ACCESS TO RECOMMENDED DIETS ON THE MANAGEMENT OF HIV AND AIDS AMONG INFECTED PREGNANT AND LACTATING WOMEN

IN DAR ES SALAAM.

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ACCESS TO RECOMMENDED DIETS ON THE MANAGEMENT OF HIV AND AIDS AMONG INFECTED PREGNANT AND LACTATING WOMEN IN DAR ES SALAAM

By

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CERTIFICATION

The undersigned certifies that she has read and hereby recommends for re-examination by Muhimbili University of Health and Allied Sciences a dissertation entitled ***Access to Recommended Diets on the Management of HIV and AIDS among Infected Pregnant and Lactating Women in Dar Es Salaam, Tanzania*** in partial fulfillment of the requirements for the degree of Master of Arts Health Policy Management of Muhimbili University of Health and Allied Sciences.

Gleyna.

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I, **Abubakary A. Mziray,** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

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DEDICATION

This work is dedicated to my lovely daughters Jamila and Hajra.

ABSTRACT

Background: HIV/AIDS infected pregnant and lactating women form a special group that has peculiar characteristics and needs among People living with HIV/AIDS. The physiological changes that occur during pregnancy and lactation call for additional nutritional needs in order to maintain the health status of the mother, fetus and the newborn. In HIV/AIDS infected pregnant and lactating women those additional nutritional needs are further perpetuated by increased nutritional demand caused by illness. Assuring access to health diets for this special group with unique characteristics forms a fundamental component in the management of the disease. This study was conducted to determine access to recommended diets and its associated factors on the management of HIV/AIDS among infected pregnant and lactating women in Dar es Salaam.

Methods: A hospital-based cross-sectional study was carried out in three municipal hospitals of Dar es Salaam in April, 2009 to determine access to recommended diets among 201 HIV/AIDS infected pregnant and lactating women. It also examined the association between access to recommended diets and nutritional status, (as the dependent variable,) and some socio-demographic characteristics, economic parameters and dietary intake as explanatory variables. Study respondents were interviewed using structured interview schedule with closed ended questions. Nutritional status was assessed anthropometrically using Body Mass Index (BMI) and reference was made from the WHO cut off points. The quality of food consumed over the past one month was assessed using a short food frequency questionnaire

Results: Results revealed that access to recommended diet was a problem among HIV positive pregnant and lactating women whereby only 46.8% of the study participants had access to these diets. A significant proportion of study participants had not received nutritional counseling (57.2%). Moreover, access to recommended diets was significantly associated with Religion ($p= 0.05$), level of education ($p < 0.001$), employment ($p=0.014$) and household assets ($p < 0.001$).

Conclusion: Access to recommended diets to HIV infected pregnant and lactating women in Dar es Salaam is determined by multitude of factors, level of education, occupation, nutrition counseling, were among factors that were positively associated with food access while food price and being Muslims were negatively associated with access to recommended diets, and its only when these factors are addressed then we will witness the impact of good nutrition in the care and management of HIV among pregnant and lactating women.

Recommendations: There is a need of strengthening and close monitoring of nutritional counseling process at VCT and CTC so that all eligible patients receive counseling from competent counselors, there is a need of strengthening information, education and communication activities to raise awareness on healthy food choices, nutrition, safe food handling and the importance of cheep indigenous foods to meet dietary needs. Government should set price ceiling for those healthy food items which are necessary for the health of its people and this should be supplemented by establishment of household income boost activities together with provision of food aids to those affected households that have difficulties in accessing foods

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DEFINATIONS OF OPERATION CONCEPT

Food security: Is define as "Physical, social and economic access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life". Food security has three aspects: food access, food availability and food utilization. But the current study will only concentrate on food access.[1]

Food access: This is the component of food security: it implies the extent to which household and all individuals within them have adequate resources to obtain appropriate food for nutritious diet. Access is determined by food availability, household income availability, its distribution and food price as well as consumer preferences. In this study food access was estimated from the level of food availability within the household and household financial capability on purchasing food items (pg 24).

Recommended diets: These are suggested food items which provide a balanced diet. According to World Health Organization and the Tanzania Ministry of Health and Social Welfare(MoH&SW) these food items should be locally available, affordable and socially acceptable

Food Poverty line: This is the cost of meeting the minimum adult calorific requirement for 28 days with a food consumption pattern typical of the poorest 50% of the population. According to the Tanzania household budget survey of 2007 (THBS) it is equivalent to TSh 13,098/=.[63]

Body Mass Index (BMI): Was calculated as weight (in kilograms) divided by height (in meter) squared. Classifications were made according to WHO standards where a BMI of less than 18.5 was classified as underweight; a BMI between 18.5 – 24.9 was classified as normal; a BMI between 25.0 – 29.9 was classified as overweight and a BMI above 30 as obese (see appendix 5)

LIST OF ABBREVIATIONS

AIDS	-	Acquired Immuno-Defficiency Syndrome
BMI	-	Body Mass Index
CTC	-	Care and Treatment Centre
DSM	-	Dar es Salaam
FAO	-	Food and Agriculture Organization of the United Nations
HIV	-	Humane Immunodeficiency Virus
MDG	-	Millennium Development Goals
MNH	-	Muhimbili National Hospital
MoH&SW	-	Ministry of Health and Social Welfare
MUAC	-	Mid Upper Arm Circumference
MUHAS	-	Muhimbili University of Health and Allied Sciences
NACP	-	National AIDS Control Programme
OR	-	Odds Ratio
PI	-	Principal Investigator
PEM	-	Protein Energy Malnutrition
PLHA	-	People Living With HIV and AIDS
PMTCT	-	Prevention of Mother To Child Transmission
STI	-	Sexual Transmitted Infection
TACAIDS	-	Tanzania Commission for AIDS
TDHS	-	Tanzania Demographics and Health Survey
THBS	-	Tanzania Household Budgetary Survey
TRCHS	-	Tanzania Reproductive and Child Health Survey
UNAIDS	-	United Nations Programme on HIV/AIDS
WHO	-	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

Throughout history, few crises have presented such a threat to human health and to social and economic progress as does the HIV and AIDS epidemic. It is even more troubling given the realization that much of the suffering and destitution caused by the disease could have been prevented[2]. Currently it is estimated that some 36 million people worldwide are infected with the HIV virus, and the magnitude of the epidemic is greatest in sub-Saharan Africa which account for 70% of all people living with HIV in the world[3]. It is also estimated that 15.5 million women are living with HIV worldwide out of this 80% are from sub-Saharan Africa[4]. In countries most heavily affected, HIV has reduced life expectancy by more than 20 years, slowed economic growth, increased food insecurity and deepened household poverty [2-5]. In Tanzania, approximately 6 percent of adults are infected with HIV, the prevalence being higher in women than men (7% versus 5%). HIV/AIDS has infected more urban women than their rural counterparts (11% versus 5%) [6]

Despite the fact that the disease has infected people of all ages and sexes its magnitude and impact to the affected society is not homogenous. Pregnant and lactating women are more affected with immensely suffering as results of biological and physiological vulnerability together with their marginalized position in the society caused by various socio-economic and cultural factors[7]. The disease has resulted into high malnutrition among HIV infected pregnant and lactating women in the developing countries, which is a major predisposing factor for mother to child transmission of HIV and high morbidity and mortality among African women[8-9]. The causes include pervasive poverty that affects the quality and quantity of the diet taken, increased nutrient requirements associated with HIV and other infections and the nutritional demands of pregnancy. Evidence for maternal malnutrition is provided by the facts that between 5 and 20% of African women have a low BMI as a result of chronic hunger and across the continent the prevalence of anemia ranges from 21 to 80%, with similarly high values for both vitamin A and Zn

deficiency levels.[2-5] The consequences of poor maternal nutritional status are reflected in low pregnancy weight gain and high infant and maternal morbidity and mortality [2-5, 7].

In general, one of the most detrimental effects of the HIV/AIDS pandemic is on nutrition, food security, and agricultural production. All dimensions of food security - availability, stability, access and use of food - are greatly affected where the prevalence of HIV/AIDS is high[9]. This has lead into the inability of affected households to access adequate food on the table[10]. In households coping with HIV/AIDS, food consumption generally decreases.[11] .The family may lack food and the time and the means to prepare some meals, especially when the mother is infected [11]. Research in Tanzania showed that per capita food consumption decreased 15 percent in the poorest households when an adult is sick or died of HIV [12]. A study carried out in Uganda showed that food insecurity and malnutrition were foremost among the immediate problems faced by female-headed AIDS-affected households and this was also found to affect both hospital and home based care and management of the disease[13]

In most countries including Tanzania, AIDS medication and special nutritional supplements are neither widely available nor affordable.[6] Then nutritional counseling to HIV infected pregnant and lactating women has an important role in the assisting them to maintain good nutritional status which can also help improve the effectiveness of treatment if available.[5] However this is largely undermined when significant number of women of child bearing age lacks reliable and sustained access to nutritious diets.[6] In Tanzania, there is inadequate information on food access and its associated factors in management of HIV among this group. This study therefore was carried out to assess level of food access, nutritional status and associated factors among HIV infected pregnant and lactating women attending CTC in Dar es Salaam.

