (Baldwin, 1993). Studies have demonstrated that nutrition may be a cofactor in HIV progression. Current literature on the interactions of nutrition, infectious disease processes and immune dysfunction demonstrates that these factors interact with each other (Babgaleh and Tollefson, 1994).

It is believed, that if nutritional care is introduced early in the course of the disease, it will be possible to avoid or counteract HIV – related depletion of nutrient stores, malnutrition, weight loss and wasting which can be life threatening. Optimising nutritional status provides a foundation for maintaining health and weight, as well as for optimal absorption of any medical regimen a person may be taking (Hanna, 1994).

1.1: STATEMENT OF THE PROBLEM:

Women's nutrition and health status is central to the quality of their lives and is a key determinant of the survival and healthy development of their children. Women are the main providers of nutrition and informal health care to other

members of the household. Therefore improving nutrition and health status, especially in the advent of the HIV epidemic may be one of the best ways of promoting health and welfare in the Third world (Leslie, 1995).

Malnutrition, itself being a global problem is caused by multiple factors. These include inadequate food supply, limited purchasing power, poor health conditions, poor maternal care and inadequate knowledge about nutrition. Nutritional demands for women with or without HIV are of significant importance. The similarities in immunodeficiency between AIDS and PEM suggest that malnutrition, acting as a facilitating factor, contributes to the immunodeficiency state in HIV infection. (Moseson et al, 1989). A nutritional deficiency or imbalance may influence specific systems involved in the progression of HIV disease, influence susceptibility to opportunistic infections, and contribute to the severity of response to HIV-related disease. Jan and Chandra (1984), have hypothesised that a malnourished HIV-infected person will develop AIDS more quickly than a well-nourished HIV infected person. Nutrition is therefore an essential component in the care of HIV-infected individuals, with changes in nutritional status occurring at the onset of the disease. The need to address nutritional issues early in the disease process is important to delay the onset of wasting and improve the quality of life (Kruse et al, 1996).

Aggressive nutritional intervention at the asymptomatic phase should be key strategy so that early dietary intervention on some symptoms of the disease may be prevented from compromising on the nutritional status and reduce the cost of health care which is a limiting factor among the low income group. Upon diagnosis with HIV – a patient should meet a registered dietician, so that any gross deficiencies in the diet or counter productive dietary habits can be identified and the patient counselled and educated on means and reasons for correction. Education and counselling should include the nutritional implications of HIV infection and the importance of maintaining body weight and eating high

protein, vitamin and caloric dense food. (Mascioli, 1993). The main objective of nutritional support in HIV - infected people should therefore be to maintain weight and optimal nutritional status (Baldwin, 1993).

Nutrition is increasingly being viewed as an important factor in the epidemiology of HIV/AIDS thus good nutrition and healthy life style can have a positive effect on the immune system. Early aggressive nutritional intervention is the key strategy, to maintaining health, overall weight and may prolong the health status of individuals and prevent them from succumbing to opportunistic infection and "full blown AIDS"(Hanna, 1994). Proper nutrition provides the body with nutrients for tissue growth and repair, and can help when coping with stress and illness- hence nutrition should be part of routine management of HIV, and may serve in the long term in benefiting prognosis (Baldwin, 1993).

A study carried out at the centre for special studies (CSS) at a New York Hospital U.S.A. (1993) showed that, 87% of the 45 HIV positive patients who received nutrition intervention as compared to 42% of the 31 patients without nutrition intervention showed a positive weight gain. This suggests that early referral for nutritional counselling in HIV positive infected people can improve nutritional status and may lead to an reduced risk of opportunistic infections (McKinley et al, 1993). It is therefore reasonable to assume that if HIV positive women are provided with adequate nutrition education services in terms of nutritional counselling, women may be able to participate in the management of their own illness by ensuring optimal nutrient intake, and prevent opportunistic infections thereby improve their immunological status.

Nutritional counselling is barely offered in major Government and private hospitals in Kenya, unless a patient is referred to a practising dietician. Personal interviews carried out in a selection of Hospitals show that the concept is a new one, and has not been explored to be offered in public health facilities. This might be the reason as to why most HIV patients are not adequately educated on

the importance of nutrition and HIV interaction. Most educated HIV patients will request for services of a dietician because they can afford to pay for the service. While the vast majority of reported cases are low-income earners, this proportion lacks the necessary guidance to make informed nutritional decisions as they are not exposed to adequate dietary information from the local health facilities they visit. Provision of nutritional counselling and an enabling environment can help most women play an active role in their own prognosis.

1.2: RESEARCH AIMS:

To determine and describe factors related to dietary patterns and nutritional status of HIV seropositive asymptomatic and HIV seronegative women.

1.3: OBJECTIVES OF THE STUDY:

a) To determine the HIV status of the respondents using ELISA test.

b) To determine and compare the nutritional status of HIV-1 seropositive asymptomatic with HIV-1 seronegative women.

c) To describe and compare the nutritional knowledge regarding dietary intake of HIV-1 seropositive asymptomatic women with that of HIV-1 seronegative women.

d) To describe and compare the dietary patterns of HIV-1 seropositive asymptomatic with that of HIV-1 seronegative women.

e) To identify which of the factors studied namely: nutritional counselling, socio-economic status, morbidity and food intake are associated with good nutritional knowledge and adequate dietary patterns.

f) To qualitatively describe nutritional adjustments that HIV-1 seropositive women have made subsequent to knowing their serostatus.

1.4: HYPOTHESIS:

(a) The HIV seronegative women will have a significantly better nutritional status compared to the HIV seropositive asymptomatic women.

(b) There will be no significant difference in the nutritional knowledge and dietary patterns of the HIV-1 seronegative and HIV-1 seropositive asymptomatic women.

1.5: EXPECTED BENEFITS:

a) The study will provide information that can be used by the governmental and NGO agencies involved in intervention programmes of HIV/AIDS in Kenya. The information gathered may be used to design educational materials/programmes for self care of HIV/AIDS patients, in the face of the HIV epidemic.

b) The information obtained from this study will identify further research needs.

1.6: LIMITATIONS AND CONSTRAINTS:

The study was limited to food frequency as a method of evaluation of nutrient adequacy and quality. A 24 hour recall for dietary assessment could not have been done owing to the limitation in resources, time, and the fact that the study was a clinic based . It was therefore not included as part of the study design.

The Problems encountered in the study were:

a) Low compliance rate to participate and co-operate by the patients in the clinic.

b) Difficulties in achieving the sample size quickly due to a high loss to follow-up rate in the clinic.

CHAPTER 2:

BACKGROUND RESEARCH

2.0: LITERATURE REVIEW:

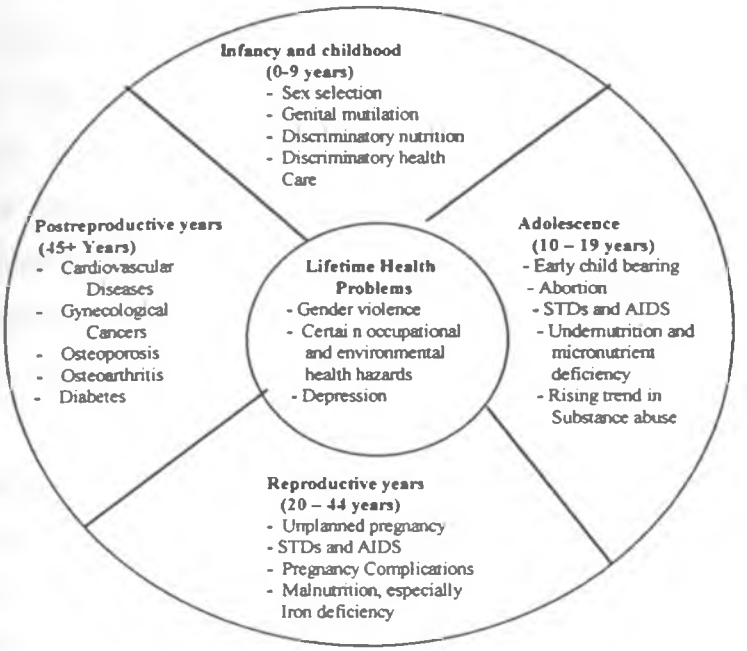
2.1: INTRODUCTION:

2.1.2: NORMAL NUTRITIONAL REQUIREMENTS IN WOMEN:

Women's health status, depends on a multitude of biological and social factors, that affect their health and nutritional status throughout their lives which have cumulative effects (World Bank, 1994). It is therefore important when examining causes and consequences of women's poor health to consider the entire life cycle because different health and nutritional problems affect females at different stages of the life cycle, from infancy, childhood, adolescence reproductive and the post reproductive period. A recent study that compared measures of ill health in several countries concluded that even though women live longer than men, they are more sickly and disabled than men throughout the life cycle (Strauss et al, 1992). Within a life cycle approach different health and nutritional problems affect females at different stages of the life cycle, from infancy and childhood, to adolescence and the reproductive years to the post-reproductive period.

An illustration of this has been produced by World Bank (1994) and is shown as Fig. 2.2. The life cycle shows probable factors affecting women at different stages. The most crucial stages addressed by this study are the adolescent and reproductive stages. Distinctively, HIV/AIDS, STD's malnutrition and micronutrient deficiencies feature as common problems within the two groups.

FIG. 2.2 HEALTH AND NUTRITION PROBLEMS AFFECTING WOMEN DURING THE LIFE CYCLE:



Note: The adolescent years are broken out separately here, although the usual distinction is between children (Ages 5 – 14) and those of reproductive age (15-44). **Source: World Bank (1994).**

Adolescence is a time of great physical growth and development. To support its normal progress, substantial nutritional input is required (Roberts, 1982). Teenager's nutrient requirements are a function of their particular stage of growth, their individual biological makeup and their environment. The proportion of women giving birth during their teenage years ranges from 10 – 50%. Early child bearing is particularly common in traditional, rural settings, where early marriages is the norm. The practice is increasingly common among unmarried adolescents. In Botswana, a study found that one in seven girls who dropped out of school did so due to pregnancy (Bledsoe et al, 1993). Studies have shown that, adolescent girls are also more biologically vulnerable to STD's, HIV/STD's than older women, are and are more likely to have more difficulty negotiating for safe sex practices with their partners. In parts of Africa, HIV

infection is increasing rapidly among females than males especially amongst the adolescent age group (Panos Dossier, 1990).

Since nutrition needs increase in early adolescence because of the growth spurt associated with puberty and onset of menstruation, inadequate diet during this period can jeopardise girl's health and physical development, with life threatening consequences (Pennbrigde et al,1991). Micronutrient deficiencies such as anaemia are also common, skeletal growth is delayed by malnutrition and a smaller pelvis can prolong labour and obstruct delivery, incomplete skeletal growth or stunting poses serious risks to child birth (World Bank, 1994).

The consequences of stuntedness among women has long-term negative reproductive consequences of obstructed labour, because of Cephalopelvic disproportion which is a serious threat to maternal mortality among women who survive, there is an increased risk of morbidity including vesico – fistulae which may cause extreme discomfort high risk of infection and ostracism (Leslie, 1995). In addition to these significant risks to women, stunted mothers have higher rates of miscarriage, still birth, low-birth weight infants and infant mortality (Leslie, 1995). Emphasis to curb problems that put women at risk should be addressed at the life cycle perspective. The entry point of intervention should be at the pre-pregnancy period.

In the reproductive stage women have a major biological role in the process of reproduction, frequently spending a large proportion of their reproductive years pregnant and/or breastfeeding (Merchant et al, 1990 and McGuire et al, 1992). Pregnancy, lactation and menstruation increase a woman's requirements for various nutrients. Heavy workload also increases women's food requirements. Time constraints may lead to infrequent meals, and exhaustion may lead to poor appetite. Given the low income, long hours worked and multiple roles frequently fulfilled by women in settings of poverty, they are more likely to have trouble

meeting their food needs and to be at risk of general malnutrition (Median San Frontiers, 1995).

An estimated 450 million adult women in developing countries are stunted as a result of protein-energy malnutrition during childhood. The causes of malnutrition include inadequate food supply, inequitable distribution of food within the household, improper food storage and preparation, taboos against eating certain foods and lack of knowledge about nutritious foods. Malnutrition hampers women's productivity, increases their susceptibility to infections and contributes to numerous debilitating and fatal conditions (World Bank, 1994).

The normal physiological Iron losses among women of reproductive as a result of shedding of surface cells, unavoidable gastrointestinal blood loss, menstrual blood losses, lactation, and most significantly the increase in blood volume and fetal /placental Iron requirements during pregnancy make it inevitable, that unless supplementation is offered, women in this age group become anaemic. Where these unavoidable losses are compounded, as in many developing countries, by a limited intake of absorbable iron, extremely closely spaced pregnancies, blood loss from hookworm infection, or malaria, the prevalence of anaemia among women is known to be substantially higher (Leslie, 1995).

The causes of anaemia are low nutrient, poor absorption or utilisation, increased nutrient losses or demands, malaria, sickle cell disease, bacterial infections, blood loss from obstetric cause or intestinal parasites such as hookworms (Baker et al, 1996). The underlying factors to anaemia are poverty and hardships, from poor nutrition, water shortages, food taboos, and inadequacies in food production and storage (Baker et al, 1996). Women in this group are also at great risk of contracting HIV/AIDS and the risk of passing the virus to their unborn children is also very high and likely to have long term effects on their nutritional status.

2.1.3: NUTRITIONAL CONSIDERATIONS FOR WOMEN WITH HIV:

Metabolism and nutrient needs change with the onset of any infection. Certain nutrients, including some known to play immune supportive roles, are routinely deficient in HIV-infected persons. A number of metabolic, biochemical, and hormonal responses favour protein catabolism and altered fluid and electrolyte balance during infections. Several factors contribute to negative nitrogen balance: losses of urinary nitrogen are increased during catabolism; the resting metbolic expenditure is increased, especially if there is fever; and anorexia limits food intake (Robinson et al, 1997). Although energy needs are increased, the utilisation of glucose and fat in peripheral tissues is reduced; consequently, skeletal muscle is catabolised and amino acids are used for gluconeogenesis in the liver. The chronic inflammatory state that HIV causes means that calorie requirements remain high for women(Hanna, 1994). Table 2.1 shows that the number of servings required for calorie adequacy is highest as compared to other nutrients.

At least two servings each for plant and animal protein in a day are required to counteract protein depletion and facilitate restoration of body cell mass, this is because the bodies ability to utilise fat decrease hence nitrogen losses become substantial. Consistent with levels of growth and activity, the nutrient needs of HIV positive teenagers are high. Dieticians suggest that teenagers eat nutrient dense foods (Ploss, 1994). Hanna (1994), recommends that adding an extra 300 calories and 10 grams of protein daily and Vitamin A rich foods will help to increase the immune system function. The increased nutrient needs can be met by adding extra servings of food. A food guide for HIV infected individuals has been suggested, as a useful way of teaching balanced nutrition by the U.S department of Agriculture and U.S department of Health and Human services. This guide as compared to the Daily food guide for normal non-pregnant women in Appendix 6:140 shows the number of servings by food groups that are relatively higher. This implies that with HIV there are increased needs to be

meet. However, consultation with a dietician is particularly valuable, to be able to assess individual needs.

TABLE 2.1 : FOOD GUIDE: A GUIDE TO DAILY FOOD CHOICES FOR HIV INFECTED PERSONS:

FOOD GROUPS	NUMBER OF SERVINGS EACH DAY
Bread, Cereal ,Rice, Pasta	5+
Meat, Poultry, Fish, Eggs, Dry beans & Nuts	2 -3
Whole Milk, Cheese, Yoghurt	2- 3
Fruit Group	2- 4
Vegetable Group	3-5
Butter, Margarine, Oil	Use sparingly

SOURCE: U.S Department of Agriculture, U.S. Department of Health and Human Services (Hanna, 1994)

Premature menopause may occur more frequently in HIV positive women (Ploss, 1994). In all menopausal women, decreased production of estrogen causes the release of calcium from the bones. Since HIV infection elevates calcium needs, it is even more important for the HIV positive menopausal women to increase intake of calcium enriched food products (Hanna, 1994). This is why the food guide above shows that at least two or more servings of animal milk products that are Calcium rich foods should be included in the diet.

Losses of Potassium, Magnessium and Phosphorus during infection accompany nitrogen losses. Retention of salt and water occur due to the influence of mineral ocortcoid and antidiuretic hormones. Shifts in plasma levels of certain minerals occur. For example Plasma Zinc and Iron levels fall while Copper increases (Robinson et al, 1997). The dietary requirements to meet these losses have to be meet by increasing dietary intake of foods such as red meat, whole grain cereals, pulses, green leafy vegetables, liver, white meats especially fish. Both Zinc and Iron are believed to be involved in the immune process.

Vitamin A deficiency is also a very common phenomenon in HIV positive individuals. Lack of Vitamin A is associated with compromised T-Cell and B-Cell function, pathological alterations of the mucosal surfaces there by increasing the risks for opportunistic infections and increased progression to AIDS (Semba, 1994). The importance of vitamin A cannot therefore cannot understated. There is a need to increase dietary intake of fatty fish, liver, cheese, milk, vitaminised margarine and eggs. High levels of dietary fats are to be avoided by HIV-infected persons because fats are generally difficult to metabolise, are associated to aggravating diarrhoea and often cause the feeling nausea. Sugars are easily absorbed, spare protein from being broken down to provide energy so could be a good substitute.

Women of childbearing age experience extreme fluctuations in hormones which affect metabolic rate, appetite, eating habits, glucose intolerance, menstrual abnormalities including heavier or lighter flow. Heavy flow may lead to anaemia, affects of drugs taken may also exacerbate anaemia. Women are therefore advised to eat iron-rich foods (Hanna, 1994). Iron can be obtained from red meat, eggs, pulse, millet, whole-wheat cereals, green leafy vegetables, dried fruits..... exectra.

2.1.4: INTERACTION OF HIV INFECTION, IMMUNITY AND NUTRITION:

Under normal circumstance the human body has ability to defend itself against infection. The first way in which this is possible is through the anatomical barriers of the skin, mucous membranes and the association secretions. Good nutrition and especially adequate micronutrients are essential for maintaining the health, vitality of these surfaces. Vitamins A, E, D and C play a vital role to this end. Vitamin A has long been known to function in the maintenance of healthy epithelial tissue. A result of Vitamin A deficiency is the keretinization of the

secretory epithelia of the respiratory tract, salivary and prostrate glands. Keratinized cells are less resistant to penetration by micro-organisms and increase the susceptibility to infections by the host. In Vitamin A deficient humans fewer globlet cells and less mucus production has been found in the gastro-intestinal tract (Sherman, 1986). HIV infected individuals are prone to recurrent skin, mucous membrane infections and specific skin dermatitis because of immunosuppression. Naturally, these conditions increase the need for these nutrients, for the effective maintenance of the integrity of these barriers (Chelbowski, 1985). Nutritional deficiencies may increase the frequency with which these conditions occur, for example Vitamin A deficiency results in dry skin that cracks easily, which in turn is easily infected.

The body also defends itself against infection by allowing the body surfaces to be populated with non-pathogenic bacteria (normal flora). Good nutrition is also important for the maintenance of the normal flora in the gastrointestinal tract (GIT) i.e: ***Lactobacili bifidus*** which has protective properties. Poor nutritional status leads to the over growth of pathogenic bacteria which in the long run impairs absorption of nutrients and affects the nutritional status. In malnutrition, there is a large increase in the total count of intestinal bacteria and a tendency for the bacteria of the lower intestinal tract to appear in the upper intestinal tract. Further, intestinal organisms, which are non-pathogenic in normal human subjects, may become pathogenic in acute diarrhoea disease (Swaminathan, 1989).

Vitamin levels of the B complex group have been shown to be abnormal due to ileal disease and this may cause diminished secretion of the intrinsic factor secondary to disease to the gastric mucosa these conditions impair absorption.
The body also defends itself against infection through active immune response. Immune system dysfunction has a potentially detrimental effect on the nutritional status as a result of conditions such as anorexia, infection, diarrhoea and adverse drug effects (Hyman et al, 1989). These conditions add insult to an already

impaired immune system and lead to loss of important nutrients. As a result of these changes in the immune system, the development of ***Pneumocystis Carinii pneumonia*** (commonly seen in patients with AIDS) is also known to be influenced by poor nutritional status (Calderon et al, 1992).

Immune responses may be characterised as non-specific and specific. Non specific responses include both passive and active components. Passive mechanisms help to prevent micro-organism from entering body tissues by binding specifically with the foreign material, whereas active host defences include the ability of body cells to kill micro-organism or release substances that aid in eliminating them. Specific responses are of two types: - Cell - mediated immunity and humoral immunity.

Cell – mediated immunity is mainly dependent upon thymus derived lymphocytes. Lymphoid atrophy and impaired maturation results in a decreased number of T lymphocytes in the peripheral blood in malnutrition (Chandra, 1980). Instead there is an increase in the number of "null cells" which bear neither B or T lymphocyte markers, these are mainly immature T lymphocytes that are associated with non-specific killing (Chandra, 1980). Poor or lack of effective maturation of T lymphocyte cells leads to an altered hypersensitivity to performing specific functions (Chandra, 1982). The immune mechanisms also include other systems such as the complement proteins, a set of serum proteins which in the presence of specific antibodies are responsible for the lysis of foreign cells and the inflammatory response which increases the blood flow to the infected areas (Chandra, 1982). Immunity depends on the cooperation of all these mechanisms.

Humoral immunity provides the production of specific antibodies following contact with foreign material such as viruses, bacterium or a toxin. These antibodies which in man are divided into five classes, IgG, IgA, IgM, IgD and IgE are capable of binding specifically with the foreign material (Chandra,1982).

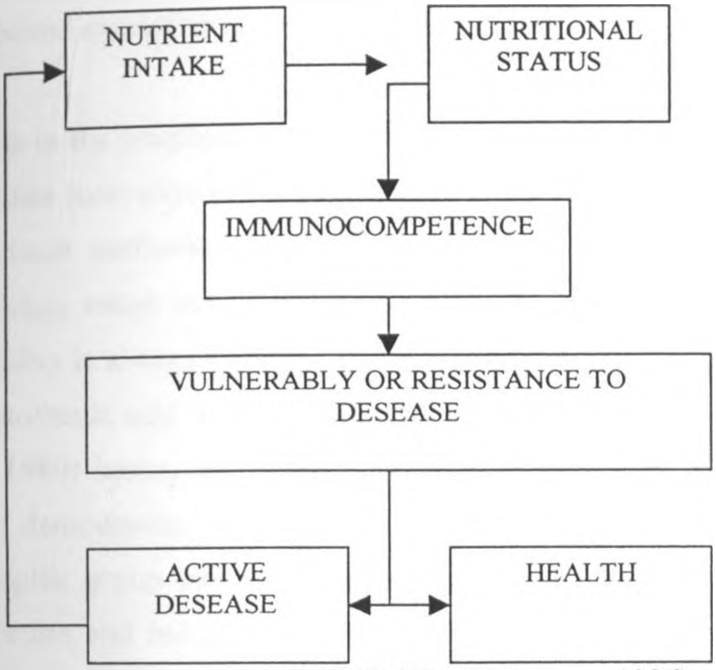
Cell mediated immunity, responds to specific antigenic stimulation but does not secrete antibodies. These lymphocytes participate in a number of immune processes such as: rejection of grafts and tumours, delayed hypersensitivity reactions, activation of macrophages and co-operation with precursors of antibody forming cells (Chandra, 1982). Cell mediated immunity is regulated by the production of T cells, while humoral immunity is regulated by the production of B Cells (Hyman et al, 1989).

HIV causes a relentless depletion of the helper/inducer subset of T-Lymphocytes and undermines the generation and regulation of the immune system. In-patients with asymptomatic HIV infection or AIDS, it has been recognised that there are an alteration in the T_4 and T_8 cell ratio of circulating T cells. The proportion of T_4 cells("the helper"cells) is reduced where as the T_8 cells("the suppressor"cells) is increased (Chandra,1982). In such patients this is the primary result of depletion of CD_4^+ (T_4) Lymphocytes. The rate of depletion of T_4 - cell varies among patients. After an initial fall, especially at the seroconversion stage, many may maintain levels of CD_4^+(T_4) cells that are relatively normal for prolonged periods followed by precipitous declines as the patient progresses to AIDS .