1.2 Statement of the problem

It has been shown that nutritional counseling to HIV and AIDS pregnant and lactating women has a positive impact when there is reliable food access by all members of the affected household, this is because the nutrition situation of women is attributed from the socio-economic situations in which they live in and especially from the traditional norms and customs that dictate women's behavior in relevant societies [14-18]. Food access is ensured when households and its members have adequate resources to obtain appropriate food for nutritious diets. This depends on the extent to which food can be obtained from household production or from the market. In urban areas, due to the scarcity of land, food access is largely determined by household income, distribution of income within the household, food preferences and food prices[19] In Tanzania it is estimated that 58% of the households have problems meeting their food needs and majority of the households are economically poor with large extended families composed of few breadwinners and many dependants[20]. In these households, women play a major role of ensuring that all members in the house are well fed by provision of food from harvest or from market. When HIV and AIDS hits these breadwinners it results in reduced work force for agricultural production and income generating activities to the extent that households become food insecure compromising their food access. Concurrently, there is depletion of household saving and food reserves to pay for health care of infected individuals.[9, 20-21]

Access to food is important in the care and management of HIV and AIDS as it improves nutritional status of infected individuals ensuring adherence to medication and increased efficacy of ART, while minimizing drug resistance that could have resulted from poor adherence caused by side effects of medication when taken without food [9, 22-25].

In Tanzania, accurate information on access to food, optimal feeding practices and their magnitude is scarce. In addition, the influence food access has on Maternal and Child Health and in the management of HIV and AIDS is not known. Thus, nutritional counseling to HIV and AIDS infected individual in Tanzania may have no or little benefit until there is an understanding of the level of food access of infected individuals. This

study estimated the level of food access among HIV infected pregnant and lactating mothers and identified factors which promote or limit access to the recommended diets. It has also explored the feeding practices of affected household and established factors that affected adherence to the recommended foods

1.3 Rationale of the study

Limited information on access to nutritious food undermines the care and management of HIV and AIDS. There are multitudes of factors within household at national level that hinders food access that need to be identified. It is important that planners and policy makers are aware of these factors when designing future intervention in the management of HIV and AIDS.

High price of fuel, currency instability caused by inflation and high food prices are among factors that explain why this study was conducted now because these are among many factors that can affect access to recommended diets especial in urban setting.

The finding from this study provides insight to policy makers and stakeholders in the designing of appropriate intervention in the care and management of HIV and AIDS among infected pregnant and lactating women as one way of reducing child mortality and improving maternal health

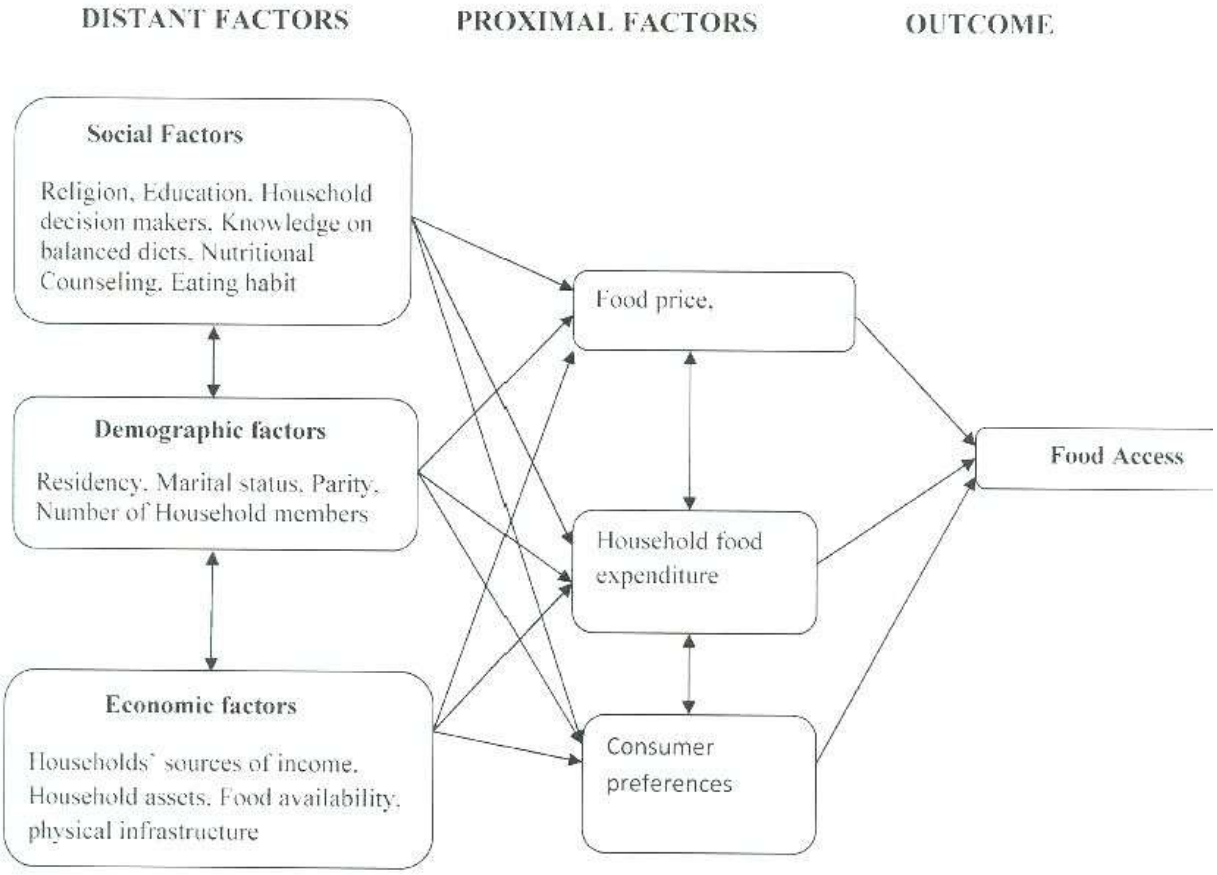
1.4 Conceptual framework

This study was based on the conceptual framework described below to identify the various factors that influence food access to HIV infected pregnant and lactating women. We hypothesized that the named socio-economic and demographic factors are distant factors that determine access to food. They act on the proximate factors (financial expenditure on food and consumer preferences) in the determination of food access.

For persons living in urban areas, food access is centered primarily on the household's ability to purchase food as most of urban population lack access to land for food production.

The urban poor often use a larger proportion of their resources to purchase food than do their wealthier counterparts. This may be a result of them being obliged to buy small quantities of food daily due to a lack of resources or living conditions that permits storage of large quantities of food at home. Moreover, they often skip meals or consume less quantity and low quality foods. Women's social status, self image and decision making powers may all be increased through education and type of the employment the women have, these in turn may have effect on eating habit and household food expenditure in relation to family/household size. Household decision makers have influence on household expenditure on foods and non food items hence affecting the ability of household in accessing food. Individual/household food preferences may affect food access. These preferences could be influenced by cultural orientation norms and taboo that are prevailing in the communities or due to religious factors that restrict consumption of certain food items

Figure 1: Conceptual framework of food access and its associated factors



1.5 Research Objectives

1.5.1 Broad Objective

To determine access to recommended diets on the management of HIV and AIDS among infected pregnant and lactating women in Dar es Salaam

1.5.2 Specific objectives

1. To determine the proportion of HIV and AIDS infected pregnant and lactating women who have access to recommended diets.
2. To assess feeding habit/ practice of HIV and AIDS infected pregnant and lactating women
3. To assess nutritional status of HIV and AIDS infected pregnant and lactating women
4. To determine economic and social-cultural factors that are associated with access to recommended diets among HIV and AIDS infected pregnant and lactating women
5. To determine the association between access to recommended diets and feeding habit/practice of HIV and AIDS infected pregnant and lactating women.
6. To determine the association between access of recommended diets and nutritional status of HIV and AIDS infected pregnant and lactating women.

CHAPTER TWO

2.0 LITERATURE REVIEW

Studies on food access are few and literature reviewed is mostly on food security as a proxy determinants of food access because food access is the component of food security.

2.1 Food Security and Food Access

From definition of operational concept, food security involves three distinct but interrelated aspects which are; food availability, food access and utilization[1]. So food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household or individual level. Food insecurity may be chronic, temporary, seasonal or transitory; therefore to achieve national food security, the above three distinct aspects of food security should be warranted.

Food availability has to do with the supply of food either from agricultural production, imports, from safe net and food aids. This should be sufficient in quantity and quality and also provide variety. Food access addresses the demand for the food. It is influenced by economic factors, physical infrastructure and consumer preferences. For households and individuals within them to be food secure, food at their access must be adequate not only in quantity but also in quality. It should ensure an adequate consistent and dependable supply of energy and nutrients through sources that are affordable and socio-culturally acceptable to them at all times. Ultimately food security should translate to an active healthy life for every individual. For this to take place the nutritionally adequate diet should be biologically utilized so that adequate performance is maintained in growth, resistance or recovery from disease, pregnancy, lactation and or physical work. In developing countries over 85 percent of the food consumed by poor households in rural setting is obtained from the farm [1], while in urban, household income and market price are important factors in meeting household food security since more than 80 percent of food consumed is purchased from markets.

2.2 Current Global Food Status

Reports from the United Nations Food and Agriculture Organization (FAO) reveal that 37 countries are in food crisis globally, and 21 of these countries are in Africa. Four of these countries - Lesotho, Somalia, Swaziland and Zimbabwe - are classified as having "exceptional shortfalls" in food; four more - Eritrea, Liberia, Mauritania and Sierra Leone have "widespread lack of access" and another 13 countries are classified as countries with "severe localized food insecurity.[26]

Globally the number of food-insecure people in the 70 lowest-income countries rose from 849 million to 982 million between 2006 and 2007. The majority of these people, who consume less than the nutritional target of 2100 calories per day, are in the African Region.[26] This food crisis is compounded by pre-existing nutrition insecurity and nutritionally-inadequate diets and may lead to an estimated 3.5 million deaths.

Food commodity prices have increased by about 83% during the past three years, resulting in increases of domestic prices between 30% and 40%.[27] The rising cost of staple foods has contributed to a growing food crisis globally which coincides with an already precarious food security situation in Africa. The World Bank estimates that as many as 100 million people will be severely affected by the high price of food and the consequences are more pronounced in Africa where most families spend 60% to 80% of their income on food and where there is over-dependence on food imports and food aid—about one third of the world's food aid and about US$ 25 billion worth of food imports per year.[10]

In 2006, the FAO food price index rose by 9% compared to the previous year, and it again increased by 23% to 37% by the end of December 2007. The cereal bill for low-income food deficit countries in Africa is projected to increase another 74% in 2008.[10,28]

High food prices mean re-prioritization of resources to address the current situation at household and national levels.

Global agricultural output per capita has grown at an average rate of 0.4% per year since 1961. Sub-Saharan Africa is the only region in which agricultural output per capita has not seen a sustained increase, with considerable variation over time and across countries.

For example, sub- Saharan Africa produces less food per person today than it did three decades ago.[1]

In Tanzania, the available data shows overall food availability at national level is good with cereal production meeting 86% of the country requirements, however there are inter/intra regional and district disparities which to some extent affect household food availability. [29] Despite of high food availability at national level resource poor households of both rural and urban areas face difficulties to access food from markets due to low purchasing power accounting for 15% for food insecured people.[30] Food prices, particularly of maize, beans and rice remain high all year round despite good availability, (70% - 80% increased production).[30] These disparities also affect the price of livestock and livestock products, drought has affected the quantity and quality of animal products as a consequence livestock keepers have been forced to sell their animals at very low prices in order to buy food or to access staple foods to feed their family.[29-31] Food self-sufficiency lasts for only four to six months in most regions of the country and regions with one rainy season (40%) food shortages are common.[35] Food supplies are also reduced due to inadequate storage facilities.[36] Starchy roots and cereals are the main staples at national level with cereals slowly replacing the starchy roots and tubers in the diets.[35-37] Generally supply of the fruit/vegetable and food of animal origin which are vital sources of micronutrients and protein has declined regularly.[29-31,35] The per capita supply of the milk, eggs, and fish/seafood is low while supply of meat/offal has remained almost constant at low level while its price has been increasing.[30] The per capita supply of pulses, nuts and oil crops, which is comprised mainly of beans and coconuts, has decline and replaced by import of vegetable oils. The most recent food supply data confirms that a wide variety of foods are grown in Tanzania, ranging from tropical to temperate climate foods. However, the diet remains monotonous, as the major food crops are limited to starchy foods such as maize, rice and cassava [29-31, 35-38]

2.3 Food Access and Nutrition

Lack of access to food influences food intake, consequently impacting the health and nutritional status of households. Today over 925 million people in the developing world are chronically under-nourished and unable to meet their basic daily nutritional needs for a healthy and active life.[10] During seasonal shortages and in times of crop failure or social unrest these numbers increase. Almost one-quarter (200 million) of the world under-nourished are in Sub-Saharan Africa, the region that has the highest proportion of under-nourished people are Central, East and Southern Africa where by more than 40% of the total population is undernourished. There is high deficiency in micronutrients such as folic acid, iodine, iron, selenium, and vitamins A and C. After Asia, Africa has the highest prevalence rate of hidden hunger, with pregnant and lactating women and preschool children most at risk.[10, 32] It is estimated that between 15,000 and 20,000 African women die each year (41–55 every day) due to severe iron-deficiency anemia. Vitamin A deficiency in children is common across the whole continent, contributing to the deaths of more than half a million African children annually. [10, 32-34]

According to recent data dietary energy supplies in about 15-17 countries are grossly insufficient below the cut-off range of about 2200-2650 kcal/person/day depending on normal activity pattern, there are about another 35 countries where the energy supply is quite low, at a daily average of 2200-2399 kcal per person. It is not possible for all in a population to meet daily basic energy needs from such limited food supplies and hunger and malnutrition are inevitable for many of the people living in these countries. About 35 additional countries have marginal food supplies of 2400-2599 kcal per person, making food security for all difficult and tenucious.[10, 32]

Despite Tanzania producing about 95% of its food requirement, 60% of household have a problem in meeting their food needs, this is due to lack of physical access to food which is influenced by inadequate infrastructure which are transportation network and storage facilities. Adequate income is also another factor that hinders access to food. In urban population where there is no land for farming buying food from the market is the way

that urban population obtained food.[35] The diets of Tanzanian are composed mainly of high carbohydrate foods. The low economic status group does not commonly consume milk and meat products, fruit and vegetables. In rural areas, vegetables are included in each meal but are consumed in small amounts. The share of energy from protein and lipids are below the recommendation limits (10-15% of energy from protein and 15-30% of energy from fat) [10, 26, 36]. When acquiring food, poor households often give priority to bulky staple foods (maize, cassava, rice). In Tanzania the diet is dominated by foods of vegetable origin, which provide a considerable part of the food energy (94%); protein (80%) and lipid supply (74%)[37] , cereals contribute more than half (51%) to the total dietary energy supply, followed by starchy roots (19%). The dietary diversification index, i.e. the contribution of food groups other than cereals and starchy roots to the DES, is therefore very low (30%). Animal foods contribute only 7% to total energy; pulses/nuts/oil crops and vegetable oils only 6% each. Given such a situation the diet is poor in micronutrient-rich foods that have negative impact to the nutrition status of Tanzanian.[35-38] In Tanzania the mean BMI of women of child bearing age was 22 kg/m² and about 10% had a BMI below 18.5 kg/m², indicative of chronic energy deficiency. Overall 18% of women 15 to 49 years old are overweight or obese.[20] urban women are more than twice as likely to be overweight or obese as women from rural areas. The observation that there is more over nutrition than under nutrition among adult women shows that Tanzania is undergoing a nutrition transition. The problem of over nutrition is particularly serious in the urban sector but is also emerging in the rural sector.[21] Prevalence of anemia among women of childbearing age is high with pregnant women more likely to be anemic than women who are breastfeeding or non-pregnant and non-breastfeeding. This is due to the high iron and folate requirements of pregnancy which are not hand in hand with its intake. In Tanzania anemia is mainly caused by the largely plant based diet, consisting mostly of cereals, legumes and vegetables; there is low consumption of fruits and animal foods. The poor bioavailability of iron from these plant foods is a major cause of iron deficiency anemia. In addition, prevalence of diseases such as malaria and AIDS as well as parasitic infestation, aggravate the phenomenon. Other contributing factors to the high prevalence of anemia is low awareness about the

relationship between food consumption and nutritional status [21].Though it is not a public Health Issue about 1% of pregnant and lactating women are suffering from clinical signs of vitamin A deficiency. The main cause of vitamin A deficiency in Tanzania appears to be the low intake of animal products, which contain high amounts of absorbable retinol, along with insufficient intake of fruit and vegetables rich in vitamin A. In Tanzania, poverty is widespread and the high financial cost of animal products limits consumption. Meat and milk consumption is extremely low, on average once a week or even less plant sources of vitamin A (carotenes) are more affordable, but bioavailability from animal sources is higher.

2.4 Nutrition and HIV Infection

The relationship between nutrition and HIV/AIDS is bi-directional and well recognized. HIV infection compromises the nutritional status of infected person and poor nutritional status can affect the progression of HIV infection. Clinically, HIV and AIDS may affect the nutritional status of an individual in various ways: reduction in food intake and nutrient absorption, and increased utilization and excretion of protein and micronutrients [39]. It has also been observed that HIV infection accelerates the release of pro-oxidant, cytokines and other reactive oxygen species leading to the increased utilization of antioxidants such as vitamin E, C, beta-carotene and micronutrients such as iron, zinc, selenium, manganese, and copper [40]. An imbalance between these pro-oxidants and antioxidants causes oxidative stress which further damages the cells, protein and enzymes, thus accelerating HIV replication [41]. Additionally, Hormones such as glucagon, insulin epinephrine and cortisol which are required in the metabolism of protein, carbohydrates and fats have been shown to be affected by HIV infection. Increased level of these hormones is believed to contribute to weight loss and wasting syndrome commonly seen in HIV patients [42-43].

2.5 Role of Maternal Nutritional Status on Pregnancy out-come

It is known that the course and outcome of the normal, uncomplicated pregnancy is significantly affected by nutritional status of the mother.[44]This is due to physiological changes that occur during pregnancy being anabolic processes that require additional calories (+300Kcal/day for pregnant women and + 500Kcal/day for lactating women), proteins (+3.3g/day for pregnant woman and +16g/day for lactating woman) and other nutrients over and above the non-pregnant state. This is important for adequate gestational weight gain to support the growth and the development of the fetus. Generally, women who are malnourished need daily energy-protein supplementation(+650Kcal/day and +21g/day) during pregnancy to improve maternal weight gain, increase infant birth weight, and reduce the risks of stillbirth, perinatal mortality and mother-to-child HIV transmission [22, 44]

2.6 Maternal nutritional Status and outcome of HIV infected pregnant women

Wasting during pregnancy may be more common in HIV-infected women than non HIV-infected pregnant women.[22] Studies conducted in Africa indicate that an HIV-infected mother's nutritional status, measured by Body mass index, mid upper arm circumference, and/or weight loss, is an important predictor of mortality during the postnatal period [45-47]. Intrauterine growth retardation, preterm delivery (<37 wk), and low birth weight (<2500 g) are more common and more pronounced in women with symptomatic HIV infection. [46-47]In addition, inadequate nutritional status has been found to increase the risk of vertical transmission of HIV by influencing maternal and child factors related to transmission.[48] It is estimated that 90% of HIV-positive children contract the virus from their mother during pregnancy, delivery or breastfeeding.[5, 23]

Factors such as Preterm delivery and low birth weight have also been found to be associated with an increased risk of mother-to-child HIV transmission[48-50]

In Tanzania regardless of HIV status, about 48% of women of reproductive age (15 - 49 years), 58% of pregnant women and 48% of breastfeeding women are anemic.[20] Overall, 10% of Tanzanian women are considered too thin (Body Mass Index [BMI] < 18.5), while 1% of women are extremely thin (BMI < 16) and Vitamin 'A' deficiency affects

about 69% of lactating women.[21]These malnutrition have accounted for 16% prevalence of low birth weight (birth weight < 2.5 kg) [20] In HIV and AIDS this under nutritional is more likely to be magnified with more adverse maternal and child outcome.[21]

2.7 Nutritional requirement of HIV and AIDS infected pregnant and lactating Women

Nutritional requirement for HIV infected Pregnant and lactating women vary slightly from those of non pregnant HIV positive women depending on the stage of the disease.