Nutrition has a very central role in immune function. The cell-mediated response is the component of the immune function most profoundly affected by malnutrition (Baldwin, 1993). Herbert and Barone 1988 (Peck et al 1990) have suggested HIV infection which has a profound effect on cell mediated immunity maybe aggravated by malnutrition. Malnutrition may be a co-factor in disease progression increasing an individuals degree of disability and subsequently opportunity to remain selfcaring. Viewed in a broad context, the relationship between food and health is linked in several intermediate steps. (Fig 2.3). Availability of food does not necessarily result in adequate intake. Many sociocultural and economic factors may impinge on this link (Guthrie, 1995). Digestion, absorption and assimilation of ingested nutrients determine the nutritional status, which may be influenced by other ecological forces such as

contamination and infection. Functional alterations, secondary to nutritional imbalance lead to disease vulnerability a step that must first precede clinical expression of disease (Chandra, 1980).

FIG 2.3: THE RELATIONSHIPS BETWEEN NUTRITION, IMMUNCOMPETENCE AND HEALTH:



SOURCE: (Sherman, 1986)

The underlying mechanisms of nutritional interactions with the immune function may either be direct or indirect. The mechanisms are direct when the primary activity of the nutritional factor being considered occurs within the lymphoid system, and indirect when the primary activity of the nutritional factor affects all cellular metabolism or another organ system (Beisel, 1980).

Direct mechanisms normally occur in the thymus and other lymphoid tissues. Protein is the main nutritional factor required for the formation of antibodies, lymphocytes and antigens (Beisel, 1980). The thymus and other lymphoid tissue react to nutritional deficits more rapidly than most other organs. Nutritional deficiencies will result in structural changes in the histology of cells or

disturbances in the functional activity (Goodhart et al, 1980). This include reduction in size and weight of cells, depletion of lymphocytes, loss of corticomedullary differentiation in tissue cells and swelling and degeneration of Hassall corpuscles (Chandra, 1980). Paracortical regions of the lymph node and periateriolar tissues in the spleen also exhibit.similar changes. Nutritional recovery is associated with gradual return of the thymus histology to normal in deprived experimental animals (Chandra, 1980).

Cells in the lymphoid series, have been implicated as sites of antibody formation. Studies have shown that a deficiency in Pantothenic acid leads to the inability to fabricate antibodies in the spleen. Such a deficiency also affects cellular division, which in turn affects antibody production in the spleen. Since cellular division is always preceded by an increase in DNA content, the participation of Pantothenic acid in DNA synthesis is also an intriguing possibility (Goodhart et al, 1980) hence, nutritional consequences cannot be underrated. Studies have also demonstrated that deficiencies of vitamin A, C and some members of the B complex group interfere with antibody response, affect leukocyte response in infection and reduce the leukocyte ability to phagocytize bacteria (Scrimshaw, 1980).

Indirect mechanisms affect cellular metabolism or another organ system in this case the nutritional factor acts as an immune regulator. The nutritional factor is essential for proper maintenance of the physiologic integrity of cell and tissues in the body, for protein and DNA synthesis. Dietary deficiencies seriously affect integrity of tissues; epithelial surfaces are most obviously involved. Lowering of the resistance of the tissues to bacterial invasion and multiplication may be a critical outcome of the disease (Scrimshaw, 1980). Among the possible alternations are:

a) Increased permeability of intestinal and other mucosal surfaces.

b) Reduction or absence of the mucous secretions.

c) Accumulation of cellular debris and mucus to give a more favorable culture medium for microbial predators.

d) Alterations of intercellular substance.

e) Interference of normal tissue repairs and replacement.

f) Loss of ciliated epithelium in respiratory tract.

g) Nutritional edema with increased tissue fluid (Scrimshaw, 1980).

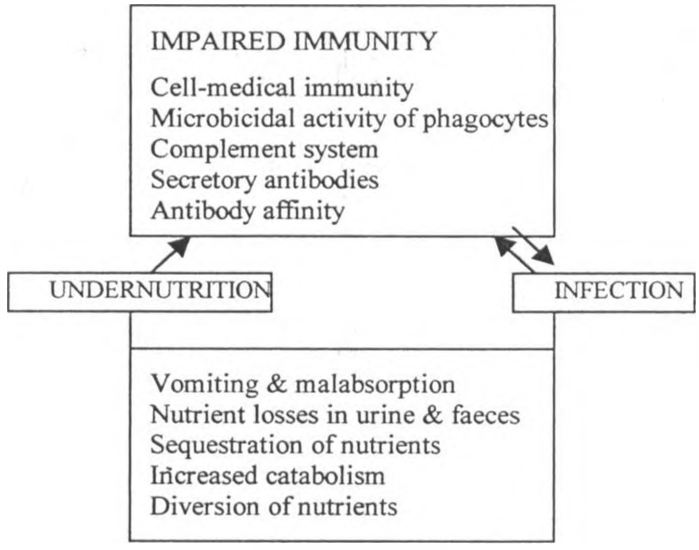
Malnutrition therefore results in suboptimal immunity, which can lead to secondary infections by opportunistic agents, further deterioration in the immunocompetence and in a patient's nutritional status Fig 2.3. The consequences of infection are increased tissue catabolism and nutrient loss in the urine, reduced appetite, and decreased absorption or protein loss in the gastrointestinal tract. In addition, the rapid sequestration of nutrients and their utilization in the production of acute-phase reactant proteins, antibodies, complement and other host protective factors result in further deficits (Scrimshaw, Wallerstein, 1982). Infection also suppresses many aspects of immunity, possibly by alterations in hormonal balance, by invasion of lymphoid tissues, by endotoxemia, by altered ratios of lymphocyte subsets, or by increased levels of c-reactive protein (Chandra, 1979). Prolonged period of negative nitrogen balance and impaired immunity can precipitate secondary infections such as Tuberculosis. Table 2.2 shows the summary of the nutrient consequences of infection.

TABLE 2.2: NUTRIENT CONSEQUENCES OF INFECTION:

I.	**Absolute losses**	
	Increased urinary nitrogen	
	Loss of electrolytes, minerals, and proteins in vomiting and diarrhoea	
	Proteinuria	
	Negative balance of cations, minerals and trace elements	
II.	**Functional wastage**	
	A.	Overutilization
		Increased usage of metabolic substrates
		Depletion of glycogen stores
		Diversion of amino acids for gluconeogenesis
		Mobilisation of the fat from depots
		Increased synthesis of cholesterol and triglyceides
	B.	Diversion
		Hepatic uptake of plasma nutrients, e.g. amino acids
		Synthesis of a cute phase reactants
		Increased hepatocytic synthesis of enzymes
	C.	Sequestration
		Uptake of minerals (Fe, Zn) into hepatocytes and phagocytes
		Uptake of trace elements by liver and other organs

SOURCE: Berg et al, 1987.

FIG 2.4: MECHANISMS OF INFECTION-INDUCED NUTRITIONAL DEFICIENCY:



SOURCE: Berg (1983)

The similarities in immunodeficiency between AIDS and PEM suggest that malnutrition, acting as a facilitating factor, considerably contributes to the immunodeficiency state in HIV infection. (Moseson et al, 1989). A nutritional deficiency or imbalance may influence specific systems involved in the progression of HIV disease, influence susceptibility to opportunistic infections,

and contribute to the severity of response to HIV – related disease. Jain and Chandra (1984) (Beach et al,1989), have hypothesised that a malnourished HIV – infected person will develop AIDS more quickly than a well nourished HIV infected person.

2.1.5: DIETARY ASSESSMENT:

Dietary assessment is an important responsibility of dietitians and nutritionists in planning and monitoring therapeutic and educational programs. There are many methods available for collecting and evaluating dietary information. Assessment tools are generally classified into two groups. Those in the first group assess intakes by ***recall***; these includes 24- four hour recall and the use of food frequencies. The second group assess intake by ***recording*** .

Methods by recall are essentially retrospective, in that the subject has not been altered in advance thus has not modified usual behavior in anticipation. This study was limited to the use of comprehensive food frequency checklist. Food frequency is generally considered to be a descriptive assessment tool. The respondent was asked about their usual intake from a list of commonly consumed foods per day, week or month. Certain assumptions are made since it does not usually ask for exact portion sizes, interpretation assumes a typical serving size.

The food frequency checklist has a number of weaknesses:

- If the list is very limited, it will not reflect the total food intake.
- If on the other hand it is too extensive, it may be tedious to complete and client may mark items indiscriminately there by overstating food intake.
- Requires much training of data collection assistants.

However the food frequency has a number of advantages:

- It is a useful "clue-seeking" tool that may help clinicians identify people who may need more detailed dietary assessment.

- It is one of the best methods for nutritional counselling. It helps to provide the nutritionist or dietician with insight that might help to establish a base inquiry and probing. For these reasons dietary intake was assessed using a food frequency checklist.

2.1.6: NUTRITIONAL COUNSELLING:

Appropriate dietary advice may affect the prognosis of the disease, alleviate symptoms and offer the patient active involvement in treatment throughout the course of HIV infection (Peck et al, 1990). A study carried out in the management of HIV positive patients in Ireland compared two groups of HIV positive patients - asymptomatic (CDC-Class II) and symptomatic (CDC-Class IV). There was no significant difference in nutrient intake in the two groups. After 12 weeks of dietetic, intervention, personalised counselling in terms of nutrition, nutrient supplementation - there were significant increase in the intake of most nutrients - the effect being greater in the symptomatic (CDC-IV) group. It was concluded that dietetic intervention has a significant role to play in the management of HIV antibody positive patients. (McKinley et al, 1993).

A number of investigators have looked at the micronutrient status of groups of individuals. Beach et al (1992) measured the micronutrient status of 100 HIV infected asymptomatic women and 42 HIV negative matched controls. The study reported overt and marginal deficiency of vitamins B_1, B_6, B_{12}, A and E in subjects with HIV infection. A strong correlation between dietary intake and plasma/serum levels was apparent for all nutrients except vitamin C, Iron and Copper indicating that these deficiencies were possibly nutritional in origin. This suggests that early aggressive intervention is a key strategy. (Hanna, 1994), and the importance of nutritional intervention, cannot be understated.

Nutritional counselling is the process whereby people are helped to deal with their dietary and nutritional problems. The goal of counselling is to bring about a desirable change in food behaviour. In the process, the principles of food and

nutritional sciences are translated into practises that are appropriate and acceptable to the client. This process directly involves the client, in actively participating in the process of decision making to effect the modification of behaviour. It involves four main steps: Assessment ⟶ Planning ⟶ Implementation ⟶ Evaluation.

- **Assessment-** Involves gathering and evaluating data from a client. This includes information with respect to nutritional status, food behaviour, social, medical and dietary history (food intake by recall, food frequency or food diary). A conclusion must be drawn at this stage to facilitate modulation of a plan.
- **Planning-** Based on the given assessment.

a) Reasonable objectives have to be set toward which the client is willing to work.

b) Ways are described to reach stated objectives.

c) Plan is devised for evaluation of results.

The plan now becomes the blue print for action.

- **Implementation-** The client now has the ability to put the plan into action, by independently planning his/her own menus, preparing foods appropriate to the needed changes (or to supervise such preparation and to consume the needed amounts of food.
- **Evaluation-** The evaluation confirms the degree success by the client. The follow-up involves a session where the client is given an opportunity to give feedback. Feedback not only involves the nutritional aspect, but involves the assessment of nutritional status. Any problem undergone during implementation stage that requires reassessment is done at this stage and necessary revision of the plan may be added for implementation to take place.

As stated earlier, nutritional counselling is barely offered in Government hospitals in Kenya. Health care providers have concentrated on treating symptomatic illnesses of HIV/AIDS other than looking at ways in which

nutrition may help counteract some of the common nutritional problems. In addition many health care providers are ignorant and not adequately trained to deal and cope with situations that require nutritional intervention. There are few trained and qualified dieticians many of whom work in private hospitals. Unfortunately, the value of nutrition as a cofactor of health has continued to be underestimated. The purpose of this study is to highlight the need for nutrition counselling as a necessary tool in the routine management of HIV/AIDS patients.

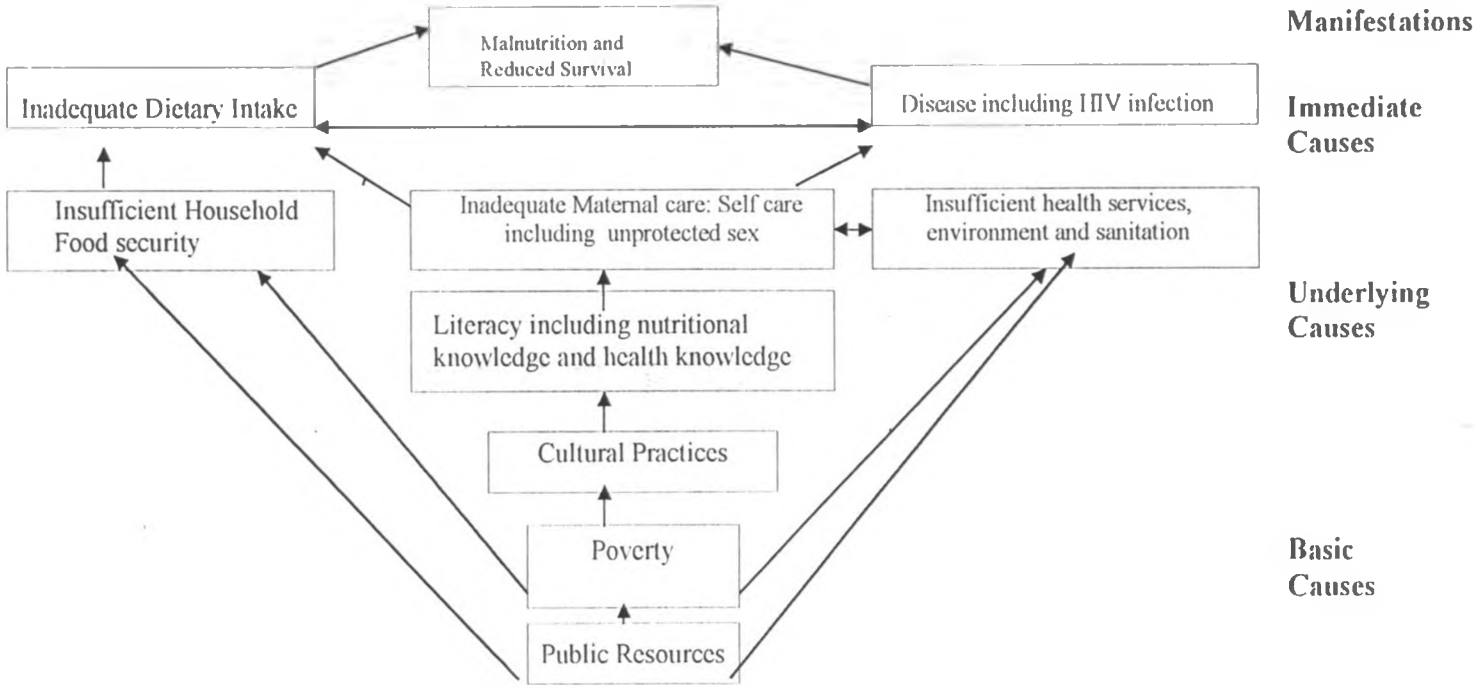
2.1.7: CAUSAL FRAMEWORK OF MALNUTRITION AND PROBLEMS ASSOCIATED WITH HIV.

Several risk factors have been identified as causes of maternal malnutrition. These problems often co-exist and their combined action aggravates the problem (Semana, 1987). These factors pose extreme risk especially in the advent of HIV disease. The proximate determinant of women's nutritional status apart from the presence of the disease state may include haemoglobin levels, excessive work, infectious diseases, poor environmental conditions, and inadequate medical care to mention a few. Fig 2.5 illustrates the interaction of some of the factors. The modified conceptual model tries to indicate that the results of malnutrition are a long sequence of interlinked events. The modified conceptual model tries to show that the results of malnutrition are a long sequence of interlinked events and was developed by WHO to show probable causes of malnutrition in the general population. This conceptual framework has now been modified slightly to help, show the interactive factors that may cause malnutrition among the HIV population and the links between these factors.

2.1.7.1: IMMEDIATE CAUSES OF MALNUTRITION IN THE HIV INFECTED POPULATION:

Inadequate dietary intake and disease including HIV are the most significant immediate causes of malnutrition and reduced survival in women.

FIG 2.5: THE CONCEPTUAL MODEL ON THE FACTORS AFFECTING THE NUTRITIONAL STATUS OF THE HIV POPULATION:



SOURCE: Modified UNICEF conceptual Model (WHO, 1992).

2.1.7.1. IMMEDIATE CAUSES OF MALNUTRITION IN THE HIV INFECTED POPULATION:

Inadequate dietary intake and disease including HIV are the most significant immediate causes of malnutrition and reduced survival in women.

Inadequate dietary intake

Diet is a critical element in the welfare of all people. Insufficient household food security in terms of availability of food and intrahousehold distribution is a common factor among low-income families (Blair, 1990). Adequate food is not available, diets of women are more likely to be deficient than those of other household members, as women tend to put the needs of their children and other family members before their own. At the same time, excessive physiological demands are made on their bodies due to long hours of work, childbearing and lactation. These could be contributory factors to decreased dietary intake (Hamilton et al, 1984).

Decreased dietary intake may also be caused by anorexia due to depression, or may be due to systematic response to HIV infection or otherwise. Many drugs used to treat HIV or opportunistic secondary infections can cause gastrointestinal side effects. Malabsorption involves the gastrointestinal tract, HIV itself has been described as causing an enteropathy possibly through lymphatic obstruction and primary infection of the cells of the gut mucosa (Mascioli, 1993). Abnormal taste sensation and oral lesions such as thrush, ulcers are other causes of inadequate dietary intake. Poor social support, poor self care, fatigue and malaise experienced by many HIV / AIDS patients make it difficult for HIV positive patients to prepare food, this also contributes to a reduced dietary intake.

Inadequate food intake has a profound effect on the body's innate immunity, which leads to secondary infections by opportunistic agents and further deterioration in the immunocompetence and in patients nutritional status. A number of studies in both animals and human beings have confirmed that

abnormalities of the immune system can be favourably affected by adjusting the specific types of micronutrients and macronutrients in a patient diet. For instance Arginine seems to have a direct stimulatory effect on the number of T Lymphocytes (T cells) and natural killer cells and on the production of Cytokine. High levels of Selenium have been shown to result in a significantly depressed immune response in HIV-infected individuals compared with individuals who have normal or low selenium levels. The deficiency of micro-nutrients – and especially Iron and Zinc have been shown to influence susceptibility to infectious agents, including some of the opportunistic infectious seen in-patients with AIDS. Iron or Zinc deficiencies provide a conducive environment for ***Candida*** and ***Salmonella*** infections, which are both important conditions in HIV infected individuals (Moseson et al, 1989).

Disease state including HIV infection.

As mentioned earlier, illness is another factor that affects women's nutritional status. The synergistic relationship between health and nutritional status is evident in several ways. Malnutrition increases an individual's vulnerability to disease and heightens the severity of the disease. There are several ways in which HIV affects the nutritional status. First HIV-1 replicates very rapidly resulting in increased metabolic requirements to maintain body processes' HIV-1 may aggravate recurrent opportunistic infections that are associated with increased catabolism. These changes are likely to affect nutritional status by affecting dietary intake and ultimately reduce survival.

Of particular concern in HIV infected people is the frequency of conditions associated with diarrhoea and vomiting, whereby increased gastric transit time affects absorption. Chronic diarrhoea is also associated with flattening of the villious brush border of the gastric mucosa, decreasing absorptive surface area causing malabsorption. At the same time the galactose enzyme that is found on the tip of the brush border is readily lost in chronic diarrhoea leading to lactose

intolerance. These drastic changes, are however reversible with good dietary management (Bowers et al, 1996).

Altered hormone secretion, liver synthesis of active-phase reactant proteins, and various intracellular enzymes that increase gluconeogenesis and lipogenesis, causing various trace elements to redistribute or sequester (Calderon et al, 1990). The net result is wasting in muscle mass, increased need for nutrients, and catabolism of nitrogen and other elements (Calderon et al, 1990).

During infection, anorexia and in many cultures, where witholding of food during illness is a standard remedy further aggravates malnutrition. Even before the advent of HIV, the relationship between nutritional needs and infection have been well described, recent work shows that the nutritional status of an individual may affect the incidence, severity and duration of an infection. A variety of metabolic responses occur during infection, which have profound effect on utilisation of diet and endogenous nutrient stores.

a) There is an increased energy expenditure, ranging from 10% -15% increase per 1 degree C rise in body temperature. Fever increases basal metabolic rate, this occurs due to increased tissue catabolism.
b) Reduced intake due to anorexia which may be due to depression, systematic response to infection, nausea, vomiting and as is a common occurrence in some cultures; intentional withholding of food during certain illness/infection e.g. diarrhoea.
c) Decreased food utilisation occurs due to destruction of villi, leading to decrease in surface area and reduction in brush border enzymes, in addition a decrease in secretory response in the intestinal mucosa, stimulated by bacterial toxins can result in malabsorption.
d) Increased nutrients requirements where the infection leads to an increase in adrenocortical activity associated with fever, resulting in increased caloric requirement. All these factors predispose an individual to malnutrition.

Most infections result in altered metabolism of major classes of nutrients including carbohydrates, lipids, proteins, intracellular and extracellular electrolytes, trace elements, and water-soluble and fat soluble vitamins (Beisel, 1980). The precise influence of an infectious disease on a patient's nutritional condition and the immune system depends largely on the virulence of the pathogen and the immunocompetence of the host. Observations from clinical situations indicate that the virulence of infectious organisms may be influenced by the host's nutritional state; a malnourished condition may change the balance between the host and the pathogen and result in the development of life-threatening infectious process (Chelbowski, 1985). The inflammatory response associated with the infection process releases mediators that cause metabolic alterations. Kotler et al 1990 (Baldwin 1993) have shown that when there is intestinal injury and dysfunction in patients with HIV or AIDS malabsorption associated with gastrointestinal symptoms suggests that the disease state itself may cause structural and functional changes in the small bowel mucosa and may result in the impairment of nutrient absorption.

Bogden et al 1990 (Beach et al, 1992) measured plasma concentrations of vitamins and minerals in 30 individuals with asymptomatic HIV infection. At least eighty seven percent had one value below the normal range. The percentages of subjects with below normal plasma concentrations were as follows: - Zinc - 30%, Calcium - 27%, Magnesium - 30%, Carotene - 31%, and Ascorbate- 27%. The study population included people at various stages of HIV infection and some who were losing weight. Ninety-three percent of the subjects showed some deficit of function in cell mediated immunity, which probably reflects the presence of HIV infection and may be related to micronutrient deficiency. Abrams et al (1993) has associated an increased CD_4^+ count with a higher intake of vitamin A, B_1, B_2 and Niacin. Trace element depletion has also been observed during the asymptomatic stage of HIV disease. These deficiencies are early indicators of the need for nutrition intervention before malnutrition and weight loss become severe. Decreased blood haemoglobin and Zinc deficiency

are associated with decreased cellular immunity and increased infection. Changes in these elements have been observed early in the disease. (Beisel, 1980).

It has been reported that there is a decreased antibody formation with deficiencies of various vitamins of the B complex, especially B_1, B_6, B_5, B_{12}, Vitamin A, Vitamin C, Vitamin D, Vitamin E, Folic acid and also with minerals such as Zinc, Selenium, Iron, Copper, Chromium, Vanadium, Iodine . Protein deficiency has for a long time been known to reduce antibody production. Dietary inadequacies decrease resistance of the tissues to infection by causing pathological changes in epithelial and other cells. The whole process is a vicious cycle whose effects on the nutritional status are very apparent.