There is a 10 to 15% (300 to 400 kcal per day) increase in energy requirements to maintain body weight and physical activity in asymptomatic HIV-infected adults and growth in asymptomatic children from the normal value of 2650 kcal per day.

During symptomatic HIV and subsequently during AIDS, energy requirements increase by approximately 20% to 30% to maintain adult body weight and there is about 50% increased in protein requirements (A non-HIV-infected man requires about 57 grams/day of protein and a woman requires 48 grams/day of protein). An HIV-infected adult needs approximately 50 to 100 percent more protein and more increase in protein requirements (for a total of 85 grams/day for men and 72 grams/day for women).[3, 5, 9, 22-23] Studies that have established the association between micronutrient supplementation and pregnancy outcome have revealed that micronutrient deficiencies is strongly associated with adverse pregnancy outcomes among HIV infected women. Micronutrient deficiencies are associated with low birth weight, small for gestational age, premature delivery, early infant death and mother to child transmission of HIV [51-54]

In HIV infected pregnant and lactating mothers, the role of nutrition becomes even more crucial. The increased energy requirement caused by the disease together with the anabolic state of the pregnancy and lactation translates to considerably higher nutrients requirements for HIV infected women. These additional needs, coupled with the nutritional consequences of common HIV-related illnesses and infections (e.g., diarrhea, tuberculosis, loss of appetite) place HIV-infected pregnant and lactating women at greater nutritional risk than uninfected pregnant and lactating women[5, 22-23]

2.8 Nutrition and management of HIV and AIDS

Adequate nutrition is necessary in ensuring optimal benefits from the use of antiretroviral treatment (ART) which is essential to prolong the lives of HIV infected people and prevent transmission of HIV from mother to child[22-23]. There is emerging evidence that patients who begin antiretroviral therapy without adequate nutrition have lower survival rates [9]. Adequate dietary intake and absorption are essential for achieving full benefits of the treatment. Antiretroviral therapy itself may increase appetite and reduce some side-effects while promoting adherence to the drugs if taken with food [24-25].

Given the importance of adherence in delaying viral resistance to first-line drugs, nutritional support becomes more important in the long run for sustaining antiretroviral treatment.

2.9 Nutritional Counseling of HIV infected Pregnant and Lactating Women

Nutritional counseling of HIV and AIDS infected individual's calls for the consumption of adequate amounts of locally available foods that are safe, socially acceptable, affordable and free from contamination to meet the body's nutritional needs for proper functioning, growth, repair and maintenance of health. Consumption of balanced diets is promoted rather than relying on nutritional supplements in the form of multivitamin and minerals which have been found to have some negative effects to the body [3, 22,43]The current recommendation is to consume a diet that contains a variety of foods ranging from energy giving foods to body building foods and protective foods. It is also recommended to increase consumption of foods rich in fibers, to increase consumption of fruits, green leafy vegetables and drink plenty of safe and clean water[5, 23]. Nutritional counseling also emphasizes on increasing the frequency of food intake to more than the three major meals.[22] It also requires evaluation of current diets, eating patterns and other factors influencing food intake. This involves assessing individuals and household-level food security, in particular the constraints to food access and consumption [5, 22-23]. Food access and nutritional counseling thus constitute a fundamental part in the care and treatment of HIV infected pregnant and lactating women.

2.10 Factors behind food access

Food access is an issue for individuals within households, for households as a whole, for nations and for the international community. At household level, it is possible for individual members of a household to be malnourished while others have sufficient food. At the national level, there can be sufficient food supplies available to the nation as a whole but still there exist food insecure households or in some areas of the country

There are multitudes of social- economic factors that affect the access of food to majority of population.

Food price

Access to food is affected by its price especially among low income household who spent large portion of their income in food, different studies conducted in east Africa shows that in most households who spend 50 percent to 70 percent of their budgets on food, higher food prices has lead into reduced food access and increased intake of less nutritious diet.[55-56] This is supported also by World Bank estimates were by food access of as many as 100 million people is severely affected by the current high price of food and significant proportion of this group lives in Africa[57]

Lifestyle and food preferences

Changing in food preferences and lifestyles (which can also be affected with income) are having a profound effect on access to food and dietary patterns. In many countries major shifts are occurring in the consumption of basic staples towards more diversified diets. Milk and livestock products, fruits and vegetables and processed foods are in increasing demand especially among affluent urban households and this has resulted into nutritional related diseases among this group.[10, 32, 57] In Tanzania trade liberalization and globalization has resulted into change in food habits and dietary patterns of high-income group, the dietary pattern has changed from a traditional diet high in carbohydrates and fiber to consumption of non-traditional processed foods, meat and alcohol with negative health impact.[37]

Household income

Food access is also affected by household level of income and this is more common in urban than in rural household. In urban area among the low-income section of the urban population, the quality and quantity of food consumed can be limited and meal frequency varies with the changes in market price. Frequency of meat and milk consumption is extremely low, on average once a week or even less. Among certain communities these products are consumed very rarely, for example once a month or less. This is also supported by finding from Food supply data in most countries that indicate a "rich-poor" gap in the availability of food and in the variety of food available to different economic groups. There are significant differences in dietary energy supply between countries based on their level of economic development. The more affluent countries and well-to-do populations within developing countries do have available appropriate levels of foods with the carbohydrates, proteins, fats, vitamins and minerals needed to provide nutritious and balanced diets. Among the least developed countries the total average dietary energy supply is under 2,200 kcal, with 75% coming from carbohydrates. Among developed countries the available dietary energy supply is over 3,400 kcal per person, with about 50% from carbohydrates.[34, 37, 57]

Education

Some studies have shown that increased level of education (which in a way may affect life style, food preference, financial capabilities and increased understanding of nutritional value of different food stuff and important of balanced diets) especially among women of developing countries has been associated with increased household access to nutritious food resulting into improved maternal and child nutritional status.[14]

Occupation/employment

This was found to be associated with increased access to nutritious food through increased household income and financial capabilities to procure nutritious food. Occupation when intermingle with education was also found to affect life style and food preferences hence increase access to nutritious foods.[14]

Intrahousehold distribution and utilization of recourses

This also has been found to affect access to nutritious diets. In Africa and other developing countries the priorities that women set concerning the allocation of their own labor, their cash expenditures, and the distribution of food among family members is dependent not only on their access to and control of the meager resources but also on the existing socio-cultural norms for a woman's roles in society.[14-16]

Lack of access to credit and loans

Despite of limited resources, lack of access to credits and other financial assistance limits woman ability to earn income hence increased dependence to their husband, women have been devoting more of their time on economic productive work than men still they have continue to gain less from pooled resources especially as decision making is the exclusive preserve for men. This to some extent has compromised their food purchasing power to the point of reducing their access to food.[14]

Negative cultural norms

Several authors have discussed women's "sacrificing role and discriminatory feeding practices" in intra-household food distribution, women from puberty onward are learn to become the least demanding in the family and to give priority to the needs of the male members of the household when food is scarce.[15,17], in some society poor women took pride in being able to provide their husbands and children with satisfying and adequate meals every day, even if they had reduced their own food intake.[18] they tend to feed their husbands first, then the children (boys before the girls), and only then do they think of

themselves. The best and most nourishing portions of the food are served to males.[58]Results from early food consumption surveys in five villages in different regions in Tanzania and from 898 villages around the world showed that food made by women for men and often the better share in quality and quantity is given to men.[59-60]

Data from a sociological study in Pakistan clearly show the subordinate position of women with regard to intra-familial distribution of food. Both husbands and wives were asked which family members needed the most healthful foods. Most husbands and an even greater proportion of wives responded that husbands most needed such foods. The food needs of infants were ranked much lower than those of men, followed by the elders. Almost never did either husbands or wives mention wives as the ones needing the most healthful foods.[61]

Taboos

Food taboos specifically directed towards women, especially pregnant and lactating women are common throughout the world. One study on women nutrition in third world countries noted that restrictions are characteristically put on protein foods, which are particularly needed by women in pregnancy and lactation however the study conclude that little is known about the nutritional importance of these taboos during other phases of the life cycle.[62]

CHAPTER THREE

3:0 METHODOLOGY

3.1 Study design

This was a hospital-based cross-sectional study conducted in April 2009. This design was chosen as it could meet the main objective of the study that is to determine levels of access to recommended diets among HIV and AIDS infected pregnant and lactating women. This design could also establish factors that are associated with access to recommended diets among those infected.

3.2 Study area

The study was conducted in Dar es Salaam region which accounts for approximately 10% of the of the Tanzania population. The current Dar es Salaam population is estimated to be 3,144,036 using the population at the 2002 census and the population growth rate of 4.39%.[21]. Dar es Salaam is at sea level and lies between 6°48' South, 39°17' East (−6.8000, 39.2833). It is made of three municipalities namely Ilala, Temeke, and Kinondoni. To the east it is bordered by the Indian Ocean and on all other sides by Coast Region. The climate is typically tropical with hot weather throughout the year (temperatures ranging from about 26°C to 35°C) and two rainy seasons; short rains in November to December and long rains in March to May.