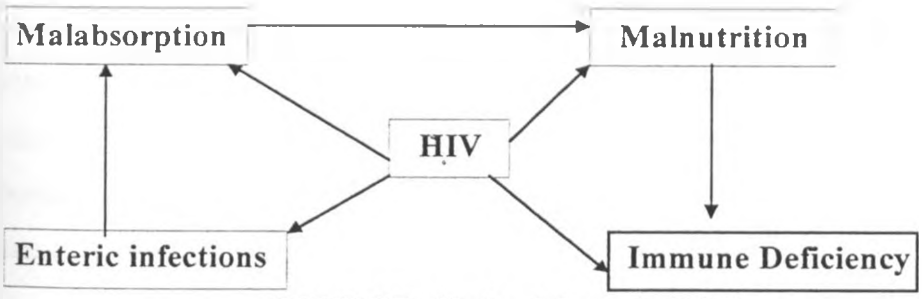
A low intake of vitamin A and vitamin A deficiency during HIV infection has been associated with impaired immunity, it has also been documented to hasten the progression to AIDS. (Baker et al, 1996). In a longitudinal study of pregnant HIV infected women and their offsprings, increased maternal and child mortality was discovered in vitamin A deficient individuals (Merchant et al,1995). In a similar study of maternal vitamin A deficiency and mother-to child transmission of HIV-1, a strong association between vitamin A deficiency and vertical transmission of HIV was found. The relation between vitamin A during pregnancy was associated with a three-fold to four-fold increased risk of mother-to-child transmission (Semba et al, 1994). The underlying biological mechanisms concerning vitamin A mother-to-child transmission may include the essential role vitamin A plays in immunity and maintenance of mucosal surfaces. Three modes of transmission of HIV were postulated: in utero, during delivery, and through breastfeeding. Lack of vitamin A is associated with compromised T-cell and B-cell function (Semba et al, 1994), which may contribute to higher viral loads or lower levels of maternal antibodies crossing the placenta. Vitamin A deficiency was also associated with wide spread pathological alteration on the mucosal surface, including mucus of the reproductive tract. The factors that were

associated with the low intake and malabsorption of vitamin A-rich foods ,increased metabolism of vitamin A during pregnancy, increased vitamin A use and abnormal urinary losses during opportunistic infection. Infection may accelerate the depletion of vitamin A stores and increase the risk of deficiency.

There is also a strong correlation between HIV/AIDS and Anaemia (Baker et al, 1996). Anaemia which is often multifactorial, with the vicious cycle of depressed immunity, infection and malnutrition displays a synergistic mode. (Leslie, 1995). Iron deficiency is associated with impaired cell mediated immunity and specifically depressed number of T-Cells. This suggests that in HIV infection, a deficiency of iron could seriously impair immunity and lead to a compromised health status (Mckinley et al, 1993).

The possible relationship between malabsorption, malnutrition, immune deficiency, and enteric infections is thus depicted below.

FIG 2.6: THE RELATIONSHIP BETWEEN MALABSOPRTION, MALNUTRITION, IMMUNE DEFICIENCY, AND ENTERIC INFECTIONS.



SOURCE: (Babgaleh et al, 1994).

In a nutshell malnutrition causes immunosuppression which increases the frequency of the infection and creates a vicious cycle of infection induced malnutrition vis a vis malnutrition induced infection. Infection in HIV-1 (i) increases energy requirements (ii) causes continued hyperactivity of the immune

system to keep HIV suppressed (iii) causes increased demand associated with other infections i.e. infection of the GIT resulting in malabsorption due to diarrhoea which occurs primarily in the gut.

2.1.7.2: UNDERLYING CAUSES OF MALNUTRITION IN THE HIV INFECTED POPULATION:

There are other factors that are equally important in determining the nutritional status of women including those who are HIV infected. Underlying causes of malnutrition may be grouped into three main clusters: Basic health services, and an unhealthy environment, poor household food security and poor maternal self-care. The availability of health services, and a healthy environment are not enough to ensure adequate nutrition or proper health care, an adequate system that ensures that health services are delivered is required.

Household food security.

Household food security focuses on the family's capacity to acquire food or produce it. Signs of nutritional stress due to food insecurity includes loss of fat stores, micronutrient deficiencies, chronic malnutrition, extreme seasonal fluctuations in weight and decreased weight capacity (Baker et al, 1996). However, food choice and maintenance of a balanced diet may be affected by a number of factors, including knowledge and information sources, socio-economic factors and HIV infection itself (Baldwin, 1993). Intrahousehold food allocation, income control, family size, work patterns also influence nutritional status.

HIV infected women live in households where there are other sick people. This problem poses an additional burden of caring for ill people in the home, and limiting time for food preparation. The added burden of caring also impacts negatively on income generating activities because most of the time will have to be spent by the care giver at home rather than earning a living. (USAID,

AIDSCAP, FHI, 1997) HIV illness and death also reduces family income considerably through loss of earnings following job loss, or due to increased spending on health care needs and therefore, there are less resources to be spent on food thereby reducing household food security in terms of quality and quantity.

In many homes, women eat last, frequently consume the poorest quality of foods (Baker et al, 1996) although they work long hours are responsible for food preparation. A study in Bukina Faso (1984) found that women ate less protein and few micronutrients than men did. Women consumed 0.8 gm of animal protein/day compared to 10.3 gm consumed by men. (Baker et al, 1996). This shows that a poor household security only impedes consumption of quality foods and reduces dietary intake.

Inadequate Maternal Self Care.

A woman's health and nutritional status affects her ability to care for her children and herself. If a woman is sick, anaemic or malnourished, depressed or exhausted from heavy physical labour, her care giving ability will likely be diminished. Chronic fatigue and morbidity may be accepted as being normal for females because of social and traditional modesty. Women are not motivated to take care of themselves, the major problem is women's lack of self confidence which results to "silence" and keeps women from seeking help and advice about their known health (Blair, 1990). A comparative study by UNESCO in urban sites of ten industrial countries and ten developing countries indicated, that wage – earning women with children were working longer hours than men and had less free time, fewer hours to sleep and even less motivated to take care of themselves (Blair, 1990). Being in the HIV state, may often demotivate many women not to take adequate care of themselves. Denial of their infection status prompts many women to ignore their own health.

Reproductive factors such as closely spaced pregnancies restrict the time devoted to oneself as one has to devote more time to the infant and other siblings other

than herself (Blair, 1990). Cultural practices also make women unequal sex partners. Many women are unable to bargain for safe sex with their partners married or not. This risk exposes women to HIV infection or exposes HIV infected women to re-infection and exposure to recurrent opportunistic infections and STD's.

Poor Environmental and sanitary conditions.

The lack of ready access to water and poor environmental sanitation are important underlying factors that affect malnutrition. These conditions directly affect health, (Whether HIV positive or not), food production, preparation and general hygiene. Inadequate access to clean water and poor sewarage disposal also affects nutrition indirectly by increasing the probability of waterborne parasitic and enteric infections, foodborne infections and intoxication. Far water sources increase workload for women due to distance required to be covered to get water, also overcrowding in homes may increase the incidence of Tuberculosis and other respiratory infections. Provision of these facilities has to be addressed at national level.

Access to Health Services.

Lack of access to timely and effective basic maternal health care is a critical problem for both HIV positive and normal individuals. In other cases many women just do not seek health care. Either the facilities are too far, or too poorly equipped to identify or handle complications and too deficient in quality of care given. Shortages of drugs is a common problem. Delays in seeking health care means that there is prolonged suffering with a problem and thus increasing the likelihood of malnutrition, for example delays in seeking care for a bleeding disorder will lead to anaemia. In a similar manner lack of access to haematonics during pregnancy may result in aggravation of anaemia. Lack of access opportunity of improving their nutritional status.

Literacy.

Inadequate or improper education particularly of women is often an underlying cause of malnutrition. It exacerbates the inability of women to generate resources for improved nutrition for themselves and their families. The evidence linking higher levels of maternal education with improved child survival and nutritional status is extremely strong (Leslie, 1995).

Low literacy levels, affects women's ability to access to information, and affects her ability to adequate hygiene and adequate nutritional intake. It seems reasonable, given the strong effect on child nutrition, to assume that higher levels of education would also be reflected in better nutritional status of women themselves, the link between women's education and their own nutritional status, as studied by Behrman and Wolfe 1987 (Leslie, 1995) suggest that there is a significantly stronger effect of education on women's nutritional status than on their health status. Educated mothers are more likely to seek the services of modern health care professional than less educated mothers and also more prompt to seek health care than their uneducated counterparts with a poor educational background.

HIV infected women are more likely to face fear of stigmatization thereby, be unable to address the issues of HIV effectively. Educated women are more likely to be capable of making informed decisions about their status, and be positive in the way they deal with HIV related issues. Many women have positively come out to help themselves cope with the situation that is facing them. In the advent of HIV, nutrition counselling is increasingly, being viewed as an important tool in the management of HIV/AIDS. Nutritional counselling has been known to help patients diagnosed with HIV take full control of their own prognosis by encouraging optimal nutrient intake, to improve immunological function and hence promote nutritional status (Hanna, 1994). However, maternal knowledge and education alone may sometimes not solve the problem of a poor nutritional status, if other enabling factors are not provided especially if the mother has a poor socio – economic background.

2.1.7.3: BASIC CAUSES OF MALNUTRITION IN THE HIV INFECTED POPULATION:

Basic factors that affect malnutrition such as social or cultural and traditional beliefs affect women's nutritional status and their fulfilment of family and community expectations.

Cultural Practices

Many beliefs and customs exacerbate the nutritional stresses brought on by chronic or seasonal food insecurity. For example, during pregnancy and lactation women's nutritional demands are increased, but many women do not compensate for these increased requirements by eating more food of greater nutritional quality or reducing their workload during pregnancy or soon after child birth (Baker et al, 1996). Failure to improve diet or to reduce work activity may be due to lack of knowledge about nutritional vulnerability and increased nutritional needs, or due to lack of choice.

Two aspects of the status of women (sociocultural factors) also appear to be particularly relevant as indirect determinants of women nutritional status. The first is sex bias in intrahousehold food allocation, the second is the cultural importance of childbearing to women's status and to their fulfilment of family expectations. These factors affect a woman's self motivation and decision making power, forcing her to make sacrifices on her own health and nutrition by placing the interests of others above her own.

Social Status

The low social status of women, reflected in their low levels of education, contributes to the persistence of female malnutrition. In addition, lack of control over income and decision-making within the household deprives women of economic and social power and the ability to take actions that will benefit their own well-being. It undercuts their ability to control the selection, purchase, and distribution of food and related resources. Several studies in Africa indicate that income controlled by women is more likely to be used for the immediate benefit

of their children than income earned by men. At similar levels of income, households with greater control of income by women are more likely to be secure in terms of nutrition (Baker at al, 1996).

Poverty.

Poverty is the major underlying basic cause of under-nutrition; it directly affects food consumption. Income limits a family's capacity to produce food both in variety and quantity. The depressed family income in turn contributes to reduced intake. Women in different socio-economic groups differ not only in their diets, but also in general health, education, and interest in health matters and ability to obtain medical care. Socio-economic and socio-cultural factors are likely to influence nutritional status (Huffman et al, 1984).

Persons with HIV have reduced economic productivity, their contributions to household budget may be reduced, causing a decrease in family income at the same time as other needs intensify. As the direct medical costs mount, families have to divert scarce resources from other household expenses. A number of studies examining coping mechanisms of poor families when there is a food crisis, report clearly that reduced food intake by adults is one of the first strategies (Poverty Profiles, 1994). This strategy otherwise results in increasing the probability of worsening nutrition for the rest of the family and the woman (Abuagye-Kwarteng et al, 1995).

The impact of reduced food intake on an individual with increased nutritional requirements because of their HIV disease is devastating. Often family income, food security and savings are reduced to pay for medical expenses (Kusimba et al, 1996). This eventually precipitates a compromised nutritional status, which triggers a vicious cycle of malnutrition and infection which depresses the immunity increasing susceptibility to opportunistic infections that could lead to hospitalisation, prolonged recovery and secondary complications (Hanna, 1994).

A recent study modelled the impact of HIV on income of families of different social class in Kenya. The study assumed that each household had the same number of members, but at different levels of earnings. Earnings were based on economic survey data for Kenya and on the average sectoral wage levels (USAID, AIDSCAP, FHI 1997).

In this study the effect of one adult (the husband) dying in year one, followed by a second adult (the wife) and an infant in the following year was modelled. The analysis considered the costs incurred on the year of AIDS death, without consideration of cost incurred during prior years of HIV infection. It was assumed that upper-income household would utilise private sector health care, paying fees equal to 100 percent of cost, because HIV/AIDS care is not covered by health insurance. The other households use the public sector and pay fees equal to 25 percent of cost.

Table 2.4 summaries these economic impacts of AIDS on households at different socio-economic levels. Under a high estimate that assumes 75% use of needed health services, all the households at each of the socioeconomic levels will have losses and expenses that equal or exceed their entire annual income by the second year. As the table shows, in the first year, with one adult death, the household loses 49 to 78 % of income. The net effect in the second year represents 95 to 167 % of household income. This effect occurs even without consideration of funeral expenses (which can be significant) and does not include any household expenses other than the cost of AIDS treatment.

TABLE 2.3: IMPACT OF HIV / AIDS ON URBAN AND RURAL HOUSEHOLD INCOME:

Household with 3 Adult Earners	URBAN	RURAL	
	Upper	Middle	Small farm
Year One			
First Adult AIDS Death			
Household Income (Kshs)	440,000	100,000	14,000
MINUS			
Earnings Loss	209,200	44,600	6,200
Health Care Costs	80,000	4,760	4,760
NET IMPACT:			
Percent of Income Lost	66%	49%	78%
(Low estimate)	54%	47%	58%
Year Two			
Second Adult, One Infant AIDS Death			
Household Income (Kshs)	240,000	60,000	8,500
MINUS			
Earnings Loss	220,000	50,000	7,000
Health Care Costs	120,300	7,160	7,160
NET IMPACT:			
Percent of Income Lost	142%	5%	167%
(Low estimate)	(108%)	(88%)	(116%)

Used by permission SOURCE: (USAID, AIDSCAP, FHI 1997)

Typical rural households are the most severely affected, with AIDS costs representing 78% of household income the first year and 167% the second year. Middle-income urban households are less severely affected than either their rural or upper-income urban counterparts. However, middle class urban households would be more than either of the two groups if they paid the costs of private sector health care, instead of using public health facilities as in the illustration. After losing their income from work in the second year, even the upper-income

urban class cannot afford private sector health care costs out of their current year's income.

It is obvious that households will adopt a variety of ways to cope with declining income and increasing health care costs. Many of these options include withdrawing children from school to save school fees, reduction in food intake, move to a poorer neighbourhood e.t.c. and they probably seek health care less often and when they do it is too late. The poverty associated with HIV probably has a significant effect on the nutritional status of women unfortunately to date there are no studies that have examined this problem in Kenya.

Public resources.
Poor resource distribution at community level defines how well the system is able to deliver resources. Without which, a proper framework of delivery of services cannot take place and ultimately affects people in the chain. There is a problem of lack Government commitment in addressing HIV/AIDS related issues effectively. Many programmes have been put into place, few or none at all address the issues of HIV and nutrition. Provision of voluntary testing and counselling for HIV is not available; and HIV infected women do not have the opportunity for early diagnosis and therefore lack the opportunity to carry out measures to improve their health and nutrition status.

There is very little health education material on nutrition and especially related to HIV, so the development of standard care methodologies are not available. In addition, since there is limited research in this area health personnel lack adequate training to deal with nutrition related issues. Nutrition counselling is also a very new concept, which has not been effectively addressed as a way of trying to help HIV patients positively take control of their own prognosis.

2.2: GAPS IN KNOWLEDGE:

Currently there is inadequate knowledge on the dietary patterns, and the effect it plays on influencing dietary intake apart from the disease itself among HIV

infected Kenyan women. The essence of the study is therefore to bridge the gap on what strategies can be developed to improve the current practises as concerns dietary intake to help HIV positive women improve their nutritional status before it is too late and they succumb to AIDS.

CHAPTER 3:

3.0: STUDY SETTING:-

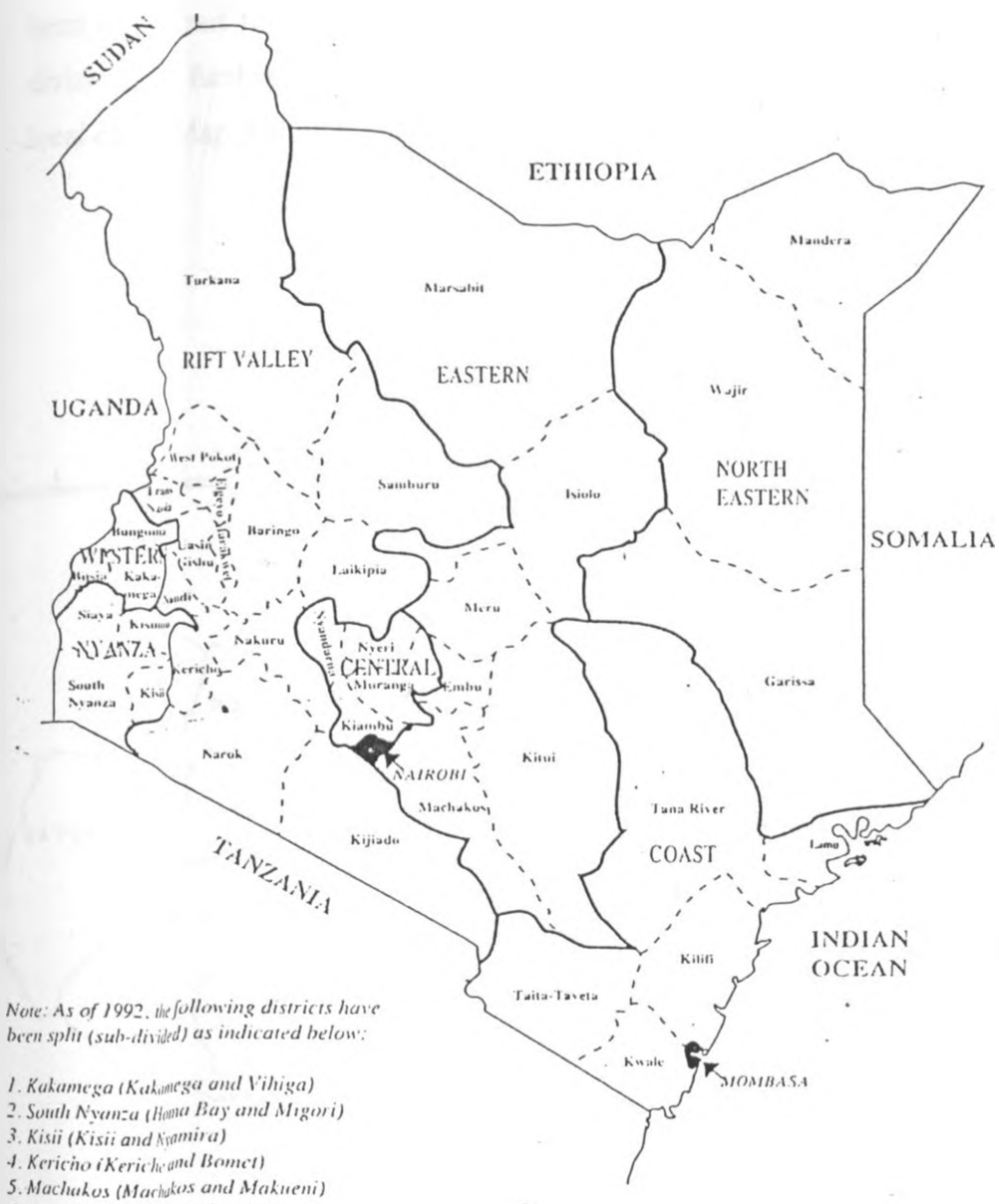
3.1: STUDY AREA:

Nairobi is the capital city of Kenya and is situated in the Southern end of the agricultural heartland of Kenya; 1.19 degrees South of the Equator and 36.59 degrees East of the Prime Meridian 70. The administrative boundary covers an area of 690 sq. Km with a population of roughly 2.5 million people according to the Demographic Census Report 1993 (KDHS, 1993).

Nairobi lies close to the Equator and is almost 1700m above the seal level, its temperatures are altitude modified tropical. The months of July and August are distinctly cool, as are the nights throughout the year. The mean annual temperature is 17^0C and the daily maximum and minimum are 23^0 C and 12^0C respectively. The mean annual rainfall is 1080 millimetres falling in two distinct seasons: The long rains are from March to May and the short rains are from October to December.

MAP 1

LOCATION OF NAIROBI:



Note: As of 1992, the following districts have been split (sub-divided) as indicated below:

1. *Kakamega (Kakamega and Vihiga)*
2. *South Nyanza (Homa Bay and Migori)*
3. *Kisii (Kisii and Nyamira)*
4. *Kericho (Kericho and Bomet)*
5. *Machakos (Machakos and Makueni)*
6. *Meru (Meru and Tharaka/Nithi)*

SOURCE: CBS, 1992.

3.2: ADMINISTRATIVE UNITS:

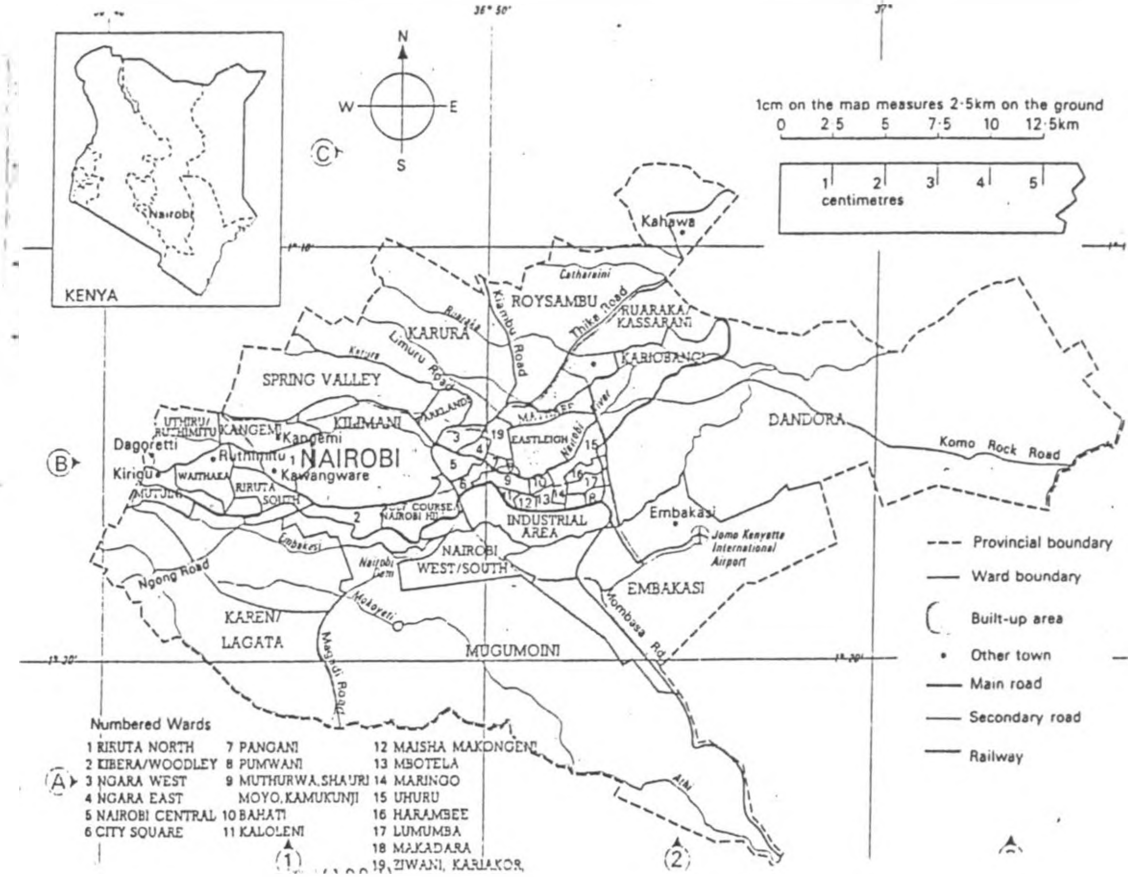
Administratively, Nairobi is demarcated into administrative zone boundaries and further into wards. The zone divisions are illustrated on Map 2 .The New Pumwani Zone - which comprises of Shauri Moyo / Muthurwa, Pumwani Ziwani / Kariokor and Pangani divisions, while Kilimani division from Dagoretti has been transferred to Parklands. Other divisions have remained the same. These divisions are further broken down into various wards. Each ward is headed by a local chief. Map 3 shows ward boundaries.

MAP 2
NAIROBI ZONE BOUNDARIES:

SOURCE: African Urban quarterly (1992) Vol. 7 No. 2

MAP 3

WARD BOUNDARIES:



SOURCE: AFRICAN URBAN QUARTERLY (1992)

3.3: STUDY SITE.

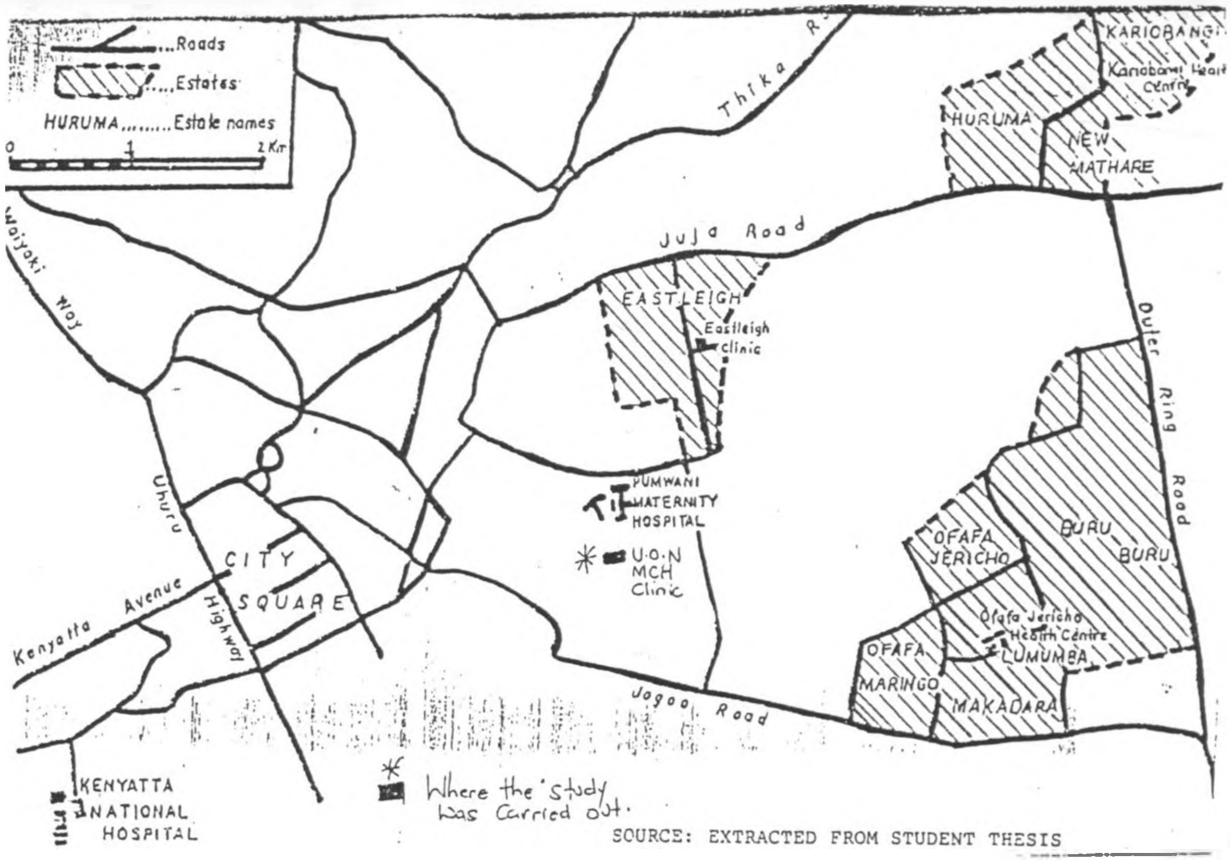
The study was conducted at the University of Nairobi Pumwani Maternal Child Health Clinic located in Pumwani Division. Pumwani is located about 2.5 Km from Nairobi Central Business District (CBD) area. It is situated in the Eastland's section of the city along Digo Road. Nairobi River, Gorofani and Bondeni Estates to the South and West border it: to the East by New Pumwani and Biafra Estates to the North by Pumwani Hospital. The cohort of women included in the study is currently participating in a study in collaboration of University of Nairobi and University of Manitoba (Canada). A University of Nairobi project doctor and two nurses run the clinic, which other personnel are involved in data collection. This is part of a WHO collaborative study. The WHO collaborative group currently involves the University of Manitoba (Canada), University of Washington (Seattle U.S.A), University of Ghent (Belgium) and University of Nairobi.

3.4: HEALTH FACILITIES:

There exist a number of health services, which serve residents of the City of Nairobi. These comprise of Private and Public Services. The major private health services in Nairobi include - Nairobi Hospital, The Aga Khan Hospital, Mater Misericordie hospital and M.P. Shah among others while public health facilities include hospitals and clinics run by the Nairobi City Council (NCC) and Kenyatta National Hospital (KNH) which is run by the Government of Kenya. Pumwani area is served by the largest maternity hospital in East and Southern Africa, one City Council dispensary and several private clinics as illustrated on Map 4.

MAP 4

DISTRIBUTION OF HEALTH FACILITIES IN PUMWANI AREA:



SOURCE: EXTRACTED FROM STUDENT THESIS

CHAPTER 4

4.0: RESEARCH DESIGN AND METHODOLOGY:

4.1: STUDY POPULATION:

The study population comprised of women, living in Nairobi and its environs. The respondents served by the clinic were registered users of the clinic.

4.2: CRITERIA FOR INCLUSION FOR ASYMTOMATIC HIV-1 SEROPOSITIVE WOMEN:

1. The HIV-1 seropositive women were Asymptomatic (WHO Criteria). (Appendix 1:125).
2. The HIV-1 seropositive women were constitutionally well and free from intercurrent opportunistic infections. This was certified by medical examination.
3. Last child above one year.
3. May or may not be breastfeeding.

CRITERIA FOR INCLUSION FOR HIV-1 SERONEGATIVE WOMEN:

All of the above criteria except they should be seronegative.

CRITERIA FOR EXCLUSION:

Both Asymptomatic HIV-1 seropositive and HIV-1 seronegative women should be non pregnant.

4.3: STUDY TYPE AND DESIGN:

A clinic based cross-sectional but comparative study was carried out from January to May 1997. The 204 respondents who were enrolled into the study comprised a cohort of women attending the MCH clinic, and participating in an ongoing Paediatric AIDS study. The cohort was made up of asymptomatic HIV - 1 Seropositive and HIV-1 Seronegative women. Both groups were generally

homogenous and had been matched by age. At the time of enrolment into the larger study the HIV status for both groups of the respondents was determined using the ELISA test. At enrolment into the current study, HIV status and current $CD4^+$ cell counts and haemoglobin (HB) level were also determined.

The HIV seropositive group comprised of women who were ascertained as "clinically stable" but who did not necessarily meet the WHO clinical criteria for the diagnosis of AIDS. (Appendix 1:125). Anthropometric measures namely the Mid-upper Arm Circumference (MUAC), Subscapula Skinfold Thickness (SST), Triceps Skinfold Thickness (TST) were also determined.

4.4: DETERMINATION OF SAMPLE SIZE:

Available evidence shows that the prevalence of malnutrition (BMI<18.5) among seropositive HIV positive women in Kenya is not documented. The current prevalence of malnutrition in a " rural population" as established in the collaborative study on food intake and human function (CRSP project in Embu) (Neumann and Bwibo 1987) found that rate of malnutrition among women in the rural population as 18.7% (BMI<18.5). This study will assume a similar proportion of malnutrition in the normal "urban population", and will make the following assumptions.

Assumptions:

1. The same prevalence set at 18.7% was used because it was assumed that there would be no differences between the two populations.
2. It was hypothesised that the prevalence of malnutrition in the HIV positive population would be twice (double) that of normal population.

The following formula, (Wassertheil-Smoller, 1993) which determines the sample size for binary outcomes, was used;

$$n => \frac{\{Z_{1-\alpha/2}\sqrt{\{2p(1-p)\}} + Z_{1-\beta}\sqrt{\{p_1(1-p_1) + p_2(1-p_2)\}}^2}{p_1 - p_2}$$

n = The desired sample size (when the population is less than 10,000)

$Z_{1-\alpha/2}$ = The standard Normal deviate usually set at 1.96 which corresponds to 95% confidence interval.

$Z_{1-\beta}$ = Power set at 80%

p_1 = Proportion of malnutrition expected in the HIV asymptomatic seropostive (cases)

p_2 = Proportion of Malnutrition of women in "Normal population" in rural Kenya at 18.7%

p_1-p_2 = Is the estimated difference between the two groups in the characteristic of interest (Degree of Accuracy desired usually set at 0.05).

Therefore: $$\frac{\{1.96\sqrt{2x(0.28)(0.72)} + 0.82\sqrt{(0.187)(0.813)+(0.374\}}\}^2}{(37.4-18.7)^2}$$

$$= \frac{(1.755)^2}{(0.187)^2}$$

= 88 per group.

= Total sample size is therefore 88x2=176

Anticipate a refusal rate of 10%, which brings the sample size to 98 per group. For the purpose of this study the sample size was worked towards higher values and the sample size was taken as 102 per group bringing the total sample size to 204.

4.5: SAMPLING FRAME:

The sample population consisted of HIV seropositive and HIV seronegative women. Hence the sampling frame comprised of a register of women who had

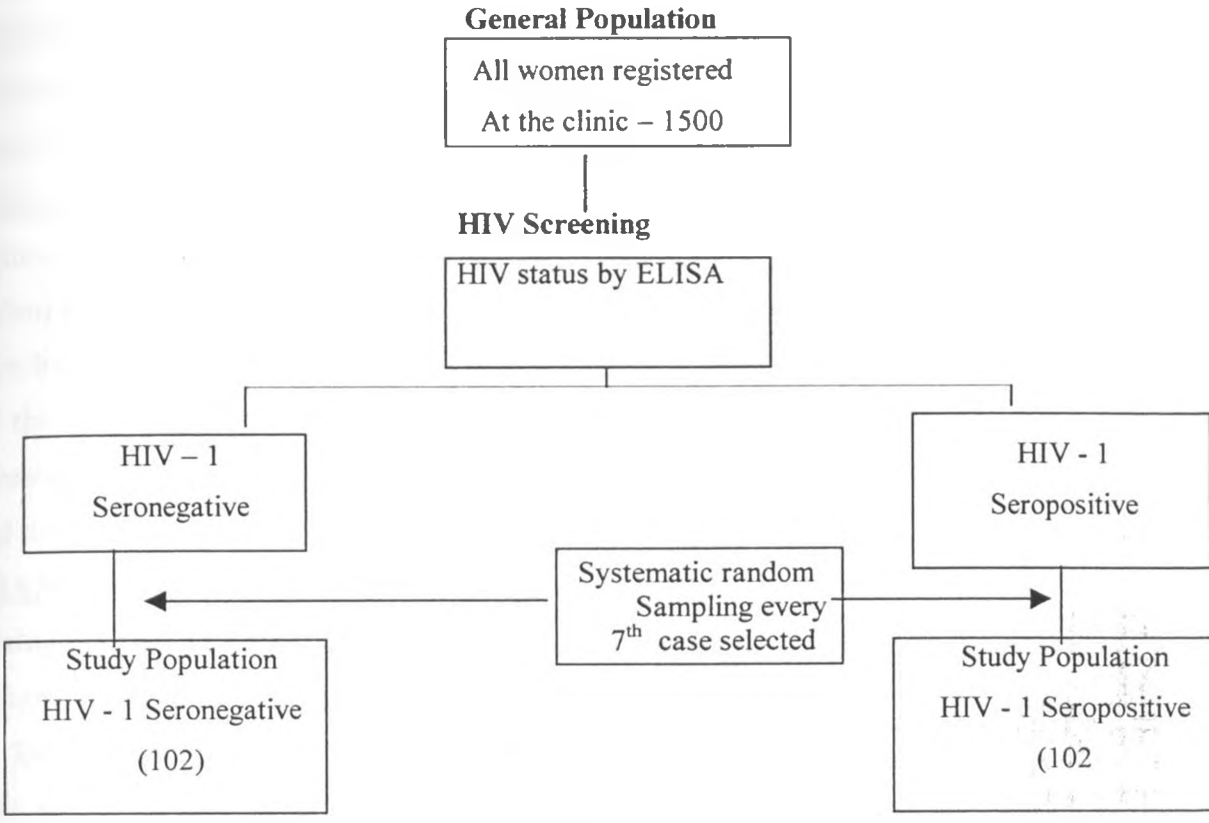
voluntarily enrolled into the Paediatric AIDS study initiated by the University of Nairobi and University of Manitoba (Canada).

The criteria for enrolment for the larger study was that mothers should have delivered at Pumwani Hospital between 7.30-11.30 am on Monday-Thursday, agree to participate, are capable of giving consent, lived within Nairobi and its environs and were able to attend the follow up clinic. Upon enrolment, the respondents have their blood tested for HIV. Women who tested HIV positive, were matched with a control group of seronegative women and were then invited to return to the clinic for follow-up care where free medical, postnatal, child immunization and health care is provided for them and their children.

4.6: METHOD OF SAMPLING:

Sample was obtained from a sample size of approximately 1,500 registered patients at the clinic. Women with children above a year were enrolled into the study as they visited the clinic on a daily basis. Their names, HIV status were confirmed from the clinic records. Systematic random sampling was then used to select an equal number of cases and controls. From the incoming order selection, starting with a randomly selected (n) of every n^{th} case was selected. In this case every 7^{th} case was selected, provided it satisfied the selection criteria. The sampling was done as illustrated in Fig 4.1: -

FIG 4.1: PROCEDURE OF SAMPLING:



4.7: METHODOLOGY OF DATA COLLECTION:

The study was conducted in two phases;

PHASE ONE:

During the first phase which was the preparatory and pilot phase a feasibility study was carried out, after which study instruments were reviewed and necessary modifications made.

Selection and training of research assistants:

The primary objective was to ensure that the research field assistants had the apptitude to acquire the necessary skills in proper data collection and taking of anthropometric measurements.

Training procedures:

Two pre-medical students, able to speak fluent Kiswahili were recruited and trained by the principle investigator. Training covered translation of the questionnaire into Kiswahili language, interviewing techniques, coding of the questionnaire and methodology of taking anthropometric measurements.

Ethical considerations:

Maternal informed consent for participation was sought from the participants before the onset of data collection. The participants of the study were required to give informed consent before being enrolled into the study. A brief explanation on the purposes and intent of the study, plus the obligations of the principal investigator were given. The respondents signed a consent form agreeing to the laid down protocol.

PHASE TWO:

During the second phase, the actual study was carried out. A questionnaire was designed and used to obtain information. It was sub-divided into six sections:

i) Demographic and Socio-economic Characteristics:

This section sought to obtain information on maternal age, sex distribution of respondent's household members, household composition, education status, employment and occupation status of the household members, residency and household income. Income was classified according to the GOK income classification of 1994. (GOK, 1994) (Appendix 7:141).

ii) Morbidity and Obstetric characteristics:

This section was designed to obtain information on the past medical experiences, current health status, obstetric characteristics and contraceptive use.

iii) Dietary intake:

This section was designed to obtain information on food intake and related factors, such as: maternal nutritional knowledge, attitudes and practice pertaining to nutrition.

Food frequency was used as an indication of dietary adequacy, variety and quality for the total sample. (Cameroon et al, 1988). A food frequency check list

was used to determine the intake of certain most commonly or seldomly consumed foods, which were categorised into five main food groups.

i) Milk/Dairy Products.

ii) Meat Products.

iii) Fruit/Vegetable Products.

iv) Grain/Cereal Products.

v) Fats and oil Products.

Maternal knowledge was assessed by use of knowledge questions where a grading method was used to develop a nutritional knowledge index (Gentry et al, 1991 and Abbi et al, 1988).

iv) Qualitative study:

a) Interview of key informants

The project Doctor in the clinic was interviewed to obtain information on the nature of counselling provided to patients and how it was being administered.

b) Focus group discussions were conducted to verify data collected using questionnaire method. The principle researcher guided the discussions. Three focus group discussions were held, exclusively with randomly selected respondents. Sessions were tape recorded with permission from participating respondents. A total of 10 respondents participated in each of the three sessions conducted. In each of the conducted sessions respondents' names were not mentioned. These discussions elicited from the respondents their current life styles, coping strategies that they adopted after becoming aware of their serostatus, their knowledge, attitudes and practices pertaining to nutrition .

v) Clinical assessment

Respondents were clinically assessed for HIV using the Elisa test. Laboratory request forms were designed to record results of serological analysis. CD_4^+/CD_8^+ absolute ratio and haemoglobin levels were also determined.

vi) Anthropometric Assessment

Anthropometric measurements: height, weight, mid upper arm circumference (MUAC), SST (subscarpula skinfold thickness), triceps skinfold thickness (TST) were also determined.

4.7.1: DETERMINATION OF NUTRIENT ADEQUACY:

The respondent's current food intake was compared to suggested servings from the five food groups for variety, adequacy of servings and nutrients to establish nutrients adequacy comparable to recommended servings as per a daily food guide (Attached in Appendix 6:140). Adequacy was determined and compared to calculated indices of proteins, vitamins, carbohydrates and fats.

Nutrient adequacy was determined by use of a scoring method, the scores used were based on the food groups. The scoring system was on a scaling of the foods as the main contributors of the main nutrients, proteins, carbohydrates, fats, vitamins (Simiko et al, 1987).

The food frequency check-list (Attached in Appendix 6:140), shows a list of codes used in the entry of food frequency data. The 9 codes were sub-divided as follows:

TABLE 4.1: SUB-DIVISION OF FOOD FREQUENCY CODES

ADEQUATE INTAKE	MODERATELY ADEQUATE INTAKE	INADEQUATE INTAKE
1. = Once daily	4. = Once a week	7. = Once a fortnight
2. = Twice daily	5. = Twice a week	8. = Occasionally
3. = More twice daily	6. = Twice a week	9. = Never

The possible range of score ranged from 0-6 points. Adequate intake obtained 3 points. Moderate intake obtained 2 points and inadequate intake obtained 1 point

respectively. All valid scores were summed up and a mean for each category obtained was further compared to the daily food guide (Appendix 6:122) which gives the recommended number of securing of different food groups per days that are considered adequate. In addition one assumption was made.

Assumptions:

A typical serving size was considered as an normal adequate serving. Participants were shown a food model depicting what would entail a normal serving.

4.7.2: DETERMINATION OF KNOWLEDGE INDEX:

To access knowledge of food intake during illness all valid scores were summed up. The possible range of scores was from 0-6 points:

(i) 2 points were given for correct and complete answers.

(ii) 1 point for partially corrects answers on the correct end of a response scale but indicative of respondents' uncertainty. [Correct food types and maybe wrong reason].

(iii) 0 No point for incorrect response. [If food type from similar food groups, or reasons were repeatedly mentioned] both indicative of respondents lack of familiarity.

A total score was then calculated and used as indicator of nutritional knowledge. Respondents overall knowledge on nutrition was rated on a scale from 0-15 by calculating all the valid responses made. Three cut off points, these being (0-5) low performance, (6-10) average performance, (11-15) high performance were used to grade and obtain a final distribution and assessment of nutritional knowledge.

Total of five questions was used for scoring to develop a nutritional knowledge index. The aspects of nutritional knowledge studied were:

(1) Whether sick people require a different diet from normal people.

(2) Examples of 3 foods from 3 main food groups important for sick people.

(3) Perceptions on what respondent could describe as a "good diet" and what criteria a "good diet" should satisfy.

(4). Respondents view on whether they (respondent) would change their diet if they had a terminal illness such as HIV.

(5) Respondent view on what type of foods from three main food groups they (respondents) would eat to improve the health status if they had a terminal illness such as HIV (Refer to Question 7-12 Appendix 4:131-132).

A response was considered valid if it provided the following information: Sick people require a special diet (Different diet). Sick people require to eat extra proteins, vitamins, and carbohydrates (in that order). A good diet should be balanced with all food groups. The respondent would change their diets to suit their needs due to infection with a terminal disease.

Important food groups to improve health status should include food from all nutrients proteins, vitamins, carbohydrates and fats.

4.7.3: METHODOLOGY OF ANTHROPOMETRY:

Anthropometry was measured as recorded by WHO (1995)

- **HEIGHT:** Height measurements were taken using a stadiometer, placed against a hard flat surface. The respondent stood on the foot plate devoid of shoes, with minimum clothing and head gear, with feet parallel and with heels shoulders buttocks and back of the head touching the vertical board. Head was held comfortably erect, and then the head piece was lowered and placed on the head and measurements taken to nearest 0.1 cm.

- **WEIGHT:** Electronic bathroom scale (Seca Alpha Model) was used to take weight. The respondents had to remove heavy clothing and stand straight with back, upright and with minimal movement on the weighing scale. Weight was then recorded to the nearest 0.1 kg.

•MID UPPER ARM CIRCUMFERENCE (MUAC):

The "Zerfas" Insertion tape made of flexible fibre glass was used. Respondents stood straight with the arms hanging towards the thighs, with the arm clear of clothing. The mid-upper arm was located half way between the acromial process and olecranon process. To locate the mid-point. The respondents elbow was flexed at 90° with the palm facing upward. The examiner located the lateral tip of the acromial at the shoulder; a small mark was made at the identified point. The tape was then lopped around the arm with the pointed end inserted through the special slot and with the window facing the examiner. The end of the tape was then pulled gently but firmly enough to avoid compressing the soft tissue and ensure uniform contact with the skin surface around the arm. The respondents arm was then relaxed elbow extended and hanging on the side of the trunk. With the tape positioned correctly, the reading was taken to the nearest 0.1 cm. point.

•SUBSCAPULA SKINFOLD THICKNESS (SST):

The "Holtain Caliper" was used. The fatfold was grasped on a diagonal directed downward and to the side just below and to the right of the inferior angle of the left scapula, approximately 45° to the spine, in the natural line of skin cleavage. The site of measurement is just inferior to the anterior angle of the scapula. The respondent had to stand straight, with arms relaxed at both sides of the trunk. The examinee had to palpate the scapula by running the fingers laterally along the vertebral boarder. The caliper jaw was then applied 1cm infero-lateral to the thumb and finger raised to the fold. The thickness was recorded to the nearest 0.2mm.

•TRICEPS SKINFOLD THICKNESS (TST):

The "Holtain Caliper" was used. The triceps skinfold was measured in the midline of the posterior of the arm. This was between the acromial process and the tip of the olecranon process. To locate the mid-point of the acromial process of the shoulder blade and the olecranon process, the same mid-point used in the

location of the MUAC was used. The fatfold was grasped 1 cm above the marked mid-point in line with the tip of the olecranon process using a thumb and forefinger. The respondent arm was then allowed to hang loosely and comfortably at the side was then allowed to hand loosely and comfortably at the side. The caliper jaws were then applied at 90^0 exactly at the marked mid-point. The measurements were taken 2-3 seconds apart.

* ***Three measurements, were taken and an average calculated.***

4.7.4: HAEMATOLOGY:

Blood samples were collected by the project doctor, under sterile conditions using disposable 2ml syringes, disposable 21G-1 using $^1/_2$" needles, and cotton swabs, dipped in methanol. Collected blood samples were transported and stored in 5ml glass bottles (vaccutainer) sterilised and coated with an anticoagulant ETD (K_3). Each bottle was labelled with the patients project number and MCH Number. The project doctor collected blood samples using rubber gloves; all needles were disposed off carefully after use. Two ml of blood was collected by veinpuncture from the patient's arm. To ensure that the CD_4^+ did not fluctuate as they tend to during the day blood specimens had to be collected between 9-12.00 am every day.

ELISA test was done for determination of HIV status, HB test for the determination of anaemia, and cell photocytometry for determination of CD_4^+/CD_8^+ Absolute cell count and ratios respectively were performed at the laboratory.

4.7.5: HAEMOGLOBIN DETERMINATION:

A complete haematological analysis was undertaken for each blood sample. Each blood sample underwent a quantitative, semi-automated haematological analysis using an electronic unit, the coulter counter model M530.

4.7.6: ELISA TEST:

Patient's serum was tested in duplicates to reduce error. The blood serum was allowed to react with antigens that were coated onto the polystyrene microwells for a specified period of time. After which unbound antibody was washed away by aspiration in a rinse step. If the patient's sera contained specific anti – HIV - 1 antibody it remained bound to the antigen coated wells.

After washing and aspiration, an enzyme–labelled anti– human antibody conjugate was added to each well and allowed to incubate. Another washing and aspiration step followed after which a substrate solution was added to the reaction well. The microwells are placed in a calorimetric machine and depending on the (colour intensity) ,the optical density quantified the optimal wave length of the substrate material. A deep brown colour shows the presence of anti HIV –1/ anti HIV –2 (lgG and /IgM) presence.