Each municipality harbours a municipal government hospital; additionally the Ilala municipality houses the national hospital. In addition to hospitals, there are various government health centres and dispensaries, and also a number of private hospitals and dispensaries.

Dar es Salaam was chosen as the study area due to the following: Firstly, Dar es Salaam is Tanzania's centre for business and government activities, the primary source of employment of the population being elementary occupations followed by service workers and 79.0% of economically active population of Dar es Salaam is employed. It has high concentration of trade activities and other services as well as manufacturing Industries compared to other parts of Tanzania, This has influenced immigration of people from various regions of the country to the city. This migration does not go hand in hand with

the economic opportunities available resulting into a population that is mixed socio-economically. There are a few people of high socio-economic status as well as few government civil servants and a relatively large group of people in low socio-economic status. About 16.4% of population of Dar es salaam are living below basic need poverty line for Dar es Salaam (Below Tsh 17,941/= per 28 days) and 7.4% are living below food poverty line for Dar es Salaam (Below Tsh 13,098/= per 28 days)[63]

Secondly, Dar es Salaam has limited land for agricultural activities; hence most of the food substances eaten by its inhabitants is obtained from neighbouring regions and has to be purchased. This in general has effects on food access especially to those with low social economic status.

Lastly, Dar es Salaam has a high prevalence of HIV and a number of well organised health facilities for care and management of the diseases. The overall prevalence of HIV among blood donors is about 17.4%. It was estimated that HIV prevalence among antenatal care (ANC) attendees during the year 2005-2006 was 10.9%, and 12.4% of youth (15-24 years of age) were HIV positive [6].

3.3 Study population

These were HIV infected Pregnant and Lactating Mothers attending care and treatment clinics (CTC) located within the three Dar es salaam Municipal Hospitals. These are Amana (Ilala), Temeke(Temeke) and Mwananyamala(Kinondoni).

This study population was chosen because it is a special group of women with specific characteristics and needs that differ from the general population. In this population, there are two lives that are at risk and their outcome is influenced by maternal nutritional status which depends on access to healthy diets. Understanding the different factors behind maternal access to recommended diets has significant importance in the reduction of child and maternal mortality.

3.4 Sample size

Sample size was determined based on the formula of a single proportion,

$$n = \frac{(Z_\alpha)^2(1 - \rho)\rho}{\varepsilon^2}$$

n = minimum sample size

Zα = standard deviate of the normal distribution = 1.96 (α = 0.05 at 95% C.I.)

ρ = Proportional of Tanzanian who have difficult in accessing food= 58 % (Tanzania Demographic Health Survey 2004-5)

ε = maximum allowable error (standard error) = 7%

Then,

$$n = \frac{(1.96)^2 * (100-58) * 58}{7^2}$$

n≈190

The minimum required sample size was 190. We included 201 HIV infected pregnant and lactating women to increase the power of our study.

3.5 Sampling procedure and eligibility

Only consenting participants were recruited into the study. Systematic sampling was used to obtain study participants. The sample width (k^{it}) was calculated from sample frame that was established from the attendance registers during every visits dividing by the minimum number of study participants that were required .The first study participants were randomly selected, then every 3rd individual was recruited until the required study sample was reached for each municipal hospital. Data was collected during week days on alternative days in order to balance for over presentation of study participants in other days. There was equal flow of study participants in the three municipal care and treatment clinics.

k^{it} = **N/n** = sample frame / required sample size

k^{it} = **N/190 = 3**

3.6 Study variables

3.6.1 Main Out-come variable

Access to recommended food (balanced diets) was the main outcome variable.

It was estimated from responses to factors that are principal determinants of food access, which according to FAO and WFP are "food availability and financial capability to purchase the food".

Food availability

This was ascertained by,

Firstly, asking the study respondents what do they normally takes for breakfast, lunch and dinner,(Qn 27,29,31) , this was then matched with table(at the end of questioner) that shows frequencies of intake of recommended diets.

Secondly, the study participants were asked to mention factors that influence the choice of food they prefer to eat most (Qn 33)

Those individual who responded that food availability was the factor that influence the choice of food they prefer to eat most were given a score of 2, or else they were scored 1.

Financial capability

The financial capability was ascertained by asking the study participants the amount of money spent on food per capita per day (Qn 35/Qn 37), this was then multiplied by 28 days to determine where they belong on Dar es Salaam food poverty lines(Tsh 13,098/=). Those respondents whose expenditure was above the Dar es Salaam food poverty line were considered as having adequate financial capability (Score 1) and those below as inadequate financial capability (Score 2), and those study participants who respond that the amount of money spent on food was enough were scored 1 or not enough were scored 2 (Question 36).

Scoring of variable

1. a) Food availability is not a factor that influence the choice of food = 1
   b) Food availability is a factor that influence the choice of food = 2

2. a) Amount of money spent on food is above Dar es Salaam food poverty line = 1
   b) Amount of money spent on food is below Dar es Salaam food poverty line = 2

3. a) The money spent on food per capita was enough = 1
   b) The money spent on food per capita was not enough = 2

A summative score of combined variables was computed from the above responses to determine level of food access. Study participants were considered to have **full access** to recommended diets **only** when they have combination of **1a**, **2a** and **3a** else they were considered to have limited access to the recommended diets.

3.6.2 Independent variables

These were demographic and socio-economic factors that are associated with access to recommended diets.

Demographic factors

Age (continuous), Residency (Kinondoni, Temeke and Ilala), Marital status (single/married or cohabit/divorced, separated or widowed), Parity (continuous), Number of Household members (continuous) were considered to be demographic factors that affects access to recommended diets.

Economic factors

The study considered three variables to ascertain the economic situation of the household, 1) Household ownership of assets such as radio, TV, refrigerator, cars and bicycle, 2) Household sources of incomes, 3) financial expenditure in food. Some of these items have been used by the World Bank [63] to allocate households and thus their members into poverty quintiles.

Household ownership of asset was categorised into multiple asset (two or more) or limited asset (one or none) based on the number of assets the household had. Employment status was enquired to assess the household's source of income. Information on whether relatives, friends and/or spouses contributed to household income and the type of investment the household own were collected. These were considered as proxy indicators of household financial ability to purchase food.

Socio-Cultural Factors

Educations, Religion, Household decision maker and knowledge on balanced diets, were socio-cultural factors that were considered in the assessment of access to recommended diets.

The level of education attained was defined as never been to school, primary, and secondary or higher education. A Household decision maker was assessed by asking study participant who is responsible for daily decision making in their household (Qn 10).

Knowledge on balanced diets was assessed by asking the individual whether they know what a balanced diet is (Qn 23) and for those who respond yes then they were asked to mention major components of balanced diets (Qn 24) and if they failed to mention the correct components of balanced diets they were regarded as not aware of balanced diets.

Eating habit/practice was assessed by using a short Food Frequency Questioners where respondent were asked how frequently they ate the recommended food items in the previous month. A summary measure was then developed (For those individuals who takes those recommended diets every day or several times in a week were considered as having adequately intake of those food items else were considered as having inadequate intake of recommended food items)

3.6.3 Nutritional status Assessment

Nutritional status was assessed using Body Mass Index (BMI). Body mass index is a simple index of weight for height that is commonly used to classify nutritional status in adults. It is defined as weight in kilograms divided by the squared height in meters (kg/m^2). BMI is a preferred indicator of nutritional status because it depends on two commonly and easily measured aspects of morphology, weight and height. Height was measured using a stadiometer where by respondents stood erect with their backs to the vertical backboard of the stadiometer. The scapula, buttocks, and heels lightly touched the stadiometer, and their heels were held together with toes pointing out 60°.The movable headpiece is then levelled with skull vault and height was recorded to the nearest 0.1m Weight was measured using a regularly calibrated beam-balanced scale and where recorded to the nearest 0.1kg. BMI was then calculated to get nutritional status of an individual. Reference was made from the WHO cut of points of BMI classification (see appendix 5).

3.7 Pre-testing of the study tools

This was carried out at the Muhimbili National Hospital Care and Treatment Centre which was not among those selected for actual study. This was focused on checking clarity of the question and responses, ensuring face validity and rectification of any ambiguity.

3.8 Recruitment and Training of Research Assistants

Two research assistants and the author collected the information during field work. The research assistants who had experience in HIV research and data collection methods were recruited from the study area. One day training was conducted for the research assistants to familiarize themselves with the study. They were trained on the Objective of the study, overview data collection process and familiarization of the instrument. During the training, research assistants were introduced to research ethics and the necessity of assuring confidentiality. Also the techniques involved in anthropometric measurements were taught focused on taking height and weight.

3.9 Data management

3.9.1 Data collection techniques and tools

Data was collected using structured questionnaires with closed ended questions. The questionnaire was prepared in English translated to Swahili and later back translated to English to ensure face validity. Eligible selected subjects were approached and informed of the study purpose. After an informed consent, participants were interviewed in a private office within the clinic by the author or a research assistant. Information on socio-demographic characteristics, access to food and anthropometric information were collected. At the end of the interview respondents were thanked for their participation. (See Appendix1-5)

3.9.2 Quality assurance

Data collection was supervised by the author and clarification of the questions and/or responses was given whenever there was any query. The team was required to do a maximum of 10 interviews per day. The questionnaires were checked for any incompleteness immediately after the interview. Data was coded and entered by the author.

3.9.3 Data analysis

The Statistical Programme for Social Sciences (SPSS version 16) was used to enter and analyse data. Mean and standard deviation for continuous variables were calculated and frequencies were obtained for categorical variables. The association of access to recommended diets and individual demographic and socio-economic factors were analysed using cross tabulations and differences were assessed using $\chi 2$ test. Odds ratios were determined using the univariate and multivariate Logistic regression models. Potential confounders were assessed and the Crude and Adjusted Odds Ratio and their 95% CI were reported to ascertain the association between independent variables and access to recommended diet. Significance level was set at 0.05.

3.10 Ethical considerations

Ethical clearance was sought from the Muhimbili University of Health and Allied Sciences Research and Publication Ethical Committee. Permission from the Region and Municipal administrative authorities was also obtained. Informed consent (verbal) from study participants was sought (see appendix 1). Study objectives, methodology and benefits were explained to eligible study participants. Only those who consent were interviewed, and were free to withdraw from the study at any point in time. Participants were assured of confidentiality by identifying them with numbers instead of names. Knowledge on balanced diet was provided to those participants who were not aware of balanced diets. No potential harm was anticipated in this study and participants were free to choose not to respond to questions they feel uncomfortable to.

CHAPTER FOUR

4:0 RESULTS

4.1 Description of the study sample

A total of 201 HIV/AIDS infected pregnant and lactating women participated in the study. Out of these, 128 (63.7%) were pregnant women and 73 (36.3%) were lactating women. About forty percent of the study participants were from Ilala district, 34.8% from Kinondoni district and 28.4% from Temeke district. The mean age of the participants was 27.9 ± 4.9 (Mean ± standard deviation). Most respondents (60.2%) were married and more than half (54.2%) of the respondents were Muslims.

Majority of the study participants 122 (60.7%) attended primary school although only 54.7% of them reported to have completed primary education. About eighteen percent had no formal education and 41 (20.4%) had gone to secondary school with only 27 (13.4%) reporting to have completed secondary education. More than two thirds of the respondent had employment among them 78.3% were engaged in informal employment.

More than half of the women (55.6%) reported to have given birth to one or two children and about 72.1% of the households had three to five members. Most participants (60%) were leaving in rented houses/rooms.

The household financial expenditures on goods and services was reported to be decided by both study participants and their spouses' (40.8%) while a modest number of study participants (21.4%) lacked verdict on financial expenditures.(Table 1 below)

Table 1: Frequency Distribution of Socio-demographic characteristics of HIV infected pregnant and lactating women in Dar es Salaam

characteristic	Category	n	%
Age, in years	≤24	43	21.4
	25 – 34	134	66.7
	35+	24	11.9
Marital status	Single	41	20.9
	Married/Cohabiting	148	73.1
	S/W/D*	12	6.0
Religion	Muslim	109	54.2
	Christian	92	45.8
Education	No formal education	36	17.9
	Primary education	124	61.7
	Secondary education and above	41	20.4
Number of children	Non	42	20.9
	1-2	111	55.2
	3+	48	23.9
Decision maker	Self	76	37.8
	Me and my spouse	82	40.8
	Others**	43	21.4

*Separated/Widowed/Divorced ** Relatives, guardians

4.2 Access to recommended diets among HIV and AIDS infected pregnant and lactating women

Less than half of the respondents 94 (46.8%) were categorized as having full access to the recommended diets as shown in figure 1 below.

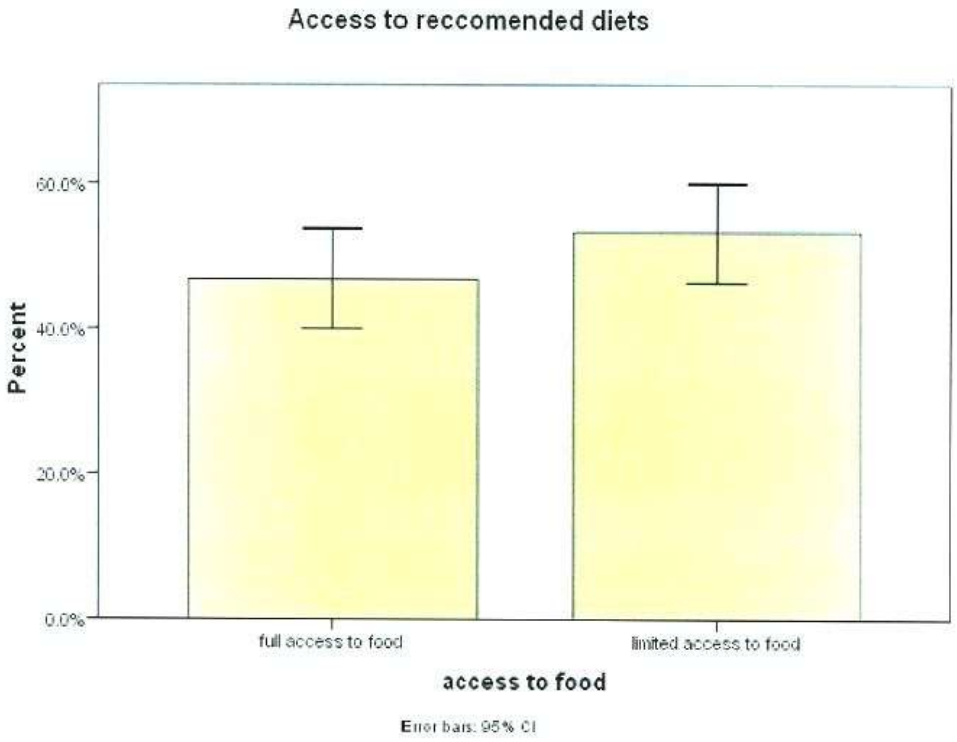


Figure 1: Distribution of Access to recommended Diets among HIV infected pregnant and lactating women in Dar es Salaam

4.3 Feeding habits/practice of HIV infected pregnant and lactating women

Generally per capita expenditures on food were not normally distributed so we use its natural log to estimate the mean and median expenditure per capita on food for 28 day. We found that mean expenditure per capita was Tsh 36,199.48 ± 1.75. Figure 2 below shows the median expenditure per capita on food in 28 days. Majority of respondents (95.5%) reported to take three meals or more daily as shown in table 2 below. About

seventy two percent of the participants belonged to households with three to five members, less than a half (42.8%) of study participants had received nutritional counseling, however 113 (56.2%) of respondents had some knowledge on balanced diets. Majority of the participants 194 (96.5%) had their expenditure above the food poverty line. Note that 94 (46.8%) participants regarded the amount of money spent on food as being enough to purchase the recommended food items. Participants who frequently resorted to certain food items in their meals reported individual preference as their main reason for such a habit 140 (69.7%).

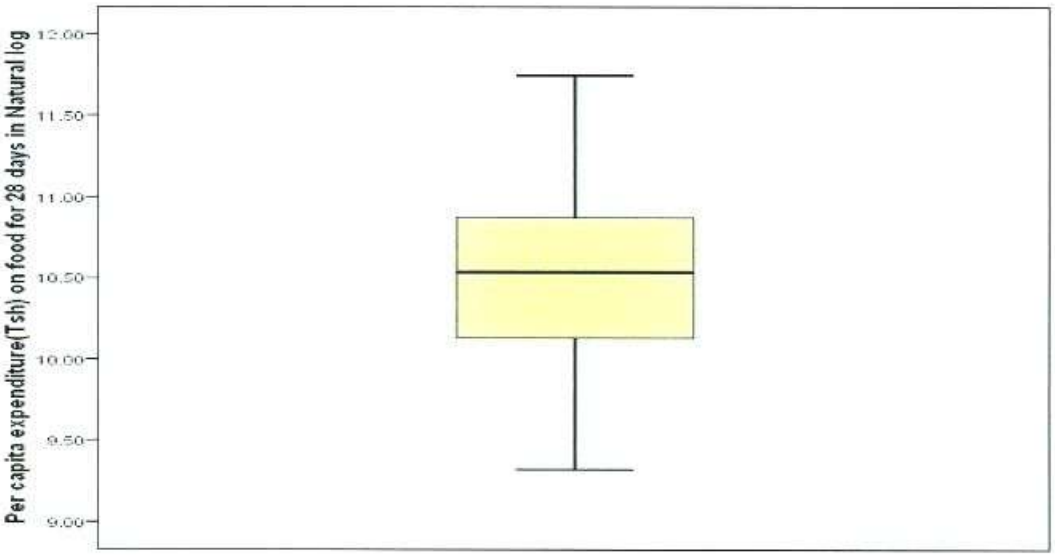


Figure 2: Distribution of Median expenditure per capita on food in 28days

Table 2: Frequency distribution of feeding practices/habits of HIV infected Pregnant and lactating women

Variable	Category	n (%)
Number of meals in a day	≤ 2 meals	9 (4.5)
	3+ meals	192 (95.5)
Factors behind feeding patterns	Cost of food	47 (23.4)
	Individual preferences	140 (69.7)
	Others	14 (6.9)
Number of household members	< 3	41 (20.4)
	3-5	145 (72.1)
	6+	15 (7.5)
Knowledge on balanced diets	Yes	113 (56.2)
	No	88 (43.8)
Received nutritional counseling	Yes	86 (42.8)
	No	115 (57.2)
Per head food expenditure	Above food poverty line	194 (96.5)
	Below food poverty line	7 (3.5)
Total food expenditure	Sufficient	94 (46.8)
	Not sufficient	107 (53.2)

4.4 Nutritional Status of HIV infected pregnant and lactating women

The mean weight of respondents was 65.2Kg ± 12.23 (Mean ± S.D) while the mean height of respondents was 160.0cm ± 7.7. The mean BMI was 25.4 ± 4.6. The proportion of respondents categorized as overweight was 49.0% and normal (47.0%), while only (4.0%) were underweight. (Fig. 3)