4.7.7: PHOTOCYTOMETRY FOR DETERMINATION OF CD_4/CD_8:

Facscan machine which is a fluorescent scan that detects the whole blood counts and percentages by using a fluorescent beam was used. Whole blood was used, which was not more than 6 hours old. It was put into 3 different tubes, an artificial antibody is added into the 3 different tubes. Contents were mixed and refrigerated for 15-30 minutes. A concentrate of fac's lyzing solution was then added to dilute the solution. It was then mixed and stored in a dark room for 15 minutes and later centrifuged at 1,500 revolutions per minute for 5 minutes. The process of centrifugation led to the breakdown of the blood particles, which was then poured off. The result was a cloudy residue at the bottom of the test tube. Isotone solution was used to wash off any residue and again poured off. Paraformaaldehyde solution which is a fixture solution, was used to run the cells in a florescent scan for the determination of the CD^{+}_4/CD^{+}_8.

4.7.8: DATA QUALITY CONTROL:

To ensure that high standards were maintained in data collection, the principal investigator ensured that all measuring equipment were checked and calibrated periodically during the study period. This was done to prevent instrumental errors that would come about due to faulty equipment.

To avoid bias and errors in recording, scales had to be adjusted before every measuring session. Weighing objects of known weights to ascertain that the weighing scales were giving consistent and accurate measurements did this. The arm circumference tapes were also checked daily for any creases, as they are made of paper. Every effort was made to ensure that at the end of the day, they were stored properly.

Stadiometer was always placed on a flat ground and head piece moved smoothly up and down before any measurements were taken. To minimise intra-observer errors readings had to be repeated three times and an average reading taken. The margin of error allowed between each measurement was 0.1cm.

Field assistants were trained in taking of anthropometric measurements, emphasis was laid on the correct methods to be used when taking measurements to enhance accuracy and validity of results.

To ensure standardisation of techniques in taking anthropometric measurements. Tests consisting of repeating measurements twice on different respondents were done. The variation between repeated measures was calculated to assess precision and a mean measure calculated to assess accuracy. These tests proved a helpful measure in instilling the importance to the field assistants that high precision and accuracy had to be adhered to, and helped to reduce the likelihood of wide variation in the intra observer measurements(WHO, 1983).

Having been adequately trained in data collection techniques the field assistants participated in piloting of the survey procedures. During the training period, the questions were read out aloud, discussed and an appropriate Kiswahili translation agreed on. This exercise was repeated until the questions were translated uniformly by the field assistants. Correct interpretation was obtained to ensure that each question was posed to all the respondents in the same way.

To ensure precision in locating the site for MUAC. SST and TSF measures, the principle investigator had to maintain supervision to obtain reliable and reproducible results during the data collection period.

Verification of data on administered questionnaires was carried out to minimise error. Each recorded questionnaire was thoroughly reviewed at the end of the day. Reviewing was done to ascertain that it had been properly completed.

Blood samples had to be drawn between 9-12.30 am and analysed around and about that time. To ensure that CD_4^+ cell counts did not fluctuate as this could have been a potential source of variability. Laboratory conditions where blood samples were analysed had modern facilities and tried to follow stringent quality control conditions. In cases where a first and second test gave inconsistent results a third and fourth trial run were performed.

4.8: DATA PROCESSING AND ANALYSIS:

Data was entered into the computer using Dbase III software. This was then translated to the SPSS program. Frequencies were run to check on the distribution of the data and to identify incorrect entries. Cleaning of data was then done before embarking on the data analysis.

4.8.1: Quantitative Data analysis:

Statistical tests that were applied included:

T-TEST- for comparison of the groups from different socio-economic strata.

PARTIAL CORRELATION CO-EFFICIENT- Were used to determine the Correlation between Nutritional status and Dietary patterns while controlling for HIV status CHI SQUARE (x^2)- was used to compare categorical variables. To determine the relationships between the various risk factors and nutritional status. ANOVA - To compare the differences within the group means and between the group means. MULTI-VARIANT ANALYSIS- To determine the most significant factors affecting both groups.

As the data was not normally distributed, non-parametric test such as the Mann-Whitney was done to compare the results of the T-test and the Chi-square. The minimum, level of significance acceptable was taken to be $p < 0.05$.

CHAPTER 5:

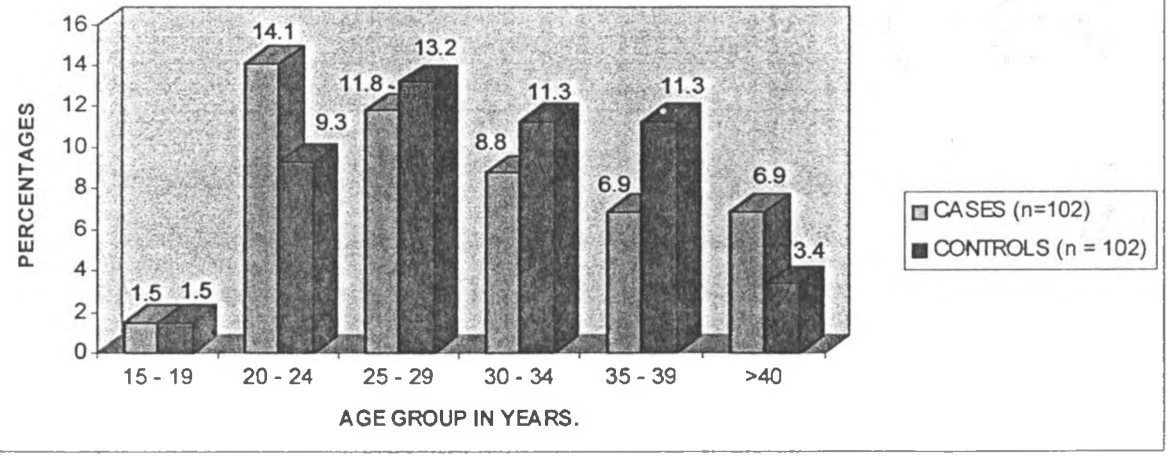
RESULTS:

5.1: CHARACTERISTICS OF THE STUDY POPULATION:

A total of 204 respondents were included in the study, of which the majority, 90% came from Nairobi and 5% came from areas around of Nairobi. These included areas such as Kikuyu, Ngong, Athi-River, Thika and Limuru.

All the study respondents were mothers, with their youngest child 1 year and above. A small proportion of 1.5% of both cases and controls accounted for adolescent mothers in the 17 – 19 age group. The much older respondents being forty years and above also accounted for a small proportion of the study population, being 6.9% cases and 3.4% controls respectively. Majority of the respondents comprised of the 20 –24 years and 25-29 years age bracket, which represented 14.1% cases, 9.3% controls and 11.8% cases and 13.2%, controls respectively. The mean maternal age was 30 years (s.d 6.14) with a range of 17 to 53 years. It appears that a majority of the cases 26% fell in the 20 – 29 years age bracket. Fig. 5.1 summarises the age distribution of the study population.

FIG. 5.1.: DISTRIBUTION OF STUDY POPULATION BY AGE.



A significant proportion of controls were married; 60.8% compared to 48.0% of the cases $p<0.05$ ($p=0.034$: Mann-whitney test). There were more separated or divorced participants among the cases compared to the controls this accounted for 13% as compared to controls of the 5%. In addition there was a higher proportion of widows among cases compared to the controls 10% versus 1%. This showed a significant difference at $p<0.05$ ($p=0.003$: Mann-whitney test).

The average household size of study respondents was 4 (s.d 1.97; range from 1 to 10) persons per household with cases having an average of 3 (s.d 1.87) among cases compared to 4 (s.d 2.05) persons per household among controls. The distribution of household size between cases and controls showed statistically significant difference $p<0.05$ ($p=0.004$: Mann – Whitney test), suggesting that households of seropositive women could have had a death or a lower fertility rate.

Education levels of the respondents were generally low. Mean education in years for the respondents was 7 years there were no major differences between the two groups. In general, 58 % cases and 53% controls respectively had attained primary level education, while 28% cases and 39% controls respectively had attained secondary level education. Only 5% cases and 1% controls had attained post-secondary education. The characteristics of the respondents are summarised in Table 5.1.

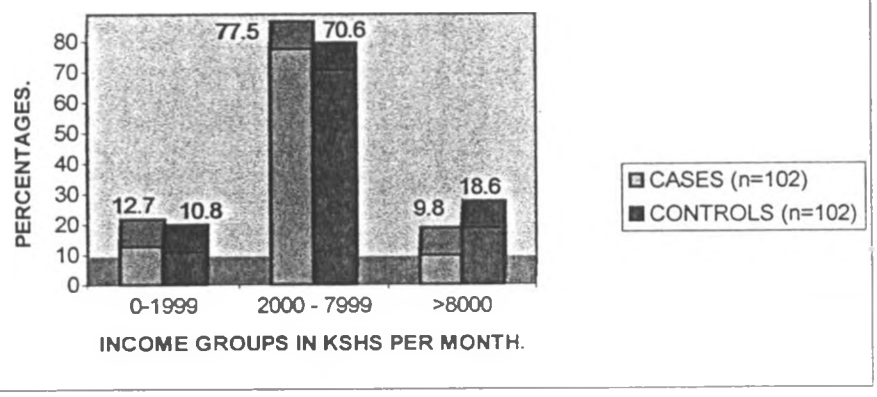
A total of 25% of the respondents were lactating mothers,15% controls and 10% of the cases . The difference in the two groups was expected but not significant. The HIV positive women attending the clinic are advised not to breastfeed for periods exceeding 6 months to reduce chances of vertical transmission of HIV to infants.

About a third 30.4% of the respondents were self employed. This represented 28.4% cases and 32.4% controls who were engaged in a number of income generating activities and petty trading like vegetable hawking and vegetable vending, selling of second-hand clothes, sale of cooked food products and participation in women group activities. Table 5.1 shows the distribution of employment status and economic activity among the respondents. Approximately a third of the cases 28% were involved in casual labour as compared to 16% of the controls.(This casual labour also includes commercial sex work).

Mean incomes per month for the two groups was relatively low 4774 Ksh. (US$ 86) (s.d 3500) with a range from 300 Ksh (US$ 5.35) to 25,000 Ksh (US$ 446). A high proportion of about 78% of the cases and 71% of the controls were middle income earners according to the GOK 1994 Income Classification category. The total mean of income earned from all activities for both cases and control groups was 4575 Ksh (US$ 82) (s.d 2889) for cases and Ksh. 4972 (US$ 89) (s.d 4025) for controls respectively.

The mean amount of money spent on food, as a percent of the total household income was 81%. This proportion was slightly higher in the controls 83% as opposed to the cases 79%. Implying that food took a large percentage of total income. Total money income spent on purchase of food was also sparsely distributed with a mean of 2912.7 (s.d 1426.9) for the two groups. The income spent on food on a monthly basis was slightly higher in the cases as compared to the controls, this accounted for Kshs. 2941 and Kshs. 2884 respectively, this difference was however marginal.

FIG. 5.2: DISTRIBUTION OF STUDY POPULATION BY INCOME LEVELS.



Majority of the respondents who were employed were middle income earners earning approximately Kshs. 2500. The distribution of total monthly income earned from all activities including employment, self-employment (income generating activities IGA), casual labour etc. is shown in Figure 5.2. More than half of the controls earned incomes greater than Kshs. 8000 per month. The distribution of the other income categories amongst the two groups was quite comparable and differences were marginal.

TABLE 5.1: SUMMARY OF MATERNAL CHARACTERISTICS (N =104)

Characteristics	Cases % N = 102	Control % N = 102	P value
Number of respondents	102	102	
Mean Age (Years)	29.8	30.3	
Marital Status			
Single	22.5	18.6	0.244
Married	48.0	60.8	0.034*
Separated	12.7	13.7	0.418
Divorced	4.9	2.0	0.124
Widow	9.8	1.0	0.003*
Separated and Remarried	2.1	3.9	0.204
Education Background			
Primary Level	57.8	52.9	0.241
Secondary Level	28.4	39.2	0.052
Tertiary Level	4.9	1.0	0.05*
Adult literacy Level	8.9	6.9	0.301
Mean year of schooling	7.5(3.4)	7.9(3.1)	0.558
Employment Status			
Salary employed (formal employment	13.7	19.6	0.129
Self employed	28.4	32.4	0.271
Casual labourer	28.4	15.7	0.049*
Unemployed	5.0	3.9	0.367
Housewife	24.5	28.4	0.263
Economic Activities			
Own Business	9.8	14.7	0.285
Sale of food products	4.9	3.9	0.733
Sale of second-hand clothes	12.7	10.8	0.663
Sale of farm produce	16.7	15.7	0.849
Women group activities	47.7	40.5	0.512
Proportion of self employed respondents engaged in more than one activity	58.6	60.6	0.549

* Statistical difference at $p<0.05$ *Percentages or means (Standard deviations in Parenthesis)*

5.2: HIV INFECTION AND IMMUNOSUPPRESSION STATUS:

CD_4 cell counts and CD_8 were used as measures of immune status of the individual. Normal individuals have absolute CD_4 counts that are >500/mm^3 and a CD4/CD_8 ratio of greater than or less than 0.6. The cut off point for CD_8 is less well defined. These findings suggest that the cases were at moderate to advanced HIV infection.

TABLE 5.2 : MEAN CD_4^+ /CD_8^+ABSOLUTE CELL COUNTS:

	Cases n=102 m ± s.d	**Control n=102 m ± s.d**	**Mann Whitney Z score**	**P Value**
CD_4	385.8(278.6)	826.6(282.5)	9.63	0.001*
CD_8	1097.5(735.4)	743.1(289.5)	3.62	0.0001**
CD_4/CD_8 Ratio	0.45(0.39)	1.21(0.45)	10.50	0.001*

* Significant difference at P<0.05 (Mann Whitney Test)

** Significant difference at P<0.001

The mean CD_4^+ cell count for the entire population was 606.2 (s.d 356.6). While the mean CD_8 count was 920 cells/mm3. The mean CD_4/CD_8 ratio was 0.83. The mean absolute CD_4 and CD_4/CD_8 counts were significantly lower among cases compared to the controls. While the CD_8 was higher among cases as compared to the controls, the mean CD_4 count among cases was 385.8 cells/mm3 compared to 826.6 cells/mm3 among controls p< 0.005(p=0.001). The mean CD8 count was 1097.5 cell/mm3 among cases compared to 743.1 cells/mm3 among controls. The CD4/CD8 ratio was significantly lower at 0.45 among cases compared to 1.21 among control. This data is presented in Table 5.2.

TABLE 5.3: PROPORTION OF STUDY POPULATION BY CD4+ CELLS AND HIV STATUS:

CD_4^+ Cell Counts cut off points	Cases % (n=102)	Controls (n=102)
<200 Cells/mm^3	20.6	0
200 – 350 Cells/mm^3	37.2	4.9
350 – 500 Cells/mm^3	20.6	8.8
>500 Cells/mm^3	21.6	86.3

P value x^2 ; 0.000 Significant difference $p<0.001$

Table 5.3 shows that 86% of controls had absolute CD4 cells>500cells/mm3. The seropositive women had a wide distribution of CD4 cell counts with approximately one-fifth having CD4 <200 cells/mm3 (severe immunosuppression) and another one-fifth having CD4 >500 cells/mm3.

5.3: NUTRITIONAL STATUS OF THE STUDY POPULATION:

The indices used to determine the Nutritional status included: -

Mid-upper arm circumference (MUAC)

Subscapula skinfold thickness (SST)

Triceps skinfold thickness (TST)

Body mass Index (BMI)

Haemoglobin levels (HB)

Table 5.4 shows a summary of proportions of the study population that were malnourished using all the nutritional status indices. It shows a summary of Means and P value, and levels of significant differences to each of nutrition status indices used. As shown the control group had significantly superior means in all anthropometric indices apart from body mass index. It is evident from the data that four indicators of nutritional status i.e. mid upper arm circumference, triceps skinfold thickness, subscapula skinfold thickness and haemoglobin levels show that prevalence of malnutrition amongst the cases was significantly higher as compared to that of controls. Body mass index indicates that both cases and controls were within normal limits.

TABLE 5.4: COMPARISON OF THE NUTRITIONAL STATUS USING SELECTED INDICES:

Nutritional status indices	Cases (n=102) m±s.d	Control (n=102) M±s.d	Mann-Whitney Z score	P Value
MUAC	28.2(4.0)	29.6(4.4)	2.685	0.01*
SST	17.2(8.2)	20.7(9.6)	2.544	0.01*
TST	20.7(7.7)	23.7(9.2)	2.172	0.03*
BMI	23.2(4.3)	24.0(4.9)	1.014	0.31
HB	11.4(2.1)	12.6(1.9)	4.362	<0.001*

* Significant difference at p<0.05 (Mann -Whitney test)

** Significant difference at p<0.001

TABLE 5.5: DISTRIBUTION OF STUDY POPULATION BY NUTRITIONAL STATUS INDICES:

	Cases % (n=102)	Control % (n=102)	P value x^2
MUAC (Malnourished) <28.5cm	7.8%	2.0%	0.04
SST (Malnourished) <13.7mm	39.2	30.4	0.19
BMI (Chronic Energy Malnutrition) <18.5	13.7	10.8	0.42
TST (Malnourished) <16.5 mm	30.4	26.5	0.54
HB (Anaemia) <12g/dl	52.0	48.0	0.001*

* Significant difference p<0.05

As recommended by Zeman et al,(1988) the cut off point used for Mid-upper arm circumference was **28.5 cm** . The mean mid upper arm circumference for the two groups of participants was 28.9 cm (s.d 4.24). The mean for cases was 28.2 (s.d 4.02) and 29.6 (s.d 4.35) for controls, which was notably significant p<0.05

(p=0.01 Mann-Whitney test) as shown in Table 5.4. Only 8% of the cases and 2.0% of the controls, fell below the set standard (< 28.5 cm). This data is presented in Table 5.2

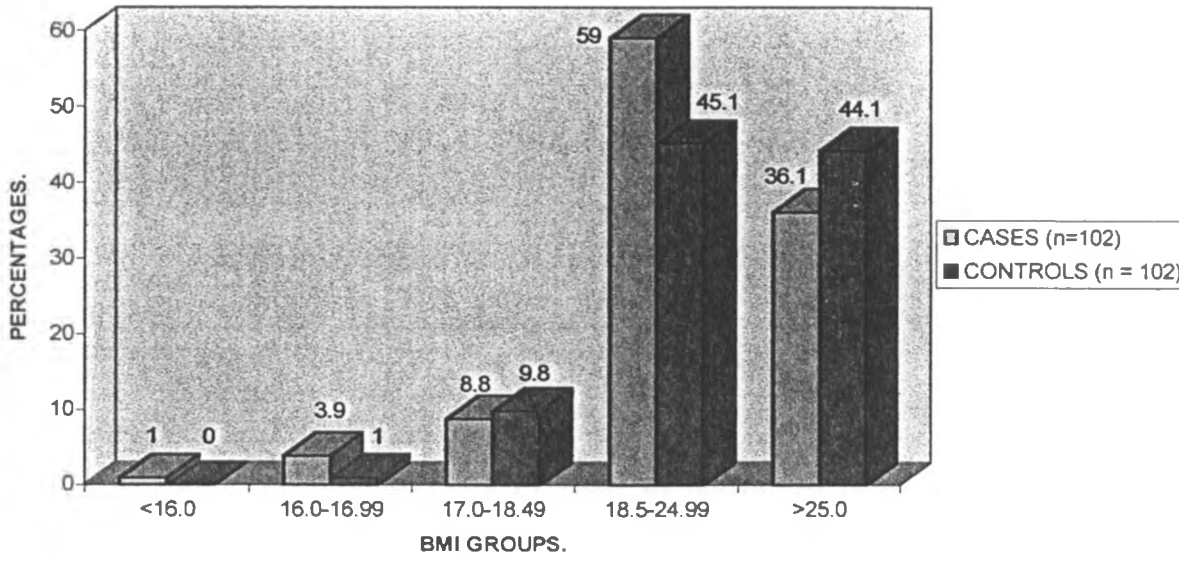
The cut off point used for subscapula skinfold thickness was **13.7mm** (Zeman et al, 1985). The mean subscapula skinfold thickness was 18.9 (s.d 9.10) with the mean SST for the cases being statistically lower than that of the controls 17.2 (s.d 8.22) versus 20.7 (s.d 9.63). About one third of both cases and controls 39% and 30% respectively fell below the set standard (<13.7mm). This data is represented in Tables 5.4 and Table 5.5.

The cut off point used for the triceps skinfold thickness was **16.5mm** (Zeman et al, 1988). The mean triceps skinfold was 22.2mm (s.d 8.56). The mean TST for the cases was 20.7 (s.d 7.67) which was significantly lower than that of the controls 23.7 (s.d 9.18) $p<0.05$ ($p=0.003$: Mann-Whitney test). The proportion of cases 30.4% below the standard (<16.5mm) was higher than that of the controls 26.5% Refer to Table 5.5.

The cut off point for BMI was based on the WHO (1995) classification for BMI i.e.; **>25.0 (Obese), 18.5-24.99 (Normal), 17.0-18.49 (Mild Malnutrition), 16.0-16.99 (Moderate Malnutrition), <16.0 (Severe Malnutrition).**

The mean BMI was 23.6 (s.d 4.64). The results show that 13.7% cases and 10.8% controls had chronic energy malnutrition (BMI<18.5), refer to Table 5.5. A higher proportion of cases 95.1% compared to 89.2% controls had BMI levels that were above 18.5. BMI was the only nutritional status indicator that did not show a statistical significant difference between cases and controls. Refer to Table 5.4. Fig 5.3: shows the distribution of the study population by BMI levels.

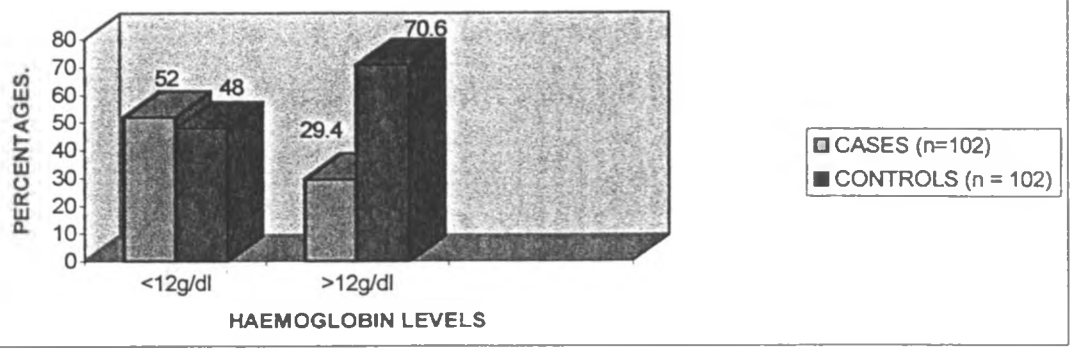
FIG. 5.3: DISTRIBUTION OF STUDY POPULATION BY BMI LEVELS.



The cut off point for Haemoglobin was **<12 g/dl** (cut off point for non-pregnant women) indicative of anaemia (UN, 1993). The mean Haemoglobin level for the study population was 12g/dl (s.d. 2.10). The prevalence of anaemia was significantly higher among cases (52%) than in the controls (48%) using the 12g/dl cut off point $p<0.05$ ($p=0.001$: Mann-whitney test).

The mean Hb for cases was significantly lower 11g/dl (s.d 2.13) compared to 12g/dl (s.d 1.89) among the controls $p<0.05$ ($p=0.001$:x^2) Refer to Table 5.4. There was a positive significant association between HB levels and total income ($r=0.21$; $p<0.05$). This implies that with more money, respondents are better placed to purchase and consume nutritious foods thereby enhancing their haemoglobin status. Fig 5.4: shows the distribution of the study population by haemoglobin levels.

FIG. 5.4: DISTRIBUTION OF STUDY POPULATION BY HAEMOGLOBIN LEVELS.



5.4: NUTRITIONAL KNOWLEDGE:

Through focus group discussions, those exposed to nutritional education had received nutrition information from the maternal child health and family planning clinics. Other sources included information from the print, voice media (T.V, radio) and were insignificant and unlikely to distort the information obtained from the clinic. With the exposure that the respondents had, it would be expected that they would make use of the knowledge to improve their nutritional status.