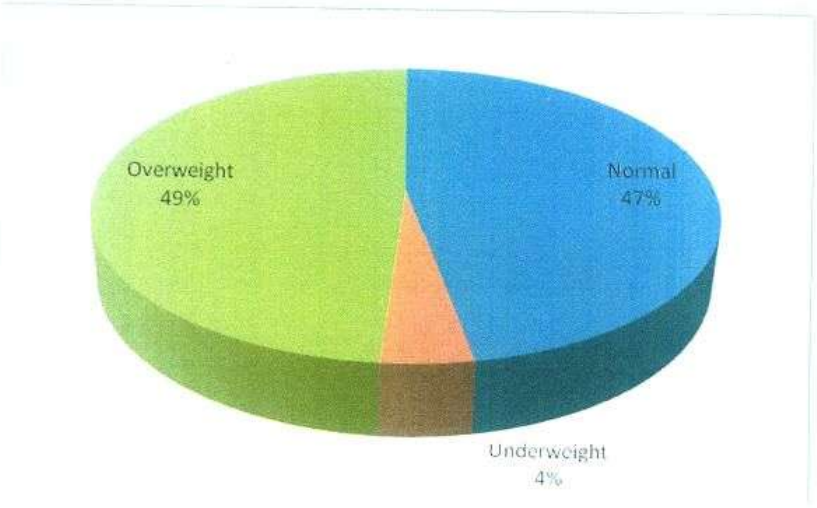


Fig 3: Frequency distribution of nutritional status of HIV positive pregnant and lactating women in Dar es Salaam, Tanzania.

4.5 Socio-demographic and economic factors that are associated with access to recommended diets

As shown in Table 3 below, access to recommended diets was not associated with age, marital status, the district of residence of the participants, type of accommodation, number of children the women had, neither was it associated with number of sources of income and the main financial decision makers of the household. Religion, level of education, source of income, number of household assets were all significantly associated with access to recommended diets. Majority of participants with full access to recommended diets were Christians while only a few Muslims were categorized as having full access to recommended diets (57.6% vs. 37.6%; $p < 0.005$). Most of the

participants with secondary school education and above (85.4%) were more likely to have full access to recommended diets compared with those with primary (41.9%) and no formal education (19.4%) ($p < 0.001$). A similar trend was observed with participants who had government employment compared to those who were unemployed (70% vs. 38.1%; $p < 0.001$). Majority of participants who reported to have multiple household assets (75.8%) were more likely to have full access to recommended diets compared with those with limited assets (22.7%) ($p < 0.001$).

Table 3: Access to recommended diets of HIV infected pregnant and lactating women by selected socio-demographic and economical characteristics

Variables	Category	n	Full access (%)	Limited access (%)	P-value
Age , in years	<24	43	53.5	46.5	
	25-34	134	46.3	53.7	
	>35	24	37.5	62.5	0.445
Residence	Kinondoni	70	44.3	55.7	
	Temeke	57	43.9	56.1	
	Ilala	74	51.4	48.6	0.609
Religion	Muslim	109	37.6	62.4	
	Christian	92	57.6	42.4	**0.005***
Marital status	Single	41	41.5	58.5	
	Married/cohabit	148	50.7	49.3	
	S/W/D**	12	16.7	83.3	0.057
Number of children	Non	42	59.5	40.5	
	1-2	111	46.8	53.2	
	3+	48	35.4	64.6	0.073
Education	No education	36	19.4	80.6	
	Primary	124	41.9	58.1	
	Secondary +	41	85.4	14.6	**<0.001***
Occupation	No employment	63	38.1	61.9	
	Formal employment	30	70.1	30.0	
	Informal employment	108	45.4	54.6	**0.014***
# of household assets	Multiple assets	91	75.8	24.2	
	Limited assets	110	22.7	77.3	**<0.001***
# of sources of income	Multiple sources	138	50.7	49.3	
	Limited sources	63	38.1	61.9	0.096
Main decision maker	Self	76	56.6	43.4	
	Me and my spouse	82	42.7	57.3	
	Others	43	37.2	62.8	0.079
Type of accommodation	Own/Spouse	52	55.8	44.2	0.079
	Parent/Guardians	29	27.6	72.4	
	Rented/company	120	47.5	52.5	0.05

χ^2 test was used to calculate the p-value. *p-value <0.05; **Separated/Widowed/Divorced;

4.6 Association between access to recommended diets and feeding habit/practice of HIV and AIDS infected pregnant and lactating women

About(76.6%) of individuals who had access to recommended diets actually consumed the appropriate diets as compared to (38.3%) whose access to food was limited.($p<0.001$). Nutritional counseling, maternal knowledge on balanced diets, cost of food, individual preferences, and number of the people eating together were significantly associated with access to recommended diets. majority (62.8%) of those who received nutritional counseling had increased opportunity to full access to recommended diets compared to those who didn't receive nutritional counseling (34.8%; $p < 0.001$), similarly majority of participants with knowledge on balanced diets (58.4%) were likely to have full access to recommended diets compared to those with no knowledge on balanced diets (31.8%; $p < 0.001$).

Most of the participants (95.1%) who reported that food cost did not affect their eating habits were likely to have full access to recommended diets compared to 14.2% who reported that their eating habits were influenced by cost of food ($p < 0.001$). Likewise majority (64.3%) of study participants who had full access to recommended diets admitted that their individual preferences influenced their eating habits while only a few of them reported that their individual preferences had no influence in their eating habits (6.6%; $p < 0.001$). Significant proportions of participants from household with few members were likely to have full access to recommended diets compared to participants from household with many members (53.7% vs. 20.0%; $p = 0.007$) (Table 4).

Table 4: Association between access to recommended diets and feeding habit/practice of HIV and AIDS infected pregnant and lactating women

Variables	Category	n	Full access (%)	Limited access (%)	P-value
Knowledge on balanced diets	Yes	113	58.4	41.6	
	No	88	31.8	68.2	**<0.001***
Received Nutritional counseling	Yes	86	62.8	37.2	
	No	115	34.8	65.2	**< 0 001***
Food cost affecting dietary pattern	Yes	120	14.2	85.8	
	No	81	95.1	4.9	**<0.001***
Individual preference affecting dietary pattern	Yes	140	64.3	35.7	
	No	61	6.6	93.4	**< 0.001***
Recommendation affecting dietary pattern	Yes	76	69.7	30.3	
	No	125	32.8	67.2	**<0.001***
Number of Household members	< 3	41	53.7	46.3	
	3-5	145	47.6	52.4	
	6+	15	20.0	80.0	0.077

$\chi 2$ test was used to calculate the p- value, *p-value < 0.001

4.7 Association between access of recommended diets and nutritional status of HIV/AIDS infected pregnant and lactating women

Among the individuals with full access to recommended diets, 50% had normal weight, 47.9% were overweight and 2.1% were categorized as underweight. There was no association between access to recommended diets and nutritional status (p=0.371).

4.8 Crude and Adjusted Odd Ratios of factors that are associated with access to recommended diets.

Various factors were noted to be associated with full access to recommended diets after adjusting for education and occupation as potential confounders. Religion, number of household assets, influence of food cost on dietary pattern, nutrition counseling, individual preferences and recommendation of foods from friends or relatives were the factors observed to be associated with full access to recommended diets. Muslims were less likely to have full access to recommended diets than Christian (AOR=0.51; 95%CI: 0.27,0.95),study participants with secondary school education and above were eight times more likely to be categorizes as having full access to recommended diets compared to participants with no formal education (AOR=8.65; 95%CI: 3.03, 24.67). Paradoxically participants with primary education were less likely to have full access to recommended diets compared to those with no education, however this was not statistically significant (AOR=0.69; 95%CI: 0.39,1.23).Study participants with formal employment were more likely to have full access to recommended diets than those with no employment (A0R=1.24; 95%CI: 0.45, 3.46). While those participants with informal employment were less likely to have full access to recommended diets compared to those with no employment, but this also was not statistically significant,(AOR=0.93: 95%CI: 0.49,1.74). Participants from household that have multiple household assets were seven times more likely to have full access to recommended diets than participants from household with limited assets (AOR=6.59; 95%CI: 3.05, 14.26). Those participants who said that their eating habits is influenced by food price were less likely to have full access to recommended diets compared to those who their eating habits is not influenced by food price (AOR=0.012; 95%CI: 0.002, 0.07). Study participants who received nutrition counseling were two times more likely to have full access to recommended diets than those who did not received nutrition counseling (AOR=2.05; 95%CI: 1.09, 3.84). Individual preferences on certain food items has eighteen times likelihood of increased access to recommended food compared to other factors (i.e. taboos and religious factors) (AOR=17.67; 95%CI: 5.27, 59.25).Relatives and friends comments on diets had three times likely hood of increased access to those recommended diets compared to lack of comment from relative and friends (AOR=3.23; 95%CI 1.62, 6.46)

Table 5: Logistic regression Odds ratios of full access to recommended diets of HIV positive pregnant and lactating women

Variable	Category	n	Full access to recommended diets	
			Crude OR (95% CI)[1]	AOR[2] (95%CI)
Religion	Christian	92	1.0	1.0
	Muslims	109	**0.44 (0.25, 0.78)***	**0.51 (0.27, 0.95)***
Education	No education	36	1.0	1.0
	Primary	124	0.60 (0.34, 1.07)	0.69 (0.39, 1.23)
	Secondary education and above	41	**9.99 (3.97, 25.15)***	**8.65 (3.03, 24.67)***
Occupation	No employment	63	1.0	1.0
	Informal	108	0.89 (0.51, 1.54)	0.93 (0.49, 1.74)
	Formal	30	1.24 (0.45, 3.46)	**3.13 (1.36, 7.24)***
Number of household asset	Limited	91	1.0	1.0
	Multiple	110	**10.66 (5.54, 20.53)***	**6.59 (3.05, 14.26)***
Received nutritional counseling	No	115	1.0	1.0
	Yes	86	**3.16 (1.77, 5.67)***	**2.05 (1.09, 3.84)***
Diet influenced by food cost	No	81	1.0	1.0
	Yes	120	**0.01 (0.00, 0.03)***	**0.01 (0.00, 0.07)***
Individual preference	No	61	1.0	1.0
	Yes	140	**25.65 (8.79, 74.86)***	**17.67 (5.27, 59.25)**
Recommendation	No	125	1.0	1.0
	Yes	76	**4.72 (2.55, 8.74)***	**3.23 (1.62, 6.46)***

[1] 95% Confidence Interval; [2] Adjusted odds ratio for Education, Occupation; * $p < 0.05$

CHAPTER FIVE

5.0 DISCUSSION

The aim of this study was to determine access to reccommended diets and its associated factors among HIV and AIDS infected pregnant and lactating women in Dar es salaam.