ATTRIBUTES OF NUTRITION KNOWLEDGE

General characteristics of nutrition knowledge were reviewed by using a scoring method to develop a nutritional knowledge index. It is evident that generally nutrition knowledge between the two study groups compared well. The term "sick" in this context refers to a person who has generally ill health and is convalescing. A total of 88% of the respondents thought that special food was necessary for sick people, of these 90% were cases and 85% controls. A small proportion of the entire study population did not know whether sick people required a special diet, while 3% while 10% did not think special food was important for sick people.

TABLE 5.6: ATTRIBUTES OF NUTRITION KNOWLEDGE CORRELATED WITH VALID RESPONSES OF RESPONDENTS TO NUTRITION KNOWLEDGE QUESTIONS

	Response %		Mean Score		
Knowledge	**Cases %**	**Controls %**	**Cases %**	**Controls %**	**P value**
Component	**(n=102)**	**(n=102)**	**(n=102)**	**(n=102)**	**x2**
Special food					
Important for sick					
People	90.2	85.3	-	-	0.24
Reported foods					
Important for sick					
People					
Carbohydrates	62.7	56.9	1.0(0.9)	1.0(1.1)	0.32
Proteins	80.4	74.5	3.3(1.4)	3.3(1.4)	0.39
Vitamins	64.7	53.9	2.1(1.7)	1.9(1.4)	0.12
Fats	0	0	-	-	-
Description of a good					
Diet					
1. Adequate in					
Amount to satisfy	12.7	13.7	-	-	
2. Balanced with all					
Food groups	76.5	75.5	-	-	
3. Do not know	10.8	10.8	-	-	0.97
Disease state and					
Change of diet					
1. Would change diet	84.3	81.4	-	-	
2. Would not change diet	15.7	18.6	-	-	0.58
Disease state and					
Important food types for					
The sick people					
Carbohydrates	51.0	53.9	1.0(0.9)	1.1(1.7)	1.00
Proteins	73.5	73.5	3.8(2.4)	3.6(1.9)	0.67
Vitamins	56.9	52.9	2.4(1.8)	2.2(1.6)	0.57
Fats	0	0	-	-	-

Important food for sick people:

The most highly reported nutrient was proteins. A higher proportion of 81% cases and 75% controls regarded proteins to be important nutrients for sick people, 63%and 57% (cases versus controls) considered carbohydrates to be important while 65% and 54% (cases versus controls) considered vitamins to be

important . Both cases and controls showed comparable results and showed no significant differences between the two study groups. Mean scores for both study groups against all nutrients were comparable. It can be noted that for both study groups fats was not mentioned as an important nutrient for sick people (Refer to Table 5.6).

Description of a good diet:

Less than one-third, 10.8% of the study population lacked knowledge on the constituents of a "good diet". Just over three quarters 76% were able to describe a "good diet" as one that should be balanced with all food groups. Approximately 13.2% thought that a good diet had to be adequate in amount in order to satisfy (Quantity). A small proportion of the study participants did not know or were unable to describe a "good diet". Refer to Table 5.6. A chi square test showed that there were no significant differences between the two groups, these were relatively similar perceptions on what they could describe as a "good diet" in both cases.

Disease state and change of diet:

A total of 84% of the cases reported that they would change their diets during illness in order to improve health status and in the long run prolong life as compared to 81.4% of the controls the differences were marginal. Only a proportion of the study participants felt that they would not change their diets but would continue with the same diets. Refer to Table 5.6.

Important food types during a terminal illness

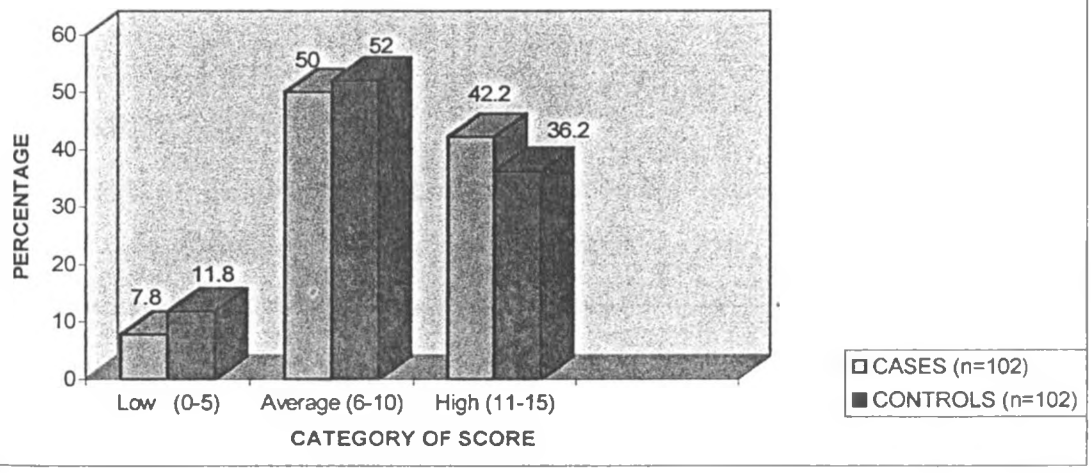
Assessment of the respondent's knowledge about nutrients important for a person during a terminal illness showed that the level of knowledge between the study groups was similar. The average the score differences between the cases and controls were marginal showing that both groups had similar level. Refer to Table 5.6. The most highly reported nutrients important during a terminal illness was proteins, 74% for cases and controls,. 51% versus 54% for carbohydrates

and 57% versus 53% for vitamins. Both cases and controls showed no significant differences. Mean scores for both study groups also showed no statistical differences. It can be noted that for both study groups, consumption of fats was not considered an important food for sick people. Refer to Table 5.6.

Assessment by total knowledge score:

The computed total knowledge score showed that the mean score for cases was higher than that of the controls. It is evident from Fig 5.4 that generally nutrition knowledge between the two study groups compared well. About 7.8% of the cases fell in the low category as compared to 11.8% of the controls. In the average category controls performed slightly better, 52.0% as compared to 50% of the cases. Whilst in the high category cases performed relatively better 42.8% as compared to 36.2% for the controls. Figure 5.5 gives a summary of the distribution.

FIG. 5.5: DISTRIBUTION OF STUDY POPULATION BY TOTAL SCORE.



Analysis by ANOVA showed that total knowledge score showed a significant association at $p < 0.05$ with lack of nutrition counselling ($p=0.02$), Constraints in dietary planning ($p=0.004$) and education in years ($p=0.004$). This could imply that if nutritional counselling was effectively provided respondents might have

been able to translate knowledge into consuming nutritious diets. Consequently if constraints such as adequate funds were addressed knowledge concerning balanced diets and consuming nutritious foods during illness would be effectively applied into practice.

5.5: NUTRITIONAL COUNSELLING:

A small proportion of the study population received nutritional counselling; this accounted for 7% cases and 8% controls. Those that received nutritional counselling 94% reported that the major information given in the counselling sessions was the food types should be eaten to improve health status. Of particular interest was that a key informant interview with the project doctor at the clinic, revealed that nutritional counselling was being provided. Despite this the majority of the respondents felt that they were not getting adequate information, this is quite evident with the high numbers 93% and 92% for cases and controls respectively that claimed they did not receive any nutritional counselling at all.

5.6 DIETARY PATTERNS:

Combinations of frequently consumed foods were determined using a food frequency questionnaire. Consumption indices for proteins, vitamins, carbohydrates and fat were calculated as suggested by Zeman et al, (1988). These indices were then compared to the daily food guide. (Appendix 6:140) which gives the recommended number of servings of different foods groups per day, that are considered adequate for non-pregnant women. The respondents were grouped into 3 groups, namely; those who consumed at adequate, moderate and inadequate levels. According to the daily food guide; the number of servings deemed adequate for carbohydrates, proteins, vitamins (which includes fruits and vegetables) and fats are: 4, 2, 2, and 1 servings respectively. The mean number of servings for each of the four main food groups by the HIV status is given below in Table 5.7.

TABLE 5.7: DISTRIBUTION OF FOOD GROUPS VERSUS NUMBER OF FOOD SERVINGS:

Food Groups	Required Number of food savings	Combined means m±s.d	Cases n=102 m±s.d	Controls n=102 m±s.d	Mann Whitney Z score	P value
Carbohydrates	4	2.0(1.1)	2.1(1.0)	2 0(1.1)	1.43	0.151
Proteins	2	1.5(1.1)	1.5(1.2)	1.5(1.0)	0.26	0.793
Vitamins	4	2.0(1.6)	2.2(1.7)	2 0(1.4)	0.898	0.368
Fats	1	1.3(0.6)	1.3(0.7)	1.4(0.6)	0.898	0.368

As indicated in Table 5.7 there was no significant difference between the cases and controls in the number of servings. Number of servings for carbohydrate and protein consumption for both study groups fell below the expected number of servings. On average both cases and controls were consuming an adequate diet. Both cases and controls were consuming half the required units of carbohydrates and two-thirds the required amount of proteins. However, the consumption of vitamins and fats were within the acceptable range for both study groups.

Nutrient adequacy of the diet:

TABLE 5.8: DISTRIBUTION OF STUDY POPULATION BY NUTRIENT ADEQUACY.

Nutrients	Cases % (n=102)	Controls % (n=102)	P value x^2
Carbohydrates			
Inadequate	70.6	69.8	
Moderate	21.6	22.6	
Adequate	7.8	7.8	0.985
Proteins			
Inadequate	56.9	56.9	
Moderate	19.6	27.5	
Adequate	23.5	15.6	0.231
Fat			
Inadequate	38.2	46.1	
Moderate	49.0	48.0	
Adequate	12.8	5.9	0.188
Vitamins			
Inadequate	45.1	52.0	
Moderate	16.7	22.5	
Adequate	38.2	25.5	0.136

Assessment of carbohydrate consumption:

Among cases and controls 70% were taking completely inadequate amounts of carbohydrates, 22% moderate amounts and only 8% were on an adequate diet of carbohydrates. The two groups were comparable.

Assessment of protein consumption:

A slightly higher proportion of cases were receiving adequate amounts of proteins 24% versus 16% of controls. However 57% of the cases and controls had inadequate amounts of protein in their diet. Analysis by chi-square shows that there were no statistical differences between the two groups.

Assessment of fat consumption:

Despite the lack of knowledge about fat as a special nutrient, about nearly half of the controls 46% compared to 38% of the cases consumed fats in their diets. A higher proportion of cases 13% versus 6% had diets that were deficient in fats. Analysis by chi-square shows that there were no statistical differences between the two groups .

Assessment of vitamin consumption:

A focus group discussion elicited that the cases consumed more vitamins to help control the body's immune system. This might explain the given trend in higher values of vitamin consumption. Cases generally consumed relatively more vitamins than controls; this accounted for 38.2% cases and 25.5% controls.

An index was developed from a combination of all foods to determine the number of respondents that consumed balanced diet. A balanced diet is defined in the text as a combination of all four nutrients in the required number of servings as stipulated by the daily food guide. From the different combinations, it became apparent that only a small proportion 28% of the study participants consumed a balanced diet, this accounted for 16% cases and 8% controls. A high proportion of both cases and controls 84% and 92% respectively consumed diets that were unbalanced. The differences between the two groups were marginal and there were no significant differences.

Constraints associated with dietary planning:

At least three quarters (75%) of the cases and controls reported that the major constraint in dietary planning for adequate and balanced meals was lack of economic power. The other reasons summarised in Table 5.9 ranged from lack of time, lack of adequate knowledge, seasonality of foodstuffs to combination of one or either of reasons stated. The other reasons given were quite comparable between the two groups. Lack of funds positively correlated to balanced diet $p<0.05$($p=0.0045$: Mann-whitney test) this means that individuals with a poor income are more likely unable to afford a balanced diet.

Lack of funds also negatively correlated with haemoglobin level at $p<0.05$($p=0.018$: Mann-whitney test) suggesting that without adequate funds the

respondent's were unable to purchase and consume nutritious foods to enhance their haemoglobin status.

TABLE 5.9: DISTRIBUTION OF THE STUDY POPULATION BY CONSTRAINTS IN DIETARY PLANNING:

Reason Given	Cases % (n=102)	control (n=102)
Lack of time	8.8	8.8
Lack of adequate fund	75.5	75.0
Lack of adequate knowledge	2.0	2.0
Seasonality of foodstuffs	1.7	1.7
Lack of funds + Seasonality of foodstuffs	5.8	6.5
Lack of funds + Lack of knowledge	6.2	6.0

P value X^2: 0.764

5.7: FACTORS ASSOCIATED WITH GOOD NUTRITIONAL KNOWLEDGE AND ADEQUATE DIETARY INTAKE:

5.7.1: FOOD INTAKE PATTERNS AND RELATED FACTORS:

About 59% of the respondents reported that they had poor appetites, 24% reported moderate appetites, while 18% reported that they had good (normal) appetites. The differences between the two groups were not significant as shown in the Table 5.10.

TABLE 5.10: DISTRIBUTION OF THE STUDY POPULATION BY APPETITE.

Description of Appetite	Cases % (n=102)	Controls %(n=102)
Poor	60.8	56.9
Moderate	23.5	31.8
Good	5.7	11.8

P value X^2; 0.065

Table 5.10 shows that 6% cases reported good appetite as compared to 12% controls. The proportion that reported poor appetites was high in both study groups. On analysis by ANOVA with the nutritional status indicators appetite was found to have a significant association with SST, TST and MUAC (Refer to Table 5.11). This significant association was only noted in cases. TST and SST which are measurements that portray amount and distribution of subcutaneous fat while MUAC which portray cardinal features of protein-calorie malnutrition, measurements showed statistical significant levels implying that respondents with poor appetite were likely to have a poor nutritional status because they might have limited intake that could result in poor storage of subcutaneous fat. BMI and HB levels did not however shows any significant association with appetite.

TABLE 5.11: ASSOCIATION BETWEEN APPETITE AND SELECTED NUTRITIONAL STATUS INDICES:

Nutritional Status	Cases % (n=102)		Controls % (n=102)	
Indicators	F value	P value	F value	P value
HB	0.516	0.598	0.621	0.94
SST	2.583	0.038*	0.527	0.591
TST	3.811	0.024*	0.807	0.448
MUAC	0.585	0.019*	0.029	0.971
BMI	1.955	0.144	0.14	0.869

* P value statistical significance at $p<0.05$ (ANOVA)

5.7.2: REPORTED MORBIDITIES:

About 18.1% of the respondents, reported having been ill in less than 7 days of whom 15% were cases and 21.6% were controls. About 22% of the respondents reported having been ill between one to two weeks of which 40% were cases and 35% were controls.

Table 5.12 gives a summary of the information obtained. The proportion of ill cases was 55% and was slightly higher than that of the controls, which accounted for 46%.

TABLE 5.12: DISTRIBUTION OF THE STUDY POPULATION BY REPORTED MORBIDITIES:

Percentages	Cases % (n=102)	Controls % (n=102)
Fever	10.6	8.6
Malaria	15.8	13.8
Cough	25.2	15.2
Diarrhoea	11.4	3.4
Headache	5.4	10.4
Skin disease	14.0	4.3
Body , aches and pain	4.3	13.3
ENT (Problems)	7.8	7.8
Backache	1.2	13.6
Others	4.3	9.6

P Value X^2; 0.691

The most prevalent illness was cough, which accounted for 25% for cases and 15% for controls. Malaria was also a prevalent illness among the cases, which accounted from 16% as compared to 14% for the controls(Malaria was determined by a laboratory test and diagnosed by the Project doctor). The other category of illnesses included minor ailments such as colds, lymphodenopathy, mouth ulcers and night sweats, which all accounted for 7%. On analysis maternal

illness by chi-square was found to be statistically significant $p<0.05(p=0.001)$ with CD_4^+ cell counts for the cases T cells in the event of an infection occurring in the body are produced to fight the infection, hence the reason why $CD4^+$ cells will tend to be lower when a person is ill.

Haemoglobin levels was also found to be statistically significant by malaria at $p<0.05(p=0.002$: Mann-whitney test) implying that infection with malaria could predispose the respondent to anaemia. Illness was associated with nutritional status using triceps skinfold thickness and subscapula skinfold thickness at statistically significant levels $p<0.05(p=0.003$: Mann-whitney test) and ($p=0.004$: Mann-whitney test) respectively. The other indices of nutritional status did not show any statistically significance. Illness was found not to affect nutritional knowledge, analysis by Chi-square showed no significant differences.

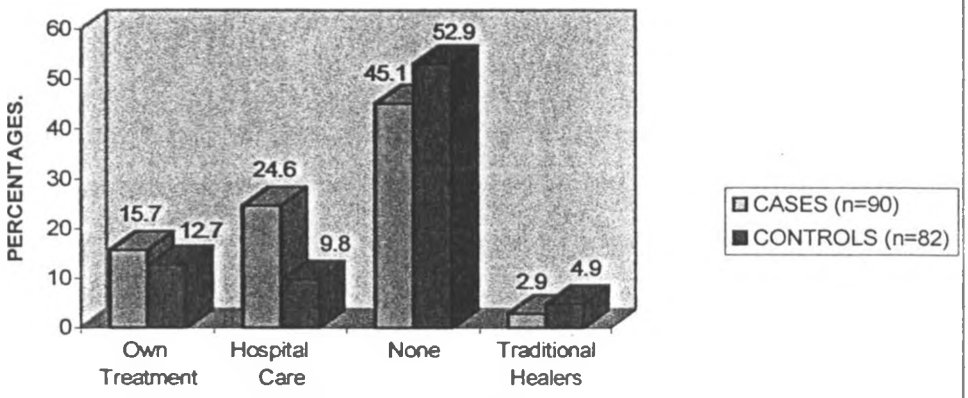
5.7.3. POOR UTILISATION OF MEDICAL CARE:

Majority of the study population who were ill sought some form of treatment. A large percentage; 45% cases and 53% (controls) were ill but did not get any form of treatment. As indicated in Figure 5.5, a proportion of controls 53% and 45% cases opted not to seek treatment when ill while a large number of cases 25% sought medical attention as compared to 9.8% of the controls. About 24% of the malnourished cases did not seek any healthcare when sick as opposed to 10% of the controls. Failure to seek any form of health care when one was ill, was associated with triceps skinfold thickness and subscapula skinfold thickness at $p<0.05$ ($p=0.043$) [($p=0.032$): Mann-whitney test] respectively. This implied that, because of no intervention, the illness was bound to predispose one to malnutrition, by causing loss of body reserves.

Focus group discussion elicited that many HIV respondents did not see the importance of maintaining regular clinic visits to monitor their health status. The clinic showed a high loss to follow up and drop at rate, from the parent study.

The attributable reason for this was the lack of adequate counselling to patients on the importance of regular follow up to monitor health status and importance of treating opportunistic infections immediately they occur. Many of the respondents gave the excuse that the incentives given to participate in the parent study were not motivating enough.

FIG. 5.6: DISTRIBUTION OF STUDY POPULATION BY HEALTH SEEKING BEHAVIOUR.



5.7.4: SOCIO-ECONOMIC STATUS:

There were no significant differences in the two study, groups in terms of income. However when money spent on food was correlated to the nutritional status indices the cases showed a positive association and had statistically significant differences at ($p<0.05$). This implies that money spent on food directly affects the nutritional status, the less money spent on food the poorer the nutritional status. Table 5.13 shows a summary of the information obtained.

TABLE 5.13: ASSOCIATION BETWEEN NUTRITIONAL STATUS AND PROPORTION OF MONEY SPENT ON FOOD:

Nutrients Status	Cases % (n=102)		Controls % (n=102)	
Indicators	Correlation Coefficient	P value	Correlation Coefficient	P value
HB	0.017*	0.01*	1.610	1.230
SST	0.2666*	0.01*	1.887	2.246
TSF	0.3280**	0.001**	1.844	2.108
MUAC	0.2712**	0.01*	2.013	4.222
BMI	0.1983	-	1.657	1.243

* P value statistical significant P<0.05

* P value statistical significant at P<0.001

It can be noted that all nutritional status indices apart from BMI for cases showed significant differences as compared to the control group. This implies that an income directly affects dietary intake, and being HIV positive could make one more prone to malnutrition as compared to being normal due to dietary intake.

Nutritional knowledge was not found to be affected by socio-economic status, analysis by chi-square showed no significant differences between the two study groups.

The mean total household income from employment and other income generating activities per month were about Kshs. 4774 (s.d. 3500). The mean household income of the two groups was comparable and the differences were marginal. Kshs. 4575 and Kshs. 4972 for the cases and controls respectively.

Majority of the respondents belonged to the middle income level (according to the Income Classification 1994 (GOK,1994-Appendix 7:141) . Socio-economic status in terms of total income groups was positively associated with haemoglobin levels at statistically significant level (p=0.012: Mann-whitney

test). Using the Mann-whitney test, balanced diet was found to associate with total amount of income at a statistically significant level $p<0.05$ ($p=0.001$). This implies that with more money, respondents would be more better placed to purchase and consume more nutritious foods there by consuming adequate diets both in quality and variety.

5.8: NUTRITIONAL ADJUSTMENTS:

Focus group discussions were conducted on randomly selected HIV respondents, to elicit information on the probable nutritional adjustments the HIV positive respondents might have made and reasons why decisions of that nature were made subsequent to knowing their present serostatus. Nutritional adjustments that had been made as a result of respondents knowledge on HIV status were generally minimal in terms of quality of food consumed as compared to quantity. Approximately 90% of the respondents felt that change might have been effect, but the main shortfall was low incomes. Hence they were finding it difficult to translate knowledge to appropriate behaviour change.

In general, (Refer to Appendix 5:139) about 90% of the respondents felt that a "good diet" should be balanced and should contain protein, carbohydrates, vitamins and minerals. This shows that respondents had general knowledge as what basic nutrients required were to comprise a "good diet". About 90% could also comprehend the general functions of the specific nutrients. This information elicited, showed that again a high proportion had obtained this information from antenatal and family planning clinics and not from nutritional counselling at the clinic.

It was noted that most respondents felt that an increase in vitamin and mineral dietary intake was necessary . Majority felt that these nutrients were essential to help protect the body from minor recurrent infections such as colds, and skin infections. Intake of vitamin supplementation was negligible, only 2% took

vitamin supplements the rest 98% reported that they did not know the importance of supplementation.

Majority of the respondents felt that since the body had an infection it was important to eat a well balanced diet to fight minor infection such as colds, skin infections and also to avoid "loss of body weight" so as not to look "so thin". Many of the respondents were concerned about their outward appearance. They did not want the people around them to think that they were "too thin" because they would know they were sick.

On nutritional counselling 90% felt they were not getting adequate information or counselling from the clinic but had obtained information concerning nutrition from the books, radio and other forms of media.

The majority over 90%, also felt that money was the limiting factor towards application of nutrition practices. Many expressed the views (and I quote) "food is expensive and requires money" and yet it is the cheapest alternative, if you cannot afford medicine (vitamin supplements).

The majority 90% of the respondents had found suitable measures to cope with the illness, such as a positive attitude, prayer, and taking part in group therapy sessions to comfort one another. These measures have helped them try to accept their fate and remain positive in the prognosis of their infection.

Certain foods were quite commonly consumed among the respondents; these were sour milk (maziwa lala or mala) garlic, ginger, onions. These foods are believed to contain components that help to reduce oral thrush, vaginal discharge and infection of the gums and hence were consumed on a higher scale. Fat was averted on a high scale, about 95% of the respondents agreed that they had a

reduced intake of fats because it was associated to diarrhoea. Table 5.14 gives a summary of the common food types consumed and reasons given.

TABLE 5.14 : COMMON FOOD TYPES CONSUMED AMONG HIV POSITIVE RESPONDENTS.

Food Types	Reported functions.
Onions	Prevents diarrhoea.
Fruits / Green vegetables	Strengthens immune system.
Garlic	Can be eaten raw or cooked – helps to strengthen the immune system and helps to fight infections.
Garlic Implants	As an anal or vaginal implant, good for diarrhoea, weight loss, herpes and inflammations. Good for treatment of STDs.
Garlic ointment	Made from a mixture of garlic and oil (vaseline). Good for cold sores, can be applied on the skin for skin infections and in treatment of Candida.
Fermented milk	More digestible than milk. Makes proteins source available to the body. Helps to reduce nausea.
Lemons	Aids in digestion of fats
Fermented porridge / Malted/Sprouting beans	Easy to digest. Helps in digestion and prevents diarrhoea. Helps to reduce nausea.