5.1 Access to recommended diets and associated factors

The present study found that access to recommended diets among HIV/AIDS infected pregnant and lactating women in Dar es Salaam was a problem. We observed that only 46.8% of study participants had full access to recommended diets. This is slight higher compared to 42% of general population.[21] This could be explained by small sample sizes and how food access where measured from our study, thus statistically we cannot generalized our finding to general population, also this study deals with HIV infected individuals who are having different characteristic from general population and some of whom had undergone nutrition counseling hence increasing their access to nutritious diets. However this is still a small number of study participants who are required to have access to nutritious foods and this means that advocacy on good nutrition together with nutrition counseling in management of HIV/AIDS is not effective when only a small proportion of the target population can access nutritious food .[42,43]

It was also found that religion, secondary education and above,formal employment and multiple household assets were significant predictors of full access to reccommended diets. In addition, we observed that food cost, nutrition couselling, individual prefference to food together with recommendation of foods from friends and relatives were siginificant predictors of full access to recommended diets.

In our study muslims were less likely to access the recommended diets compared to christians, this could probably be explained by confounding effect of education and employment in muslim having reduced chance of having full access to recommended diets due to the fact that only few muslims had both formal employment 11(10.1%) and higher education 17(15.6%) compared to christians (appendix 11). These factors were among the strong predictors of full access to recommended diets in our study.Regarding

education and occupation our study findings are similar to findings from three other studies whereby education and employment were components of socio economic status that were found to be associated with access to healthy diets when exploring total house hold expediture in food. [23,24, 25]

In Brazil, HIV infected women with higher level of education, multiple household assets together with independent purchasing power had an increased access to a more adequate diet and better health services.[26] These factors could contribute to improve their nutritional status and to slower progression of the disease.[26] Contrary to our expectations, knowledge on balanced diets was not associated with access to recommended diets after adjusting for education and occupation in the analysis. The lack of a relationship between knowledge on balanced diets and access to nutritious diets could be due to methodological weakness on how the knowledge was assessed this was superficially assessed based on claim of knowing what is balanced diets and to list those components of balanced diets, however this could also reflects the complex social forces underlying food and nutrition in Tanzania. There is thus a need to tailor intervention programs to meet the unique needs of different socioeconomic groups in the country.[16 -18]
High food price was associated with reduced access to recommended diets especially among those study participant with informal occupation and low level of education, this is supported with reports from world bank and from THBS 2007. [3,35,63] Our study also found that nutrition counselling to HIV infected pregnant and lactating women was associated with increasing their access to nutritious diets, this also concur with reports from FAO and WHO.[22 - 25]

Individual prefferences on food items was also found to be associated with increased access to recommended diets. Prefferences is about making choices among alternatives and this is determined by individual taste and financial capability, in urban setting quality healthy diets are costly and are reserved for those with financial capability. Poor individual often have limited alternative diets forcing them to resort into low quality and unhealthy diets. Also financial capability goes together with education and both can

intermingle with individual taste to affect individual prefferences hence affecting access to recommended diets[37]

Recommendations from friends, relatives and peer group on the diet of HIV infected individuals has resulted into increased access of study participants to recommended diets. These could be trusted people who know the sero-status of the study participants and may support them morally, socially and economically, they are respected people with knowledge and have been entrusted with secrecy, they could be friends or relatives who are also HIV infected with experiences and knowledge on proper feeding.Their experiences, knowledge, trustfullnes and close relationship with the study participant constitutes effective tool in dietary counselling resulting into increased access to recommended diets. They may also know cheap alternative foods that provide same nutrients.This presents opportunity for integrating the community in communications, advocacy and delivery of health messages as a way of improving overall management of HIV and AIDS.

5.2 Food access and eating habits and practices

Despite the fact that majority (96%) of the study participants took three meals or more daily and the mean expenditure per capita on food for 28 day was twice that of THBS (2007) for Dar es Salaam and it was three times above food poverty line for Dar es salaam but still only few study participants had full access to reccomended diets.This could be explained by the fact that larger propotions of study participants (57.2%) had not received nutritonal counselling and there may be other social cultural factors beyond this study that hinder access to recommended diets that need to be explored. Our findings are in contrast with what other studies on expenditure on foods have observed, where lack of access to health diets was associated with less expenditure in food among poorer women who had less education and low income[64-65]. However, we observed an association between nutritional counseling and access to recommended diet which conforms to findings from other studies, whereby an increased access to health diets among patients who were attending dietary counselling clinics was observed due to increased insight on healthy foods following the counselling[22-26]. Studies done in East

Africa reveal that most households typically spend 50% to 70% of their budgets on food and that higher food prices lead to reduced food access and increased intake of less nutritious diet [27-31]

5.3 Association between access to reccommended diets and nutritional status

In our study we found that access to recomended diets was not associated with nutritional status of HIV infected pregnant and lactating women.This could be explained by majority of study participants reported to consume staple foods as their main source of energy especially among those with low income. Carbohydrates are consumed in large quantities daily as a source of energy. Foods mainly consumed include Ugali (stiff maize porridge), potatoes, cassava and banana. Often the intake of Protein and fats is limited to those with higher income. The high intake of carbohydrates compensates for protein and fats needed by the body to acquire required nutients for health resulting in higher Body Mass index despite of limited access to reccommended diets, this is supported by available diet data that reflects the disparity in nutritional status by income. It was estimated the total energy intake of the urban population in Dar es Salaam to be 1600 kcal for the low-income group and 3000 kcal or more for the high-income group. Fats contributed 43% (mainly animal fats), proteins 17% and carbohydrates (cereals, sugar, potatoes and alcohol) 40% to total energy intake in the high-income group. For the middle- and lower-income groups, fats contributed 15%, proteins 15% and carbohydrates 70%. [36, 59]

The above finding could also be explained by the confounding effects of ARV on Maternal BMI that could have resulted from lipodystrophy syndrome.

5.4 Conclusion

Our study observed that access to recommended diets among HIV infected pregnant and lactating women in Dar es Salaam was a problem. Access to recommended diets was positively associated with level of education, occupation, nutrition counseling, number of household assets, individual preferences and inversely associated with food price and being Muslim. There is a need to adequately address these factors to improve access to

recommended diets among this special group to improve nutrition and assist in the management and care of HIV/AIDS among pregnant and lactating women

5.5 Limitation of the study

Our findings need to be considered alongside the following limitations. Our study was a cross-sectional study design which limits our ability to infer causality in the observed associations. We conducted a hospital-based study involving HIV positive pregnant and lactating women. Our sample will thus be different in various baseline characteristics with population of HIV infected pregnant and lactating women not attending health facilities. This will limit our ability to generalize our findings to that population. In addition, HIV positive women attending health facilities may also differ from HIV positive women who opt not to attend health facility in characteristics such as stage of disease etc. Our small sample size may have limited our ability to detect differences present in the population. However, our study had strength in that we used a comprehensive definition of access to food which took into account the local food poverty line, socio-economic status and frequencies of consumption of balanced diets. This detailed definition may have limited our ability to compare with other studies but we believe is suitable for the setting the study was conducted in.

5.6 Recommendations

This study provides baseline information regarding access to health diets among HIV infected pregnant and lactating mothers. It therefore recommends the following to the local health policymakers, donors and stakeholders involved in care and support of People who are living with HIV/AIDs, research institutions and ministry of health:

1. Generally, there is the need of maintaining the current increase in school enrolment to all level of education. Specifically, effort should be made to strengthen information, education and communication activities that will raise awareness on healthy food choices, nutrition and the importance of cheep indigenous foods to meet dietary needs.
2. There is a need of establishing income generating activities/programs among affected households in order to increase their financial capabilities to accessing food, this should go in hand with establishing community based household food access programs to assist affected household as a component of care and support for PLWHIVAIDS. Whenever possible, food assistances should be provided to affected household that do not have the means of accessing nutritious diets.
3. There is the need of strengthening and close monitoring of nutritional counseling process at VCT and CTC so that all eligible patients receive counseling from competent counselors.
4. Government should control food price by, control inflation, provide subsidy to agricultural goods and services and establish price ceiling to healthy food items that are necessary for health of its citizens.
5. There is a need of promoting the establishment of clubs and forum for HIV infected individual where they will share information's and experiences together with discussing issues that concern their wellbeing.
6. The study also recommends the need to conduct community based assessment of food access, care and practices. This will assist to determine the magnitude of access to nutritious diets; the most effective uses of available local foods necessary for people infected/affected by HIV/AIDS. In this assessment information regarding the burden of the disease, household income and

expenditure profile, eating habits, available foods and market prices should be collected.

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