A case study was carried out, information elicited generally shows typical features among the HIV group.

CASE STUDY:

AMINA:

At the time of this interview, Amina (not her real name), a 41 year old divorced mother of three, was living within the Pumwani / Majengo slum area. She has had her children in her custody since, she was divorced.

Amina has only attained adult literacy education. she has had no steady form of employment and has survived on petty trade especially vegetable vending and selling of second hand clothes. She used to engage in commercial sex but has since stopped since she knew her serostatus to avoid reinfection. Amina has been a patient at the clinic for the last five years .

Amina is very interested in knowing what she should do to keep well and healthy, she has received quite a lot of information from the radio and she attends group counselling for HIV women in the slum organised by a Christian organisation. Amina however feels she does not obtain the information she really requires from the clinic. Any nutrition information she has obtained from the "counselling session" is minimal as this is not a major concern of these sessions. She expects to get some information from the doctors at the clinic because "they should know".

However, Amina knows that a "good diet" should be balanced and should contain proteins, carbohydrates, vitamins and minerals. In addition, Amina has increased the use of garlic and sour milk because she has learnt that these foods contain components that help keep off infections. She tries to maintain a rich diet , but the limiting factor is a low income, and her family needs have to come before her very own.

CHAPTER 6

DISCUSSIONS:

6.0: INTRODUCTION:

This study was carried on asymptomatic HIV-1 Seropositive and HIV-1 Seronegative women in Nairobi and was aimed at establishing factors related to dietary patterns and those significantly impinging on maternal nutritional status in the two groups. The findings are deemed to be important to the Government and NGO's involved in HIV/AIDS programmes in Kenya.

6.1: SOCIAL DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION:

The participants in this study were relatively young (mean age 30 years), majority of the participants comprised of the 20 - 24 years and 25 - 29 year's age bracket. A high majority of the cases in particular represented the 20-29 age group this is the age that has shown to be vulnerable to HIV infection and is currently contributing to the high mortality and morbidity of HIV infection in women in Kenya (USAID, AIDSCAP, FHI, 1997). Seropositve women tend to be younger than the seronegative women. The age distribution of the cases shows a gradual-decreasing trend as compared to that of controls. A total of 23% controls comprised the 20 – 29 years age bracket compared to 26% of the cases. Although this trend did not show any statistical significance, it is consistent with observations in other studies that women become infected with HIV at a very young age. (UNDP, 1995)

One such gender and age desegregated study in Zambia 1986, revealed that one in ten women attending antenatal clinics was infected with HIV. Among these, one in four women of those aged 20 – 25 years was HIV infected (UNDP, 1995). In another similar study in Zaire, 1984 data showed that women diagnosed with HIV were on average ten years younger than men and there was a sharp peak in AIDS cases in younger women 20 – 29 years old (UNDP, 1995). These data set reveals disturbing patterns that the infection profile by age has a precipitous peak in the age group 20 – 29 and declines for older pre-menopausal age group as implied by this study. Factors that are likely to increase risk of exposure to HIV infection are lack of affordable health care, low levels of literacy, women's access to cash economy, cultural restrictions and nutritional status (UNDP, 1995). Some of these factors have also been implied in this study. Another factor also implied in this study, is that HIV positive women were either widowed, separated or single and younger in age. This means that many of these women are more likely to be heads of house holds at younger age. Implying that they are more vulnerable to the loss of a steady income because of their disease state at an early age. If and when this happens the impact on their nutritional security may be devastating.

Education levels of the respondents were low, with majority 55.4% having only attained primary school education (7-years), and was correlated to HIV status. It can be implied by data that, majority in both study groups could not have been able to proceed with their education and may have dropped out of school before completing their education given that a high proportion were married, this accounted for 48% cases and 60.8% controls respectively, this showed a significant difference $p<0.05$ ($p=0.034$: Mann Whitney test). According to the 1993 KDHS, school dropout rate in Nairobi among the low-income groups is very high especially at primary level mainly because of early pregnancies and lack of school fees. The limited education means that the women have fewer skills to enable them to attain wage employment. It is not surprising that only one - fifth were in wage employment. Although higher education levels have

been associated with improved socio-economic status, implying better living conditions which should in turn lead to high levels of nutritional status (Huffman, 1984). This study population were largely in self employment, 28% cases and 32% controls respectively, were engaged in, small income generating activities and petty hawking like vegetable vending, selling of second hand clothes, sale of cooked food products, selling of paraffin and charcoal. This kind of employment is expected to generate low incomes.

Poverty, coupled with limited education and petty trading although classified as middle - income, and the fact that majority of the participants were spending 80% of the income on food implies that they are economically vulnerable. Little income is left for other needs such as rent, healthcare , children's education or for saving. Since the type of employment is labour intensive it could easily collapse if an individual is ill and unable to work. This is especially the case for the seropositive participants.

The household sizes had a mean size of 4. Household size for cases was found to be statistically significant to HIV status, implying that most cases might have lost a family member either child or husband owing to the disease. Most HIV respondents have decided not to enlarge their families because of the consequences of transmission of HIV to the unborn child.

6.2: HIV INFECTION AND IMMUNOSUPPRESSION STATUS:

All respondents were serologically examined for HIV. Current CD_4^+ / CD_8^+ cell counts, were also done to determine counts at the respective point in time.

The HIV seropositive women had low CD_4/CD_8 ratio as well as low CD_8 cell counts and elevated CD_8 cell counts. This is consistents with their HIV infection status. The low T cell counts indicate that many of them were

immunosuppressed and thus vulnerable to opportunistic infections (Ho et al, 1987).

The possible implication for these high values in the cases could be that HIV selectively replicates in the CD_4^+ T cell lymphocyte but not in any other lymphocytes . The CD_4^+ T cell in the body provides a receptor site for HIV, and often specific binding to the target cell, HIV enters the cell, and is uncoated, it is believed that transcription and replication take place. Once this happens, the CD_4^+ T cells are killed and the whole process results in a significant loss of helper / inducer subset of T lympholytes (Ho et al, 1987). Because the CD_4^+ T cells play a focal point in the regulation of virtually all human immune responses that are mediated by B Cells, monocyte, macrophages, Cytotoxic T Cells, suppressers T Cells and natural killer cells (NK), there is subsequent eradication of CD_4^+ T cells which results in, low CD_4^+ T cells and global immunosuppression that renders the individual susceptible to a host of opportunistic infections (Devita et al, 1992).

6.3: NUTRITIONAL STATUS OF THE RESPONDENTS:

All the participants probably acquired HIV infection after they had achieved their normal skeletal growth. It is therefore it is not surprising that only a small proportion had small stature <1.45cm. Only 3% of the study participants, 1% and 4% controls had height <1.45m respectively.

In this study, the seropositive women had an overall poorer nutritional status compared to the seronegative women using the indicators of MUAC, TST, SST and Haemoglobin but not by BMI, MUAC, TST,SST, and Haemoglobin have shown themselves as very sensitive indicators. Physiological response during infection decreases energy intake there arises need to catabolise body stores. Data from this study reveals that respondents from both study groups were within normal limits, no severe weight loss had been experienced as yet and

hence serious intervention measures if instituted early in the disease might help prevent further weight loss.

MUAC is a useful screening for reflecting maternal fat and lean body tissue. The poor nutritional status as depicted by MUAC measurements indicates a drain on depot energy to supplement inadequate dietary intake of the study population 60% fell below 90% of the standard (<25.7cm) (Jelliffe, 1966). This comprised of 30% for both cases and controls. This is not a surprising finding because in this study, dietary adequacy of the respondents was poor in both groups and notably deficient in carbohydrates which is an important energy source. Although the proportion falling below 90% standard was similar in both groups, the cases had significantly lower mean MUAC . This could imply that loss of fat tissue tends to set in early in the disease. Poor nutritional status by MUAC measurements indicate a drain on energy to supplement inadequate energy intake. In this study, dietary adequacy of the carbohydrates and fats, which are a main source of energy, were much lower in cases than in controls.

Subscapula skinfold thickness and Triceps skinfold thickness also showed that approximately 25.0% and 24.5% respectively of the respondents fell below the 90% standard (<12.1mm) and (<14.9mm) respectively (Jelliffe, 1966). Both skinfold thickness measurements show that although there were some fat deposits respondents were still malnourished.

Findings from the 1993 demographic health survey indicate that Mean BMI for mother's in Kenya is 22. The mean BMI for the study respondents was 23. The prevalence of the study population with BMI <18.5 (chronic under nutrition) was 11.8% of whom 12.7% were cases and 10.8% controls. BMI is the only indicator in this study that showed respondents were within normal limits, data from both study groups showed that results were comparable and there were no

significance differences. This suggest that BMI is a less sensitive indicator compared to TST and SST.

Studies by WHO, have indicated that anaemia prevalence rates in developing countries is estimated at 42%. The prevalence of anaemia (<12 g/dl) in the study cohort was 55.7% which is high, more than half of the respondents had anaemia and this accounted for 52% cases and 48% controls. This points to micronutrient deficiencies in the diets of the study respondents. In this study we did not carry out a nutrient analysis, however diets that are adequate in proteins and vitamins are usually adequate in micronutrients. In this study population the diets were relatively poor, inadequate or deficient in proteins and vitamins which implies micronutrient deficiencies. Income spent on food also showed a positive association with anaemia implying that increase in incomes is likely to have a positive influence on dietary intake.

The findings of iron deficiency are significant. The role of iron in the immune function is well known, Iron is an essential component of haemoglobin and many enzymes. Iron deficiency is associated with impaired cell, mediated immunity and specifically depressed number of T – Cells. This suggests that in HIV infection, a deficiency of iron, could seriously impair immunity and lead to a compromised health status. The high rate of anaemia in the study group might suggest that the HIV respondents will be more prone to opportunistic infections if the deficiencies are not reduced.

Majority of the cases, 50% with CD_4^+ T lymphocytes ranging from 200 – 300 Cells/mm^3 had anaemia, implying a possible relationship between anaemia and depressed number of T lymphocytes. This is not surprising because HIV infects the germ cells in the bone marrow and causes a panncytoxemia. In addition women with depressed immune function have repeated infection that results in inadequate dietary intake and utilising. In support of this premises is the

observation that Iron – foliate supplementation, studies (World Bank, 1993B) among anaemia HIV positive women have been shown to bring marked improvements in general health status of women. This could be one aspect that requires to be looked into in Kenya.

6.4: NUTRITIONAL KNOWLEDGE:

Seropositive and seronegate women had reasonable knowledge about nutrition. They had the basic information on what a balanced diet is and what it should comprise of. The study population of whom were 84.3% cases and 81.4% were controls felt that change of diet would be an important intervention, in the event they knew they had a terminal disease such as HIV, to improve health and nutrition status. The participants noted that the main stumbling block, to effecting such change, was low incomes. Other studies have demonstrated that nutritional knowledge alone does not necessarily translate into better nutritional status, other intervening variables such as income have to be dealt with (Horweg and Niemeijer, 1980).

Knowledge might be there, but may not translate into actual practice could be difficult because of factors such as lack of nutrition counselling in the case of HIV patients, socio-economic status, seasonality of food and availability (accessibility). What is evident is that unless socio-economic status improves simultaneously, women may not be able to put into practice all they know. But in order to best utilise their limited nutritional and health resources to enhance their status, it is still essential that adequate nutritional knowledge and counselling is provided.

6.5: DIETARY PATTERNS AND DIETARY ADEQUACY:

Dietary intake reflected the nutritional knowledge. The study population only received half the required serving of carbohydrate, three - quarters receiving the

required amounts of protein and vitamins, while most of them received adequate servings of fat. In keeping with these observations a large proportion of cases and control had inadequate in take of all the nutrients. Diets for the study population were generally deficient in proteins, carbohydrates and relatively adequate in fats and vitamins for both study groups. This meant that diets did not adequately meet the nutritional needs of the respondents. This was seen to be reflected in the nutritional status of both study groups. Many studies among women in underdeveloped countries have documented the same fact that Caloric intake of women is often low. Deficiencies in caloric intake are common regardless of physiologic status. (World Bank, 1992). Where intakes are reported by income, low-income women still appear to consume less than their middle and high-income counterparts. Women generally meet a small percentage of their current recommended daily requirements than men (World Bank, 1992).

HIV seropositive women were vulnerable nutritionally, the association of nutritional status with appetite and reports of illness and amount of money spent on food. Suggest that human beings have tremendous resilience to withstand inadequate nutritional intake. Seronegative Women were well nourished inspite of in adequate intake, However when there is chronic illness such as HIV, individuals loose this resilience and in this instance inadequate nutritional intake illness or loss of appetite have significant impact. Most often, anorexia occurs as a result of drug -induced side affects from treatment the HIV Infection or may be due to gastrointestinal disturbances, malignancies, and psycho social factors (Beal et al, 1995).

HIV/AIDS patients require an extra margin of nutrients to help maintain body weight and appearance (Peck et al, 1990; Hanna, 1994). Hence diets should be well balanced and contain extra nutrients to help meet the extra needs of the body at the time of infection. Keeping the body healthy ultimately reduces

episodes of recurrent opportunistic infections. Proper nutrition is the best choice as compared to excessive intake of food supplements whose intake might have side effects Leslie et al, (1993) found that the major factor seen to have attributed to inadequacy of diets was low socio-economic status which tended to hamper the purchase and consumption of adequate quantities of nutritious foods. This was quite evident in this study, since anaemia was also prevalent and the attributable factor was income, folate - iron tablets could be given as a way of supplement iron in women's diets.

6.6: FACTORS AFFECTING DIETARY INTAKE AND NUTRITION KNOWLEDGE:

Interaction of nutrition and illness

The prevalence of reported morbidity was quite high, approximately 55% for cases and 46.1% for controls. Maternal illness was significantly associated with maternal nutritional status at $p < 0.05$ and more of the malnourished respondents reported having been sick. Malnutrition may dispose one to infections and other illness. Maternal illness was found to be associated to TST ($p=0.003$: Man Whitney) and SST ($p=0.004$: Mann Whitney test) implying that illness may cause a breakdown of stored fat tissue to provide energy in the event of an illness. The synergistic relationship between health and nutrition is evident, malnutrition increases an individual's vulnerability to disease and heightens the severity of the disease (Baker et al, 1996).

Maternal illness by HIV status was significantly associated with appetite at $p<0.05$ for cases ($p=0.0033$: Mann Whitney test) and not controls. In HIV, one of the contributory factors to loss of appetite or alterations of taste perception is oral candidiasis which has been found to be a common feature of immnodeficiency (Peck et al ,1990). Oral candidaisis tend to grow over taste buds altering taste perception. There is a line of thought that ***Lactobacillus bifidus*** in unpasteurised natural yoghurt may help to prevent colonisation of this

organism. Cold yoghurt may relieve the sore area and act locally on candida, although drugs should also be used systematically (Peck et al, 1990). Other complications likely to affect appetite due to disease state is Kaposi sarcoma of the palate, which can cause an exceptionally sore mouth and swallowing difficulties. Treatment by prophylaxisis, chemotherpy can be used but have been known to cause nausea and precipitate sickness (Peck et al, 1990).

Patients experiencing nausea or loss of appetite should be encouraged to eat, small frequent portions but try to avoid food withholding due to the way they are feeling. Foods with excessive amounts of fats, should be avoided as they only exacerbate "feeling of fullness", nausea and or may alter the taste of food. Focus group discussions elicited that yoghurt (fermented milk; Maziwa mala or lala) and malted food products such as beans were commonly eaten because through experience respondents had found that these foods helped to reduce feelings of nausea, were easy to chew and digest, helped to ease the discomfort in the mouth caused by oral candidiasis and reduce incidences of diarrhoea and excessive flatulence. Scientifically, fermenting or malting are used to prepare high concentrates of flour products and food products because these processes' help to increase iron and zinc absorption which are crucial nutrients especially for HIV positive patients (Aids Action, 1995).

Maternal illness was also found to be statistically significant to CD_4^+ levels $p<0.05$ ($p=0.001$ using Mann Whitney test). This trend of illness was expected to cause a drop in CD_4^+ because T cells are produced in the event of an infection to fight the disease. In HIV a marked reduction in CD4+ T Cells decreases by about 40 to 80 cells /mm^3 per year, the rate of decline of course varies widely in individuals. (Devita et al, 1992). Reduction in CD4+ T cells (primary known as T lymphocytes) has been known to occur due to the occurrence of opportunistic diseases. Basically T lymphocytes are produced for the express purpose of regulation of immunologic function. HIV infection transcripts the immune cells,

causing cell death hence a reduction of the CD4+ T cells. Data from this study implies that the cases who seemed to manifest more illness, were more at risk of developing opportunistic infections which would compromise health status.

Malaria was the second most prevalent illness. Malaria prevalence accounted for 15% of the study population. It was highest among the cases 16% as compared to 14% for controls, differences were not significant. Haemoglobin levels were found to be statistically significant to malaria. Implying that malaria was likely to predispose one to anaemia if untreated and hence affect the nutritional status. Malaria, tends to worsen women's nutritional status, since it destroys red blood cells resulting in anaemia. Approximately 75% of women in sub-saharan Africa live in malaria endemic areas (Baker et al, 1996). The prevalence of anaemia among women in Kenya is quite high, a study by Kibunguchi et al (1991) reveals that approximately 40% of all women non- pregnant women admitted at Kenyatta National Hospital (Nairobi) had low haemoglobin levels (<12 g/dl).

Study data reveals that prevalence of anaemia among the cases was reasonably high 52.0% as opposed to 48% for the controls. Studies have shown that there is a strong correlation between HIV/AIDS and anaemia (Leslie 1995). Clinically significant hematologic abnormalities are common in persons with human immunodeficiency virus. Impaired hematopoises, immune – mediated cytopeniasis and altered coagulation mechanisms have been seen in HIV – infected persons. These abnormalities occur as a result of HIV itself or as a sequelae of HIV – related opportunistic infections, or as a result of therapies employed in the treatment of HIV (Devita et al, 1992).

In a study of patients receiving no myelasuppressive therapies, 8% of asymptomatic HIV seropositive patients, and 20% of patients with AIDS – related conditions (ARC), and 71% patients with AIDS were anaemic. Investigations of a cohort from a longitudinal study found that 18% of the HIV-

seropositive patients, 50% of the patients with Aids related complex (ARC), and 75% of those with AIDS had anaemia. This study also found that 3.2% of the HIV seropositive patients with mean CD_4^+ T lymphocyte cells counts of greater than 700 cells /mm^3 were also anaemic, where as 20% of those with mean CD_4^+ T lymphocyte cells <249 cells /mm^3 were anaemic. This study had similar implication, 50% of the cases with CD_4^+ T lymphocyte cells <200 and 200 – 300 cells /mm^3 had anaemia, while only 38% of cases who had CD_4^+ T lymphocyte >500 cells /mm^3 had anaemia. For the control group, only 2% of those with CD_4^+ T lymphocyte 200-500 cells/mm3 had anaemia as compared to 10% of those who had CD_4^+ T lymphocytes, >500 cells/mm3. This shows that HIV is likely to dispose one to anaemia, it is therefore important that diets should provide nutrients that will help the patients improve their nutrition status. Study results reflect that dietary intake of proteins and vitamins were inadequate to meet nutritional needs, this could imply that the probable reason for high prevalence of anaemia among the cases which might be diet or disease related.

Data shows that high prevalence of anaemia in the HIV group could be attributed to the disease state. Other studies have found that anaemia is associated with HIV infection. Most patients with advanced HIV disease have at least mild changes in red blood cell size and shape. Anaemia has also been seen to be drug-induced, in cases where Ziovudine has been used to treat HIV infection. Other causes of anaemia in HIV could be bone marrow infections, presence of gastrointestinal bleeding (Devita et al, 1992). Anaemia was found to be associated to income this implies the correlation between anaemia and income $p<0.05$ ($r=0.21$; $p=0.001$) that with more income, respondents would be better placed to purchase and consume nutritious foods thereby enhancing their haemoglobin status.

Prolonged morbidity could also have predisposed these respondents to malnutrition as results indicate that most of the malnourished women had been

sick for more than one week. Infections increase the rate of metabolism and the breakdown of tissue and so create a need for extra nutrients. Accompanying fever usually depresses appetite, and when the infection affects the function of the gastro-intestinal tract, absorption of nutrients is impaired. If the infection is prolonged, or there are repeated attacks, severe malnutrition may set in (Passmore et al, 1987).

The worrying trend was that of health seeking behaviour. Despite the high prevalence of morbidity, 45% of cases and 53% controls did not get any form of treatment when ill. A small proportion sought traditional medication while 16% cases and 13% controls resorted to their own medication, which is a dangerous practise but is often practised because of the cost of health care. Results indicate that morbidity was high in cases than in controls; but hospital attendance in controls was poor, 53% of the controls opted not to get any form of medical attention when ill. The small difference between the two study groups could imply that cases acted more promptly to seek medical attention than controls. It is crucial for patients especially those who are HIV positive to seek medical attention as soon as opportunistic infections arise to avoid these infection from compromising their health and nutrition status.

Given the low incomes, it become apparent that, respondents were not seeking medical care because of the costs involved. What was a surprising trend was that the research clinic does offer free medication, asked why they did not indulge the free service the general complaint by 80% of the patients was that essentially the drugs given were not "very good in their opinion",(low quality drugs) "they kept being given the same drugs that did not work".

The results indicate that 30% of the respondents of whom 29% cases and 324% controls were engaged in self-employment. Majority of the respondent belonged to the middle income group but this is not reflected of their nutritional status and

residence that respondents lived in. Although total percentage of money spent on food was high, implying that most families spent most of their income on food, diets were still grossly deficient in nutrients. The main handicap towards affording nutritious and balanced diets was income. The proportion of money spent on food was found to be associated with all nutritional status indicators SST, TST, MUAC and HB apart from BMI. This was especially so for cases. This implies that income directly affects dietary intake. HIV infection necessitates the need for a balanced diet and a safety margin to meet the extra body needs (Peck et al, 1990). HIV infected people need to be encouraged to eat well balanced diets, and in extra amounts to meet the needs for physiological stress, that their bodies undergo during phase of infection (Peck et al, 1990).

Nutritional Knowledge

This study found that nutritional knowledge was directly affected by socio-economic status and education in years implying that educated women are more likely to make better informed decisions concerning nutrition related matters than uneducated w omen.

Nutrition knowledge was found to compare quite well between cases and controls. Low incomes were found to be statistically significant with nutrition knowledge $p<0.05$. Analysis by ANOVA showed that knowledge was associated to lack of nutritional counselling especially for cases ($r=0.21$;$p=0.023$) but did not show any association with nutritional counselling ($r=0.42$; $p=0.14$) for controls. Results imply that nutritional counselling directly affects dietary and feeding behaviour practices HIV positive women. If respondents were provided with adequate nutritional counselling they might be able to translate knowledge into practice i.e. consuming nutritious foods and thereby improve their nutritional status.

Nutritional knowledge was also found to associate significantly with education in years $p<0.05$ ($p=0.004$: Mann Whitney test) implying that with higher education levels, there would be a better understanding and probably better response to nutrition related issues. However, when all is said and done, for women to effectively translate knowledge into practice; education or nutrition counselling may not effectively facilitate translation of knowledge into practise unless enabling factors are provided.

6.7: NUTRITIONAL COUNSELLING

Nutritional counselling has been viewed in many studies as an area in the management of the HIV, that can help HIV patients have complete control of their prognosis (Hanna, 1994). Studies have also shown (Mckinley et al, 1993) that early referral of HIV positive patients to a dietician helps the patient identify gross counter productive dietary habits, helps to provide the patient with relevant information about interactions of the disease and nutrition. These early interventions, have been seen to help patients make informed decisions about their health and has helped improve HIV positive people to improve their nutritional status.

This study found that nutritional counselling was not being offered *per se* in the maternal child health clinic. Spot checks, within main government hospitals in Nairobi such as Kenyatta National Hospitals, IDH (Infectious disease hospital Mbagathi), City Council maternal child health clinics showed that nutritional counselling was not being offered at all. This study results confirm that even the low numbers that were thought to receive "nutritional counselling", could not clearly define the concept nutritional counselling adequately- the term to them remained questionable - even when the term had been clearly defined. It is suffice to conclude that this area needs to be explored further.

6.8: NUTRITIONAL ADJUSTMENTS:

Nutrition adjustments that had been made by the HIV patients were minimal. Most of the adjustments made were either as a result of what patients had learnt themselves through their own dietary experience, or as a result of information they may have acquired from MCH clinics, radio or print media. Over all no nutritional counselling per se was being offered at the MCH clinics.

Use of fermented foodstuffs such as porridge or milk was common among the HIV patients. The process of fermentation results in beneficial nutrients in the product. Fermentation not only preserves food for later consumption, it also transforms the product so that foods are more desirable and nutrition value is enhanced (Wilson, 1985). Fermentation process of milk or floor products (such as sorghum, millet or maize) enhances nutritional quality of food by driving the minerals especially (calcium, zinc, iron or sodium), vitamins (B complex Group B_1, B_2, B_6 and B_{12}) and proteins (lysine an amino acid) from the flour so that they become available to the consumer after the fermentation and cooking process (Wilson 1985). Fermentation also, makes food easily digestible and the process of culturing of microbes also provides microbes useful to the body to maintain digestive flora (Wilson, 1985).

Sprouting or malting is closely related to fermentation and was a method also commonly used among the HIV patients. Both legumes (beans) and grains (maize) were normally used for this purpose. Grains (maize) were preserved in moist conditions for a few days until they began to sprout and then cooked or ground. This process enhances the availability of nutrients chiefly B vitamins (AIDS Action, 1995).

The use of garlic and onions was also very common. Garlic was used either fresh (raw) or used to make vaginal or anal implants or to make an ointment. Garlic is known to contain components that have healing and protective

The use of garlic and onions was also very common. Garlic was used either fresh (raw) or used to make vaginal or anal implants or to make an ointment. Garlic is known to contain components that have healing and protective properties against infection. It is a plant that is commonly used among the Asian communities not only as a spice, but also for wounds, and treatment of skin infections (Wilson, 1985). The HIV respondents from experience, used garlic to treat vaginal or anal thrush (Candida) it was seen to be very effective in the healing of wounds.

It can be noted that some of the dietary behaviours adapted were beneficial and should be encouraged, however nutritional education should still be offered to the HIV patients so that they acquire the right information and are aware of the scientific and nutritional basis of the importance of these processes in helping to maintain a good nutritional status.

6.9-.: PERSONAL EXPERIENCE:

During the survey the principle researcher, noted that even though a key informant interview with project doctor elicited that "nutrition counselling " was being given. The term had been highly misconceived, and what was being offered in the name of "nutrition counselling" per say was actually very basic nutrition education and was thus inadequate and not sufficient to meet the needs of the HIV positive patients who attended the clinic. This might be the reason why HIV positive group who are the target population for dietary intervention did not portray differences in nutritional knowledge, attitude and practice compared to the HIV negative group as should have been the case.

It was felt that, the modalities for provision of nutritional counselling be set in place, as the medical personnel were not adequately trained in the area of counselling under the guidelines and provision of counselling. All patients need

individualised counselling as pertains their nutritional status as factors affecting them may be unique. In light of this nutrition education services, nutrition counselling should therefore ideally aim at: offering a client – centred service.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Maternal malnutrition was highly prevalent. The synergistic relationship between health and nutritional status was evident. Both study cases groups portrayed some degree of malnutrition but the cases were considerably more malnourished using all the nutritional status indicator's apart from BMI. This was attributed to **prolonged morbidity**, (exposure to opportunistic infections in the case of HIV patients), **seeking no medical care when ill** and the **disease state itself** (HIV Infection). **Anaemia**, which was common in both study groups was more prevalent in cases than in controls. Majority of cases with CD_4^+ T lymphocytes ranging between 200 and 350 had anaemia implying a probable relationship between anaemia and CD_4^+ T lymphocytes cell counts. In this case, anaemia was conclusively more as a result of disease state although diet could also have been a contributory factor.

Women may have come from the middle income groups but their incomes were still low. Although more than 80% of total income was spent on food, diets were still inadequate in quality and quantity especially in terms of major nutrients: carbohydrates, vitamins and proteins due to the fact that respondents could not afford nutrient - rich foods. In addition, many women lacked information on nutrient requirements, the nutrient value of various foods. The differences in dietary intake and adequacy in both groups were however comparable. Diets did not meet nutritional needs adequately for both cases and controls and this could have contributed to general malnutrition. The major factor that could have also attributed to inadequacies of intake could be seen to be **poor income levels** and **poor appetites**.

Nutritional knowledge between the two study groups was comparable. Basic knowledge had been acquired by both groups but could not be effectively translated into practise owing to poor incomes. Another factor that affected nutritional knowledge considerably especially for the cases was the lack of nutritional counselling. Adequate knowledge as concerns appropriate nutrition information on interaction between HIV and nutrition, need for nutrient supplementation is information that is important for the health of these HIV/AIDS patients but one that is not being effectively disseminated to the target group. The main hindrance to effective nutrition counselling could be seen as **lack adequate training of medical personnel, or lack of provision of a trained dietician** to handle nutrition related matters.

The HIV positive group had made minor nutritional adjustment as concerns nutrition because adequate information was not available to this group. The consumption of certain food was seen prevalent among the HIV positive group. These foods being, fermented milk (maziwa mala, lala, or yoghurt), porridge, sprouted beans, garlic, onions and lemons. All these foods have benefits to the nutrition status and immune system but, the respondents did not have adequate information concerning their use. Knowledge was seen to be there, the main hindrance to effective translation in practice or behaviour change was low incomes. Therefore some enabling environment should be made available to help these women.

7.2 RECOMMENDATIONS:

Serious efforts to improve women's nutrition must have an approach to improving women's access to resources, their control over health and nutrition decision-making processes and norms regarding their social status.

To reduce and possibly eradicate maternal malnutrition in order to have a positive effort on maternal mortality especially to HIV women, the following is required:

1. Nutrition education and counselling should be set up in clinics and hospitals to empower women to successfully address their own nutritional needs and that of their families especially in the advent of HIV/AIDS.

These are the recommendations for ideal nutrition counselling: -

- ❖ Provide accurate information on appropriate nutrition early in the course of the disease to prevent weight loss, maintain appearance, optimise nutritional status and immunological function and give HIV positive people participation in their own diagnosis.
- ❖ Provide symptomatic relief and maintenance of nutritional status during the course of the HIV disease.
- ❖ Provide nutritional counselling aimed at promoting regular balanced intake of protein, carbohydrates, fat, vitamins, minerals and fluids in such a way that patients meet the Recommended Daily Allowances plus a safety margins, to maintain body weight and appearance. (Peck et al, 1990).
- ❖ Provide information on the use of vitamin supplements additions to diet especially vitamin A which have been known to have remedial effects.
- ❖ Provide accurate information on the risk nutrients, which are, needed to optimise nutritional status and immunologic function hence encourage their regular intake.

2. Further research needs to be carried out to determine the adequacy of the training of health care personnel in terms of provision of counselling so as to provide proper training to ensure they can effectively handle their patients.
3. Administration of Iron, folate and vitamin A to boost haemoglobin and improve immune status of women especially infected with HIV.
5. Further investigation needs to be carried out on micronutrient deficiencies due to prevalence of anaemia.

6. Access to affordable, (in terms of provision of quality medication) maternal care services
7. Provision of a means of economic empowerment, aimed at promoting self reliance which allows patients to play an active role in their own lives rather than 'sit to die". HIV/AIDS has a great economic impact on families especially on low-income families due to the cost of health care.

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10: APPENDICES

APPENDIX 1:

TABLE 10.1: WHO GUIDELINES FOR DIAGNOSIS OF AIDS.

Major signs:	Weight loss >10% of body weight . Chronic diarrhoea > 1 month(Intermittent or constant)
Minor signs :	Persistent cough for > 1 month. Generalised puritic dermatitis. Recurrent herpes zoster. Oropharyngeal candidiasis. Chronic progressive, disseminated herpes Simplex infection. The presence of Kaposis' sarcoma or Cryptococcal meningitis are sufficient by themselves for the diagnosis for AIDS.

Source: WHO HIV Supplement (1990)

The WHO criteria was developed for use in resource poor settings and depends on clinical presentation . This criteria was first developed as an epidemiological surveillance tool but in the absence of an alternative criteria it has been used or adopted for clinical use. The WHO criteria defines AIDS in an adult by the existence of at least two of the major signs associated with at least one minor sign, in the absence of known causes of immunosuppression such as cancer , severe malnutrition ,use of immuno-suppressive drugs or other recognised aetiologies.

APPENDIX 2:

CDC classification of HIV(1990).

The following classification has been proposed as a clinical marker for prognosis.

GROUP 1 - Seroconversion illness:

GROUP 11 - Asymptomatic infection:

GROUP 111 - Progressive Generalised Lymphadenopathy.

GROUP 1V and Subgroups; Clinical symptoms and signs of HIV other or in addition to Lymphadenopathy.(Peck and Johnson 1990).

APPENDIX 3:

LABORATORY MEASURE OF IMMUNOSUPPRESSION.

There has been an attempt to unify clinical presentation of CD_4 cell counts and the total lymphocyte counts as surrogate measures of immunosuppression as shown below in Table 10.2.

TABLE 10.2 : THE RELATIONSHIP BETWEEN THE IMMUNE STATUS, CD_4 CELL COUNTS, THE LYMPHOCYTE COUNT AND THE PRESENCE OF SYMPTOMATIC DISEASE:

Clinical condition	CD_4 cell count	Lymphocyte cell count
*Well with no symptoms	> 500-600 cells/mm^3	> 2500 cells /mm^3
Minor symptoms	350- 500 cells /mm^3	1000-2500 cells /mm^3
Minor symptoms and opportunistic disease.	200- 350 cells/mm^3	500 -1000 cells /mm^3
AIDS.	< 200 cells/mm^3	500- 1000 cells /mm^3

SOURCE: Evian 1995 (p.24)

APPENDIX 4

INSTRUCTIONS TO THE INTERVIEWER:

1. Ethical issues should be considered, no information on the respondents should be divulged to any one. Ensure all respondents fill and sign the consent form.
2. I expect all questions to be answered and questionnaires filled appropriately.
2. The Questionnaire will be administered to sampled respondents. The respondents must be registered as users of the clinic. The conditions for respondent recruitment:
   a) Should be resident in Nairobi and its environs at the time of the interview. (do not recruit respondents from upcountry).
   b) Should have the last child above the age of one year.
4. Leading questions should not be given to the respondents.
   For questions with outlined alternatives indicate the response given by the respondents, beside the question in legible handwriting.
6. Take measurements and weights of all sampled respondents.
7. Use the codes **PVE or NVE** beside the respondents clinic number to indicate the serostatus of the respondent.

RESPONDENT CODED NO.[RESNO]_____

A1: **QUESTIONNAIRE.**

SECTION A: DEMOGRAPHY:

A.1 VITAL STATISTICS

Respondent MCH Number [RESMCHNO]_____

Name of interviewer _____

Date [dd/mm/yy] [DATEINTE] _____

Name of respondent _____

Age[MATAGE] _____

Marital status[MATMARIT] _____

1=Single. 2=Married. 3=Separated. 4=Divorced. 5=Widow. 7=Separated & Remarried.

Where do your reside in Nairobi (location of residency)?[MATRES]_____

How long have you lived in this place_____(years/months)[DURATLIV].

SECTION A

A.2 Household Composition

ID No	Name	Sex	Age in years/Months for children.	Relation to Respondent	Edu in Yrs	Occup
1						
2						
3						
4						
5						
6						

3. What was the Duration of the illness [DURATILL]_____
   1 = < 7 days 2 = 1-2 weeks
   3= More than 2 weeks 4= N/A

4. Presence of diarrhoea in the last 4/52 [DIARRH]_____
   1=Yes 2=No

5. Presence of cough in the past 4/52 [COUGH] _____
   1=Yes 2=No

6. What is the current treatment of the illness[CURRTEA]____
   0 = None 1 = Antibiotics
   2 = Chloroquine and Antipyretics 3 = Antipyretics
   4 = 1 + 2 5 = 1 + 3 6 = N/A 7 = Others (specify)

SECTION B:B1: NUTRITION KNOWLEDGE

7. Do you think sick people should get "special food"?[SPEFOOD] 1=Yes
   2=No 3=DNK _____
8. Give examples of 3 foods which you think sick people should eat starting from the most
   1 = _____ 2 = _____
   3 = _____

   Note: (2 points for each correct food group)
   Total Score [TOTSCOE]_____

9. What would you consider a good diet to be?[GOODIET]
   _____
   1= Adequate in amount to satisfy.
   2= Balanced with all food groups.
   3= DNK.

10. Why do you think food is important in ones' diet?[REASDIET] _____
    1= It builds the body.
    2= It protects the body.
    3= It provides energy for the body.
    4= 1+2+3. 5=DNK 6=1+2 7=1+3 8=2+3

11. Would you change your diet if you learnt that you had a terminal disease e.g HIV or other sickness?[CHANDIET]

1=Yes 2= No 3=DNK _____

12. Which food groups do you think would be important for your body during this illness?. List at least 3 different types and give reasons for choice.

	Food type[TYPFOOD1-3]	Reason [REASON1-3]	Score[FOOD TYPE SCORE 1-3]
1			
2			
3			
		Total [TOTSCORE]	

(2 points for each correct food in each category and correct reason)

[NOTE QUESTION 10 FOR OPTIONS]

13. Which foods would you avoid to eat if you were sick. List at least 3 different types.

Food type[AVOID 1-4]	Reason[WHY 1-4]	1= Medical reasons eg. Allergies.
		2= Aversions e.g Nausea.
		3= Socio-Economic factors.
		4= Religious/Cultural reasons.
		5= Personal Preference-Dislike.
		6= Not applicable.

14. What are some of the constraints you face in proper dietary planning? [DIETPLAN]_____

1= Lack of time. 2= Lack of funds.

3= Lack of adequate knowledge concerning foods that should be eaten

4= DNK 5=Seasonality of foodstuffs 6=2+5 7=2+3 8=1+2

15. Have you received any information from the clinic during your visits about the foods you should eat, in-order to maintain proper health? [NUTCON]_____
1=Yes 2=No

16. If you do, what information is given?[NUTINFOR]_____
1= Foods that should be eaten
2= Safe food Preparation methods
3= Importance of safe clean drinking water
4= Food preparation methods
5=N/A

FOOD FREQUENCY

17. How many times do you eat the following stated foods.

Give foods you seldom eat, which you never eat.

	FOOD	FREQUNCEY
1	Dark green Vegetables (Mboga za greeni)	
2	Bread (Mkate)	
3	Ugali (Sima)	
4	Rice (Wali/Mchele)	
5	Chapati	
6	Potatoes (Viazi ulaya)	
7.	Green Bananas (Matoke / Ndisi Mibichi)	
8	Cassava (Mhogo)	
9	Githeri	
10	Sweet potatoes (Viazi mitamu)	
11	Carrots (Karati)	
12	Oranges (Machungwa)	
13	Lemons (Ndimu)	
14	Tangerines (Chenza)	
15	Mangoes (Embe)	
16	Pawpaws (Papai)	
17	Bananas (Ndisi tamu)	
18	Pineapples (Nanasi)	
19	Avacado	
20	Milk (Maziwa)	
21	Eggs (Mayai ya kuku)	
22	Meat (Nyama)	
23.	Chicken (Nyama ya kuku)	
24	Fish (Samaki)	
25	Beans (Maharagwe)	
26	Cowpeas (Kunde)	
27	Njahe (Maharagwe Nyeusi)	
28	Green grams (Ndengu/Pojo)	
29	Pigeon Peas (Mbahazi)	
30	Peas (Minji)	
31	Soya Beans (Soya)	
32	Groundnuts (Njugu Karanga)	
33	Cooking oil/Ghee (Mafuta ya kupikia)	
34	Margarine (Siagi)	
35	Porridge (Uji)	
36	Liver (Maini)	

CODES

1= Once daily
2= Twice daily
3= More than twice daily
6= >Twice a week
7= Once a fortnight
8= Occasionally
4= Once a week
5= Twice a week
9= Never

B.3 FOOD INTAKE PATTERNS AND RELATED FACTORS.

18. How do you describe your appetite now or most of the time. [APPETITE]
    1= Good
    2 = Moderate
    3 = Poor

19. How many main meals do you take in a day? _____ [MEALNUMB]
    1 = One 2 = Two
    3 = Three 4 = > than 3 meals including snacks
    5 = Snacks only

20. Are there foods that you do not eat?[FONOTEAT]_____
    1= Yes 2=No

21. If so, what foods are these

	Reason	
1 = Dairy foods .e.g milk and milk products		1= Medical reasons e.g Allergies 2= Aversions e.g Nausea 3= Socio-Economic reasons 4= Religious/Cultural reasons 5= Personal Preference eg. Dislike 6= Not applicable
2 = Fatty foods e.g fried foods		
3 = Green vegetables e.g Kale		
4 = Cereals and cereal products e.g. Rice, Ugali		
5 = Animal protein e.g. Meat		
6=Vegetable Protein e.g. Beans, Peas		
7 = Fruits		
8 = Others specify		

22. Do you take vitamin or mineral supplements?[VITASUPP] ___
    1= Yes 2= No

23a).If yes, what kind?[KINDQ23a]
    1=Vitamin supplement only. 2=Mineral supplement only.
    3=1+2 4=Whole food supplement.
    5=N/A _____

23b). Give brand Name[BRANDQ23b]
    1=Vitamin B complex tablets. 2=Vitamin A tablets.
    3=Vitamin C tablets. 4=Folic acid tablets.
    5=Multivitamin tablets. 6=Cod-Liver oil.
    7=Iron tablets. 8=N/A. _____

24. What are the activities you do at home, other than take care of children.[Q24]_____
    1= Household chores
    2= Washing clothes 3= Invalid doing nothing
    4= None 5= 1+2

SECTION C:

C.1 SOCIO-ECONOMIC STATUS

25. Which of the following activities were a source of cash income for you during the last one month?
    1= Yes 2= No

Activity	Yes/No	Amount in Ksh
Sale of prepared foods e.g. fish, Mandazi.		
Sale of farm produce e.g. vegetables.		
Casual labour		
Earning from Co-operatives or women groups		
Formal Employment		
Own Business e.g. Hair salon		
From Relatives, Mother etc		
From Husband		

26. How much did you spend on food in the last one month?[MONEFOOD] ___

SECTION D:

SANITATION: Ask for

27. Type of roof of the main house?[TYPEROOF]_____
    1= Grass thatched
    2= Flat tins
    3= Corrugated iron sheets
    4= Tiles
    5= Cement

28. Type of wall? [WALL] _____
    1 = Brick 3 = Wood 5 = Mud
    2 = Cement / Block 4 = Metal

29. Materials used for the floor? [FLOOR] _____
    1 = Mud 3 = Cement
    2 = Dung & Mud 4 = Timber 5 = Mud & cement

50. How many rooms does the main house contain? [ROOMS] _____
    1 = One2 = Two 3 = Three 4 = Four 5 = > than 4

31. How many people share the residency [SHARE] _____

32. How do you dispose waste [DISPOSE] _____
    1 = Indoor toilet 2 = Pit latrine
    3 = Communal toilet

33. Do you have electricity? [ELECT] _____
    1 = Yes 2 = No

34. Source of water? [WATER] _____
    1 = Piped - within the house
    2 = Tap - within the compound
    3 = Tap - within 5 minute walk
    4 = Tap - within 15 minutes walk
    5 = Buy water
    6 = River

35. Where do you throw your rubbish [RUBBISH] _____
    1 = In the Compound
    2 = In a pit
    3 = Burn
    4 = Bury in a pit
    5 = Collected by garbage collectors
    6 = DNK 7 = Open ground
    8 = Throw in the river

SECTION E:

OBSTETRIC CHARACTERISTICS:

36. How long is it since your last delivery?[LASTDELI]
Years _____ Months _____

37. Are you currently breastfeeding?[BREASTFE]_____
1= Yes 2= No

(a) If yes, how old is the child _____ years[INDEXCHI]

(b) If yes, how many times do you breastfeed the child?[TIMEBREA] _____
1 = Once a day 2 = Twice a day 3 = On demand 4 = N/A

38. Are you currently using any contraceptives?[CONTRA]_____
1 = Yes 2 = No

39. What type are you using?[TYPECONT] _____
1 = None 2 = Oral Contraceptives
3 = IUD 4 = Tubal Ligation
5 = Condom 6 = Deproprovera Injection
7 = Norplant 8 = Natural method

40. a). **MATERNAL ANTHROPOMETRY:**

	1st Reading	2nd Reading	3rd Reading	Total Average
Weight (Kg)				
Height (cm)				

b).

	1st Reading	2nd Reading	3rd Reading	Total Average
MUAC (cm)				
TST (mm)				
SST (mm)				

APPENDIX 5 :

FOCUS GROUP DISCUSSION GUIDELINE QUESTIONS:

OBJECTIVE TO COLLECT QUALITATIVE DATA RELEVANT ON KAP (KNOWLEDGE ATTITUDES AND PRACTICES PERTAINING TO NUTRITION:

VENUE _____ DATE _____

MODERATOR _____

QUESTIONS

1. What do you consider a good diet to be ?
2. Why do you think HIV positive people should eat well ?
3. Do you feel you get the right nutritional counselling at the clinic when you need it?
4. Do you feel that HIV positive people require special food in their condition?
5. What are some of the factors that interfere with your ability to take care of yourself?
6. Do you feel that it is important to promote your own health care due to your present condition?
7. Is your care taker role, economic dependence on your family members,
8. financial dependency on men a factor that affects your ability to take care of yourself?
9. What coping strategies have you instituted to cope with your condition?
9. Have your nutritional habits changed since you knew your sero status?
10. What nutritional changes in your diet have you made since then?

NOTES FOR THE MODERATOR:

DATE _____ TIME START _____

END _____ DURATION _____

VENUE _____ NO. OF PARTICIPANTS _____

NAME AND CHARACTERISTICS OF PARTICIPANTS:

MCH NUMBER HIV STATUS

_____ _____

_____ _____

APPENDIX 6:

DAILY FOOD GUIDE.

Daily Food Guide for Non-Pregnancy, Pregnant and Lactation.

Number of Servings

FOOD GROUP	Non Pregnant Women (Normal)	Pregnant Women	Lactating Women
Protein	2	4	4
Animal+	(1)	(2)	(2)
Vegetable #	(1)	(2)	(2)
Milk and Milk Products	2	4	4 –5
Breads and cereals @	4	4	4
Fruits and vegetables	4	4	4
Vitamin C rich fruits and vegetables	(1)	(1)	(1)
Dark green vegetables	(1)	(1)	(1)
Other fruits and vegetables	(2)	(2)	(2)
Fats	1	1	1

The daily food guide meets the RDA for pregnancy for all nutrients except Iron, Folacin, and energy. Approximately 400 additional Kilocalories (Kcal) are needed to meet energy needs. Daily supplementation of 30 - 60 mg Iron and 400 - 800 mg Folacin are recommended during pregnancy. In addition to the daily food guide 2 t (30 ml) of fats or oils should be included each day.

+ One serving is 2 oz (60 g).

Should include at least one serving legumes.

@ Whole grain products should be emphasised to provide additional Magnesium, Zinc, Folacin, and Vitamin B_6

SOURCE: (Zeman et al 1988)

APPENDIX 7:

SOCIO-ECONOMIC INCOME CLASSIFICATION

To enable analysis of Socio-economic status in terms of income levels, the population was categorised in 3 income groups as given in the GOK economic survey 1994.

Kshs 0 - Kshs. 1999	Low Income Group
Kshs. 2000 - Kshs. 7999	Middle Income Group
> Kshs. 8000	High Income Group

SOURCE: Gok (1994) Economic Survey.

APPENDIX 8:

RESPONDENT CODED NO. [RESNO]____

MATERNAL LABORATORY RESULTS

RESPONDENT NUMBER [RESMCHNO] _____

DATE [dd/mm/yy] _____

NAME OF HOSPITAL OR LAB _____

NAME OF RESPONDENT_____

HIV/ELISA[HIVSTAT] _____ DATE DONE [DATEDON1]_____

1 = POSITIVE 2 = NEGATIVE

CD_4 CELL COUNTS _____

CD_8 CELL COUNTS _____

$CD4/CD_8$ RATIO _____

HAEMOGLOBIN LEVELS___(g/dl) DATE DONE [DATEDON2]_____